FINAL REPORT

Feasibility Analysis

Edmonds Ferry Terminal

City of Edmonds

June 1992

Prepared by

REID MIDDLETON

in conjunction with

Hewitt-Isley
Herrera Environmental Consultants
&
Property Counselors, Inc.

REID MIDDLETON

June 16, 1992
File No. 24-91-008

Honorable Laura Hall, Mayor
City of Edmonds
505 Bell Street
Edmonds, WA 98020

Subject: Final Report - Edmonds Ferry Terminal Study

Dear Mayor Hall:

Here are twenty-five (25) copies of the Final Report of the Edmonds Ferry Terminal Study.

This study was authorized by our agreement with the City of Edmonds dated February 26, 1991, and funded by the Washington State Department of Transportation. The goal of the study was to examine the feasibility of several alternatives for improvement of the Washington State Department of Transportation's Edmonds ferry terminal. The scope of work included engineering and architectural/urban design studies analyzing three alternatives: 1) do nothing, 2) expand the existing site, and 3) relocate the ferry terminal to the Union Oil of California (UNOCAL) property at Edwards Point. During the course of the study, other site alternatives were investigated, and a mid-waterfront location was selected as an additional alternative for inclusion in the final analysis.

The work included establishment of design criteria; background studies of physical, environmental and land use conditions; a navigation feasibility analysis; development of conceptual designs and routing schemes for alternative locations; identification of comparative environmental impacts, and preliminary budget level costs for each alternative; evaluation of alternatives; and preparation of a report documenting the findings.

The study recommends that Alternative 1, the existing site, be dropped from active consideration as the "long-term" solution to identified problems at the Edmonds Ferry Terminal. Both Alternative 2, the mid-waterfront location, and Alternative 3, Edwards Point, are physically and operationally feasible. Project costs, in 1991 dollars, are projected to range from $17 million for Alternative 1 to as much as $86 million for Alternative 3.

REID MIDDLETON has enjoyed performing this study for the City of Edmonds, and hope that our findings will be of value to the City and the Washington State Department of Transportation as the effort continues to find solutions to problems at the Edmonds Ferry Terminal. We particularly wish to acknowledge the efforts of the present and former members of the Policy Committee and the Technical Advisory Committee and City and WSDOT staff for their guidance and assistance in our efforts.

Very truly yours,

REID MIDDLETON, INC.

Paul W. Masten, P.E.
Project Manager

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City of Edmonds and Washington State Department of Transportation Policy Statements

The following Policy Statements were developed by the Edmonds City Council and the Washington State Transportation Commission based on their respective views of project goals and planning strategies for the Edmonds Ferry Terminal. The Policy Statements, which were developed following completion of the Feasibility Analysis, address such issues as funding and long-term City, County and State planning goals.

MEMORANDUM
May 20, 1992 4:00 P.M.

TO: Washington State Transportation Commission

FROM: Honorable Laura Hall, Mayor, City of Edmonds

SUBJECT: Confirmation of City of Edmonds' Position Paper dated February 18, 1992, on Ferry Dock Relocation

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HISTORY

- Exisiting terminal construction predated State Environmental Policy Act and increased environmental awareness
- In last few decades has grown to be a detriment to the City

CURRENT

- Edmonds Ferry Terminal deemed by Washington State Transportation Commission to be an integral part of national, state, and regional transportation system
- City continues to assume responsibility under ESHB 1025 (1991 legislative session) to plan ferry dock location
- Edmonds-Kingston ferry route projected to have one of highest growth rates of ferry system
- Current negative impacts of downtown site:
    1. Safety hazards include:
        a. Conflicts between ferry traffic and city traffic
        b. Conflicts between ferry traffic and pedestrians
        c. Increasing safety hazards between ferry traffic, pedestrians, city traffic, and railroad
    2. Separation of waterfront from downtown
    3. Obstruction of waterfront views
- Cleanup procedures for Point Edwards are available, feasible, and will be paid by current owner
- Unique opportunity for state to relocate an existing facility to meet present and future needs

EXPECTATIONS

- Siting of the facility should receive priority consideration in the State's ferry modal plan for this region of the state. Future siting must mitigate current and anticipated negative effects.
- Funding of regional transportation facility and full mitigation to be obligation of WSDOT as exemplified by I-90 corridor through City of Mercer Island
- Point Edwards location provides best opportunity to mitigate negative impacts well into the next century
- Cooperation between all entities will ensure a successful completion of this project

Laura Hall 5/20/92 — Jeff Palmer 5/20/92

Mayor, City of Edmonds Date — Jeff Palmer, Council President Date

CITY OF EDMONDS POSITION PAPER

EDMONDS FERRY LOCATION

Adopted February 18, 1992

[For inclusion in the final ferry location study]

The State Ferry Dock at the foot of Main Street has grown to be a detriment to the City over the last few decades. The facility was constructed at a time predating the State Environmental Policy Act and predating the city's growth into a hundred year old mature city. The Edmonds-Kingston ferry route is projected to have one of the highest growth rates in the state ferry system and the negative impacts of the ferry on the city will grow.

The ferry dock and its operations have had and will continue to have negative impacts on the city. These include: a splitting of the downtown from the waterfront; conflicts between ferry traffic and city traffic; conflicts between ferry traffic and pedestrian movements along and toward the waterfront; potential dangerous conflicts between ferry traffic, pedestrian traffic, and railroad movements which compromise safety; and impact on waterfront views.

The city's position is that any change in the ferry dock configuration and location should mitigate the negative impacts which have affected the city for many years. The city is sensitive to the state's expressed desire to change the Edmonds ferry dock by adding a second slip, overhead passenger loading, widening the dock or otherwise providing stacking space for a full boat load of cars west of the railroad tracks. These changes would undoubtedly be even more desired by the Marine Division as traffic on the route grows as projected. The City Council is on record as finding these desired changes to have greater negative impacts than already exist, and to have potential liability impacts, and it therefore opposes such changes at the present site.

The City supports many of the State's transportation policies contained in the *1991 Transportation Plan for Washington State* and discussed at some detail in a July 17, 1991, letter from the City to the State Transportation Commission (see appendix). These policies, adopted by the State, reinforce the City's position in favor of full mitigation of transportation facilities. The City is also well aware of its responsibilities under ESHB 1025 (1991 Legislative Session) to allow the siting of a ferry dock in Edmonds. Under this act, the State also has reciprocal responsibilities to mitigate the impact of transportation

facilities in accordance with local comprehensive plan policies.

The City takes the position that the Point Edwards location identified in the report provides opportunities for significant mitigation of negative impacts. The City takes the position that the State has a rare opportunity to relocate an existing facility to a superior location and thereby meet its own present and future operational needs and the city's as well as the State's policies.

The City takes the position that the funding of regional transportation facilities is the obligation of the State Department of Transportation. This includes full mitigation, a policy which is consistent with the construction of other major facilities in the state and region such as the construction of I-90 through the City of Mercer Island. The latter is directly analogous in that a predominant percentage of the users of both transportation facilities merely pass through the host cities.

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RESOLUTION NO. 421

WHEREAS the Edmonds Ferry Terminal is a principal state route currently qualifying as part of the National Highway System connecting the Everett, and Bremerton naval bases;

WHEREAS the Edmonds Ferry Terminal is on a State Route which supports economic activities of statewide significance providing a vital link, to the Kitsap and Olympic Peninsulas,

WHEREAS the Edmonds Ferry Terminal is a regional route providing transportation linkages between employment, residential, recreational, and commercial activities,

NOW, THEREFORE, BE IT RESOLVED that the Washington State Transportation Commission considers the Edmonds Ferry Terminal to be an integral part of the National, State and regional transportation system, and hereby adopts the attached policy statement.

ADOPTED this 21st day of May 1992

WASHINGTON STATE
TRANSPORTATION COMMISSION

JIM HENNING, Chairman

ATTEST:

ANA PETERSON, Administrator

APPROVED AS TO FORM:

Assistant Attorney General

RESOLUTION NO. 421

Edmonds - Policy Statement

PRESERVATION OF EXISTING TERMINAL OPERATIONS

The Washington State Transportation Commission is committed to maintaining the existing ferry terminal in operable condition until a general improvement program can be completed. Necessary improvements to meet our operating plan will be made in the interim period and capital and maintenance funds will be budgeted for this purpose.

This effort at the current site includes plans to replace the north sheet pile wall ($500,000), continue routine maintenance and replacement of wing walls and dolphins ($500,000/year), replace the south wing wall ($240,000), replace the south sheet pile wall ($500,000), and other routine maintenance work ($180,000/year) or construction as necessary to maintain a satisfactory level of service.

INTERIM IMPROVEMENTS AT EXISTING SITE

The Anderson Marine property($1,500,000 approximate accessed valuation) will be acquired to allow for needed interim improvements (approximately $250,000) such as a transit center, a disabled passenger drop off and pick up area and to provide a shore side landing with a widened retained fill to the south at approximately $1,000,000. Any long-range alternative sites can be funded in part by the future sale of this property .

The Washington State Department of Transportation right of way process will require that appraisals, appraisal review, negotiations, and relocation all be accomplished prior to acquisition of this property. It may also be necessary to enter court proceedings to establish public need for the property, and the fair market value of the property if an agreement to purchase cannot be reached with the owner. This process could take as long as two years.

CONTINGENCY PLAN IN THE EVENT OF TERMINAL CLOSURE

Service between Edmonds and Kingston has been disrupted several times in recent months due to weather and equipment failure at Edmonds. During these closures, alternate routes are needed to serve the Kingston customers. The primary options available, from an operations perspective, are: (1) divert traffic to Bainbridge Island, (2) establish service between Kingston and Seattle, (3) establish service between Kingston and Mukilteo.

If the Edmonds-Kingston route is closed due to weather, sailing from either location may be impossible. Traffic should be diverted to the Seattle-Bainbridge Island route, if it is operating. The larger of the Edmonds-Kingston boats could augment the two Seattle-Bainbridge Island boats, and if necessary, the second boat could augment the Seattle-Bremerton route to handle the traffic diverted from Bainbridge Island. Terminal operations at Seattle, Bainbridge Island and Bremerton would remain the same except for traffic volume. Since the destinations remain the same, holding areas and ticket sales for an additional destination are not required. Additional terminal staff might be required to handle the increased traffic load.

If the Edmonds terminal is closed for facility damage, traffic routing would again depend on the estimated duration of the closure. For a short closure, traffic should be routed as discussed above. The operations at the functioning terminals would remain unchanged except for an increase in volume. A boat which is sailing from Kingston when Edmonds closes, should sail to Seattle, then augment the Seattle-Bainbridge Island route. The sailing time between Seattle and Kingston would be approximately twice as long as between Edmonds and Kingston or Seattle and Bainbridge Island. Moving the commuter traffic between Kingston and Seattle would take twice as long as it does between Kingston and Edmonds. It is unlikely, therefore, that the traffic would wait at Kingston for a sailing to Seattle, even if it were available. The traffic would drive down to Bainbridge Island to take advantage of the more frequent crossings and the large boats. It would be better, therefore, to add a third boat to the Seattle-Bainbridge Island route to handle the inevitable traffic increase than to continue to sail between Seattle and Kingston.

Walk-on traffic will also need alternative transportation to their destinations. Kitsap Transit provides excellent emergency transportation between Kingston and Bainbridge Island. Unfortunately, Snohomish County Transit and Metro do not have as much flexibility in their system due to their route structure and availability of equipment. They will, however, provide extra service if they can.

Also, sailings between Kingston and Mukilteo are possible to support the traffic destined north of Edmonds.

In summary, the alternatives for managing the Edmonds-Kingston traffic in the event of a closure is dependent on a number of variables. The solution selected needs to be based on the current circumstances and therefore, could only be finalized at the time of the closure.

RELATIONSHIP TO REGIONAL TRANSPORTATION PLANS

The SR 104 transportation corridor, which includes the Edmonds - Kingston ferry is classified as a Principal State Highway, and is now on the National Highway System. The Washington State Transportation Commission therefore considers the completed study effort to be of significant value to the State and other interested bodies in that it will assist in the development of Transportation, and Land Use components of local, regional and state comprehensive plans.

The Washington State Transportation Commission will await the 1993 development of the Edmonds comprehensive plan and the regional transportation plan as required by the growth management act. The WSDOT and the City of Edmonds will continue discussions on the local siting of this statewide facility, including its related financial impact, as the City's comprehensive plan is developed. These plans will contain a proposed location for this facility of statewide significance. These plans must address the physical elements of the proposed facility and must present a feasible funding plan. Such financial plan must recognize state revenue limitations and other competing expenditure demands for marine capital funds. The Washington State Transportation Commission will not participate in the acquisition of a site that requires significant cleanup of toxic or hazardous material.

FUNDING PARTNERSHIP

When all growth management plans and related transportation funding plans are to be adopted, the Washington State Transportation Commission will request funds for the construction of a new ferry terminal with dual slips, overhead loading, adequate holding capacity, transit interface, passenger waiting areas, office space, and other amenities as normally required for ferry service. In addition mitigation efforts to offset traffic impact directly related to the terminal operation will be included. It is estimated that the normal cost of providing these features at a ferry terminal, including mitigation impacts, would cost $17 to $20 million.

Extraordinary expenses associated with the accommodation of general City growth, or improvements to the local urban setting are not considered transportation costs and funding will not be requested by the Washington State Transportation Commission. Such costs must be provided through other local, regional, state or federal sources to cover expenses as relocation, Right-of-Way, and extraordinary construction to enhance marine reliability.

TIME LINE

If a feasible plan including a funding plan for the location of this facility is not available through the growth management plan by 1995 the Washington State Transportation Commission will then move towards the expansion of the existing site with existing state resources. This will only be initiated in the event expansion of this essential public faciiity at Point Edwards site is precluded due to inadequate funding or environmental factors. The anticipated time line for current site development, if a feasible plan is not forth coming is as follows:

ACTIVITY	COMPLETION
PROGRAM APPROVAL	06-01-95
SCOPING PROCESS	12-31-95
DESIGN APPROVAL	06-01-96
ENVIRONMENTAL APPROVALS	06-01-96
ENVIRONMENTAL APPEALS	12-31-97
PLAN PREPARATION PHASE 1	08-01-98
PLAN PREPARATION PHASE 2	05-01-99
COMPLETION OF CONSTRUCTION	09-01-00

Executive Summary

Study Scope and Process

The overall goal of the Edmonds Ferry Terminal Study was to examine the feasibility of several alternatives for improvement of the Edmonds ferry terminal. The scope of work for the study initially included engineering and architectural studies analyzing three alternatives: 1) do nothing, 2) expand the existing site, and 3) relocate to the Union Oil of California (UNOCAL) property at Edwards Point. During the course of the study, other site alternatives were investigated. A mid-waterfront location between the existing site and the Port of Edmonds northern breakwater was selected as an additional alternative for inclusion in the final analysis.

Facility requirements were divided into two areas: upland facilities and mooring/docking facilities. Basic upland issues included vehicular staging, park-and-ride facilities, transit access, passenger access (including facilities for the disabled), rail/ferry interactions and impacts on other waterfront property owners such as the Port of Edmonds. Basic mooring/docking issues included all-weather docking capability, additional loading/unloading capacity, vehicle/pedestrian separation and a second or back-up slip.

The scope of work was divided into four Basic Tasks:

I - Background Studies

II - Navigation Feasibility Analysis

III - Alternatives Analysis

IV - Meetings and Meeting Facilitation

Findings

Criteria identified as being of particular importance in evaluating alternatives include resolution of conflicts between ferry traffic and Burlington Northern Railroad (BNRR) traffic, separation of pedestrian and vehicular loading and unloading, improvement of traffic circulation in downtown Edmonds, and potential for consolidation and/or expansion

in the downtown area. Based on the evaluation of these criteria, three feasible alternatives are recommended for further study and public comment. The three alternatives include: 1) Anderson Marine - expand the existing facility by the purchase of Anderson Marine property, rebuild the docking facility on the southern portion of the property and use the remainder of the property for holding and egress lanes, retaining the existing traffic routes; 2) Midwaterfront - construct a depressed access under the BNRR tracks from SR 104 to a central waterfront location with a new terminal/docking facility; and 3) Edwards Point - relocate the terminal to the UNOCAL property at Edwards Point, providing access from SR 104 at Pine Street, with vehicle holding along the hillside and access to the ferry dock by an overpass across the BNRR.

Navigation would be feasible at all three locations; however, the Edwards Point alternative would require additional protection because the site is exposed to southerly storms. A breakwater and mooring slip oriented into the wind would be required at Edwards Point to provide the same level of service during storm conditions that exists at the present site.

All three alternatives would eliminate the interruption of loading due to conflicts with passing BNRR trains. The Midwaterfront and Edwards Point Alternatives would also eliminate safety conflicts due to traffic crossing the tracks. The Anderson Marine site (Alternative 1) would not eliminate safety concerns related to vehicle/train and pedestrian/train conflicts.

All three alternatives would include overhead pedestrian loading and would therefore eliminate safety concerns related to pedestrian/vehicle conflicts during vessel loading. Overhead loading would also provide direct accessibility to vessel passenger areas for the disabled, thus complying with recent federal legislation.

The Anderson Marine alternative would not substantially alter current traffic patterns in downtown Edmonds and along the waterfront. The Mid-waterfront Alternative would separate ferry traffic from general traffic in the immediate downtown area and along the waterfront. Circulation would be improved on Dayton Avenue, Main Street, Railroad Avenue, Sunset and SR 104 between Dayton Avenue and Main Street due to elimination of ferry traffic on these roadways. The Edwards Point alternative would also remove ferry traffic from Central Edmonds and the waterfront area. None of the alternatives directly addresses the impact of ferry traffic entering Edmonds from the north on SR 524 and passing through the downtown area.

The Anderson Marine Site (Alternative 1) would not provide for consolidation of the central and waterfront commercial districts. The holding lanes and SR 104 will remain a visual and physical barrier between the two districts. Consolidation of the waterfront and central commercial districts will be possible with the Mid-waterfront and Edwards Point Alternatives. The Midwaterfront Alternative would allow redevelopment of the holding

lane area, the existing terminal, and much of the Safeway/Goldie's site. Vehicular and pedestrian circulation between the waterfront and central commercial areas would be accommodated by overpasses, and would be uninterrupted by ferry traffic. Visual consolidation of the downtown and waterfront areas may also be enhanced through careful urban design. The Edwards Point Alternative provides the most opportunity for consolidation of the downtown and waterfront areas because the ferry terminal is completely removed from the area. Alternative 3 may also allow for redevelopment of portions of the UNOCAL site not needed for ferry facilities.

The Anderson Marine site (Alternative 1) could be developed for the lowest initial cost, but does not fully satisfy the criteria established by the Policy Committee, particularly in the area of impact to the community. A mid-waterfront site (Alternative 2) is substantially more expensive than Alternative 1 and satisfies most criteria. A potentially major drawback to Alternative 2 is the need to acquire numerous privately owned properties. The Edwards Point site (Alternative 3) most clearly satisfies the Policy Committee criteria but is also the most expensive to construct. Further, the potentially long time required to complete cleanup of the UNOCAL site, combined with concerns over residual liability for contamination, may reduce the attractiveness of Alternative 3.

Recommendations

We recommend that Alternative 1 be dropped from active consideration as the "long-term" solution to problems at the Edmonds Ferry Terminal. We recommend that the City of Edmonds and the Washington State Department of Transportation continue discussions regarding implementation of either Alternative 2, the mid-waterfront location, or Alternative 3, Edwards Point, as the site of the future Edmonds Ferry Terminal. Both the mid-waterfront and Edwards Point sites have been found to be physically and operationally feasible. Each has significant strong points and weaknesses. Development of either site will be relatively expensive and may require between five and ten years to accomplish. Successful implementation of either the mid-waterfront or Edwards Point site will offer significant opportunities for positive change in the area between the Edmonds waterfront and downtown.

Since neither the Midwaterfront nor the Edwards Point Alternative can likely be accomplished within the next five years, we recommend that the City and the WSDOT actively pursue a short- to mid-term solution to problems at the existing facility. WSDOT personnel have indicated that significant maintenance expenditures are required immediately to keep the facility in operation. In light of the need for such expenditures, it may be prudent to consider acquisition of the Anderson Marine site for use as a vehicle staging area to alleviate congestion on SR 104 and loading delays due to rail interference. The site could then be converted to other uses as such time as the terminal is relocated.

Introduction

Scope of Study

The overall goal of the Edmonds Ferry Terminal Study was to examine the feasibility of several alternatives for improvement of the Edmonds ferry terminal. The scope of work for the study initially included engineering and architectural studies analyzing three alternatives: 1) do nothing, 2) expand the existing site, and 3) relocate to the Union Oil of California (UNOCAL) property at Edwards Point. During the course of the study, several other site alternatives were investigated. An additional alternative was selected for inclusion in the final analysis: a Mid-waterfront Alternative between the existing site and the Port of Edmonds northern breakwater. The alternative of utilizing the existing terminal was also included in the comparison analysis.

Facility requirements were divided into two areas: upland facilities and mooring/docking facilities. Basic upland issues included safety, vehicular staging, park-and-ride facilities, transit access, passenger access (including access for the disabled), rail/ferry interactions and consideration of impacts to other waterfront property owners such as the Port of Edmonds. Basic mooring/docking issues included all weather docking capability, additional loading/unloading capacity, vehicle/pedestrian separation and a second or back-up slip.

The scope of work was divided into four Basic Tasks:

I - Background Studies

II - Navigation Feasibility Analysis

III - Alternatives Analysis

IV - Meetings and Meeting Facilitation

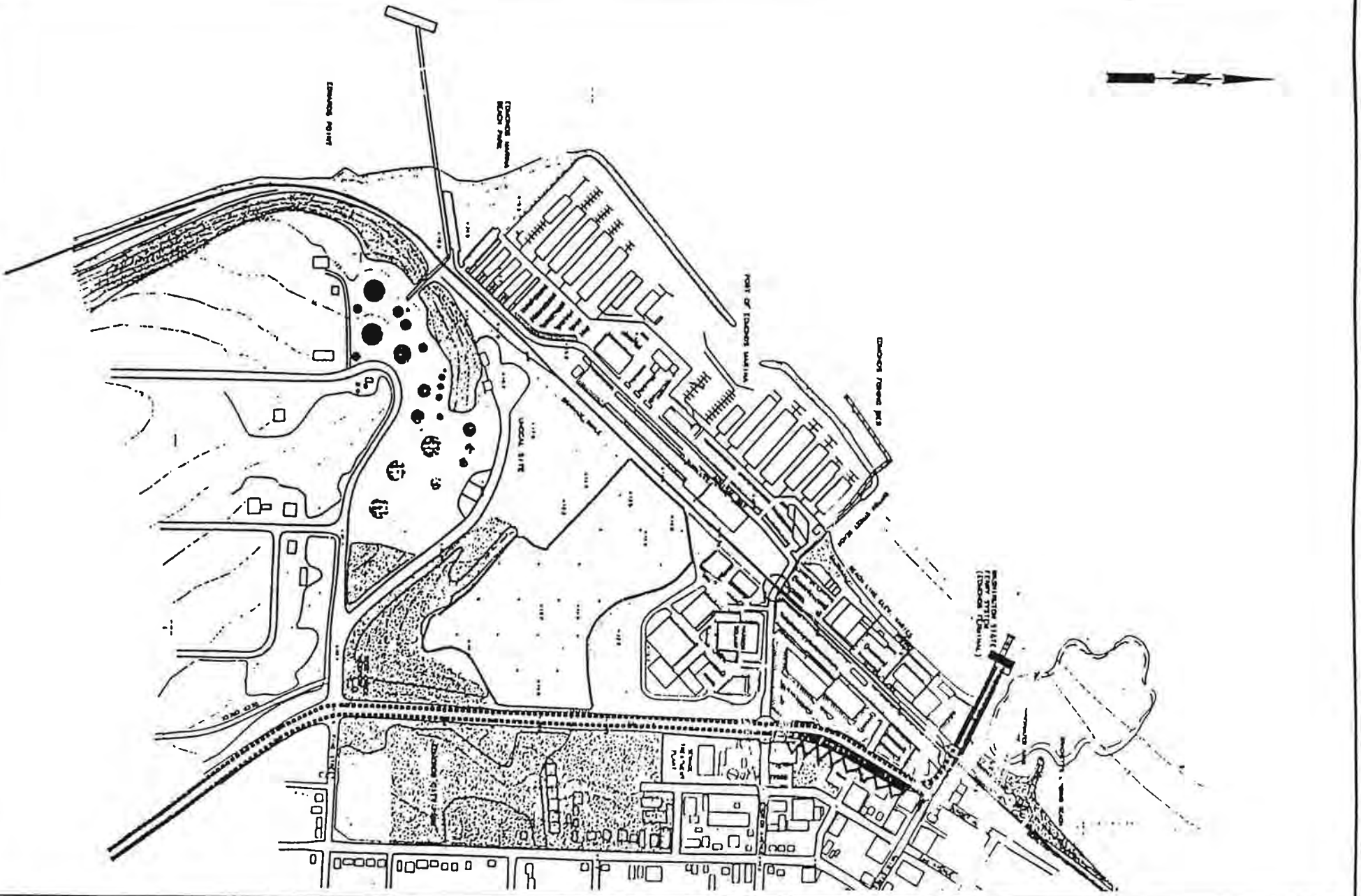
Existing topographic, bathymetric, meteorological, wave, littoral drift and current data was researched for the Edmonds area. Based on available topographic, bathymetric and planning maps, a base map of the area was prepared, Figure 2.

An environmental site review was conducted that focused on aquatic habitat issues. Site specific issues such as intertidal and subtidal habitat, epibenthic productivity and soil

Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

PROJECT LOCATION

FIGURE 1



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

CITY OF EDMONDS WATERFRONT

FIGURE 2

contamination are presented in the report "Edmonds Ferry Terminal Background Studies Environmental Site Review" (see Appendix A). The report describes the existing conditions and potential environmental impacts of the alternatives, and suggests additional data collection programs for the preparation of an EIS.

A navigational feasibility analysis was conducted to determine the feasibility of locating a mooring/docking facility at Edwards Point. The analysis is detailed in "Edmonds Ferry Terminal Navigation Feasibility Analysis - Wind and Wave Effects on Berthing at Point Edwards" (see Appendix B).

Historical meteorological data from 1980 to 1990 from Paine Field and Sea-Tac Airport was analyzed for frequency of occurrence and severity of storm events. Major storm events were correlated with impacts to ferry operation on the Edmonds-Kingston run and the Mukilteo-Clinton run based on accounts in the ferry Pilot House Logs and newspapers. Typical threshold wind conditions were determined that affected ferry operations.

Utilizing statistical meteorological data, an analysis of the reoccurrence frequency for selected wave heights was conducted. A wave refraction analysis was performed to determine wave heights at the proposed Edwards Point site and at the existing terminal. Based on the refraction diagrams and storm information, the impacts on ferry operations due to waves was determined for both sites. Based on the predicted increase in impact on ferry operations at Edwards Point due to storm conditions, an additional report "Breakwater Analysis at Point Edwards" was prepared (see Appendix C).

A variety of conceptual designs for alternative locations and routing schemes for the terminal were developed. Conceptual design of the dock, uplands and access were prepared. Issues considered included the City of Edmonds circulation plan, Washington State Ferry (WSF) System queuing needs, safety issues, transit, preferential access for high occupancy vehicles, park-and-ride facilities, drop off requirements, railroad interaction, conflicts between transportation modes, Port use, holding lanes, split holding, remote holding and future use. Alternatives for specific site issues such as an overpass versus an at-grade crossing or underpass across the railroad were considered.

These issues and the various alternatives were presented to the Technical, Public Involvement and Policy Committees for discussion. Based on input from the committees, the issues were incorporated into the selected alternatives for further conceptual design and feasibility analysis.

Potential environmental impacts for each of the selected alternatives were identified. These impacts are based on known existing site conditions and the proposed development. A budget level cost estimate for the aquatic habitat mitigation was prepared. Reports by

the Department of Ecology on the level of upland soil contamination at the UNOCAL site were reviewed.

A set of criteria was developed that was used in the evaluation of each of the alternatives. A matrix of the criteria was prepared to show the relative "rating" of each alternative. Criteria included issues related to business/commerce, community, construction, economy, environment, ferry operations, ferry users, growth and transportation.

A preliminary budget level cost estimate was prepared for each alternative. Land acquisition cost were estimated for each alternative.

This draft report describes the proposed facilities, feasibility, probable impacts and cost estimates.

Throughout the project meetings were conducted with three committees. A Policy Committee was formed which included City of Edmonds and Washington State Department of Transportation (WSDOT) officials and was responsible for providing overall policy direction and guidance for the project. Additional input was provided by the Technical Advisory Committee and the Public Involvement Committee.

Study Process

The study began with investigation of existing site conditions. A base map showing the existing site conditions such as the location of the Burlington Northern Railroad (BNRR) tracks, Port of Edmonds facilities and existing terminal facilities was prepared. Current traffic routes, right of ways, existing businesses centers, residential centers and recreational facilities were identified.

The primary issues related to the goals and specific requirements of the proposed terminal facility were identified based on historical information, discussion with City of Edmonds and WSDOT officials, input from interested parties and various transportation studies, Figure 3. A summary of the goals for the proposed terminal facility was formulated. Issues identified early on included but were not limited to the following:

- Marine Park Preservation
- Safety Issues of BNRR/Automobile/Pedestrian Conflict at Grade
- BNRR/Automobile Loading Conflict at Grade
- View Obstructions Associated with an Automobile Overpass of BNRR
- View Obstructions Associated with Overhead Loading for Pedestrians
- Limits to Business District Expansion
- Holding Lanes Barrier Between Business Lanes

Issues:

Marine Park preservation

BNRR/Automobile loading conflict at grade

Elevated automobile loading/ view obstruction

Overhead loading for pedestrians/ view obstructions

Limits to business district expansion

Holding lanes barrier between-business areas

Dayton Avenue "chokepoint" for marina access

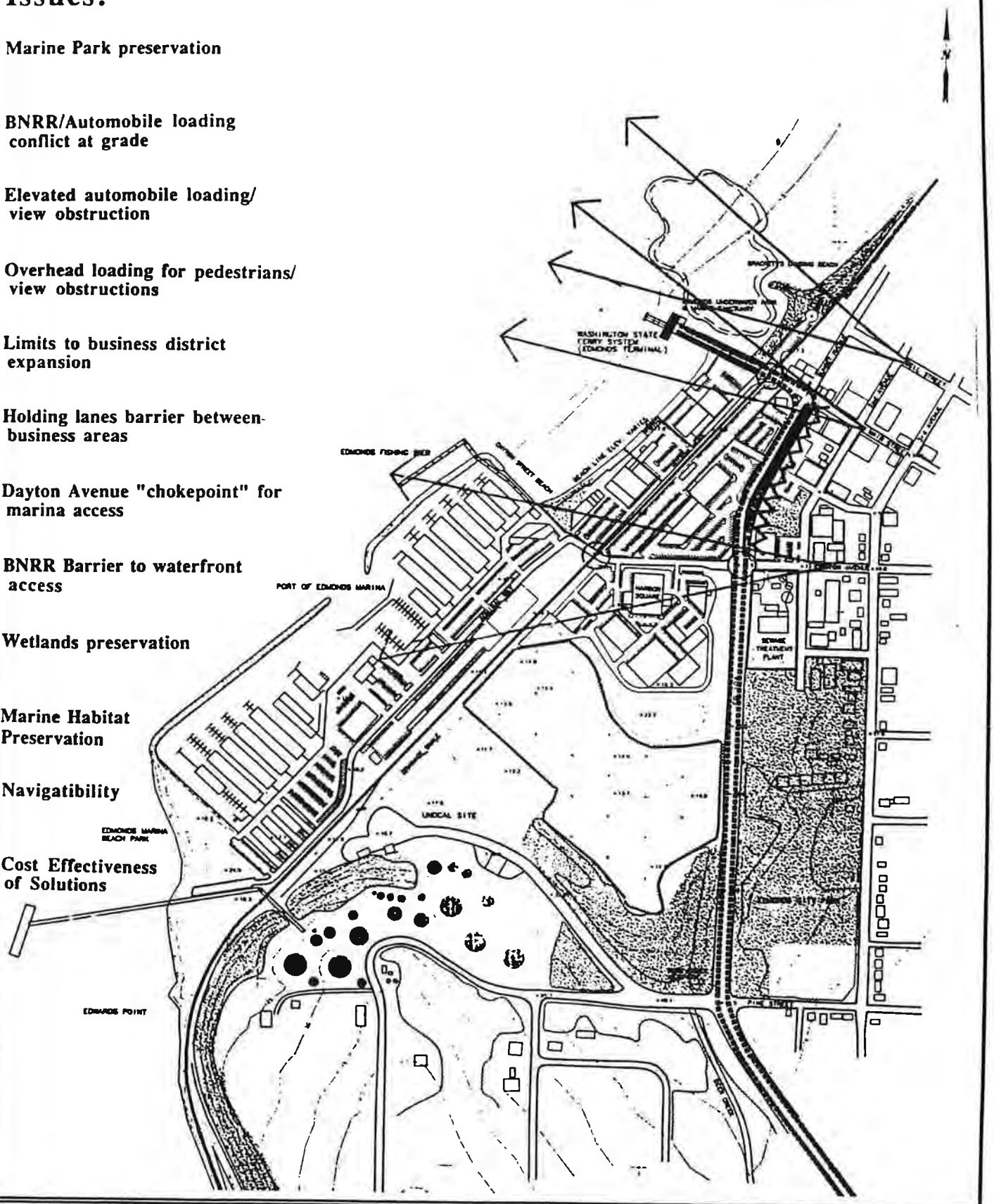
BNRR Barrier to waterfront access

Wetlands preservation

Marine Habitat Preservation

Navigatibility

Cost Effectiveness of Solutions



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis	**ISSUES**
	FIGURE 3
REID MIDDLETON *HEWITT-ISLEY* *HERRERA ENVIRONMENTAL CONSULTANTS*	2/92

- Dayton Avenue "Choke Point" for Marina Access
- BNRR Barrier to Waterfront Access
- Wetlands Preservation
- Marine Habitat Preservation
- Holding Capacity
- Service Reliability
- Navigability
- Cost Effectiveness of Solutions
- Opportunities for Intermodal Connections

Based on the established goals and requirements, a variety of alternatives were presented to the committees for discussion and review. Through discussion the alternatives were refined. After careful considerations, those alternatives that had significant apparent flaws were eliminated. These flaws included such items as extensive view blockage and prohibited at-grade crossings of the BNRR tracks.

A determination of the feasibility and specific issues and requirements unique to each alternative was then established. This included the ability for navigation and operations at the site, environmental constraints, safety constraints and construction constraints. Specific issues relating to contamination and timing for site availability were discussed for the UNOCAL site. The availability of property required for the access route, construction requirements and transportation issues were discussed for all sites.

A list of criteria was established which was used to evaluate the alternatives. This list was developed into a matrix and each of the alternatives was "rated" by the consultants based on the criteria.

The final portion of the project will involve a public meeting at which time the study process and results will be presented to the public. Public input at this meeting will be summarized and included in the final report.

Technical and Policy Committees

Three committees were formed for the discussion process of selecting feasible site alternatives and related issues: a Policy Committee, a Technical Advisory Committee and a Public Involvement Committee.

The Policy Committee consisted of Mayor Larry Naughten, City Councilmember William Kasper and City Councilmember Roger Hertrich (alternate) representing the City of Edmonds, and Washington State Transportation Commissioner Bernice Stern represented by Washington State Transportation Commissioner Alice Tawresey, Assistant Secretary

Harold Parker and Director of Marine Planning Donald Nutter (alternate) representing the Washington State Department of Transportation. Admiral Parker retired during the course of the study, and was replaced on the Policy Committee by Terry McCarthy, Acting Assistant Secretary. The Policy Committee was responsible for overseeing the study and all executive decisions in regards to the project. A total of ten Policy Committee meetings were held to discuss the project. A brief summary of the key issues discussed at each of the meetings is included in Appendix D.

The Technical Advisory Committee was established to allow an opportunity for input of technical comments from interested agencies. Members included Peter Hahn (Director of Community Development for the City of Edmonds), Bill Carter (WSDOT Marine Division), Don Hoffman (WSDOT District 1), Bill Stevens (Port of Edmonds), and L.G. Hahn (Community Transit). Representatives from Burlington Northern were invited to participate in the Technical Advisory Committee but were unable to attend the meetings.

Public Participation Process

The Public Involvement Committee was established to provide initial input from interested public groups. Representatives from the Ferry Riders Coalition, Edmonds Chamber of Commerce, Tulalip Tribe, and Town of Woodway were invited to attend the meetings.

Public Involvement Committee meetings were held following each Technical Committee Meeting. Issues discussed at the Technical Meeting were reviewed and discussed with the Public Involvement Committee.

A public meeting will be scheduled to present the issues, alternatives, and criteria for the project and to receive public input.

Background/Existing Conditions

Project History

The City of Edmonds was incorporated in 1890. Cross-sound travel from Edmonds was provided intermittently by private navigation companies during the early 1900's. In 1922 the Edmonds City Council initiated service to Kingston by contracting with the Joyce Brothers of Mukilteo. The Joyce Brothers service was planned to provide two round-trips daily, increasing to five daily round-trips in the summer. The original traffic demand pattern seems to have included a significant portion of recreational trips, as is the case today.

The Edmonds Ferry Terminal was built at its present location in the early 1900's. The terminal was expanded in 1930. The Edmonds-Kingston ferry route was acquired by the State in the 1950's.

The BNRR tracks were built along the Edmonds coastline in the 1800's. Due to the steep upland topography, the BNRR tracks were constructed on the narrow, flat coastal plain, in many places on fill materials. The location of the railroad restricted waterfront development in the Edmonds area to a narrow band along the shoreline.

Development of the Port of Edmonds took place in the early 1960's. Commercial development took place along Admiral Way and Railroad Avenue in the late 1970's and early 1980's. During the past 30 years, the focus of the waterfront area in Edmonds has shifted from an industrial waterfront to commercial, retail, and recreational marine activities.

From Edwards Point north to Brackett's Landing on the north side of the existing ferry terminal, the shoreline is significantly altered by fills, dredging, and bulkheading. The Port of Edmonds marina, parking areas, retail areas, and the ferry terminal are all constructed on imported fill. The shoreline in the area is well developed and typically armored against erosion.

Development in Kingston and the Olympic Peninsula has caused continual increases in ridership on the Edmonds-Kingston run. The route serves as a cross-sound commuter route as well as a vacation route to and from the Kitsap and Olympic Peninsulas.

Congestion between ferry traffic, non-ferry traffic, and rail traffic increased with the development of the Port and waterfront commercial business and the growth of communities on the Kitsap and Olympic Peninsulas.

Today, the original ferry, the *City of Edmonds*, with a 12 automobile and 125 passenger capacity, has been eclipsed by Super Class vessels with capacities of 160 automobiles and 2,500 passengers. These 382' long ferries have a beam of 73' - wider than the length of the original City of Edmonds (65'). These ferries make approximately two dozen round trips daily. In 1990 the Edmonds-Kingston average daily traffic was 4,502 vehicles.

In the future the Super Class vessels may be replaced with Jumbo class ferries that provide capacity for 206 automobiles and 2,000 passengers. The year 2000 forecast for summer season average daily vehicle trips is 8,640 -- an increase of 79% over the 1987 ridership (Puget Sound Council of Governments).

Discussions between the City and WSDOT were begun in 1989 to address the issues related to the predicted 79% growth in ridership between 1987 and the year 2000. The City of Edmonds was concerned about the many adverse impacts anticipated due to increased ferry ridership, while the WSDOT was attempting to identify ways to mitigate existing deficiencies at the Edmonds terminal and provide needed future capacity.

In early 1990 it was revealed that the UNOCAL property located at Edwards Point was being offered for sale. This action was seen as a possible opportunity for a long term solution to the problems occurring at the existing ferry terminal location at the foot of Main Street. Relocation to Edwards Point would also allow the consolidation and expansion of the commercial waterfront district.

In 1990 a joint study was authorized by the City and WSDOT to evaluate several alternatives for future improvements to the Edmonds ferry terminal. These alternatives included: 1) no changes at the current terminal site, 2) improvement of the existing site, and 3) relocating the terminal to a different site. This report examines the feasibility of a terminal at the Edwards Point site as well as identifying other possible alternatives including phased implementation. The report provides background documentation for use in the NEPA and SEPA scoping processes.

Existing Terminal Facilities - Conditions, Shortcomings

The existing terminal facility is located west of the BNRR and extends westward into Puget Sound from Railroad Avenue approximately 500 feet (see Figure 4). At the western end of the facility an adjustable transfer bridge extends an additional 100 feet to serve the single mooring slip. The 500 feet facility is made up of approximately 400 feet of landfill

Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

EXISTING TERMINAL FACILITY

FIGURE 4

retained by driven sheet pilings along the west and north faces and 200 feet of pier structure (deck supported by pilings).

The mooring facilities consist of various mooring dolphins and appurtenances providing moorage for a single vessel. The transfer span is hinged at the end of the pier so that it may be raised or lowered to accommodate differing ferry deck heights due to tidal fluctuations. The span is raised and lowered by a mechanical winch system supported on two towers approximately 25 feet high. The single slip provides moorage for the majority of ferry types operated by WSDOT today and would accommodate Jumbo class vessels. There are no mooring facilities at Edmonds for passenger-only ferries.

The terminal building and a vessel service staging area are built on the north side of the pier structure. Pedestrian/bicycle walkways are provided on the north and south sides of the approach way. The south walkway, which is fenced off from the vehicle lanes, is used mainly be exiting pedestrians, while the northern walkway is used by loading pedestrians. Pedestrians and bicyclists purchase their tickets from the south side of the ticket booth at the upland end of the docking facility. They must then cross the vehicular lane of traffic to reach the northern walkway which leads to the terminal building at the end of the pier. From the terminal building foot passengers and bicyclists load across the vehicle transfer span. Due to safety requirements, pedestrians and bicyclists must load before and after the vehicles.

There are four 12-foot wide holding lanes and two 12-foot wide exit lanes on the deck area above the retained fill. This decreases to two 12-foot wide holding lanes and two 12-foot wide exit lanes on the pier section. This total approach area holds approximately 60 vehicles. Currently, over-size vehicles are staged in a separate area from cars and tall vehicles must be sorted from other vehicles due to loading requirements and height limitations of the ferries used on the route.

The Super class vessels currently used on the route have a capacity of 160 vehicles. The pier does not provide holding area adequate to load a complete Super Class vessel. This necessitates using land side holding areas for the remainder of the vessel capacity.

Additional ticketed holding lane capacity is provided east of the BNRR parallel to SR 104 from Main Street to Dayton Avenue. These five holding lanes provide capacity for approximately 160 cars. Unpaid holding capacity is held parallel to SR 104 south of Dayton Avenue. A single dedicated lane for ferry traffic extends along SR 104 from the north end of Edmonds City Park to Dayton Avenue.

The existing main access route to and from the terminal is via SR 104 from SR 99 and I-5 at the 244th Street interchange. Within the City of Edmonds, SR 104 approaches the Edmonds Ferry Terminal from the southwest. The alignment of the roadway within the

Central Business District is north and south. Two exit lanes are provided along SR 104 for exiting ferry traffic, Figure 5.

Additional ferry access is via SR 524 to the north of the terminal. SR 524 traverses several local arterial streets in Edmonds and Lynnwood between the ferry terminal and the I-5 interchange at 44th Avenue SW/196th Street SW, Figure 5. Ferry traffic exiting the terminal uses, in turn, Main Street, 3rd Avenue, Caspers Street, 9th Avenue, and 196th Street SW. Ferry traffic approaching the terminal along SR 524 is routed from 196th Street SW to 9th Street to Caspers Street to Third Avenue, past Main Street and Dayton Avenue to Pine Street where it then merges into the holding lanes along SR 104.

Access to the intersection at the upland end of the terminal is possible from Brackett's Landing Park, Main Street, SR 104, Sunset Avenue, Railroad Avenue, the upland paid holding areas, and the terminal facility. Because access to the terminal is possible from many different areas, it is necessary for ferry personnel to collect tickets from vehicles arriving from the paid holding lanes. A ticket booth is located at the upland end of the approach deck for this purpose.

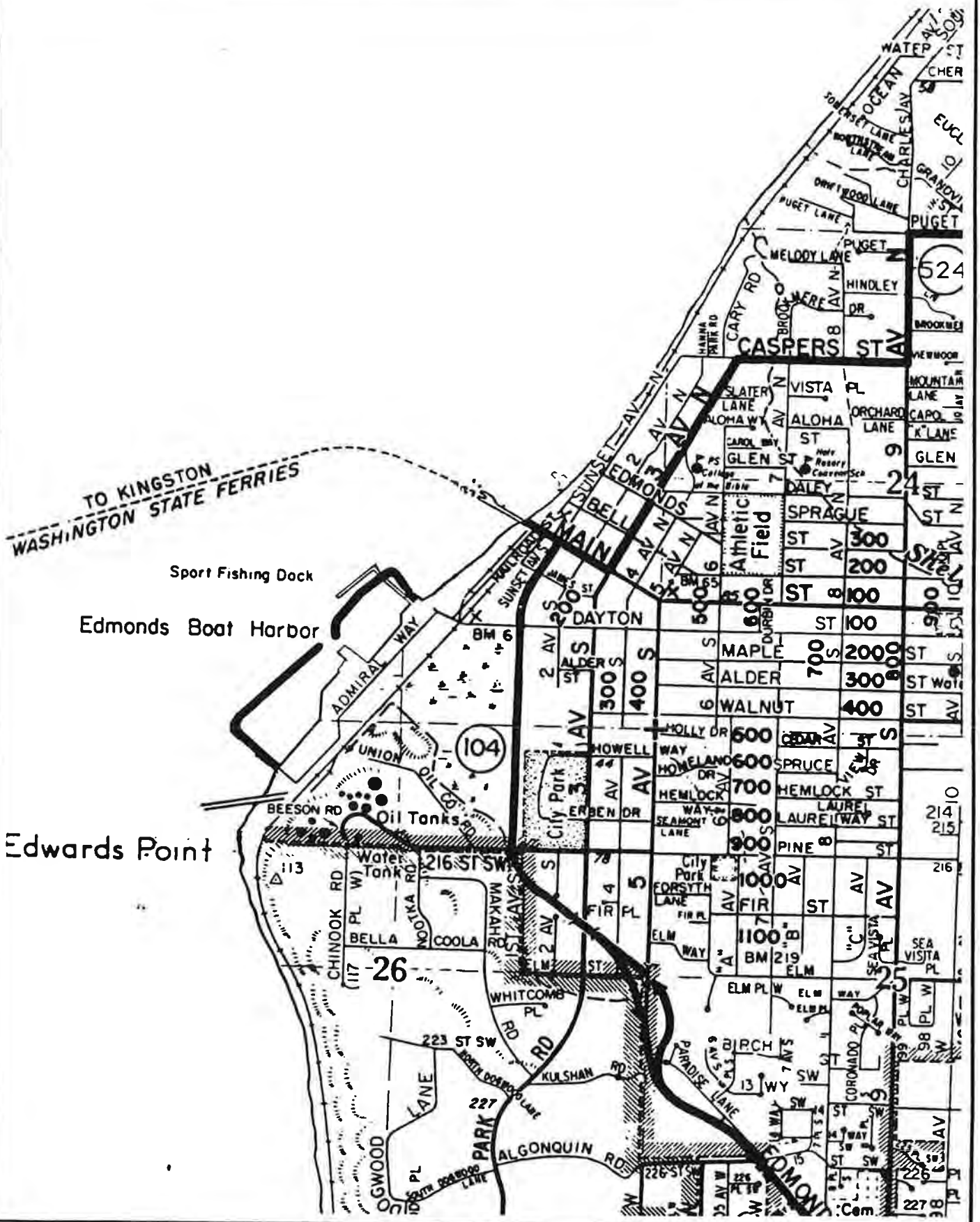
Parking for the terminal is currently on WSDOT-owned property leased to a private operator. The lot is located in the triangular area formed by SR 104, Main Street and Railroad Avenue. There are 76 WSDOT lot spaces and 211 other spaces for a total of 287 available parking spaces.

City of Edmonds Planning Context

The City of Edmonds is currently beginning a Comprehensive Waterfront Plan. The ferry terminal is a significant feature of the shoreline in terms of the visual and spacial environment. The overall consolidation of the Central Business District (CBD) and expansion opportunities for the CBD and waterfront district are significant issues in the City's planning program. Circulation in the area is a key factor in the consolidation of the CBD.

Circulation

The Edmonds central waterfront has two vehicular access points: Main Street on the north and Dayton Avenue on the south, Figure 6. Main Street is roughly perpendicular to the shoreline between the ferry terminal and 5th Avenue and bends slightly north to an east-west alignment thereafter. Between the shoreline and the Burlington Northern railroad tracks, Railroad Avenue extends from Main Street on the north to Dayton Avenue on the south. Dayton Avenue crosses the BNRR between the Olympic View Park and the Port of Edmonds and provides the only access to the marina.



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis	**FERRY ACCESS ROUTES**
	FIGURE 5
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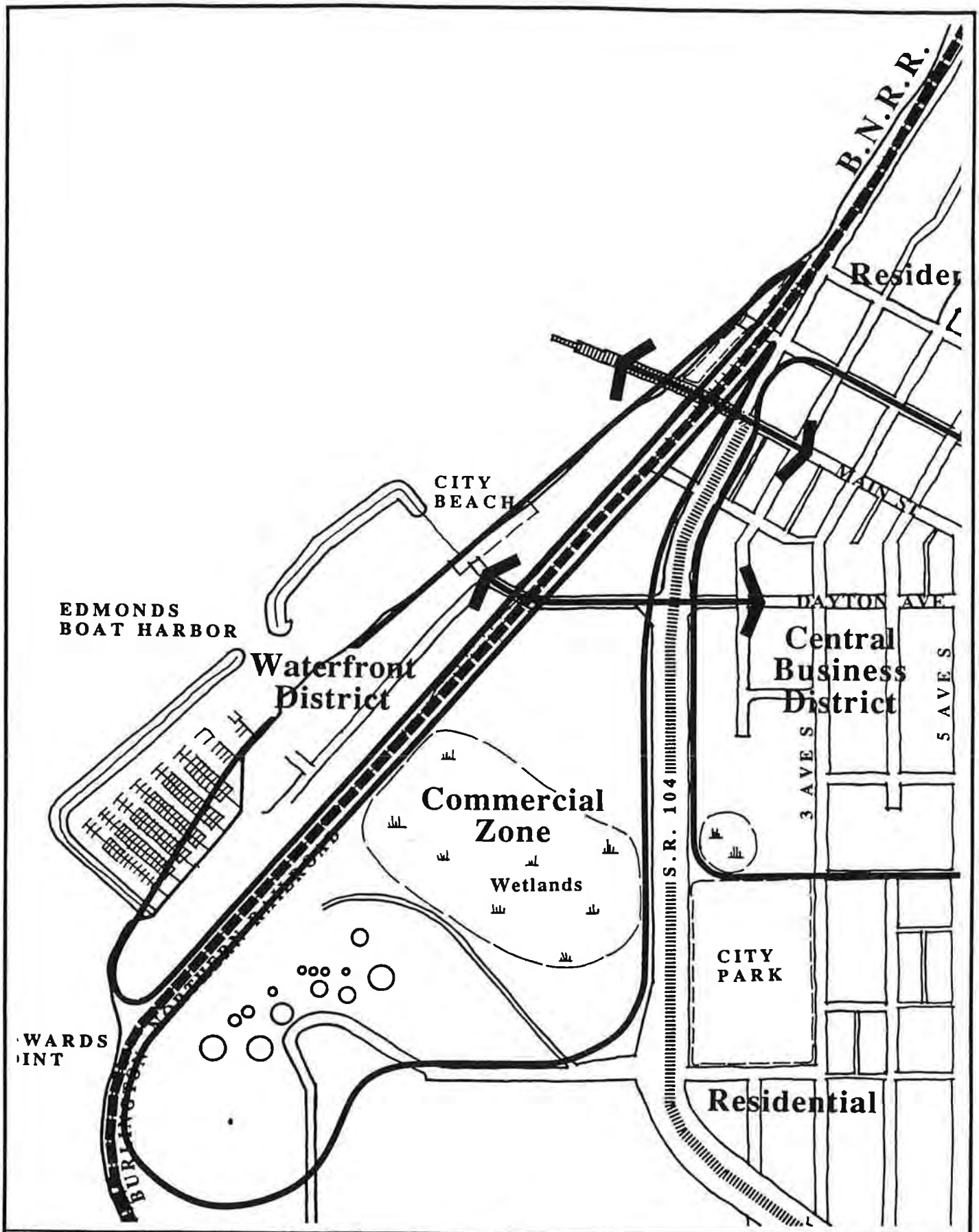


Edmonds Ferry Terminal - Alternative Site Feasibility Analysis	**DISTRICTS AND ACCESS POINTS**
	FIGURE 6

REID MIDDLETON *HEWITT-ISLEY* *HERRERA ENVIRONMENTAL CONSULTANTS* 2/92

In 1990 the average daily traffic for SR 524 was 4,750 vehicles at the junction of SR104 and Sunset Avenue. The average daily traffic along SR 104 at Pine Street in 1990 was 9,300 vehicles. The average daily vehicular volume on the Edmonds-Kingston ferry route was 4,502. Based on these figures, ferry traffic accounts for approximately one-third of the traffic on these two streets on average. The majority of the volumes are not spread throughout the day but occur during peak hours, as is normally the case. The volume of ferry traffic fluctuates during peak hours and may be higher or lower than local traffic.

Peak traffic volumes for the Edmonds-Kingston route occur during the weekday rush hours and weekend vacation periods. Currently, approximately seven times as many vehicles arrive from Kingston in the morning commuter hours as leave from Edmonds to Kingston. The majority of the vehicles arriving from Kingston continue on to major employment centers such as Seattle and Everett. This pattern is reversed in the evening. Congestion occurs as ferry commuter traffic combines with local residential and commercial traffic during peak commuter hours.

In the summer there is a major increase in ferry traffic traveling from Edmonds to Kingston beginning Friday afternoons as vacation travelers depart to the Kitsap and Olympic Peninsulas. The holding traffic extends far back along SR 104 during holidays, and travelers can often expect a wait of two vessels before loading. The situation is reversed on Sunday and Monday holiday evenings with long waits in Kingston. The increase in ferry traffic on the weekends corresponds with an increase in local traffic on the waterfront at Edmonds as people from throughout the region utilize the marina, retail, service and recreational facilities along the shoreline and at the Port of Edmonds.

Congestion in the intersection at the upland end of the ferry terminal provides both a physical and visual barrier between the Central Business District and the waterfront areas. This congestion is aggravated by the presence of the Burlington Northern railroad tracks, which serve more than 20 freight trains and two passenger trains each day. Virtually all freight rail traffic passes through the area relatively quickly. Passenger trains, however, serve the Edmonds railroad station which is located on the east side of the tracks between Main Street and Dayton Avenue.

Waterfront Facilities

Brackett's Landing

The northern portion of the Edmonds downtown waterfront is the Brackett's Landing public beach and marine park, Figure 7. Brackett's Landing Park extends from the ferry terminal to the foot of Caspers Street. This unique facility has an offshore marine park that is popular with scuba enthusiasts. Protection of the marine habitat in Brackett's Landing Park is an important aspect of the park activities. The ocean floor habitats in the

Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

BRACKETTS LANDING

FIGURE 7

park have been enhanced by the sinking of a 300-foot dry dock in 1935, and a 94-foot tug in 1972. A public restroom and parking facility for divers and park users complements the shoreline park.

The proximity of the ferry vessels to the Underwater Park has been a concern to divers. In the summer of 1991 an incident was reported of a diver being drawn towards a waiting ferry by tidal action.

Anderson Marine

Anderson Marine is located south of the ferry terminal dock between Railroad Avenue and the shoreline. This facility is used for boat sales and servicing, and has a large open yard located between the ferry terminal pier and the sales and service buildings located on the southern side of the property. One building is located over the bulkhead along the shoreline high water mark. It may be questioned if this building could be built beyond the high water line under current Shoreline Management Program regulations. The Anderson Marine complex covers a site area of approximately 1.5 acres and has approximately 275 feet of shoreline without public access.

The Regency on Edmonds Bay - Office Building

The Regency on Edmonds Bay is a three-story commercial office building south of Anderson Marine. The building houses Fish House Charlies, a restaurant, and other small commercial businesses. Parking is provided in portions of the first floor of the building, and between the building's west facade and the bulkhead along the shoreline. The shoreline is paralleled with a narrow landscaping treatment between the parking and the high water line bulkhead. This site occupies approximately 200-feet of shoreline without public access.

Senior Center

On the site south of the office building, the South Snohomish County Senior Center provides space for senior recreation, social gatherings, and other activities. The senior center is a pair of buildings: a two-story structure at the southern property line, and a one-story structure along the shoreline. The senior center is served by Community Transit using Railroad Avenue as the access route. Automobile parking for the senior center is between the low building along the shoreline and Railroad Avenue. A portion of the parking is located on a concrete slab that extends past the high water line approximately 20 feet. This structure was damaged in the storms of the 1990-91 winter season and was repaired in the summer of 1991. While repairs to the old structure are allowed, as with the boat service building at Anderson Marine, it may be questioned if a new parking deck could be built under current Shoreline Management Program regulations. The senior center occupies approximately 300 feet of shoreline and provides public waterfront access along the frontage.

Condominium Development
The Ebb Tide is the tallest building on the central waterfront (see Figure 8). The Ebb Tide is a five-story residential building, probably from 42 to 48 feet high, and could not be built today in compliance with the 30-foot height limit for the waterfront district in Edmonds. This building occupies 100 feet of shoreline without public access. Parking for this building is provided in covered stalls between the building and Railroad Avenue. The Reef is a three-story residential building adjacent to the Ebb Tide. In front of The Reef is a single-story commercial dive shop.

Private Use Building Complex/Olympic Park
South of the condominium building, and north of the Port of Edmonds Marina, a group of buildings with mixed uses lines the shoreline. This building group is made up of a two-story building along the north property line, single-family buildings, and a new three-story office building at the southernmost portion of the site. Between the shoreline and these buildings, the City of Edmonds Olympic Park provides approximately 350 feet of public access.

Port of Edmonds
South of Olympic Park, the Port of Edmonds owns and operates a major marina facility, including shops, restaurants, boat storage, boat mooring, boat repair, and other commercial activities. The facility includes fourteen docks that provide covered boat moorage and approximately six smaller docks for uncovered or transient storage. Dry boat storage is provided for boats on cradles, on racks, and under cover. Put-in and haul-out cranes are available to the dry storage users. The marina occupies 2,400 feet of shoreline. Public access along the water is available, but primarily between the parking and private docks. No public access is available on the marina breakwaters. The public has a pedestrian access to the Edmonds Fishing Pier, which extends from the Dayton Avenue Beach to 100 feet past the northern breakwater and thence parallel to the breakwater and shoreline for 400 feet.

Edmonds Marina Beach Park
The Edmonds Marina Beach Park, south of the Port of Edmonds Marina and north of the UNOCAL loading pier, is operated by the City of Edmonds Department of Parks and Recreation. Approximately three acres in size, the park is a popular sunning, picnic, and volleyball location for Edmonds citizens. As the southernmost public facility on the waterfront, it becomes a "turnaround" for joggers and strollers. Limited auto parking is provided, but during peak usage periods many beach visitors use Edmonds Marina parking areas.

UNOCAL Tanker Terminal at Edwards Point
South of the Marina Park, the UNOCAL Corporation has a long pier extending into deep water for the loading/unloading of oil tankers to supply the landside storage facility. The

Edmonds Ferry Terminal - Alternative Site Feasibility Analysis	**CENTRAL WATERFRONT**
	FIGURE 8

pier and piping structure is 1,200 feet long, with approximately 450 feet over land and the remaining 750 feet over water at high tide. This area of the shoreline is very shallow with much of the bottom exposed at low tides. The end of the pier at Edwards Point is the most western point in Edmonds. Other than islands, Richmond Beach and Shilshole Bay are the only other land features extending as far west as Edwards Point in the northern Puget Sound area. The exposure of this point and pier makes docking a challenging exercise, and UNOCAL captains have required tug assists to dock in storm situations.

Commercial District between SR 104 and Burlington Northern

The area between the Burlington Northern Railroad right-of-way that parallels the shoreline and the alignment of SR 104 to the east and the southern municipal limits of the City of Edmonds is a triangularly shaped commercial area, Figure 9. This area narrows at the northern point as the BNRR and SR 104 converge and flares at the south. Woodway is the southern border of this area. This approximately 100-acre district is separated north and south by Dayton Avenue - the primary access route across the Burlington Northern right-of-way to the waterfront and Marina.

Area Between Main Street and Dayton Avenue

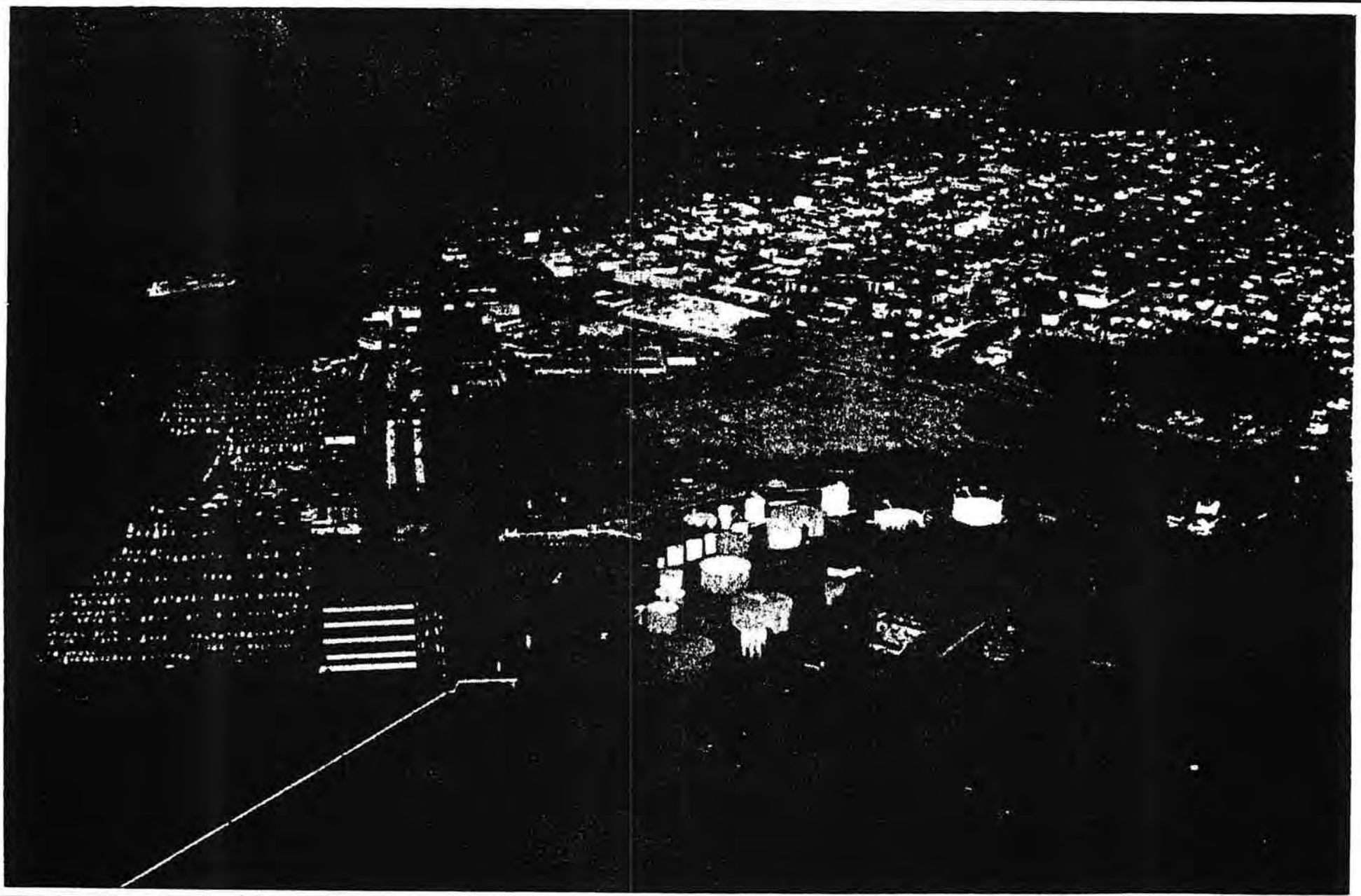
The district north of Dayton Avenue the Skipper's restaurant, located at the corner of SR 104 and Main Street, the Burlington Northern/Amtrak Station, the Washington State Ferry park-and-ride lots, and the older commercial district including Goldies and the vacant Safeway. This area, located between two major transportation routes, lacks a clear association with either the waterfront district or the established central business district.

Area Between Dayton Avenue and Woodway

The area south of Dayton Avenue includes the Harbor Square development (approximately 15 acres), a wetland area (approximately 20 acres), and the UNOCAL facility (approximately 40 acres). From a "windshield survey" the Harbor Square businesses appear to have a low vacancy rate and active customer traffic.

Wetlands

The wetlands area between Harbor Square and UNOCAL may have formed as an old stream carrying drainage from the east and Deer Creek from the south were backed up because of fill activities along the shoreline. The original streambed from the high ground from the east can be traced from vegetation identified on aerial photographs. The original railroad causeway may have been the primary agent causing this sedimentation and wetland formation. This wetland area is a rich habitat where even the layman can identify many different birds species during a casual visit. Blue herons have been observed in the wetlands. The twenty or so acres of wetlands lie largely west of SR 104, but a fragment also exists between the new waste water treatment plant and Edmonds City Park located between SR 104, Pine Street, and Third.



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

CITY OF EDMONDS

FIGURE 9

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UNOCAL

The UNOCAL site provided oil transfer functions from offshore tankers to land distribution via rail and trucks (See Figure 10). This facility has been unused since May 1991, but maintenance activities still occur with a small staff. The land parcel is composed of two distinct landforms: the flatland immediately south of the wetlands area and the wooded slope between the flatland and the City of Woodway. The majority of the storage tanks are sited on the sloping portion and surrounded by containment berms. In the past, the site soils, particularly along the railroad siding areas, have been contaminated with petroleum products. The contamination areas and extent have been examined by various state and federal agencies as well as private geotechnical consultants. Cleanup processes are being conducted. The contamination/cleanup issue is discussed in greater detail in the report "Edmonds Ferry Terminal Environmental Site Report" (Appendix A).

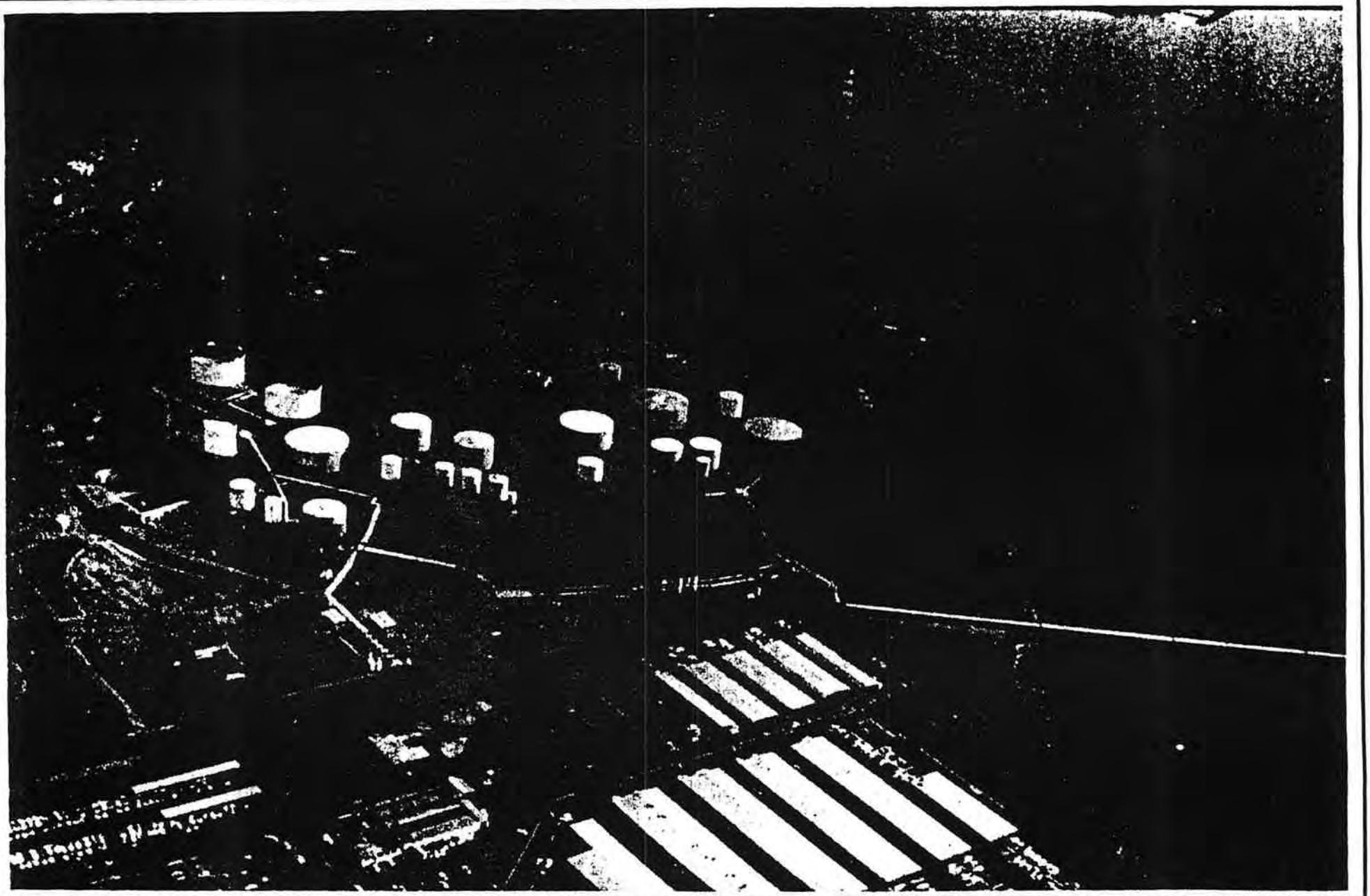
The hillside is reportedly relatively clean of contaminants. The mature forest is a pleasing green background for the southern edge of the City of Edmonds. The hillside, wrapping around the bluff to the south, also provides a green edge to Puget Sound for ferry passengers arriving from Kingston. This forest, as is the wetland, is an important habitat. The richness of the forested canopy, understory, and floor, and the extent of the forested area, combined with the adjacent natural areas bordering Deer Creek, provide an environment supporting larger mammals like deer and coyote.

Central Business District

The Edmonds Central Business District (CBD) is primarily concentrated between Fifth Avenue and SR 104, and between Main Street and Dayton Avenue. The "sense of center" of downtown Edmonds seems to be at the roundabout traffic circle at the intersection between Main Street and Fifth Avenue. The buildings in the downtown area are predominantly one- or two-story buildings and with the relatively narrow street right-of-way, provide a more "intimate" than "grand" sense of scale to this urban district. The building density and street widths allow a balance between on-street parking and parking provided in off-street lots. In the CBD most off-street parking lots are less than one parking bay wide (a parking bay is two parking zones on either side of a central aisle for vehicular movement). Some two-parking bay areas exist, and these facilities are generally 120 feet wide. Nowhere in the central business area does parking exist like that of the Safeway/Goldies complex. For the most part, the central area is pedestrian scaled and generally comfortable and convenient for the visitor.

Historical Growth Trends

In 1965 the average daily traffic on the Edmonds-Kingston route was 1,088 vehicles. The daily usage steadily increased to 3,012 vehicles by 1978. In 1979 there was a significant drop in traffic volume ridership on the Edmonds-Kingston route due to the sinking of the



Edmonds Ferry Terminal - Alternative Site
Feasibility Analysis

UNOCAL
FIGURE 10

Hood Canal Bridge. Since the Hood Canal Bridge was reopened, the Edmonds Ferry Terminal has experienced consistent growth in patronage. Since 1981, the average daily volume of traffic has increased by 2,620 vehicles per day to a total average daily volume of 4,502 vehicles in 1990. The route is one of the fastest growing in the state. It currently has the third highest average daily traffic volume in the state.

A major cause for the increase in ridership on the Edmonds-Kingston route is the population growth in Kitsap County. The population of Kitsap County increased by 45% from 1970 to 1980, and increased an additional 29% from 1980 to 1990. The northern portion of Kitsap County, which includes Kingston, is one of the fastest growing population centers in Kitsap County. Approximately 10 to 25% of the workers from northern Kitsap County commute to work in the Seattle Central Business District (PSCOG, Trend No. 32, May 1990).

Environmental Data

Significant natural resources exist along the Edmonds waterfront between the existing ferry terminal and Edwards Point. Some of these resources are briefly discussed below. A more comprehensive, detailed discussion of these resources and the potential impacts of ferry terminal relocation is presented in the report "Edmonds Ferry Terminal Preliminary Environmental Site Review Alternative Analysis and Background Studies" (Appendix A). The report provides a compilation of known information on the existing natural resources in the Edmonds area. It is not to be interpreted as an environmental impact analysis document but is designed primarily to guide the planning and site selection process.

Soils

The soil survey for Snohomish County published by the Soil Conservation Service identifies and maps the soil series that occur in the Edwards Point and Edmonds areas. Soils are generally gravelly sandy loams, urban land and muck. Moderate to severe development limitations exist in the Edwards Point vicinity because of the characteristics of gravelly sand loams on steep slopes.

From Edwards Point north to the ferry terminal, the shoreline is significantly altered by fills, dredging, and bulkheading. The Port of Edmonds marina, parking areas, and retail areas, and the ferry terminal are all on imported fill. The shoreline in the area is well developed and typically armored against erosion.

Contamination

Soils on the UNOCAL property, which is located adjacent to the Union Oil Marsh, are contaminated with petroleum hydrocarbons, diesel, gasoline and asphalt plant wastes. The Department of Ecology (DOE) recently concluded a site hazard assessment and assigned

the lower yard area of the site an overall rating of one. This rank indicates that site contamination may pose significant environmental and human health risks. The volume of contaminated soil has been estimated at between 150,000 and 300,000 cubic yards. Depending on what remediation methods are selected, costs of clean-up for these lower yard contamination soils may range between $20 and $120 million.

Edmonds Way Drainage Basin

Fisheries

The Edmonds Way Drainage covers approximately 1,321 acres and is comprised of two major drainage systems: the Edmonds Way (SR 104) trunk storm drain and Willow Creek. These systems consist of natural features and man-made facilities, including streams, wetlands, ditches, detention systems and storm drains. The storm drains discharges between the south breakwater of the Edmonds Marina and the existing UNOCAL pier. The other major drainage consists of Willow and Shellebarger Creeks which flow into the Union Oil Marsh then into Puget Sound via a drainage channel and a 1,100-foot, 48-inch diameter culvert.

Although extensive fish population studies have not been conducted, habitat studies indicate that poor to good fish habitat exist in the creeks. Salmon, which have historically spawned in these creeks, may still use the marsh and accessible portions of these creeks. Because access to the marsh and the adjoining creeks is difficult, spawning activities may be limited. It is uncertain whether resident salmonids occur in this wetland/creek system.

Wildlife

The Union Oil Marsh and the narrow adjoining riparian corridors of Willow and Shellebarger Creeks provide significant habitat for a variety of native flora and fauna. The productive marsh ecosystem, which is designated as a wildlife sanctuary by the City of Edmonds, supports a diverse assemblage of amphibians, small mammals and other organisms. Resident and migratory birds, including great blue herons and bald eagles, have been observed frequently in the marsh.

Marine Environments

Intertidal/Subtidal

The intertidal and subtidal communities at Edwards Point and the existing ferry terminal site support many species of plants and animals, including some commercially important fish and shellfish. Community composition is variable and complex. Habitats range from low wave energy eelgrass beds at the existing facility to more heterogeneous mixed substrate, alga dominated communities and broad, sandy tideflats at Edwards Point.

Marine Flora and Fauna

The array of marine habitats at Edwards Point and the existing terminal support a diverse, complex food web. Eelgrass beds and algal communities provide food and habitat for numerous benthic and epibenthic organisms. These communities attract and support other higher life forms such as salmon, shellfish, rockfish, waterfowl, shorebirds and a multitude of other animals. A list of characteristic flora and fauna dependent on these habitats is presented in the appended existing conditions report (See Appendix A). The intertidal and subtidal habitats at Edwards Point and the existing terminal are very important breeding, feeding, and rearing areas for commercially and economically important fish and shellfish (e.g., salmon, sole, Dungeness crab, etc.).

Navigation Feasibility Analysis

The navigation analysis for the existing ferry terminal and the proposed Point Edwards site is presented in the report "Edmonds Ferry Terminal Navigational Feasibility Analysis - Wind and Wave Affects on Berthing at Point Edwards" (see Appendix B).

The majority of storms in the Puget Sound region have winds that approach from the south. The existing terminal is protected by the Port of Edmonds breakwaters and Edwards Point from southerly storms. A docking facility located at Edwards Point would not be protected from southerly storms. An unprotected terminal located at Edwards Point would be subject to more frequent interruption of service due to storm conditions than a terminal located north of the Port of Edmonds. Northerly storms would have relatively the same effects on operations at either location.

In order to determine the impacts of storms on ferry operations, meteorological information was researched from Paine Field and Sea-Tac Airport for the period of 1980 to 1990. Occurrences of storms with high winds were correlated with disruptions to ferry operations based on information in the Pilot House logs from the Edmonds-Kingston and Mukilteo-Clinton routes. A threshold value for wind speed was determined that impacted ferry operations. Short-term differences in wind speeds between the Edwards Point site and the existing terminal were obtained from a University of Washington research project.

Based on statistical meteorological data, wave hindcasting was performed for the Edmonds coastline. Based on wave refraction diagrams, differences in wave heights between the two locations were obtained. The impact of high waves on ferry operations was estimated based on accounts in the Pilot House logs. Because wind and waves are complex and interactive, it is difficult to distinguish the relative effects of wind and waves.

Due to the exposed location, it was determined that operations at Edwards Point would be impacted an additional five to six times per year. An impact is when operations are curtailed for one or more runs, and does not necessarily mean the loss of an entire day of operations. In order to provide the same level of operations that exist at the current terminal site, protection from waves and high winds is necessary. A breakwater would protect the docking facility from southerly waves. A slip oriented into the wind would be required to provide acceptable docking conditions during periods of high southerly winds. The interruption to service due to the less frequent northerly storms would be similar to the existing site.

The mooring slips would be located approximately 940 feet offshore. Because of adequate depths at this point, no dredging or filling would be required at the Edwards Point site. Because of the greater depths at this location, less economical construction techniques will be necessary.

Future Facility Requirements

Forecasted Growth/Demand

The Edmonds-Kingston route has experienced steadily increasing ridership since 1981. This trend is predicted to continue. According to the West Corridor Study developed by the Puget Sound Council of Governments (PSCOG), the average daily vehicle traffic for the summer season for the year 2000 on the Edmonds-Kingston route will be 8,640. This is a 79% increase from 1987. The PSCOG has predicted an annual ferry ridership of 5.95 million in the year 2020, more than double the ridership of 2.9 million in 1990. (Ridership represents the total number of people using the ferry, and thus includes not only drivers but also vehicle passengers, bicyclists and pedestrians).

The Edmonds-Kingston route is predicted to be the fastest growing route in the state. The Mukilteo-Clinton is predicted to be the next fastest growing, increasing 46% from 1987 to the year 2000. According to the report, the Edmonds-Kingston route is predicted to be the second most traveled ferry route in the year 2000.

The 1990 Cross-Sound Analysis Report by PSCOG recommends the assignment of two Jumbo ferries and one Issaquah Class ferry for operation at the terminal in the year 2000. The jumbo ferries provide service for 206 cars, while the Issaquah class provides service for 100 cars. With these three ferries in operation on the route, the average daily capacity would be 12,290 vehicles. Based on the predicted average daily traffic volume of 8,640 vehicles, this would correspond to 70% of full capacity on average.

The "Summary of Proposed Six Year Auto Vessel Service Plan" from Admiral Parker to the Joint Subcommittee on Marine Transportation, contains an outline of the proposed service increase for the Edmonds-Kingston route for the years 1991 to 1997. The plan calls for several interim service improvements culminating with the route being served by one 206-car Jumbo class and one 160-car Super class vessel by the end of fiscal year 1997.

If an accelerated Jumbo class construction program were to be implemented, the 160-car Super class ferry would be replaced by a Jumbo class ferry in 1996 rather than 1997. During Fiscal Year 1997, a 160-car Super class vessel would be replaced with a 206-car Jumbo class vessel and the 100-car Evergreen State class vessel would be added for the summer season only. The memo states that "this is a significant increase in vessel

capacity and assumes that terminal improvements have been implemented to take full advantage of the increased capacity." Implementation of the accelerated Jumbo class construction program has not yet been authorized by the Legislature, and the implementation schedule anticipated in the memo will not be achieved.

In light of the dramatically heightened awareness of transportation demand management measures in recent years, coupled with significantly increased funding for transit and vanpool service, it is likely that transit and other HOV use will grow substantially. No detailed forecast of future travel demand and mode of travel was performed as part of this study. However, it was assumed that all new facilities would include specific measures to enhance usage by HOV's, including transit, vanpools and carpools. Specific provisions for enhanced pedestrian, bicycle and drop-off (kiss-n-ride) use were also assumed.

City of Edmonds Issues

In preparation for the examination of alternative concepts for the relocation of the ferry terminal facility, various issues were examined to gauge how alternative sites could better serve the community. Issues identified early on included:

- Safety issues associated with BNRR/Automobile conflict at Main Street
- BNRR barrier to waterfront access
- View obstruction associated with automobile overpass of BNRR
- View obstruction associated with elevated pedestrian loading
- Limits to business district expansion
- Holding lanes creating barrier between business areas
- Dayton Avenue "Choke point" for marina access
- Wetlands preservation
- Marine park preservation
- Marine habitat preservation
- Cost effectiveness of solutions
- Opportunity for transit and intermodal connections

Major issues for the City of Edmonds included overall incorporation of waterfront and downtown commercial districts, maximum preservation of view corridors, provision for public waterfront access and amenities, consolidation of waterfront district, expansion of commercial district, circulation, safety, reduction/elimination of congestion in downtown area, noise and lighting issues, architectural integration of facility, and conformance to local plans, policies, programs and the overall quality of life in Edmonds.

Burlington Northern Railroad

The Burlington Northern rail line connects northern service areas, i.e., Everett, Bellingham, and Vancouver to Seattle and points south. This rail line is a single-track facility carrying freight and Amtrak passenger service. At Edmonds, the rail route parallelling the shoreline separates the ferry terminal and other waterfront facilities from the rest of Edmonds and vehicular access routes to the east.

The two vehicular crossing points over Burlington Northern tracks are at Main Street and at Dayton Avenue. Additional at-grade crossing locations were explored during the alternative site location phase of the study. A third crossing has been discussed with the Port of Edmonds and BNRR at the southern portion of the marina facility to provide emergency vehicle access. BNRR has been reluctant to approve additional crossing points, in particular south of the existing location, because of the lack of sight distance for north bound trains as they round the bluff at Edwards Point. During the study, no direct discussions were pursued with BNRR concerning additional rail crossings specifically for ferry terminal access.

The speed of the trains through Edmonds is a concern to many of the study participants. In Cincinnati, a major park composed of waterfalls, ponds, and grass areas is separated from the riverfront facilities (football/baseball stadium, concert hall, waterside promenade) by a railroad line. The rail line is not a major disruption of the pedestrian flow between the park and the riverfront even though the line is used during the times of peak pedestrian park usage. A major difference between the Cincinnati experience and the Edmonds situation is how fast the trains pass through these districts. The Edmonds trains travel much faster than the trains going five to ten miles per hour in Cincinnati.

View Obstruction

The existing ferry facilities are at the foot of Main Street, which, after bending at the "roundabout" at the intersection of 5th Avenue, provides a significant vista to Puget Sound and the Olympic Mountains on the clear horizon. As the observer approaches the ferry terminal facilities, Main Street descends and the view of the Sound is obscured by overhead wires, overhead lights, light poles, and directional signage. At the intersection of Main Street and Sunset, the observer has descended to a point where the height of a ferry docked at the end of the terminal obscures the horizon.

Concern about improvements to the ferry terminal is focused on overhead structures that may accommodate pedestrian loading or vehicular overpasses clearing the Burlington Northern rails. Hewitt-Isley developed view studies for Washington State Ferries in 1989 that superimposed overhead pedestrian loading structures at the existing ferry terminal.

View locations across and up and down Puget Sound from Edmonds were discussed during the relocation study process. View obstruction studies were prepared by Hewitt-Isley for two of the alternate locations. In these simulations, the view points were from the public beach access points: Olympic Beach and Brackett's Landing, Figure 11 and Figure 12. These points were probably "worst case" situations, and the larger view of the water from higher elevations will minimize the view impacts of the terminal and any future overhead structures.

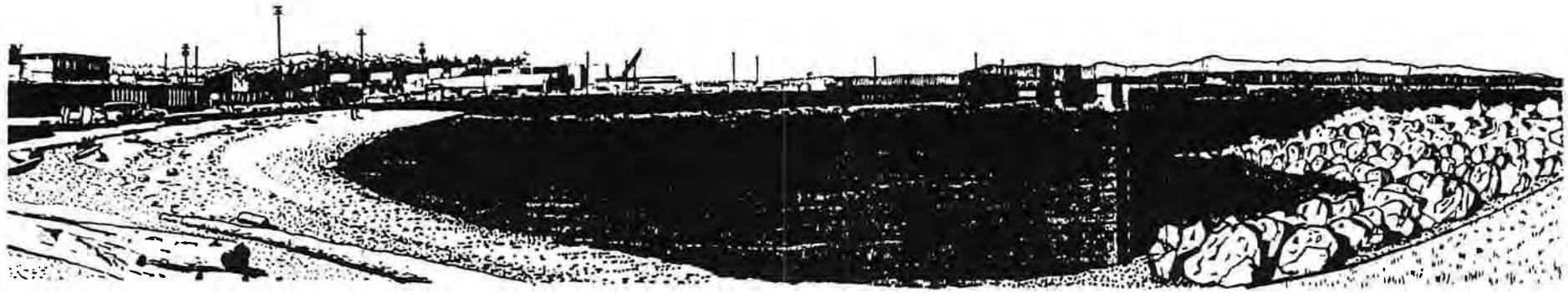
View points, view values and obstructions are part of the "eye of the beholder." Some participants in the view discussion felt that the ferry itself, at the foot of Main Street was a view obstruction of the more valuable vista of the water and Olympic Mountains. Others felt that the ferry itself was a positive element in the viewshed and cited the fact that the City of Edmonds logo includes the ferry as a central theme.

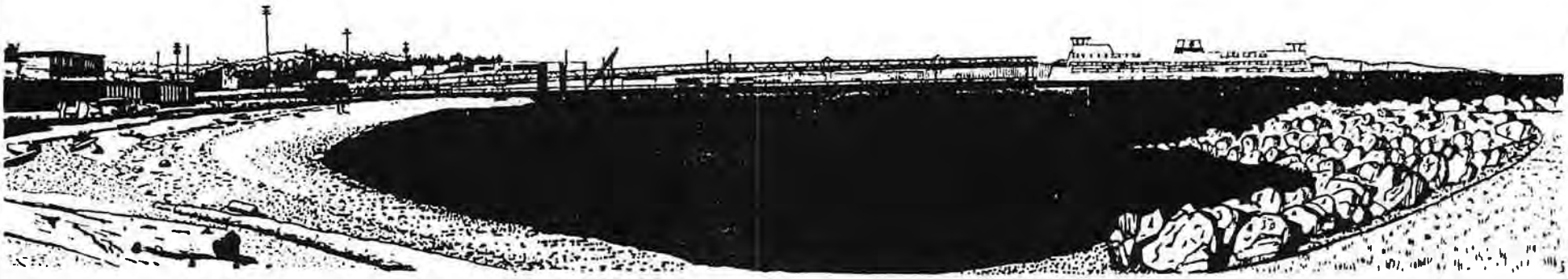
Business District

The expansion and integration of the waterfront commercial district, the middle business area, and the Edmonds Central Business District are limited by the Burlington Northern Railroad and the alignment of SR 104. In addition to the access lanes to the ferry, the landside vehicle holding area that parallels the roadway is five lanes wide from Dayton Avenue to Main Street. The roadway and these holding lanes separate the buildings of the Central Business District from the Safeway/Goldies complex by parking along the buildings to the east, approximately 120 feet of right-of-way, and an additional 120 feet of parking at the Safeway/Goldies site. The subjective perception of this distance is aggravated by the layers of standing or moving cars, and additional separating elements such as striping, curb lines, and tree lines. Because of this separation and the building form of the Safeway/Goldies complex (an isolated building surrounded by parking), the perception is less that of a city separated by a roadway, but more of a city center on the east and a remote building on the west.

The Harbor Square complex, like the Safeway/Goldies development is perceived to be detached from the city center. With the main automobile access points from Dayton Avenue, the development has no direct traffic link to the CBD. The wetlands to the south, the new waste water treatment plant, and additional wetlands to the west reinforce the sense that the Harbor Square complex is more focused to Dayton Avenue than to the businesses on 2nd and 3rd Streets.

The present routing of ferry traffic aggravates the separation of these business areas - both functionally and visually. An elevated roadway would be a more emphatic visual separation. A depressed roadway or tunnel would avoid the visual separation. The provisions of a depressed roadway could take many forms, from a completely enclosed tunnel, to an open cut with sloping, landscaped side embankments. The completely enclosed tunnel would be an extremely expensive solution and provide a terrible

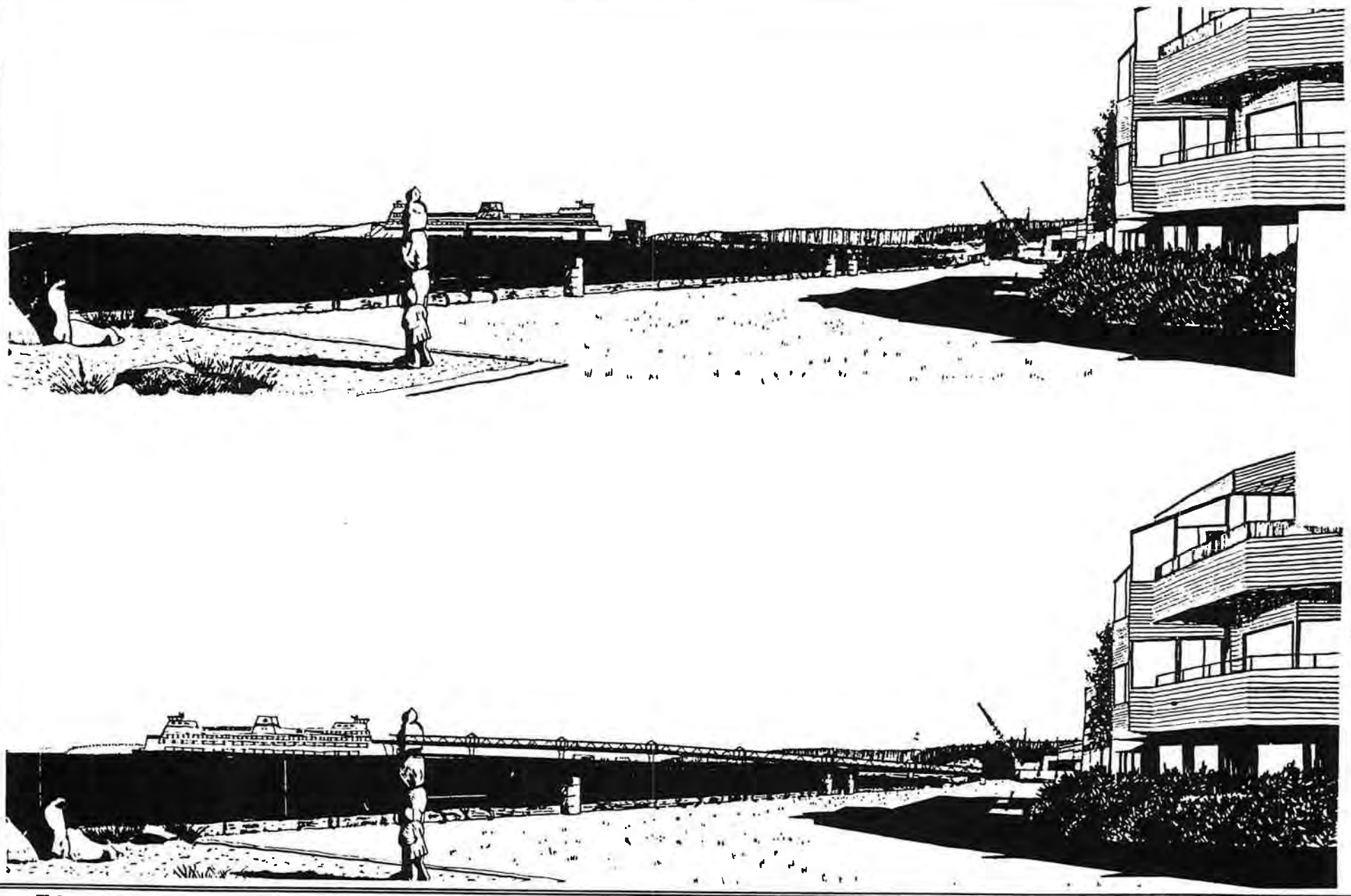




Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

VIEW IMPACT FROM BRACKETTS LANDING

FIGURE 11



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

VIEW IMPACT FROM OLYMPIC PARK

FIGURE 12

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environment for ferry users waiting to load, but would allow integration of the waterfront commercial areas, the intermediate business complex, and the central business district. An open cut depressed roadway would require that more land area be devoted to ferry access, but would also offer a lower cost solution that could be made much more attractive to both ferry users and the general public. While it is true that new buildings could be constructed over the top of a fully enclosed tunnel, is doubtful that such construction would be economically justifiable due to zoning restrictions on maximum building height.

Relocation of the SR 104 alignment to the south to serve a facility at the UNOCAL site would allow the vacation of the holding lanes, eliminate the intersection conflicts between local traffic and ferry traffic at Dayton Avenue and Main, and remove the higher speed exiting ferry traffic from the central portion of Edmonds. The holding lanes could be redeveloped into commercial facilities, tree lined parking areas, or park promenades.

Wetlands Preservations

The wetlands south of Harbor Square were probably tidelands that gradually silted up after landfill operations to provide a roadbed for the railroad and sites for early shingle mills. The wetlands, as described earlier, are a rich and valuable habitat. Routing ferry traffic through the wetlands, or providing additional holding lanes in this area would require filling or removal of wetland areas. A depressed roadway would require removal of some of the wetlands as the descent to clear Dayton Avenue would necessarily begin approximately 800 to 900 feet south of Dayton Avenue.

An elevated roadway over the wetlands would not result in loss of wetlands, and in fact would provide some shading to reduce water temperatures in the summer seasons. Current regulations would mandate that contaminants from the elevated roadway (such as oil residue and friable brake pad material) that washed off the roadway during rains would be collected in drainage systems and discharged to appropriate treatment systems.

Ferry Operations Issues

Major ferry operations issues identified during the study included provision for efficient loading and unloading ("throughput" of traffic and separation of modes), uninterrupted service, provisions for a secured paid area, required level of staffing, and time to implement a new facility.

Efficient Loading/Unloading and Passenger/Vehicle Separation

At the existing Edmonds terminal, foot passengers load across the vehicle ramp. Currently pedestrian and vehicle loading cannot occur at the same time due to safety considerations. The current mix of walk-on passengers and vehicles on the auto deck level often requires a

three-stage loading sequence as passengers walk on, vehicles load, and then a last group of pedestrians board the ferry.

This inefficient loading sequence is aggravated by the lack of adequate holding capacity for a full vessel load of autos. Because some of the autos must wait east of the BNRR tracks, it is not uncommon for loading to be interrupted by passage of a train.

A major goal of the ferry system is to separate vehicular and pedestrian traffic, so that both can load and unload simultaneously. This is accommodated by provision of overhead pedestrian loading, which allows passengers to enter directly on the passenger deck of the vessel. This method also accommodates disabled passengers.

Improved loading times have the potential to decrease the cost of service per passenger, since vessels can operate on shorter headways due to decreased turnaround times.

Uninterrupted Service

Three major causes of interrupted service in ferry operations are storm conditions, a physical, mechanical, or electrical failure of the docking system, and interruption of loading/unloading vehicles by trains.

The current mooring facility provides sufficient protection for mooring in all but the worst storms. Any future terminal is required to provide the same number of operable days and if possible to reduce the shutdown time for ferry operations due to storm conditions.

A desired requirement for ferry operations is a second or backup slip that would provide an emergency docking facility in the case of physical, mechanical, or electrical breakdown of the primary slip. The need for such a slip was dramatically illustrated at Edmonds on October 30, 1991, when a mechanical failure in the transfer span required that service be shut down for more than eight hours. During the shut down period, significant delays were experienced in cross-sound ferry traffic.

As noted above, ferry loading is often interrupted as trains pass through Edmonds. The average turnaround time for a ferry to dock, off-load, reload, and leave is ten minutes. When a train passes Main Street the average time from the engine to the end of the train is 3 to 6 minutes. Approximately two passenger trains and forty cargo trains pass through Edmonds in an average twenty-four hour period.

Secured Paid Area

A secured paid area is an essential element of revenue control for the Washington State Ferry System. The current situation at Edmonds is far from ideal, because drivers and passengers are free to wander in and out of the fare-paid parking area. Extra staffing is required to control access to the vessel, in an effort to ensure that all persons entering the

ferry have actually paid a fare. Any new terminal design would incorporate a clearly defined secured paid area, with provision for controlled egress and reentry by waiting passengers.

Required Level of Staffing

At present, staffing levels and related costs are higher than desirable at Edmonds due to the manner in which the facility functions. In addition to multiple fare collection points, it is necessary to use several employees, especially during peak travel periods, to control both ferry and general traffic at the intersections of Main and Sunset and SR 104 and Dayton. In some cases, City of Edmonds police personnel are also used to control traffic.

Any new terminal would ideally function in a manner that would minimize overall staffing.

Timing for Implementation

The amount of time needed to implement new facilities at Edmonds is of particular concern to Washington State Ferries because the existing facility is experiencing significant structural deterioration, requiring relatively expensive repairs. It is vital for the WSDOT to plan such repairs in a way that they will allow continued operations until a new facility is in place, but not require a level of investment that cannot be justified over the remaining operation life of the existing facility.

Safety

Safety issues are also a concern with the intersection of a rail crossing and the loading/unloading route for the ferry. Because of the speed and frequency of the trains that pass through Edmonds, and the volume of vehicle and pedestrian traffic to and from the ferry and waterfront, the intersection at the upland end of the ferry dock is unsafe. Because of the numerous activities near the intersection and the various agencies involved with these activities the liability issue for accidents at this intersection is unclear.

Ferry System Issues

Several major policy issues will affect the WSDOT approach to dealing with the Edmonds ferry terminal. These include cost, the decision process, manner in which unacceptable solutions are dealt with, and the project's relationship to the Washington State Ferries Capital Facilities Plan.

At present, the WSDOT has programmed approximately $15,000,000 for long range improvements to the Edmonds ferry terminal. It appears unlikely that any alternative that satisfies a majority of the selected criteria can be constructed for the programmed amount. Thus, implementation of any facility will require additional funding from sources that have

not yet been identified. Further, it will have to be determined that the project has a sufficiently high priority, when compared to other projects, to justify expenditure of limited public funds. The final decision on investment in a capital facility of this magnitude will involve the WSDOT staff, the Washington State Transportation Commission, and the Legislature.

In order for the project to be implemented, it will be necessary for the City of Edmonds and WSDOT to reach agreement where each parties' most important criteria can be satisfied without compromising the others' wishes. In other words, to achieve a "win-win" situation, each entity must be prepared to make some concessions to the other.

Regional Transportation Issues

The Edmonds ferry terminal is a key facility in the regional transportation network. The ferry is the crucial water link of SR 104, which connects the areas near Kenmore on the Lake Washington shoreline to the Olympic Peninsula. From its eastern intersection with SR 522 near Lake Washington, SR 104 runs west to Edmonds and proceeds across Puget Sound via ferry to Kingston. From the Kingston ferry terminal, the road crosses the Kitsap Peninsula to Hood Canal where the floating bridge links the Kitsap Peninsula to the Olympic Peninsula. SR 104 ends at the intersection with Highway 101 near the southern reach of Discovery Bay. This east-west route carries many commuter trips and also a significant portion of recreational trips to and from the Olympic Peninsula. The average daily traffic counts increase significantly in the summer months, which has been referred to as extending from President's Day to Thanksgiving.

In March 1989, PSCOG published the "West Corridor Study." The West Corridor Project evaluated cross-Sound travel in central Puget Sound through the year 2020, considered alternatives for expanding passenger service, and looked at changes in terminal design that will be needed to accommodate the increasing role that is seen for transit in the corridor. SR 104, which includes the Edmonds-Kingston ferry route, is a major east-west transportation corridor in the Western Washington region. It has the third highest daily volume of traffic and is the fastest growing route in the state.

Any new ferry terminal constructed in Edmonds will be a major regional transportation facility serving the region for many years. It must be planned and designed with sufficient capacity to accommodate foreseeable growth, while preserving the ability to serve changes in travel patterns such as vastly increased use of transit and other high occupancy vehicles.

Although passenger-only ferry service to Edmonds has been discussed in several reports, it was not considered in detail as part of this study.

Alternatives

Initial Alternatives

Various initial alternatives were proposed for upland access routes to several terminal locations (see Figure 13).

In initially analyzing the potential sites for relocating the ferry facilities, the waterfront was examined from the existing site in the northern extreme to the UNOCAL property in the south - a length of approximately 4000 feet. The location of the docking facility/terminal was restricted to south of the existing Brackett's Landing Marine Park to Edwards Point, mainly due to required accessibility from SR 104. The waterfront location of the facility was further limited by existing development including the Port of Edmonds.

The shoreline between Main Street and Dayton Avenue is approximately 1,300 feet long and the Port of Edmonds facilities use 2,400 feet of shoreline between Dayton Avenue and the UNOCAL site. In searching for possible relocation sites, consideration was given to waterfront property ownership, parcel size, Burlington Northern crossing issues, landside access and landside property required for terminal access, wetlands, business and local access impacts.

The Port of Edmonds facility was discussed as a possible relocation site, but the value of the shoreside and waterside improvements, and potential encumbrance of marina access from the water proved to be difficult issues to solve. The search for relocation sites was narrowed to the length of waterfront between the existing terminal and Dayton Avenue, plus the UNOCAL site. Between the existing site and the north Port of Edmonds breakwater, five parcels were identified: Anderson Marine, the Regency office building, the senior center, the Ebb Tide condominium complex, and the office buildings at Dayton Avenue Beach. The other location available for a docking facility was south of the Port of Edmonds at the UNOCAL site at Edwards Point.

Ferry Dock Access/BNRR Crossing

A major project issue is the safety concern and the interruption of traffic flow caused by the crossing of the railroad tracks by ferry vehicles and pedestrian passengers. In considering the Burlington Northern crossing issue, three concepts emerged to facilitate the loading of a Super class ferry: 1) elevated automobile access over BNRR, 2) depressed

Alternate Concepts: Ferry Loading

Alternate 1:
Elevated access over
BNRR at Main Street

Alternate 2:
Grade crossing at Main Street
with waterside holding lanes

Alternate 2a:
Grade Crossing at Dayton Avenue
with holding at Anderson Marine

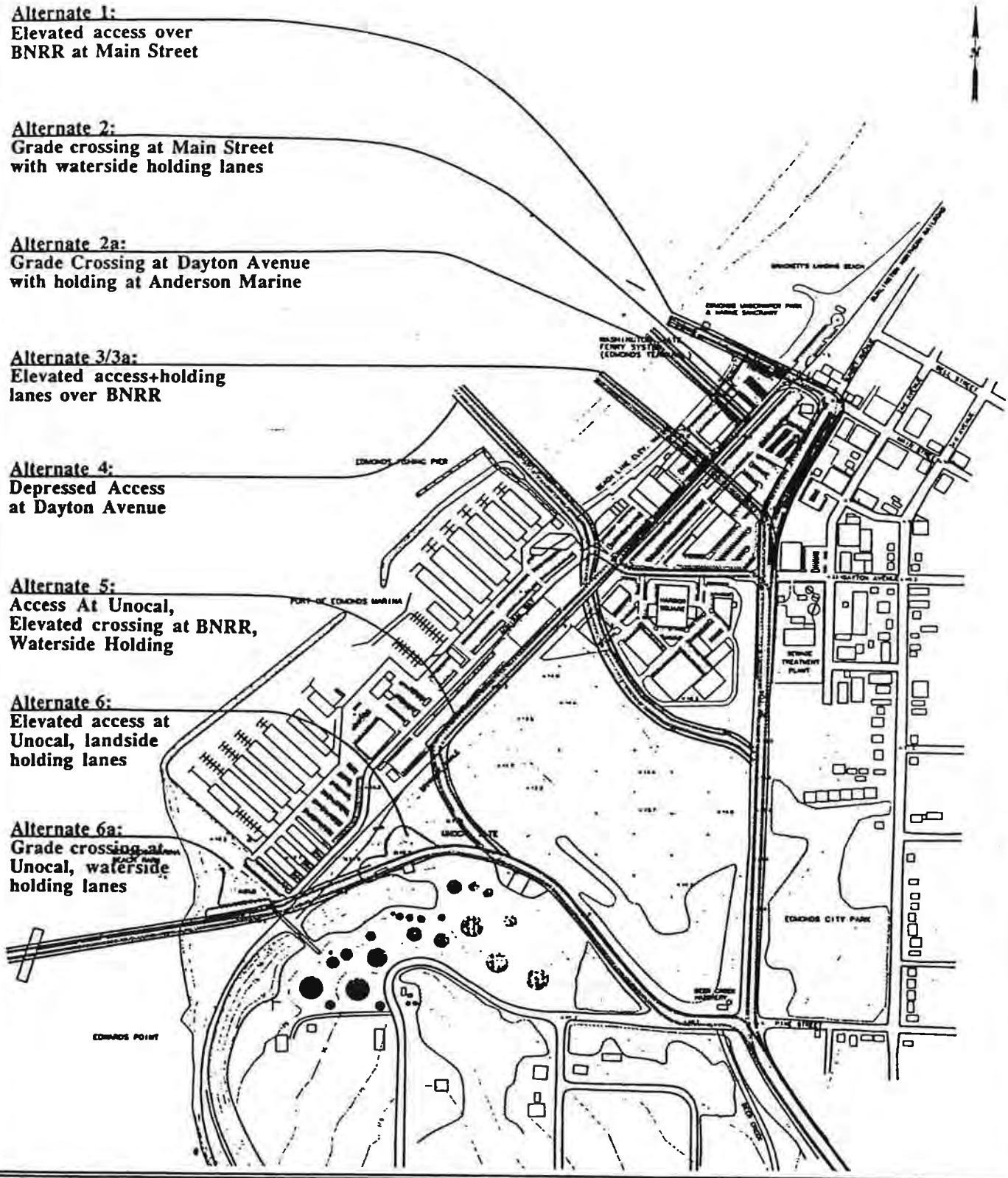
Alternate 3/3a:
Elevated access+holding
lanes over BNRR

Alternate 4:
Depressed Access
at Dayton Avenue

Alternate 5:
Access At Unocal,
Elevated crossing at BNRR,
Waterside Holding

Alternate 6:
Elevated access at
Unocal, landside
holding lanes

Alternate 6a:
Grade crossing at
Unocal, waterside
holding lanes



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis	**ALTERNATE CONCEPTS**
	FIGURE 13
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access under BNRR, or 3) the provision of adequate holding area (160 automobiles) waterside of the BNRR tracks. These options were investigated for the various feasible locations of the docking facility.

At-Grade Crossing

There are two at-grade crossings of the railroad in the downtown Edmonds area, at Main Street, and Dayton Avenue. Main Street provides access to the existing Ferry Terminal, Brackett's Landing Park, and commercial and residential facilities along Railroad Avenue. The Dayton Avenue crossing also serves commercial businesses along Railroad Avenue as well as Admiral Way, and is the only upland access to the Port of Edmonds. Because of limited access and limited land area with a concentration of commercial, residential, and recreational facilities, both crossings as well as Railroad Avenue are frequently congested.

The two main concerns regarding the railroad crossing are safety and interruption of loading. Safety at an at-grade crossing can be improved with signalization and warning equipment, but the potential for train/vehicle and train/pedestrian conflicts cannot be eliminated. In order to prevent interruption of ferry loading by the passing of a train, there must be a facility on the west side of the railroad that has the holding capacity for a full ferry load or approximately 160 cars. This would be feasible in two areas, along Railroad Avenue, and on the Anderson Marine property. All other locations along the waterfront at Edmonds are substantial commercial developments, dedicated public park facilities, or lack the required area.

Alternative routes with an at-grade crossing of the railroad were analyzed. It is possible to utilize the existing crossing at Main Street for a terminal located at the existing site or at the Anderson Marine site. The existing crossing or a crossing at Dayton Avenue could also be used with a terminal located at the senior center or further south with holding lanes along Railroad Avenue on the terminal side of the tracks. Various vehicle access routes were analyzed which utilized an existing crossing of the tracks with holding lanes along Railroad Avenue. Railroad Avenue is a two lane street with a single parking lane on the west side. Because of the existing congestion on Railroad Avenue between Dayton Avenue and Main Streets, and the importance of the Dayton Avenue/Railroad Avenue/Admiral Way intersection as the single access point to the Port of Edmonds, it was determined that holding lanes along Railroad Avenue were not desirable.

An at-grade crossing of the railroad tracks at Edwards Point would not be feasible due to the requirements for allowable sight distance for train operations. The Port of Edmonds has discussed a crossing at the southern portion of the marina facility to provide emergency vehicle access with BNRR. BNRR has been reluctant to approve additional crossing points, in particular south of the existing Dayton Avenue location, because of the lack of sight distance for north bound trains as they sweep around the bluff at Point Edwards. During the study, no direct discussions were pursued with BNRR concerning

additional rail crossings specifically for ferry terminal access. While it is most likely not feasible to have the egress and holding lanes crossing the tracks at-grade at Edwards Point, it may be possible to have an at-grade emergency crossing for Port and ferry terminal access.

Elevated Crossing of BNRR Tracks

Overhead crossing of the railroad tracks was examined as an alternative that would eliminate the vehicle/train and pedestrian/train safety and loading conflicts. Various overhead loading routes to the feasible docking locations were analyzed.

The design criteria used for the grades of the ascending or descending roadways were developed from highway standards, railroad clearance standards, and the experience of the Washington State Ferry engineers. The clearance requirement for a structure over a railroad is 23 feet 6 inches from the track to the bottom of the structure supporting the approach roadway. In evaluating alternatives, the elevated roadways presented two issues: how to achieve the required clearance at the railroad, and how to descend down to the ferry dock elevation in the distance available between the tracks and the dock.

The distances required for the ascending/descending roads were a function of the clearance and allowable slopes of the roadway. Because the roadway may be used to stack vehicles waiting to load, highway grades were judged to be too steep. Passengers in waiting cars would be uncomfortable in vehicles resting at maximum allowable highway grades. The experience of the Washington State Ferry engineers suggested that a maximum allowable grade for the approach roads would be 3%.

Using a design dock elevation of +18 feet above mean lower low water, a rail track elevation of +16 feet, a roadway bridge structural depth of 8 feet, railroad clearance standards of 23 feet 6 inches and a grade of 3%, a distance of 933 feet would be required to descend from above the tracks to a dock at elevation +18. A roadway that begins to ascend near City Park along SR 104 would require approximately 920 linear feet of approach roadway to meet the clearance requirements at the center of the railroad tracks, based on an elevation of +20 feet for the beginning point of ascension along SR 104.

An overhead crossing of the BNRR tracks in the mid-waterfront area would require an elevated roadway that starts near City Park and reaches elevation +47 feet mean lower low water above the railroad tracks. This would be an extensive structure above the height limit of 30 feet established for the waterfront area. Because of the impact of view blockage by an overhead structure, the alternative for an overhead crossing in the mid-waterfront location was determined to be undesirable.

An overhead crossing of the railroad tracks at the Edwards Point site is feasible. Because of the topography in the area, the access lanes could follow the hillside at Edwards Point. Because of the bathymetry, the mooring facility would be located approximately 950 feet from the shore. This distance corresponds with the 930 feet required to descend from above the tracks to the deck level of +18 feet.

Depressed Crossing of the BNRR Tracks

The third way of crossing the railroad tracks is by an underpass or below-grade crossing. The clearance requirements for a below-grade crossing are based on highway clearances. The total distance required from the roadway to the bottom of the railroad support structure is 16 feet 6 inches. Allowing 8 feet for the depth of the track support structure, and a maximum allowable grade of 3%, a distance of 861 feet would be required from beneath the railroad tracks to a dock at elevation +18 feet mean lower low water.

A below-grade crossing of the railroad tracks would require special construction techniques. A large portion of the structure will be below the ground water table and will require dewatering. Because the shoreline is only 200 feet to 300 feet from the tracks, this solution would require retaining walls, or a tunnel section as the road passes the intertidal and low water lines.

Three feasible areas were analyzed for a below-grade crossing in the mid-waterfront area: 1) the park-n-ride lot and Anderson Marine, 2) Safeway and the Senior Center, and 3) south of Harbor Square to Dayton Avenue Beach. In all cases, the roadway would begin descending along SR 104 near Pine Street, and pass under Dayton Avenue and SR 104. Approximately 950 feet would be required to reach the required elevation beneath the center of the BNRR track, based on an elevation of +20 feet at SR 104. Because of clearance requirements under Dayton Avenue, the roadway is required to start descending 950 feet south of the intersection of Dayton Avenue and SR 104 near Edmonds City Park.

The depressed roadway could take many forms, from a completely enclosed tunnel, to an open cut with sloping, landscaped side embankments. In any case, traffic on Dayton Avenue and Main Street would be unencumbered by ferry traffic.

An underpass is feasible at the Edwards Point site. However, it would be less economical and less environmentally sensitive than an overpass at the site. Thus, an underpass at the Edwards Point site was not considered as a preferred alternative.

Alternative Site Locations and Loading Concepts

Through initial discussion, ten site concepts were developed. The ten concepts below sometimes use different loading methods on the same site. The five feasible sites were determined to be the existing facility at Main Street, Anderson Marine, the senior center,

the Dayton Avenue Beach site, and the UNOCAL site. The different sites and the loading/unloading configurations are listed below:

Site Alternative 1 Terminal at the foot of Main Street with elevated access over BNRR at Main Street with holding areas at existing locations, but elevated

Site Alternative 2 Terminal at Anderson Marine with BNRR grade crossing at Main Street, with waterside holding areas at Anderson Marine

Site Alternative 2a Terminal at Anderson Marine with depressed access under BNRR

Site Alternative 2b Terminal at Anderson Marine with grade crossing at Dayton Avenue with waterside holding lanes at Anderson Marine

Site Alternative 3 Terminal at Senior Center with elevated access over BNRR tracks

Site Alternative 3a Terminal at Senior Center with depressed access under BNRR with landside holding areas at Safeway/Goldies

Site Alternative 4 Terminal at Dayton Avenue Beach with depressed access under BNRR at Dayton Avenue access south of Harbor Square

Site Alternative 5 Terminal at the foot of Main Street with grade crossing of BNRR at UNOCAL with waterside holding lanes at Anderson Marine

Site Alternative 6 Terminal at UNOCAL site with elevated access above BNRR at UNOCAL with landside Holding Lanes

Site Alternative 6a Terminal at UNOCAL site with grade crossing of BNRR at UNOCAL Waterside Holding Lanes

Refined Alternatives

During the site selection presentations and discussions at Technical Advisory and Policy Committee meetings, the pros and cons of the various alternatives were discussed. Alternatives in the central waterfront area (between Main Street and Dayton Avenue) that required elevated automobile access (Alternatives 1 and 3) were rejected due to view impacts. Alternative 2b was rejected because of the at-grade crossing conflict with BNRR and traffic congestion as Port of Edmonds and ferry traffic mix at Dayton Avenue. An at-grade crossing of the railroad at Edwards Point (Alternate 5 and 6a) was eliminated as an alternative because of the grade crossing conflict between loading automobiles and BNRR and the safety issues associated with the reduced sight distance as north-bound trains travel

around Edwards Point. The remaining alternatives (original alternatives 2, 2a, 3a, 4, and 6) were developed into more refined schemes and renumbered from north to south as:

Alternative A	The existing terminal and access/egress route
Alternative 1	An At-Grade Crossing of the BNRR Tracks at Main Street, with Waterside Holding Areas at Anderson Marine
Alternative 2	A Below-Grade Crossing of the BNRR Tracks at a "Central Waterfront" location
Alternative 3	An Above-Grade Crossing of the BNRR Tracks at UNOCAL, with Waterside Holding Lanes

These sites were used as the basis for preparing a conceptual site plan that could be evaluated using the criteria that follow in the "Evaluation of Alternatives" section of this report. While the sites and loading configurations chosen for refinement were strikingly different, several common features of the ferry terminal and the associated facilities were assumed for each site in order to provide concepts that were comparable for evaluation purposes. The common features provided in each alternative included were:

Pedestrian overhead loading
Unencumbered automobile loading
Park-and-ride facilities
Community Transit interface
Passenger facilities - waiting area, restrooms, etc.
Dedicated Transit/carpool lane

Alternative Ferry Terminal Concept 1 - Main Street Terminal
BNRR Grade Crossing at Main Street with Ferry Traffic Holding Area at Anderson Marine

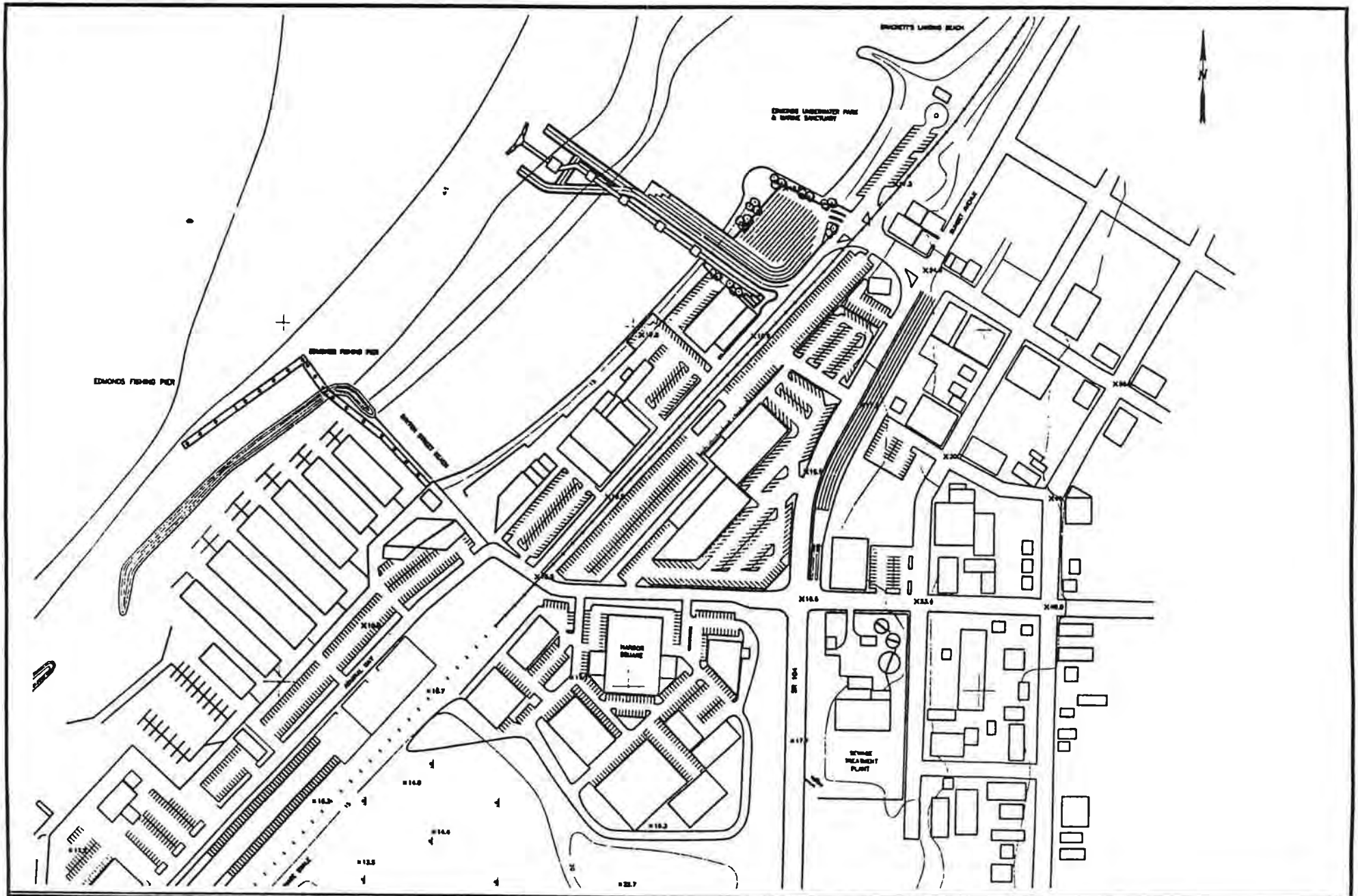
This alternative would require the purchase of the Anderson Marine property. A new docking facility with two moorage slips and an overhead passenger loading ramp would be constructed on the southern tidelands of the Anderson Marine property, Figure 14. Holding capacity for a 160-car Super class ferry would be provided on the Anderson Marine property and the existing terminal property. The pier portion of the existing facility would be demolished as part of the mitigation for the new docking facility.

Ferry Traffic Circulation

The access pattern to the terminal will essentially be the same as the existing situation. The ferry dock facility is rebuilt on the southern portion of the site, allowing uninterrupted ferry service on the existing facility during the construction phase. The acquisition of the Anderson Marine property allows a holding area that would provide, when combined with automobile lanes on the pier, space for approximately 275 cars. The exiting cars could either return to SR 104 from Main Street or be routed down Railroad Avenue to Dayton and thence to SR 104. Because the exiting cars must clear the vessel, before loading the Kingston bound traffic, the train traffic could conceivably block the full unloading of the ferry. For those situations where the unloading operation is blocked by a passing train, exiting autos could be stacked on the exit lanes of the pier, the portion of Railroad Avenue between the terminal and Main Street, and also, in overflow situations, rerouted south on Railroad Avenue to Dayton. If two lanes on Railroad Avenue were dedicated to exiting ferry traffic, approximately 165 cars (out of the Super Class capacity of 206) could be temporarily stored while the train passes. This concept requires removal of the parallel parking lane along the west side of Railroad Avenue, and reservation of that space for potential exiting ferry traffic. If only the existing south bound lane along Railroad Avenue is used for exiting ferry traffic, then 115 cars can be stored in this configuration while the train passes.

Community Transit Access

The Community Transit access pattern would be northbound on SR 104, west on Main Street and southbound on Railroad Avenue to the terminal. The pier can be designed with passenger waiting areas at the off-shore end of the dock, incorporating bus drop off at that location to minimize walking distance. Space restrictions at that end of the dock would influence the design of the pedestrian access to the overhead loading system from the end of pier drop off. The pedestrian access to the overhead loading system at the end of the pier would probably require either stairs in combination with a handicapped access elevator, or switchback ramp system designed to handicapped standards.



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

ALTERNATE 1 - ANDERSON MARINE

FIGURE 14

Private Vehicle Drop-Off
The passenger being dropped off from a private vehicle follows the Community Transit route, with the exception of the end of pier access, which would be restricted to Community Transit. The private vehicle drop off would be in a pull off curb cut on the south-bound lane of Railroad Avenue. From this point, the pedestrian can use the covered walkway ramp to ascend to the passenger overhead loading.

Park-and-Ride Passengers
Passengers using the Washington State Ferry park-and-ride lot south of Skipper's restaurant could cross the Burlington Northern right-of-way at a new marked pedestrian "safe" zone and arrive at the entrance to the covered walkway west of Railroad Avenue.

Public Beach Access
This concept would be an extension of the public waterfront from Brackett's Landing Park, to the existing, but to be abandoned, ferry bulkhead and then south to the new dock. This new public shoreline would add an additional 350 feet of public beach access.

Wetlands Preservation
This facility would not affect the wetlands any more or less than the existing situation.

Business District Impacts
This facility would not affect the business districts any more or less than the existing situation.

Alternative Ferry Terminal Concept 2 - Central Waterfront Terminal
Depressed Crossing at BNRR with Ferry Traffic Holding Area in Approach Lanes

The central waterfront alternative includes depressed access/egress lanes and a docking facility located between the existing site and the northern Port of Edmonds breakwater, Figure 15 and Figure 16. The docking facility would include two mooring slips. The feasible locations for the docking facility would be the south side of the Anderson Marine property, the senior center tidelands, or Dayton Avenue Beach tidelands.

Ferry Traffic Circulation

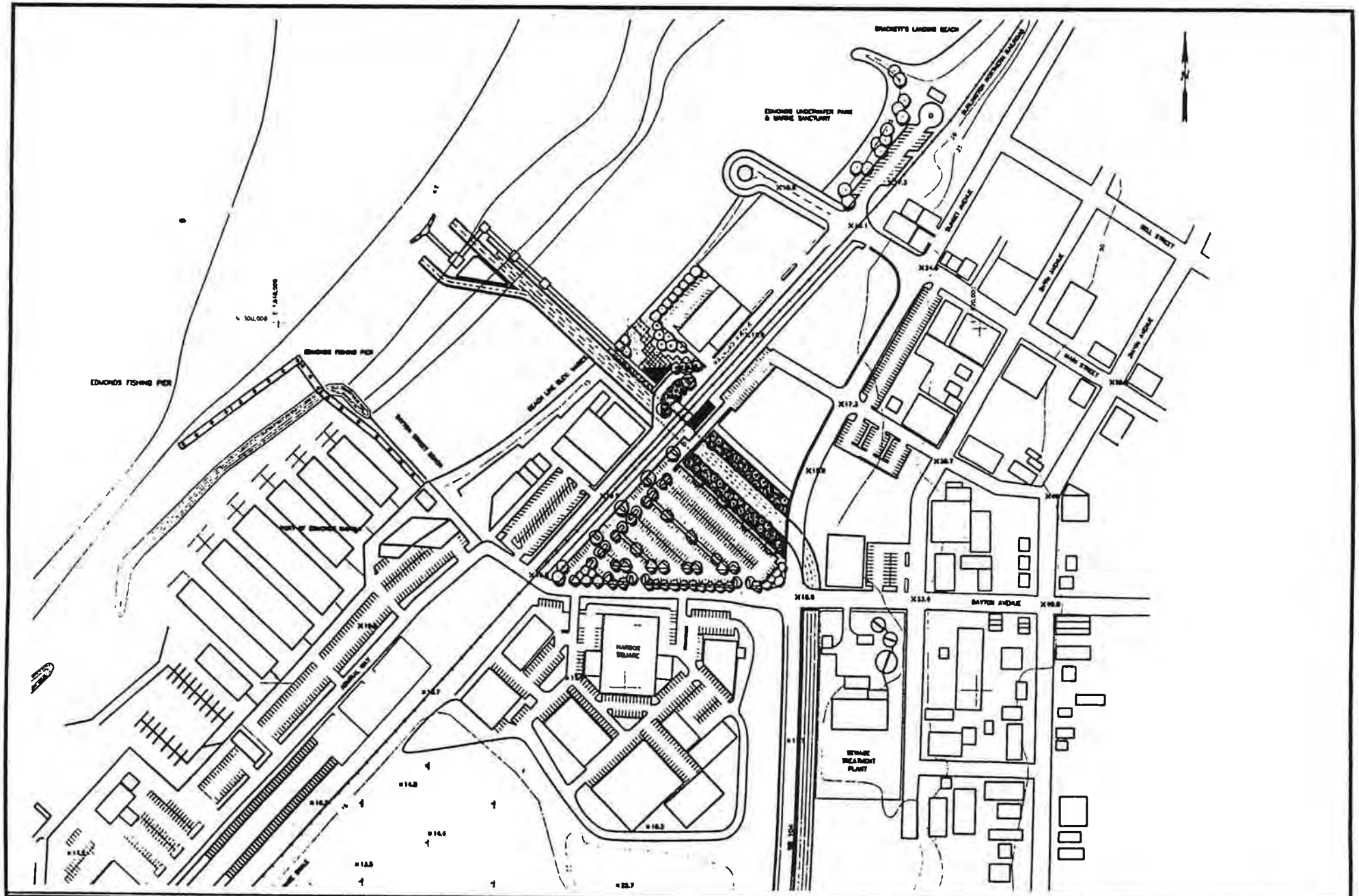
For a facility located at Anderson Marine or the senior center, the access lanes along SR 104 would begin to descend near Edmonds City Park south of Dayton Avenue. The roadway would pass under Dayton and turn west under SR 104. For a facility located at Dayton Avenue Beach, the access\egress lanes would pass south of Harbor Square and under Admiral Way. After passing under the railroad, the lanes would ascend to the elevation of the docking structure. The section of SR 104 past the access lanes would be downgraded to a local arterial.

The holding lanes are provided by expanding the number of approach lanes after the toll booth, similar in pattern to the existing situation. The holding lanes in this concept follow the grade of the approach lanes in order to clear the BNRR and Dayton Avenue. Between these points, the holding area is essentially flat. As described earlier, the maximum grade used in these roadways is 3%. The depressed holding area between the BNRR alignment and Dayton Avenue is uncovered and open to light and air. The embankments on either side of these holding lanes are sloped upward at a 1:3 ratio and landscaped to provide shade and visual interest to waiting passengers. After passing under the railroad tracks, the holding lanes ascend to the ferry dock height in a open cut with vertical walls. A pumping system will be required to remove storm water runoff from the depressed roadway. This will result in long-term operational and maintenance costs not encountered in the other alternatives.

Because the ferry dock facility is rebuilt at a remote site south of the existing facility, uninterrupted ferry service can be provided on the existing facility during the construction phase. Phasing of the access lanes to the new facility will be necessary to provide continuous service. Further design study is necessary for the access lanes south of Dayton Avenue to ensure the right-of-way configuration, the retaining wall system, and holding lane design is optimized to provide uninterrupted service with minimum impact to wetlands.

Community Transit Access

The Community Transit access pattern directly to the ferry would be north-bound on SR 104. The buses would enter the descending ferry terminal access roadway to the toll

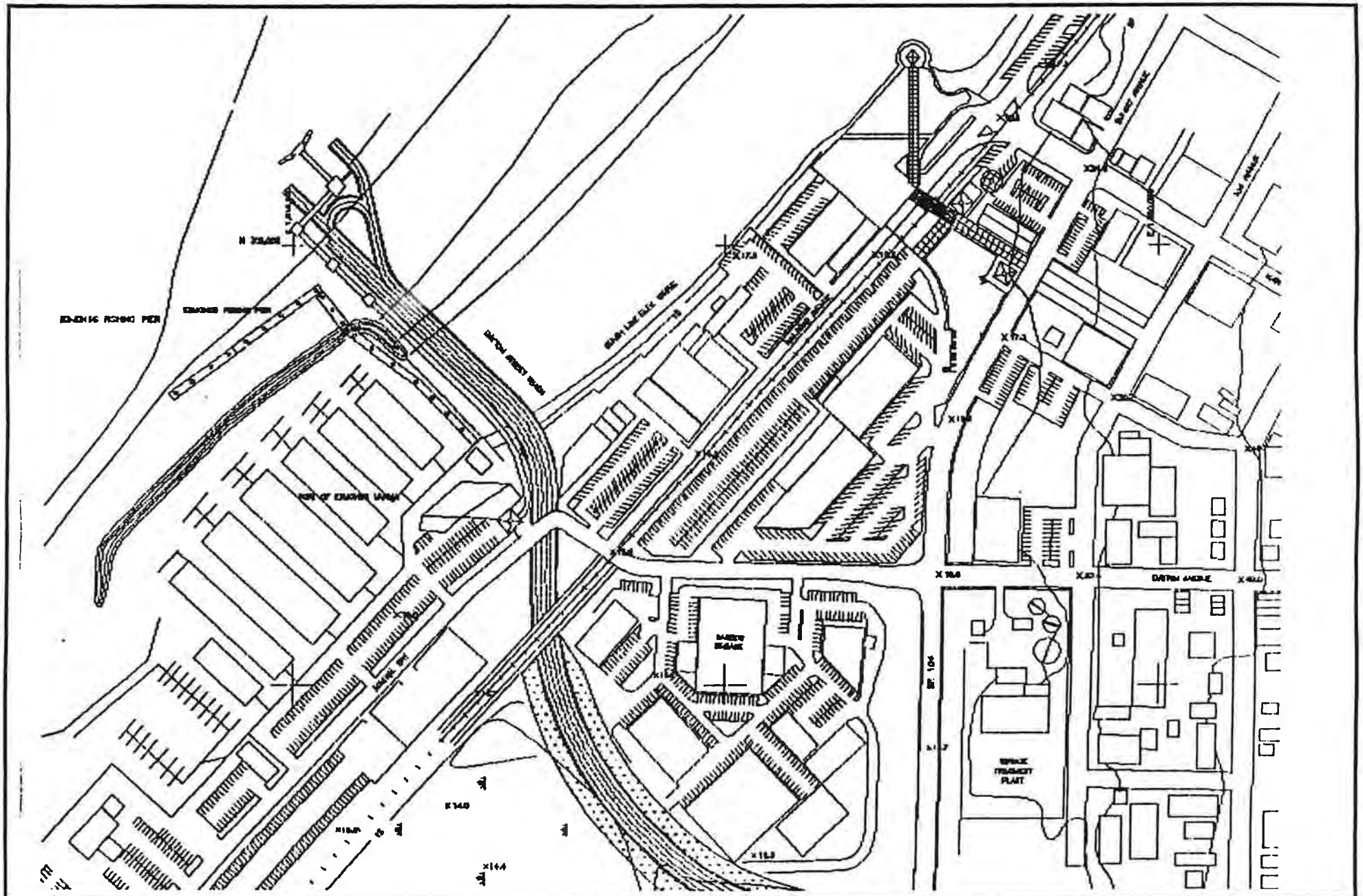


Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

ALTERNATE 2 - MID-WATERFRONT (SENIOR CENTER)

FIGURE 15

REID MIDDLETON *HEWITT- ISLEY* *HERRERA ENVIRONMENTAL CONSULTANTS* *2/92*



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

ALTERNATE 2 - MID-WATERFRONT (DAYTON AVENUE)

FIGURE 16

REID MIDDLETON *HEWITT- ISLEY* *HERRERA ENVIRONMENTAL CONSULTANTS* *2/92*

booths and then proceed to the end of pier drop-off pattern. Community Transit vehicles will use the ferry traffic exiting lanes in a contra flow pattern to get to the dock, and the right-hand exiting lane to leave the pier. As in the first alternative, the pier can be designed with passenger waiting areas at the off-shore end of the dock, incorporating a bus drop off at that location to minimize walking distance. Again, space restrictions at that end of dock would influence the design of the pedestrian access to the overhead loading system from the end of the pier drop-off. The pedestrian access to the overhead loading system at the end of the pier would probably require either stairs in combination with a handicapped access elevator, or switchback ramp system design for handicapped standards.

The local Community Transit route would dropoff and pickup passengers at a transit facility on the east side of the tracks just south of the depressed access lanes. Pedestrians would then pass over or under the tracks on a dedicated walkway. This would eliminate the need for buses to cross the railroad tracks, though Community Transit may also utilize Railroad Avenue as a drop-off point for pedestrians.

Private Vehicle Drop-Off

The passenger being dropped off from a private vehicle follows the Community Transit route on the east side of the tracks to the transit station or along Railroad Avenue. The private vehicle drop-off would be in a pull off curb cut on the south bound lane of Railroad Avenue. From this point, the pedestrian can use the covered walkway ramp to ascend to the passenger overhead loading.

Park-and-Ride Passengers

The location of the terminal, and the necessary acquisition of the Safeway/Goldies complex, would allow an expanded park-and-ride facility north of Dayton Avenue and between the Burlington Northern rail and SR 104. This facility, shared by rail and ferry users, will replace the 300 stalls now available to WSF and BNRR. Passengers using this new park-and-ride lot could cross the Burlington Northern right-of-way at a new marked pedestrian "safe" zone established between the Amtrak passenger station and the new ferry terminal facilities. The new ferry terminal building, located along Railroad Avenue, would incorporate the entrance to the covered walkway west of Railroad Avenue. If commuter service is established on this rail alignment, this facility has potential for an intermodal mix of ferry, bus, rail and private automobile traffic.

Public Beach Access

This concept would be an extension of the public waterfront from Brackett's Landing Park, to the existing, but to be abandoned, ferry bulkhead, and then south to the Anderson Marine property line. This new public shoreline would add an additional 300 feet of public beach access.

Wetlands Preservation

This facility will negatively affect the wetlands compared to the existing situation. The widening of approach lanes to accommodate the descending roadway as it passes under Dayton Avenue will require removal of wetland areas. The alternative south of Harbor Square may also require some removal of wetland area.

Business District Impacts

This alternative will positively affect the Edmonds central business district, in that the removal of the ferry traffic between Dayton and Main Street, the relocation of the existing WSF park-and-ride lots, and some reuse of the Goldies/Safeway parcel will allow redevelopment of the area between Anderson Marine and the CBD. Because the traffic is relocated and grade separated, the local traffic will not have nearly as many conflicts with ferry traffic.

The impact to the Safeway/Goldies complex is obvious. The impact to Harbor Square should be positive, as street traffic conflicts are reduced and the park-and-ride facility north of Dayton Avenue will provide customer exposure and access.

Alternative Ferry Terminal Concept 3 - UNOCAL Site Terminal
Elevated BNRR Crossing with Ferry Traffic Holding Area East of BNRR

Two schemes were prepared for the ferry terminal facilities at Edwards Point: 1) with the UNOCAL facilities remaining, but with an air rights lease to the ferry system for the approach road and holding lanes, Figure 17, and 2) with UNOCAL facilities removed, Figure 18. The schemes are differentiated by the land lease or fee simple purchase financial structures. These different transactions bear on the speed and cost of cleaning up the contaminants on the site.

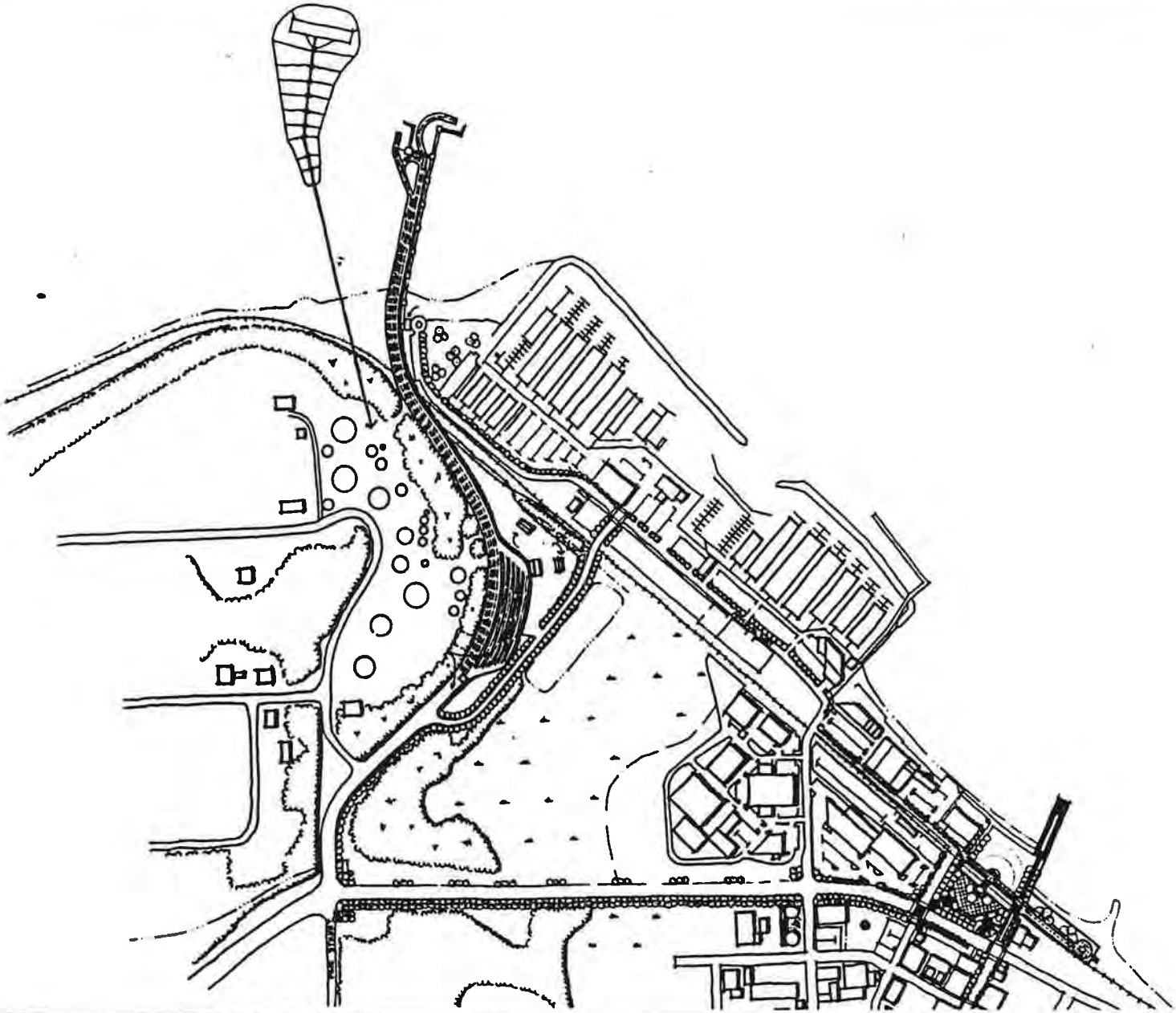
Ferry Traffic Circulation

The ferry traffic access pattern for both schemes will follow a relocated SR 104 that leads more directly to the ferry terminal. The new alignment of SR 104 can follow the contour line along the hill above the UNOCAL facilities and fly over the BNRR tracks at the location of the present tanker unloading pier. The use of the 50-foot contour will reduce the need for bridge structures on the landward side of the BNRR alignment. The descent from the elevation of the roadway at the BNRR will require a 3% grade and a length of approximately 900 feet past the track alignment to descend to the proper deck height. The shallowness of the water at this location requires a distance of approximately 1,200 feet from the rail tracks to get to water adequately deep for ferries.

The holding lanes for this scenario are on the approach lanes. After the ticket booths, the approach road is three lanes wide, which allows storage of 206 ticketed autos. Overflow holding lanes are located parallel to the approach/exiting lanes before the ticket booth. In the land lease concept, the holding lanes are sited on a deck structure using air rights over the UNOCAL facilities. In the fee simple purchase concept, the overflow holding lanes follow the natural contour lines down the hillside.

Community Transit Access

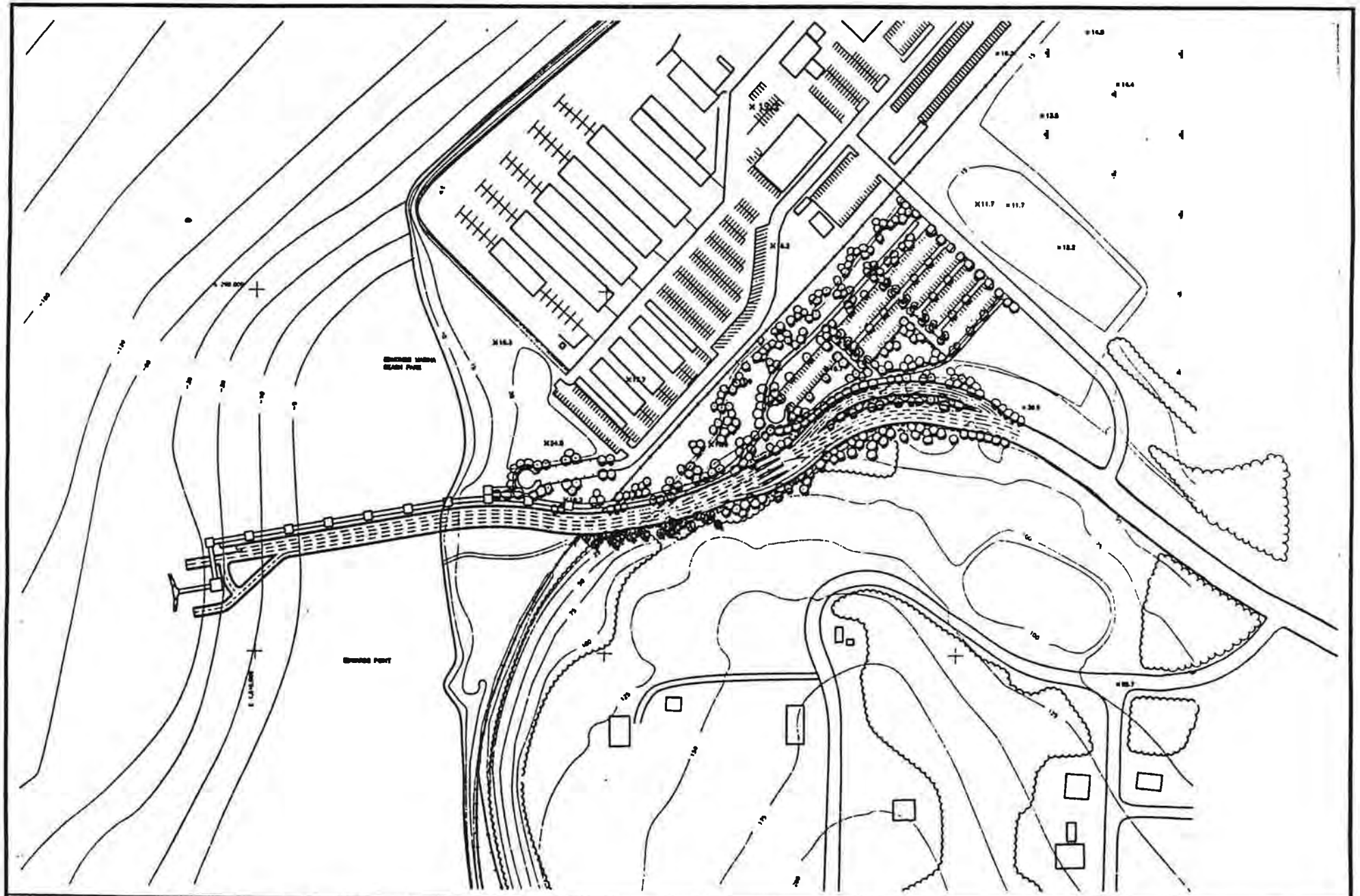
Community Transit access follows the realigned SR 104, bypasses the ticket booth and proceeds to the end of pier drop off station. After the ticket booth, Community Transit vehicles will use the ferry traffic exiting lanes in a contra flow pattern to get to the dock, and the right hand exiting lane to leave the pier. As in the previous scenarios, the pier can be designed with passenger waiting areas at the end of the dock, incorporating a bus drop-off at that location to minimize walking distance. Again, space restrictions at that end of dock would influence the design of the pedestrian access to the overhead loading system from the end of pier drop-off. The pedestrian access to the overhead loading system at the end of the pier would probably require either stairs in combination with handicapped access elevator, or switchback ramp system design for handicapped standards.



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

ALTERNATE 3 - EDWARDS POINT (LEASED)

FIGURE 17



Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

ALTERNATE 3 - EDWARDS POINT (LAND PURCHASED)

FIGURE 18

REID MIDDLETON *HEWITT- ISLEY* *HERRERA ENVIRONMENTAL CONSULTANTS* *2/92*

Private Vehicle Drop-Off
In both concepts, private vehicles can use the drop-off location at the turnaround location at the end of the Marina Beach parking lot. In the land purchase concept, an additional drop-off location can be provided landside of the BNRR tracks, although this location requires approximately 1,500 feet of foot travel to the ferry deck.

Park-and-Ride Passengers
The scheme that is based on a title transfer transaction (the fee simple purchase concept) can replace the UNOCAL facilities with additional parking for park-and-ride users and also for additional Port of Edmonds or Marina Beach park users. The scheme that installs ferry terminal facilities over UNOCAL operations would not provide additional parking for such uses.

Public Beach Access
This concept would be an extension of the public waterfront from Brackett's Landing Park, to the existing, but to be abandoned, ferry bulkhead, and then south to the Anderson Marine property line. This new public shoreline would add an additional 300 feet of public beach access.

Wetlands Preservation
This facility will positively affect the wetlands along the existing SR 104 alignment. Because the road width can be reduced to accommodate only local traffic, the extra inbound lander and additional ferry exit lane can be removed and landscaped. While this additional landscape edge will not necessarily constitute a wetland habitat, it can be designed as a buffering edge, protecting the existing wetland from roadway contaminants. In addition, this scheme, with reduced traffic volumes on the portion of SR 104 between Pine Street and Dayton, can provide pedestrian links between the existing city park north of Pine Street and a nature trail circumscribing the wetlands.

Business District Impacts
The impact to the Safeway/Goldies complex and Harbor Square should be positive as local traffic/ferry conflicts are reduced. Redevelopment of the existing WSF park-and-ride facility north of the Safeway/Goldies complex will provide an opportunity for integration of the CBD and the waterfront, perhaps stimulating redevelopment of Anderson Marine.

Contamination Issues
Because of the existing contamination of soil and groundwater at the UNOCAL site, the availability of the site is unclear. UNOCAL has stated that they are looking for a tenant to lease the site. UNOCAL has stated that a long term lease is preferred for the site because of issues associated with future cleanup requirements. UNOCAL is in the process of cleaning the site.

It may be feasible based on the amount of cleanup required and the method of cleanup, to lease a portion of the site, or the air rights at the site, and construct the access roadway to a new terminal concurrently with the cleanup of the site. It has not been determined whether a portion of the site could be used for UNOCAL operations and a portion used for ferry operations. This may be a possibility depending on what type of operations UNOCAL proposes for the site. The legal issues of the State leasing or purchasing the contaminated UNOCAL site have not been determined.

Phased Implementation/Interim Solutions

Any project of this magnitude will require substantial start-up time to accomplish acquisition/allocation of funds, the permitting processes, right-of-way appraisal and acquisition, engineering/architectural design and actual construction. In addition, if the UNOCAL site is selected, additional time may be required to accomplish the site cleanup process. It is unclear at this time exactly how much time will be required to clean the UNOCAL site of contaminants. Because of the potential delays in the availability of a new operating terminal, interim solutions to current operating problems may be necessary.

The steel bulkhead at the current terminal is corroding. The retained fill behind the steel bulkhead is being washed away through the resultant holes. Immediate repair is required for the bulkhead. This repair is estimated to cost approximately two million dollars. Other repairs may be required in the future. The maintenance and repair will continue, possibly along with interim solutions, until a new facility is complete.

One possible interim solution would be to acquire the Anderson Marine property, and utilize that area for holding lanes serving the existing docking facility. This would solve the issue of interrupted loading due to passing trains. This facility could be used until an alternative site is built and operating.

If the final location of the facility is located away from the Anderson Marine property, then the Anderson Marine property and the existing terminal property could revert to commercial, retail, or recreational use. If the Anderson Marine site is chosen as the final site location, a new dock facility could be built on the south side of the property. An underpass structure to access the dock could then be constructed through the existing park-and-ride lot and beneath the railroad in a later phase.

Certain structures could feasibly be built in one location and later relocated to another site. While a concrete pier structure would be expensive and difficult to relocate, it is not impossible to salvage concrete piles. Piers constructed of timber piling are less expensive and can be salvaged or relocated. Other facilities such as passenger loading ramps, and transfer spans are potentially easier to relocate. An overhead passenger loading walkway

and transfer span could be constructed at a given location and later relocated to another facility.

The time requirement for the cleanup of the contaminants at the UNOCAL site is a key factor in determining the merit of the Edwards Point site. Unocal is currently proposing a thermal absorption method of cleanup for the soils at the site. If elevated access lanes were constructed along the hillside at Edwards Point, it is feasible that the cleanup of the contaminants could be done concurrently with construction of the access roadway. Depending on the proposed uses for the site by UNOCAL, concurrent use of the site by UNOCAL and the ferry system may be feasible.

The most important aspect of any interim solution is to identify the time required for the final facility to be in operation. Because of the contamination at the UNOCAL site, the uncertainty of the DOE evaluation process, and UNOCAL's expressed desire to find a tenant for the site, the timing of the availability of the UNOCAL site is unclear. Other sites are subject to typical property acquisition processes and have no apparent characteristics that would cause a significant delay in acquisition.

Another important aspect of an interim or phased solution is the "linkage" between the existing facility, interim solutions, and the final facility. Because the process of terminal design, phasing and funding of such facilities is extremely complex and subject to change, it is necessary that all parties are in agreement about the desirability of the final outcome in order to assure the implementation of the final facility.

Environmental Analysis/Potential Impacts

The following summary provides an overview of some parts of the potential environmental issues and concerns for three identified Edmonds Ferry Terminal site alternatives developed by the Edmonds Ferry Study Policy Committee. It is compiled from a more thorough report that documents potential impacts at each of the three alternative sites, including Anderson Marine, Mid-waterfront and Edwards Point (See Appendix B). Because this is not an environmental impact statement (EIS) or a SEPA document, some of the elements of the environment that are typically addressed in an EIS are not addressed at this time (e.g., the no action alternative). As such, the intent of this report is to identify potential environmental issues and concerns, to serve as a foundation for future environmental documents, and to guide the planning process.

Potential Environmental Issues and Concerns

The following environmental issues and concerns are excerpted from the appended report that identifies site-specific potential impacts to the natural and built environments that might occur as a result of ferry terminal relocation (See Appendix B). Potential impacts are identified based on the best available information.

Natural Environment

(a) Earth

Because all three of the proposed ferry terminal sites are located in a relatively highly urbanized setting, construction of the ferry terminal and associated infrastructures is unlikely to have adverse impacts on existing soils and geology. None of the sites will result in any land filling, erosion or enlargement of existing land area. Pier construction and removal of the existing pier, which would occur for any of the alternatives, may result in short-term increases in suspended sediments in the marine environment. This may result in temporary adverse impacts to marine flora and fauna. None of the alternatives would require dredging.

The presence of contaminated soils at the UNOCAL facility may pose significant risk to human and environmental health. The site has been recently assigned an overall ranking of 1 by the Washington Department of Ecology. The contaminants present may pose potential liability risks as well as environmental problems if the Edwards Point site is selected.

(b) Air

While none of the alternatives is expected to result in additional loading of air pollutants to the atmosphere, relocation of the holding lanes and other ferry terminal infrastructures may result in the relocation of air pollution to areas adjacent to these facilities. Air quality in the north Woodway area may change slightly as a result of ferry terminal relocation.

(c) Water

Ferry passenger vehicles (e.g., automobiles and trucks) and other internal combustion engines contribute to atmospheric air pollution. These pollutants (e.g., polycyclic aromatic hydrocarbons, metal, etc.) can be deposited on impervious surfaces and transmitted to adjacent water bodies via stormwater runoff. Conveyance of untreated urban runoff from impervious ferry terminal facilities may result in the contamination of receiving waters and sediments. Recent laws require that all stormwater runoff from structures such as the proposed ferry terminal facilities be collected and treated prior to discharge into receiving waters. The total amount of pollutants that would enter receiving waters as a result of the ferry terminal relocation is not expected to change significantly, but may in fact be reduced.

Groundwater contamination exists at the UNOCAL site. Considerable amounts of free-floating fuels (i.e., diesel and gasoline) have been detected on this site. Groundwater contamination may require extensive cleanup and hinder timely site development.

(d) Plants and Animals

Generally, there will be not be any impacts to the existing terrestrial environment because of the high level of development that presently exists at each of the alternative sites. However, marine flora and fauna may be adversely affected by degraded surface water and sediment quality associated with pollutants in untreated urban runoff.

Pier construction for the Anderson Marine and Mid-waterfront Alternatives will result in eelgrass habitat losses. Total economic and mitigation costs for eelgrass habitat impacts could exceed $350,000 for either of these two alternatives. By contrast, pier construction activities at Edwards Point will not result in a significant loss of eelgrass habitat.

Pier construction for all three sites will likely result in adverse short-lived impacts to marine flora and fauna. Increased suspended sediment levels from construction activities may temporarily displace or reduce local populations of various organisms.

Removal of the old pier, which is common to all alternatives, may have a positive influence on marine plants and animals. If eelgrass is able to recolonize all or part of the area occupied by the existing terminal, eelgrass dependent flora and fauna are likely to benefit. Although unlikely, removal of the existing pier may result in increased beach erosion and subsequent losses of eelgrass habitat from wave scour.

Animals that inhabit or use the Union Oil Marsh and are intolerant of human activities may be displaced by normal ferry operations at Edwards Point. Use of a rubblemound breakwater with this alternative would increase the habitat diversity in the subtidal marine environment and would likely enhance community structure.

Built Environment

(a) Environmental Health

None of the preliminary site alternatives poses any significant changes in noise, risk of explosion, or the potential release of toxic substances. If impervious holding lane and other facility surfaces drain directly to the Sound, there may be a somewhat higher probability of environmental contamination and a potentially greater threat to public health from exposure to contaminated media (i.e., sediments, air, and water). However, recent laws strictly require that all surface drainage is collected and treated before being discharged into the Sound. Therefore a new facility will result in less discharge of pollutants to the Sound.

(b) Land and Shoreline Use

Both Alternatives 1 (Anderson Marine) and 2 (Mid-waterfront) will result in the loss of existing business. Neither of these two alternatives is likely to result in significant adverse impacts to existing shoreline use such as access/egress to the existing waterfront parks. Because of its proximity to existing traffic areas, it is unlikely that the Anderson Marine Alternative will significantly improve access/egress to the CBD or commercial waterfront areas. Alternatives 1 and 2 may result in minor adverse view, noise, and aesthetic impacts for nearby residents.

By contrast, relocation of the ferry terminal to Edwards Point will not displace any existing businesses and probably has the greatest potential to enhance access/egress to the CBD and commercial waterfront areas. In addition, there may be potential to enhance fish spawning access by constructing an open channel connecting Puget Sound to the Union Oil Marsh. A potential problem with this alternative is that the routine ferry operation may interfere with commercial and tribal fishing activities. Alternate 3 may result in minor adverse view, noise, and aesthetic impacts for nearby residents, however the bluff at Edwards Point will provide a partial buffer between the ferry facility and Woodway.

(c) Public Services and Utilities

All alternatives may require additional storm drains and electrical services to convey stormwater runoff, and lighting of parking areas and holding lanes. The proposed pier location for the Mid-waterfront Alternative may not be compatible with the existing location of the municipal wastewater effluent discharge lines and cable crossings.

Environmental Site Review

The environmental site review is presented in "Edmonds Ferry Terminal Environmental Site Review" (see Appendix A). The report discusses environmental issues related to the UNOCAL site as well as wetland and coastal areas.

Union Oil Site Cleanup Review

The UNOCAL area was developed as a fuel transfer station. Operations have included transfer of oil from tankers to trains and trucks. There are 10 underground and 23 above-ground storage tanks at the site. Operations on the upper portion of the site have mainly been storage of product, while the majority of transferring operations have taken place in the lower yard. Approximately 25,000 gallons of contaminants have been released into the groundwater and soils.

UNOCAL is currently in the process of cleaning up the facility. In 1987, approximately 7,500 gallons of contaminants had been cleaned from the site. Contaminants are being removed from the groundwater and soil.

A preliminary review by the Department of Ecology (DOE) of the UNOCAL site is reported in "Edmonds Ferry Terminal Environmental Site Review" (See Appendix A). The report by the DOE focused on the lower portion of the property.

The State and City will not purchase the UNOCAL property until it is deemed "clean" by the DOE. All responsibility for the contamination at the site and the entire cleanup will remain with UNOCAL. UNOCAL has stated that they prefer to lease the site rather than sell the site due to questions regarding future cleanup requirements. It has not been determined whether the State would lease "unclean" property. There is concern over future cleanup requirements should standards change.

UNOCAL is currently attempting to lease portions of the site to another petroleum supplier. Texaco recently expressed interest in the facility, but has since decided that it would not lease or buy the UNOCAL site. It may be feasible to construct and operate the roadway and terminal on a portion of the site which is not contaminated, while cleanup and other operations occur on another portion of the site. This is dependent on the type of cleanup and operations which are proposed by UNOCAL, and the extent of the contamination.

Preliminary Cost Estimate

The budget level cost estimate for the project has been broken down into upland and waterfront work. The waterfront work consists of a pier approach structure, vehicle loading ramp, two mooring slips, mooring dolphins and navigational aids. The upland portion of the project consists of property acquisition costs, access/egress lanes, the terminal building, utilities, and other site improvements. Salvage potential of any existing structures, such as the vehicle transfer span, is not included in the estimate.

The estimate is at budget level based on basic design concepts. The actual costs may vary considerably based on actual design and requirements. Property acquisition costs are approximate for budget purposes only and should not be considered as appraisals. Detailed property acquisition costs for the project are presented in the report "Edmonds Ferry Terminal Report - Comparison of Acquisition costs of Alternative Schemes" (Appendix D). The report also discusses the potential for reuse of property with each of the alternatives, and identifies the current assessed value for taxing purposes of each parcel.

The waterfront portion of work for the Anderson Marine alternative includes a 45,000 s.f. docking facility with two mooring slips and mooring support structures, as well as demolition of the existing pier. The overhead passenger loading walkway and transfer span and the terminal building are included in the waterfront portion of the estimate. The upland portion of the project includes site improvements such as utilities, paving, lighting, landscaping and traffic control facilities.

The mid-waterfront alternative items are similar to the Anderson Marine alternative. The waterfront facilities also include the cost of retaining wall structures and construction dewatering required for the depressed roadway. The upland portion of the work includes excavation, retaining walls, a railroad bridge structure, embankment requirements, and site improvements. Existing utility adjustments are also included in the estimate.

The Edwards Point waterfront work consists of two mooring slips with one oriented north-south, a 70,000 s.f. approach pier, overhead passenger loading, and a terminal building. The cost for the pier structure is higher in this location due to the longer required pile lengths, the exposed location, and the skewed mooring slips. The breakwater is also included in the waterfront estimate. The upland portion of the work includes the hillside roadway, a park-and-ride lot, utilities, and miscellaneous site improvements.

	ALTERNATE 1 ANDERSON MARINE			ALTERNATE 2 CENTRAL WATERFRONT			ALTERNATE 3 EDWARDS POINT		
WATERFRONT	$14,000,000			$27,000,000			$52,000,000		
UPLANDS	$2,000,000			$27,000,000			$17,000,000		
SUBTOTAL W/O PROPERTY ACQUISITION COSTS	**$16,000,000**			**$54,000,000**			**$69,000,000**		
PROPERTY ACQUISITION	$1,100,000	TO	$1,500,000	$2,500,000	TO	$5,200,000	$8,900,000	TO	$16,600,000
TOTAL COST	**$17,000,000**	TO	**$18,000,000**	**$57,000,000**	TO	**$59,000,000**	**$78,000,000**	TO	**$86,000,000**
ESTIMATED VALUE OF REUSE OF PROPERTY	$0			($680,000)	TO	($790,000)	($5,700,000)	TO	($7,980,000)

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR. THIS COST ESTIMATE IS FOR THE COST OF CONSTRUCTION IN NOVEMBER 1991. ESCALATION IS NOT INCLUDED. ESCALATION TO THE TIME OF CONSTRUCTION CAN BE APPROXIMATED AS 4% PER YEAR.

BY: SMK, BWS
FILE: TOTAL$.XLS

PROJECT NO: 24-91-008
DATE: 7/23/91

Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

SUMMARY COST ESTIMATE

FIGURE 19

REID MIDDLETON *HEWITT-ISLEY* *HERRERA ENVIRONMENTAL CONSULTANTS* #

ALTERNATE 1
ANDERSON MARINE

ITEM NO.	DESCRIPTION	UNIT $	UNIT	QTY	TOTAL COST
WATERFRONT					
1.	MOBILIZATION	$280,000	LS	1	$280,000
2.	EXISTING PIER STRUCTURE DEMOLITION (NOT INCL. DISPOSAL)	$10	SF	20,000	$200,000
3.	DISPOSAL OF PIER STRUCTURE	$25	SF	20,000	$500,000
4.	FIXED PIER STRUCTURE	$65	SF	45,000	$2,925,000
5.	COVERED WALKWAY	$48	SF	10,600	$508,800
6.	CONCRETE CURBS & RAILINGS	$60	LF	2,000	$120,000
7.	ELECTRICAL INCL. LIGHTING	$500,000	LS	1	$500,000
8.	TERMINAL BUILDING	$150	SF	5,000	$750,000
9.	VEHICLE TRANSFER SPAN	$800,000	EA	2	$1,600,000
10.	PEDESTRIAN TRANSFER SPAN	$600,000	LS	1	$600,000
11.	MOORING DOLPHINS & APPURTENANCES	$1,100,000	LS	1	$1,100,000
		SUBTOTAL			**$9,080,000**
		10% ENGINEERING			$910,000
		SUBTOTAL			**$9,990,000**
		20% CONTINGENCY			$2,000,000
		SUBTOTAL			**$11,990,000**
		10% OVERHEAD & PROFIT			$1,200,000
		SUBTOTAL			**$13,190,000**
		8% SALES TAX			$1,060,000
		TOTAL			**$14,000,000**

BY: SMK, BWS
FILE: ANDER$.XLS
PROJECT NO: 24-91-008-001-02
DATE: 7/23/91

Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

ALTERNATE 1 - COST ESTIMATE
FIGURE 20

ALTERNATE 1
ANDERSON MARINE

ITEM NO.	DESCRIPTION	UNIT $	UNIT	QTY	TOTAL COST
UPLAND					
1.	MOBILIZATION	$40,000	LS	1	$40,000
2.	REMOVAL OF STRUCT. AND OBSTRUCT.	$120,000	LS	1	$120,000
3.	PAVING, INCL. CRUSHED SURF. & STRIP.	$40	TON	2,300	$92,000
4.	CONCRETE CURBS & GUTTERS	$10	LF	1,200	$12,000
5.	GENERAL LANDSCAPING	$60,000	LS	1	$60,000
6.	LIGHTING INCL. ELECTRICAL	$150,000	LS	1	$150,000
9.	TOLL BOOTHS	$100,000	LS	1	$100,000
10.	STORM SEWER SYSTEM	$80,000	LS	1	$80,000
11.	WATER & FIRE SERVICE	$100,000	LS	1	$100,000
12.	SANITARY SEWER SYSTEM	$50,000	LS	1	$50,000
13.	TRAFFIC CONTROLS & SIGNAGE	$100,000	LS	1	$100,000
				SUBTOTAL	**$900,000**
				10% ENGINEERING	$90,000
				SUBTOTAL	**$990,000**
				20% CONTINGENCY	$200,000
				SUBTOTAL	**$1,190,000**
				10% OVERHEAD & PROFIT	$120,000
				SUBTOTAL	**$1,310,000**
				8% SALES TAX	$100,000
				UPLAND TOTAL	**$2,000,000**
				PROJECT TOTAL	**$16,000,000**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

THIS COST ESTIMATE IS FOR THE COST OF CONSTRUCTION IN NOVEMBER 1991. ESCALATION IS NOT INCLUDED. ESCALATION TO THE TIME OF CONSTRUCTION CAN BE APPROXIMATED AS 4% PER YEAR.

ALTERNATE 2
CENTRAL WATERFRONT

ITEM NO.	DESCRIPTION	UNIT $	UNIT	QTY	TOTAL COST
WATERFRONT					
1.	MOBILIZATION	$550,000	LS	1	$550,000
2.	EXISTING PIER STRUCTURE DEMOLITION (NOT INCL. DISPOSAL)	$10	SF	20,000	$200,000
3.	DISPOSAL OF PIER STRUCTURE	$25	SF	20,000	$500,000
4.	FIXED PIER STRUCTURE	$65	SF	45,000	$2,925,000
5.	RETAINING WALL STRUCTURES	$8,000,000	LS	1	$8,000,000
6.	COVERED WALKWAY	$48	SF	10,600	$508,800
7.	CONCRETE CURBS & RAILINGS	$60	LF	1,000	$60,000
8.	LIGHTING	$350,000	LS	1	$350,000
9.	TERMINAL BUILDING	$150	SF	5,000	$750,000
10.	VEHICLE TRANSFER SPAN	$800,000	EA	2	$1,600,000
11.	PEDESTRIAN TRANSFER SPAN	$600,000	LS	1	$600,000
12.	MOORING DOLPHINS & APPURTENANCES	$1,100,000	LS	1	$1,100,000
			SUBTOTAL		**$17,140,000**
		10% ENGINEERING			$1,710,000
			SUBTOTAL		**$18,850,000**
		20% CONTINGENCY			$3,770,000
			SUBTOTAL		**$22,620,000**
		10% OVERHEAD & PROFIT			$2,260,000
			SUBTOTAL		**$24,880,000**
		8% SALES TAX			$1,990,000
			WATERFRONT TOTAL		**$27,000,000**

PROJECT NO: 24-91-008-001-02
DATE: 7/23/91
BY: SMK. BWS
FILE: SENIOR$.XLS

Edmonds Ferry Terminal - Alternative Site Feasibility Analysis

ALTERNATE 2 - COST ESTIMATE
FIGURE 21

ALTERNATE 2
CENTRAL WATERFRONT

ITEM NO.	DESCRIPTION	UNIT $	UNIT	QTY	TOTAL COST
UPLAND					
1.	MOBILIZATION	$550,000	LS	1	$550,000
2.	REMOVAL OF STRUCT. AND OBSTRUCT.	$375,000	LS	1	$375,000
3.	UTILITY RELOCATION	$150,000	LS	1	$150,000
4.	UNDERPASS STRUCTURES INCL. EXCAV.	$15,000,000	LS	1	$15,000,000
5.	PAVING, INCL. CRUSHED SURF. & STRIP.	$40	TON	3,500	$140,000
6.	CONCRETE CURBS & GUTTERS	$8	LF	5,000	$40,000
7.	GENERAL LANDSCAPING	$80,000	LS	1	$80,000
8.	LIGHTING	$130,000	LS	1	$130,000
10.	TOLL BOOTHS	$100,000	LS	1	$100,000
11.	STORM SEWER SYSTEM	$150,000	LS	1	$150,000
12.	WATER & FIRE SERVICE	$100,000	LS	1	$100,000
13.	SANITARY SEWER SYSTEM	$45,000	LS	1	$45,000
14.	TRAFFIC CONTROL & SIGNAGE	$150,000	LS	1	$150,000
				SUBTOTAL	**$17,010,000**
				10% ENGINEERING	$1,700,000
				SUBTOTAL	**$18,710,000**
				20% CONTINGENCY	$3,740,000
				SUBTOTAL	**$22,450,000**
				10% OVERHEAD & PROFIT	$2,250,000
				SUBTOTAL	**$24,700,000**
				8% SALES TAX	$1,980,000
				UPLAND TOTAL	**$27,000,000**
				PROJECT TOTAL	**$54,000,000**

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ALTERNATE 3
EDWARDS POINT

ITEM NO.	DESCRIPTION	UNIT $	UNIT	QTY	TOTAL COST
WATERFRONT					
1.	MOBILIZATION	$1,000,000	LS	1	$1,000,000
2.	EXISTING PIER STRUCTURE DEMOLITION (NOT INCL. DISPOSAL)				
	A. FERRY TERMINAL	$10	SF	20,000	$200,000
	B. UNOCAL PIER	$10	SF	42,000	$420,000
3.	DISPOSAL OF PIER STRUCTURE	$25	SF	62,000	$1,550,000
4.	BREAKWATER	$18,000,000	LS	1	$18,000,000
5.	FIXED PIER STRUCTURE	$75	SF	70,000	$5,250,000
6.	COVERED WALKWAY	$48	SF	11,500	$552,000
7.	CONCRETE CURBS & RAILINGS	$60	LF	3,000	$180,000
8.	ELECTRICAL INCL. LIGHTING	$700,000	LS	1	$700,000
9.	TERMINAL BUILDING	$150	SF	5,000	$750,000
10.	VEHICLE TRANSFER SPAN	$800,000	EA	2	$1,600,000
11.	PEDESTRIAN TRANSFER SPAN	$900,000	LS	1	$900,000
12.	MOORING DOLPHINS & APPURTENANCES	$1,800,000	LS	1	$1,800,000
		SUBTOTAL			**$32,902,000**
		10% ENGINEERING			$3,290,000
		SUBTOTAL			**$36,190,000**
		20% CONTINGENCY			$7,240,000
		SUBTOTAL			**$43,430,000**
		10% OVERHEAD & PROFIT			$4,340,000
		SUBTOTAL			**$47,770,000**
		8% SALES TAX			$3,820,000
		WATERFRONT TOTAL			**$52,000,000**

PROJECT NO: 24-91-008-001-02
DATE: 7/23/91
BY: SMK, BWS
FILE: EDWARD$.XLS

ALTERNATE 3
EDWARDS POINT

ITEM NO.	DESCRIPTION	UNIT $	UNIT	QTY	TOTAL COST
UPLAND					
1.	MOBILIZATION	$350,000	LS	1	$350,000
2.	REMOVAL OF STRUCT. AND OBSTRUCT.	$20,000	LS	1	$20,000
3.	OVERPASS STRUCTURE	$5,000,000	LS	1	$5,000,000
4.	HILLSIDE HOLDING LANES	$4,000,000	LS	1	$4,000,000
5.	PAVING, INCL. CRUSHED SURF. & STRIP.	$38	TON	12,500	$475,000
6.	CONCRETE CURBS & GUTTERS	$8	LF	12,000	$96,000
7.	GENERAL LANDSCAPING	$60,000	LS	1	$60,000
8.	LIGHTING	$250,000	LS	1	$250,000
10.	TOLL BOOTHS	$100,000	LS	1	$100,000
11.	STORM SEWER SYSTEM	$250,000	LS	1	$250,000
12.	WATER & FIRE SERVICE	$100,000	LS	1	$100,000
13.	SANITARY SEWER SYSTEM	$80,000	LS	1	$80,000
14.	TRAFFIC CONTROLS & SIGNAGE	$300,000	LS	1	$300,000
	SUBTOTAL				**$11,080,000**
	10% ENGINEERING				$1,110,000
	SUBTOTAL				**$12,190,000**
	20% CONTINGENCY				$2,440,000
	SUBTOTAL				**$14,630,000**
	10% OVERHEAD & PROFIT				$1,460,000
	SUBTOTAL				**$16,090,000**
	8% SALES TAX				$1,290,000
	UPLAND TOTAL				**$17,000,000**
	PROJECT TOTAL				**$69,000,000**

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Funding

Sources of Funds

The primary source of funds for WSDOT Marine Division capital projects is the department's Category W4 Marine Construction Program. This program provides funding for new and rebuilt ferry vessels and facilities. The appropriation for the current FY 91-93 biennium is $126 million, with amounts of $98 million and $85 million currently planned for the FY 93-95 and FY 95-97 biennia, respectively. With preliminary costs for the Edmonds ferry terminal ranging to more than $70 million, it is clear that additional funding sources will be required.

Although no specific designated sources of additional funds are known, several programs may offer opportunities. The U.S. Congress recently enacted a new Surface Transportation Act, which provides reauthorization of highway and transit funding for the next six years. The act includes $100 million nationwide for the next six years for state-operated ferry system vessel and terminal refurbishment and construction.

Other potential funding participation in the project might come from general surface transportation revenues, both state and federal, from transit sources, since the project is expected to provide a high level of transit and TDM supportive service, as well as other agencies.

Another possible funding opportunity is through sale of excess property, or development rights, following project construction. As pointed out in Appendix D, there is significant potential for redevelopment of the UNOCAL site, in particular.

Allocation of Costs

The use of multiple funding sources implies that the various parties involved in the project must develop some method to allocate costs between them. For example, the cost of basic marine operations facilities might to attributed to the Marine Division, while the cost of transit enhancements might be allocated to the transit operator. The cost of certain amenities provided primarily for the City of Edmonds might be allocated to the city.

Evaluation of Alternatives

Development of Evaluation Criteria

The Washington State Ferry Planning Division has established a set of issues and criteria to evaluate the merits of new improvements as they relate to the community and their functional efficiency. These criteria, listed below, became the starting basis for tailoring the next generation of criteria, responsive to the issues at Edmonds, that would effectively gauge the merits of the various conceptual facility plans. These criteria are also present in the West Corridor Project as suggested "Terminal Design Policies and Criteria."

Initial Criteria

Users
User comfort and user convenience

Aesthetics/Design
Assure acceptable appearance to the surrounding community
Assure acceptable appearance to the user
Avoid impacts or intrusion on Environmentally Sensitive Areas

Circulation
Assure effective connection among transportation modes
Assure safe facilities and access to them
Maximize effective traffic circulation in and around the future terminal
Provide access patterns to reduce impacts on community business and pedestrians

Economy
Maximize cost-effectiveness of the facility

Environment
Minimize adverse environmental impacts

The special qualities of the Edmonds situation and the unique characteristics of the various concepts influenced the refinement of the initial criteria into the set that follows.
To organize the evaluation process, the criteria were placed in nine categories; Business/Commerce, Community, Construction Issues, Economy, Environment, Ferry Operations, Ferry Users, Growth, and Transportation. Many criteria are applicable to more than one category.

Refined Criteria

Commercial Potential

Provisions for opportunity to expand the waterfront commercial district
Impacts on existing businesses
Provisions for opportunity to expand the Edmonds Central Business District (CBD)
Integration of downtown and waterfront

Community Benefits and Impacts for Edmonds and Woodway

Impact on view corridors at street level
Impact on view corridors at beach level
Impact on view of ferry boat
Provision for public waterfront access
Provision for expansion of waterfront recreation areas
Impacts on community services (i.e., senior center)
Provisions for direct auto routes to community businesses/facilities
Provisions for direct pedestrian routes to community businesses/facilities
Impacts of traffic in residential areas
Parking impacts in residential and commercial areas

Impacts of Construction

Impacts on business operations during construction
Impacts on ferry service during construction

Economics of the Facility

Monetary cost of site cleanup
Monetary cost of the dock facility (excluding overhead loading)
Monetary cost of navigational protection (breakwater)
Monetary cost of overhead passenger loading including provision for weather protection for pedestrian walkways
Monetary cost of the access\egress roadway
Monetary cost of property acquisition, including leased and feasible reused properties
Monetary cost of relocating disrupted facilities, including community services, businesses, parking lots, roadways, utilities
Monetary cost of permitting, (i.e., SEPA, wetland mitigation)
Monetary cost of mitigating marine environment (eel grass) impacts
Ability to promote joint development among various agencies
for shared costs (City, County, State, Port, Businesses, etc.)
Provision for non-ferry-related facilities that provide operating revenues
Ability to be phased into a set of discrete projects for long-term budgeting
Relative values of operating costs
Relative values of maintenance costs

Environmental Impacts
Impacts on wetlands
Impacts on marine habitat/eel grass ecosystem disruption
Noise impacts
Impacts of lighting
Impacts of auto emissions due to disruption of auto traffic
Opportunity to enhance existing ecosystems (underwater sanctuary, salmon spawning stream, wetland)
Impacts on parks/opportunity to augment existing parks
Environmental issues of UNOCAL site acquisition
Impacts on commercial fishing grounds
Impacts on Indian fishing grounds

Potential for Future Growth
Provisions for a circulation route that reinforces the long-term growth potential of Central Edmonds
Provisions for future types of ferries and ferry services
Coordination with future mass transit modes
Ability to be built/developed in phases to accommodate growth
Opportunity for future business/community development
Opportunity for future Passenger-Only Service

Operation Costs & Level of Service
Provision for efficient loading and unloading (throughput of traffic)
Impacts to service due to "storm" conditions
Provisions for a secured paid area
Required staffing - onsite (ticketing, holding area traffic control)
Required staffing - offsite (traffic control)
Time requirement before implementing new facility

Impacts on Effective/Safe Transportation Patterns/Modes
Provisions for future types of ferries and ferry service including Passenger Only Service
Impacts on transit operations
Provision for high-occupancy vehicle opportunities
Provision for bus unloading/layover/loading
Provision for joint use areas (park-and-ride/overload, etc.)
Provision for additional parking & park-and-ride facilities
Direct auto/passenger drop-off and pick-up location & routes
Provision for separation of pedestrian, transit, vehicle modes
Impacts on at-grade crossing conflicts with BNRR
Opportunity to reduce traffic and minimize backups on SR 524, SR 104, and City roads
Impacts on circulation efficiency for all modes

Impact on emergency access to the waterfront/ferry/port
Opportunity to reduce conflicts between local & ferry traffic
Coordination with future mass transit modes

User Benefits & Costs
Opportunity to reduce waiting/loading time
Walking distance and grade
Directness of passenger and vehicle routes
Availability of wide range of transportation modes including pedestrian/rail/bike
Handicap Access/Ease of use
Impacts of grade changes
Opportunities for interaction between ferry users & local service businesses
Opportunities for provision of services for ferry riders

Comparative Evaluation of Alternatives

These criteria were used by the policy committee members and the consulting team to evaluate the three different scenarios and also, for comparative purposes, the existing situation. The evaluation process attempts to use objective criteria to standardize subjective value judgements. These criteria, organized in a matrix with the different alternatives, were evaluated on a five step value system, using "++", "+", "0", "-", "--" as measuring standards. In this system, "++" was a superior solution and "--" was an inferior assessment. Obviously, this system was not absolutely quantitative, i.e. measuring square feet of lost wetland, for example, but more an assessment of the relative merits of the alternatives. The consultant team summary evaluation is included in Appendix E.

The goal of the matrix rating was to determine the general impact of the particular alternative when measured against each specific criteria. While some criteria are objective, such as cost and minimum space requirements, the majority of the criteria are subjective. A particular alternative may have a positive impact on a retail business, but have a negative impact on an industrial business. The view impacts are relative to the viewers location and personal opinions. It is not feasible within this scope to determine the impact on each business, ferry user or community member.

Decision Process for State Capital Facility Projects

A new ferry terminal at Edmonds, particularly if constructed at a new location, will be a major capital project with both local and regional significance. The process of reaching a decision to construct such a facility will, of necessity, involve several layers of government, as well as significant public involvement. The recently enacted Growth Management Act and amendments include provisions which require that city comprehensive plans include a fair share element which addresses the siting of state and regional public facilities, such as correctional facilities, airports and ferry terminals. While the City of Edmonds and several state and federal agencies will have permitting authority over the project, the ultimate decision to proceed will rest with the Washington State Legislature, through its oversight of the Washington State Department of Transportation.

Summary and Recommendations

Criteria identified as being of particular importance in evaluating alternatives include resolution of conflicts between ferry traffic and Burlington Northern Railroad (BNRR) traffic, separation of pedestrian and vehicular loading and unloading, improvement of traffic circulation in downtown Edmonds, and potential for consolidation and/or expansion in the downtown area. Based on the evaluation of these criteria, three feasible alternatives are recommended for further study and public comment. The three alternatives include: 1) expand the existing facility by the purchase of Anderson Marine property, rebuild the docking facility on the southern portion of the property and use the remainder of the property for holding and egress lanes, retaining the existing traffic routes; 2) construct a depressed access under the BNRR tracks from SR 104 to a central waterfront location with a new terminal/docking facility; and 3) relocate the terminal to the UNOCAL property at Edwards Point, providing access from SR 104 at Pine Street, with vehicle holding along the hillside and access to the ferry dock by an overpass across the BNRR.

Navigation would be feasible at all three locations; however, the Edwards Point alternative would require additional protection because the site is exposed to southerly storms. A breakwater and mooring slip oriented into the wind would be required at Edwards Point to provide the same level of service during storm conditions that exists at the present site.

All three alternatives would eliminate the interruption of loading due to conflicts with passing BNRR trains. The Mid-waterfront and Edwards Point Alternatives would also eliminate safety conflicts due to traffic crossing the tracks. The Anderson Marine site (Alternative 1) would not eliminate safety concerns related to vehicle/train and pedestrian/train conflicts.

All three alternatives would include overhead pedestrian loading and would therefore eliminate safety concerns related to pedestrian/vehicle conflicts during vessel loading. Overhead loading would also provide direct accessibility to vessel passenger areas for the disabled, thus complying with recent federal legislation.

The Anderson Marine alternative would not substantially alter current traffic patterns in downtown Edmonds and along the waterfront. The Mid-waterfront Alternative would separate ferry traffic from general traffic in the immediate downtown area and along the waterfront. Circulation would be improved on Dayton Avenue, Main Street, Railroad Avenue, Sunset and SR 104 between Dayton Avenue and Main Street due to elimination of ferry traffic on these roadways. The Edwards Point Alternative would also remove

ferry traffic from Central Edmonds and the waterfront area. None of the alternatives directly addresses the impact of ferry traffic entering Edmonds from the north on SR 524 and passing through the downtown area.

Alternative 1 would not provide for consolidation of the central and waterfront commercial districts. The holding lanes and SR 104 will remain a visual and physical barrier between the two districts. Consolidation of the waterfront and central commercial districts will be possible with Alternatives 2 and 3. The mid-waterfront alternative would allow redevelopment of the holding lane area, the existing terminal, and much of the Safeway/Goldies site. Vehicular and pedestrian circulation between the waterfront and central commercial areas would be accommodated by overpasses, and would be uninterrupted by ferry traffic. Visual consolidation of the downtown and waterfront areas may also be enhanced through careful urban design. Alternative 3 provides the most opportunity for consolidation of the downtown and waterfront areas because the ferry terminal is completely removed from the area. On the other hand, it does not require that any action be taken in the area west of SR 104 and north of Dayton. Alternative 3 may also allow for redevelopment of portions of the UNOCAL site not needed for ferry facilities.

The Anderson Marine site (Alternative 1) could be developed for the lowest initial cost, but does not fully satisfy the criteria established by the Policy Committee, particularly in the area of impact to the community. The Mid-waterfront Alternative (Alternate 2) is substantially more expensive than Alternative 1, and satisfies most criteria. A potentially major drawback to Alternative 2 is the need to acquire numerous privately-owned properties. The Edwards Point site (Alternative 3) most clearly satisfies the Policy Committee criteria, but is also the most expensive to construct. Further, the potential length of time required to complete cleanup of the UNOCAL site, combined with concerns over residual liability for contamination, may reduce the attractiveness of Alternative 3.

Recommendations

We recommend that The Anderson Marine site (Alternative 1) be dropped from active consideration as the "long-term" solution to problems at the Edmonds Ferry Terminal. We recommend that the City of Edmonds and the Washington State Department of Transportation continue discussions regarding implementation of either Alternative 2, the mid-waterfront location, or Alternative 3, Edwards Point as the site of the future Edmonds Ferry Terminal. Both sites have been found to be physically and operationally feasible. Each has significant strong points and weaknesses. Development of either site will be relatively expensive and may require between five and ten years to accomplish. Successful implementation of either site will offer significant opportunities for positive change in the area between the Edmonds waterfront and downtown.

Since neither the Midwaterfront nor Edwards Point Alternatives can likely be accomplished within the next five years, we recommend that the City and the WSDOT actively pursue a short- to mid-term solution to problems at the existing facility. WSDOT personnel have indicated that significant maintenance expenditures are required immediately to keep the facility in operation. In light of the need for such expenditures, it may be prudent to consider acquisition of the Anderson Marine site for use as a vehicle staging area to alleviate congestion on SR 104 and loading delays due to rail interference. The site could then be converted to other uses at such time as the terminal is relocated.

Appendix A

EDMONDS FERRY TERMINAL
PRELIMINARY ENVIRONMENTAL SITE REVIEW
ALTERNATIVES ANALYSIS
AND
BACKGROUND STUDIES

HERRERA
ENVIRONMENTAL
CONSULTANTS

EDMONDS FERRY TERMINAL
PRELIMINARY ENVIRONMENTAL SITE REVIEW
ALTERNATIVES ANALYSIS
AND
BACKGROUND STUDIES

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October 31, 1991

TABLE OF CONTENTS

EDMONDS FERRY TERMINAL
PRELIMINARY ENVIRONMENTAL SITE REVIEW

INTRODUCTION

The following review provides an analysis of the potential environmental issues and concerns for the three identified Edmonds ferry terminal site alternatives developed by the Edmonds Ferry Study Policy Committee. These alternative sites include Anderson Marine, Midtown and Edwards Point. The no action alternative is not discussed. Potential impacts that may be generated by each alternative are identified for the major elements of the environment listed in WAC 197-11-444. Some elements of the environment are not included in this review because there are no apparent, significant effects on these elements as a result of the proposed terminal relocation. This preliminary environmental evaluation is based upon the best currently available information. This document is not intended to serve as an environmental impact statement but rather is designed to assist in identifying potential environmental issues and concerns associated with the proposed alternatives.

POTENTIAL ENVIRONMENTAL ISSUES AND CONCERNS BY ALTERNATIVE

Alternative 1 - Main Street Terminal With At Grade Crossing & Waterside Holding Area (Anderson Marine).

(1) Natural Environment

(a) Earth. Conditions with regard to soils and geology would remain relatively unchanged when compared to existing urban development. Because this is already a relatively flat urbanized area, there are no unique natural physical features or topography. Construction of a ferry terminal and associated infrastructures at this site will not result in any land-filling, erosion, or enlargement of the existing land area. Therefore, little or no adverse impacts to soils and geology are anticipated for Alternative 1. There may be short-term increases in suspended sediment from resuspension of marine sediments during construction of the new pier and removal of the old pier.

(b) Air Quality. Alternative 1 may result in an increased potential for atmospheric deposition of particulates and other emissions from internal combustion engines in the

nearby marine environment through the relocation of the proposed parking structures/holding lanes. A specific group of substances of concern are polycyclic aromatic hydrocarbons (PAHs) which are by-products of incomplete combustion of fossil fuels. These compounds have been identified as priority pollutants by the Environmental Protection Agency and are a pollutant of concern in Puget Sound. No increase in pollutant loading to the atmosphere is anticipated for any of the alternatives although a relocation and change in the local fallout zone for these pollutants (e.g., PAHs and particulates) could occur.

(c) Water. Localized areas of Puget Sound that receive contaminated urban runoff and sediments have been degraded. The extent of such contamination has not been documented for the Edmonds area but is observed generally throughout the region (Evans-Hamilton, Inc. et al. 1987). Urban runoff typically contains pollutants such as suspended solids, nutrients, coliform bacteria, metals (lead, zinc, copper, nickel, and chromium), organics (PAHs), fertilizers and pesticides (Galvin and Moore 1982; Ellis 1986). Although some studies of the biological effects of contaminated urban runoff have concluded that benthic organisms are not measurably affected (Comiskey et al. 1984), accumulations of these pollutants in Puget Sound sediments can be a problem.

Unless construction of holding lanes and associated ferry terminal infrastructures for Alternative 1 results in the conveyance of additional contaminants to the Sound or other surface waters, the magnitude of existing surface and sediment quality degradation is not expected to increase. However, depending on the location of contaminated stormwater runoff discharge from these impervious surfaces, the location of degradation or impact may change.

(d) Plants and Animals. Alternative 1 will result in no impacts to the existing terrestrial environment because of the high level of development that currently exists. Depending on the location of stormwater runoff discharges, marine plants and animals may be adversely impacted by degraded surface water and sediment quality. If holding lane stormwater runoff is directly discharged to the marine environment without being treated, benthic flora and fauna will continue to be adversely affected by contaminants present in stormwater runoff.

Eelgrass beds and associated species assemblages may be adversely influenced by degraded water quality from contaminated stormwater runoff. PAHs, metals and other

toxicants present in untreated stormwater runoff could result in undesirable changes in sediment and water chemistry which could be detrimental to eelgrass productivity (e.g., accumulation of toxicants).

Construction of a pier for Alternative 1 will result in the loss of an estimated 930 square meters or 0.23 acres of eelgrass. This is a conservative estimate based on the assumption that existing eelgrass beds extend only to the -10 foot contour. If these beds extend out past the -20 foot contour, then the amount of area destroyed by pier construction may be as high as 1860 square meters or 0.46 acres. Though these numbers do not represent a very large habitat loss, cumulative habitat losses from this and other development activities may result in significant adverse impact on the region's eelgrass communities. Continued loss of eelgrass beds may result in significant reductions of commercially valuable fish and shellfish (See Attachment A) populations and associated economic impacts from reduced harvests. The total economic value of natural resources dependent on eelgrass meadows (i.e., commercial and recreational fisheries, etc.) was estimated to be $12,325/acre/year (1975 dollars), according to Helfferich and McRoy (1978).

In addition to the costs associated with the loss of eelgrass habitat, the Washington Department of Fisheries may require replacement of lost eelgrass habitat (i.e., compensatory mitigation). The average cost of replacing eelgrass meadows is estimated at $100,000 per acre plus approximately $20,000 or $30,000 a year for post mitigation monitoring (Thom 1991 pers. comm.). In addition, state and federal wetland development regulators require a minimum of 10 years of mitigation monitoring. Hence, the total estimated cost of replacing eelgrass beds lost by pier development and mitigation monitoring for this alternative is estimated to be between $320,000 and $350,000, assuming an annual mitigation monitoring cost of $30,000. Eelgrass mitigation costs could be considerably higher if property must be purchased to provide an alternative mitigation site. Because existing compensatory eelgrass mitigation projects have had limited success and the functional value of replacement beds are questionable (Thom 1990), the Washington Department of Fisheries is reluctant to approve development activities requiring a hydraulic permit which will adversely impact eelgrass beds.

Unless the existing structure of the pier changes considerably, impacts to marine flora (other than eelgrass) and fauna from pier construction are expected to be short-lived.

This conclusion is based on the premise that the new pier will have similar design specifications to the existing pier and a configuration which will not adversely affect the existing physical and chemical conditions of the sediment or water column, circulation patterns, or biota.

Although unlikely, removal of the existing pier may result in increased beach erosion, subsequent losses in eelgrass habitat, and reduced species diversity. A potential positive and more likely impact of pier removal is that eelgrass will recolonize at least part of the area now occupied by the existing pier.

(2) Built Environment

(a) Environmental Health. Because Alternative 1 would be similar to existing conditions, no significant changes in noise, risk of explosion, or potential for the release of toxic substances are anticipated. However because of the proximity of the parking and holding lanes to the Brackett's Landing and Olympic Beach Park, and the occasional presence of large recreational and educational groups in these areas, there may be a marginally increased exposure risk to those people from the accidental spill or release of volatile organics or other hazardous, controlled substances. Furthermore, if impervious holding lane surface areas drain directly to the Sound, there may be a somewhat higher probability of environmental contamination and a greater potential threat to public health from exposure to contaminated media (i.e., sediments, air, and water).

(b) Land and Shoreline Use. Except for the loss of Anderson Marine, adverse impacts to land and shoreline use in the vicinity of the proposed alternative are not anticipated. Alternative 1 appears to be consistent with existing zoning and development restrictions in the area and may actually facilitate access to the Brackett's Landing and the adjacent waterfront by relocating ferry passenger traffic so that it does not impede access to those areas. Recreational use of the Brackett's Landing area is expected to increase as a result of unimpeded access.

(c) Transportation. All alternatives will include the necessary design provisions for accommodating projected traffic volumes. Because the primary access/egress remains unchanged, Alternative 1 is not expected to eliminate existing traffic congestion in the central business district and the commercial waterfront areas during ferry unloading. However, congestion of Main Street and westbound traffic on SR 104 may be reduced

as a result of the relocation of holding lanes to the west side of the railroad tracks. Relocation of the holding lanes to the waterfront area may reduce confusion and accidents associated with the existing situation. Congestion from unloading vehicles in the downtown area may be further reduced by routing disembarking vehicles east onto SR 104 and preventing them from entering the downtown area. The at-grade railroad crossing proposed for this alternative may create delays in the ferry schedule, similar to existing conditions, if train traffic delays loading and unloading activities.

(d) Public Services and Utilities. Additional storm drains and electrical services may be required to convey stormwater runoff and to light parking areas/holding lanes. If recreational opportunities increase at Brackett's Landing as a result of enhanced/unimpeded access, additional maintenance including solid waste disposal services may be necessary. If existing storm drain lines are unable to handle the additional volumes of stormwater runoff generated from the holding lanes, terminal, and parking areas, the stormwater drainage system may need to be upgraded.

Alternative 2 - Main Street Terminal With Below Grade Crossing (Midtown)

(1) Natural Environment

(a) Earth. Construction of the proposed pier and the below-grade access/egress may alter the existing beach topography and potentially change nearshore drift patterns in the immediate vicinity of the pier. In addition, if the existing pier is removed, adverse impacts may occur to the underwater park and Brackett's Landing from storm generated waves. The existing structure may provide protection to these areas from storm events, acting as a breakwater to stabilize marine sediments and prevent beach erosion. Changes in circulation patterns and deposition rates may adversely affect marine benthos by altering existing conditions. Pier construction will probably result in short-lived resuspension and redistribution of bottom sediments and increased turbidity. This disturbance is expected to be short-lived unless buried contaminated sediments are resuspended and deposited on the surface. If dredging occurs as part of the project, similar short-lived impacts to marine flora and fauna are expected.

(b) Air Quality. Air quality and odor are not expected to change significantly as a result of this proposed alternative. Degraded air quality may occur in the below grade access/egress roadway area if air circulation is affected and pollutants accumulate. The

quantity and quality of automobile emissions and associated pollutants are assumed to be equal for all alternatives.

(c) Water Quality. As noted for Alternative 1, Alternative 2 may adversely influence water quality in the area of the untreated, stormwater discharge outfall. Because the amount of impervious surfaces will not change significantly, surface water quality is expected to be similar to existing conditions. Contaminated stormwater runoff from parking areas and holding lanes may result in episodic, short-term contamination of those areas receiving runoff. A potential mitigating measure is to avoid discharging stormwater runoff directly onto beaches.

Groundwater movement, quality, and any interaction between salt and freshwater may be marginally affected by below-grade structures associated with this alternative. However, there may be some potential for below ground excavation activities to intercept and disrupt shallow groundwater flows. If water from shallow groundwater flows accumulates in below grade excavations, pumping and removal may be required during construction activities. If shallow groundwater flows are disrupted, conduits could be installed below the access/egress roadway in the direction of groundwater flow to mitigate or eliminate adverse effects on groundwater movement.

(d) Plants and Animals. Construction of the proposed pier will result in the loss of an estimated 800 square meters (0.2 acres) to 1600 square meters (0.4 acres) of eelgrass bed habitat in the intertidal and shallow subtidal zones. Loss of this extremely important habitat may result in both short-term and long-term adverse impacts to marine benthos and fishes that feed, breed, or live in these areas. Some of those species that may be adversely affected by eelgrass habitat losses are commercially important (See Attachment A). Though the direct impacts of these proposed activities may result in relatively small losses of eelgrass habitat, cumulative impacts from these and similar small developments could have significant adverse regional effects on these resources.

Although unlikely, adverse impacts to eelgrass and marine benthos may occur if the existing pier structure is removed. If the pier protects existing underwater structures and eelgrass beds from the erosive energy of storm waves (i.e., attenuation of the impacts from storm generated waves), removal of the pier could threaten the Brackett's Landing underwater park structures and eelgrass habitat. Eelgrass beds and their substrates may be more susceptible to storm damage, erosion and sediment removal and other

disturbance if the pier is removed. To mitigate or prevent scouring of marine sediments that could occur from pier removal, a rubblemound breakwater or similar wave attenuation structure may be necessary to protect existing eelgrass and underwater park resources. Another option could be to retain the existing pier and to incorporate it as part of Brackett's Landing Underwater Park. A more likely, potential positive impact of removing the existing pier is that eelgrass will recolonize at least a portion of the area occupied by the pier.

The estimated cost of replacing and monitoring eelgrass habitat lost as a result of this alternative is estimated to be between $320,000 and $340,000. This estimate includes the cost of monitoring for 10 years after the mitigation is completed. Eelgrass mitigation costs could be considerably higher if the mitigation site property must be purchased.

(2) Built Environment

(a) Environmental Health. Noise, risk of explosion, and the potential for the release of toxic substances for Alternative 2 would be similar to existing conditions. Holding lanes, parking facilities and other facilities associated with this alternative are not expected to have any significant effect on environmental health.

(b) Land and Shoreline Use. Alternative 2 will result in the loss of several existing small businesses, Safeway, and the Senior Center. Landscaped slopes associated with the below grade access/egress will likely improve the aesthetics in the area and reduce the amount of stormwater runoff by providing infiltration where none existed previously. Beach access and views may be enhanced at the existing terminal site if the terminal is removed. By contrast, views of the Sound for those residents next to the existing Senior Center will be partially obstructed by relocation of the pier.

The proposed development for Alternative 2 is generally consistent with existing land uses in the area. The below grade access/egress is expected to prevent adverse impacts to existing land and shoreline activities and may improve existing traffic conditions by promoting less impeded access to adjacent businesses and the waterfront area. A potential benefit of this alternative may be to create a small upland park in the vicinity of the existing Safeway.

(c) Transportation. Alternative 2 is expected to reduce existing transportation conflicts between ferry, rail, and automobile traffic. The existing ferry holding lanes which are located between Dayton and Main Streets, and which are a source of confusion and impede the flow of traffic, will be removed. The proposed below grade holding lane access/egress is expected to eliminate traffic congestion between Dayton and Main Street on SR 104 and to improve access to the central business district and the commercial waterfront areas. In addition, the below grade railroad crossing is expected to prevent delays in ferry loading and unloading by preventing any conflict between rail and ferry traffic. If the proposed pedestrian corridor to the ferry terminal provides access to the waterfront, pedestrian access to the waterfront and Olympic Beach Park may be improved by the addition of an access point where none previously existed.

(d) Public Services and Utilities. Assuming that increased waterfront access translates to greater volumes of pedestrian traffic and an increased potential for criminal activities and/or conflict, police services may need to be increased in the vicinity. Also if more people use Olympic Beach Park, associated maintenance costs/needs may increase proportionally. Excavation and the below grade access/egress of Alternative 2 could require removal and relocation of (or additional) stormwater drainage lines. No additional sewer services will be necessary. Because Alternative 2 will not create additional impervious surfaces nor result in increases in stormwater runoff, the existing storm drainage system probably does not need to be upgraded to handle runoff from the project area. Installation of a stormwater runoff pumping station may be required to prevent accumulation of stormwater runoff in the below grade access/egress.

Municipal wastewater effluent discharge lines are present in the area between the public fishing pier and existing ferry terminal. Two lines (36 inches in diameter) extend approximately 1300 feet out from the beach to outfalls located between the -60 and -70 foot contours. The lines are approximately 500 feet apart at their outfalls (Bauer 1991 pers. comm.). Construction of a new pier at the proposed Midtown location (Alternative 2) may not be compatible with the existing effluent discharge lines.

Alternative 3 - Edwards Point With Elevated Crossing at UNOCAL.

(1) Natural Environment

(a) Earth. The Edwards Point UNOCAL site has contaminated soils and free floating petroleum which contaminates the shallow groundwater aquifer. These contaminants may present significant barriers to timely construction and may result in significant construction delays, litigation, and/or possibly unforeseen clean-up expenses. According to GeoEngineers (Attachment A), an estimated 150,000 to 300,000 cubic yards of contaminated soils and 30,000 gallons of free floating petroleum hydrocarbons in three separate plumes exist in the lower yard at the UNOCAL site. Using the Washington ranking method for assessing human and environmental health risks, the Washington Department of Ecology recently assigned an overall rating of 1 to the site.An overall rating of 1 indicates that existing contamination may pose significant environmental and human health risks.

The estimated cost of cleaning up these contaminated soils ranges from a lower limit of $18 million to treat 150,000 cubic yards using bioremediation methods (e.g., fungal or bacteriological) to an upper limit of over $118 million to incinerate 300,000 cubic yards. Incineration, the most costly remedial method, may not be a feasible alternative for this site because of permit constraints and because it may be unacceptable to the public. Costs of other remedial alternatives, including encapsulation (in situ) and landfilling, fall somewhere between these upper and lower limits. The two volumes of contaminated soil used in these calculations represent the estimated amount of contaminated soil in the lower yard only. Clean-up costs could be considerably higher if the contaminated soils in the upper yard also are included in the estimated costs of clean-up.

Two recovery well systems were installed in 1987 to mitigate groundwater contamination caused by two of the fuel plumes. To date, only 7,500 gallons of product has been recovered (Parametrix and SAIC 1991). GeoEngineers, the geotechnical consultant retained by UNOCAL, has estimated that recovery wells need to operate for at least one year to recover most of the free product (GeoEngineers 1988). Recent conversations with the UNOCAL site manager indicate that one of the recovery wells is inoperable (RW-1) and the other is relatively ineffective because it is operated infrequently (Clark 1991 pers. comm.).

Contaminants may be present in sediments near the outfall of the SR 104 storm trunk drain located between the existing UNOCAL pier and the south breakwater of the Edmonds Marina. If pier construction for Alternative 3 results in the resuspension and distribution of contaminated sediments, marine flora and fauna may be adversely affected. Construction activities also may cause resuspension and subsequent redistribution of previously buried contaminants to other areas. If no contaminated sediments exist in the area, turbidity and disturbance of marine benthos from construction activities are expected to be short-lived.

Construction of the terminal for Alternative 3 would require the use of a breakwater to attenuate storm generated waves and to maintain the existing level of ferry service. Two different types of breakwater have been proposed as part of Alternative 3, a floating breakwater or a rubblemound breakwater.

A detached floating breakwater could result in conditions favorable to increased sediment deposition. Such a breakwater could influence surface currents, littoral transport processes, and result in the localized accumulation of sediment-bound contaminants from the stormwater discharge outfall located between the UNOCAL pier and the Edmonds Harbor. The floating breakwater structure proposed for this alternative is expected to consist of two sections each 60 feet wide, 18 feet deep and 360 feet long. Although currents and depositional rates could be affected to some degree by such a structure, tides and local bathymetry are the primary factors that influence currents (Reid-Middleton 1991). Therefore, adverse effects on marine biota from changes in currents or deposition rates are likely to be negligible.

The second type of breakwater that could be used is a rubblemound breakwater. The top elevation of the proposed rubblemound breakwater is +18.5 feet with a crest width of 6 feet. This breakwater, which would begin at the -10 foot contour, has side slopes of 1.5:1 and would extend approximately 800 feet to the western toe (Reid-Middleton 1991). A rubblemound breakwater is not expected to adversely affect the net northward transport of sediment by longshore currents. Rubblemound breakwater materials will cover and result in the loss of a considerable amount of marine benthos and epibenthos and result in increased turbidity during construction. However, rocks used for the rubblemound breakwater will provide new areas for rocky subtidal organisms to colonize and will result in increased habitat diversity in the area.

(b) Air Quality. Air quality impacts are anticipated to be similar for all alternatives. Relocation of holding lanes and other facilities away from the downtown area for Alternative 3 can be expected to result in a similar relocation of existing local air quality and odor problems to the vicinity of Edwards Point. Dispersion and movement of automobile emissions/pollutants are expected to be somewhat different at this site because of the exposure at Edwards Point and the adjacent, hilly upland topography. These features may significantly influence local air circulation patterns. Increased atmospheric deposition of pollutants in and around the Union Oil Marsh and Marina Beach areas may occur. However, significant adverse impacts to the environment around Edwards Point from air pollution problems are unlikely because of the location, circulation, and the relatively low levels of pollutants emitted by a limited number of ferry passenger vehicles. Atmospheric pollutants from auto emissions are likely to be transported away from the area in the direction of the prevailing winds.

(c) Water Quality. Alternative 3 will result in the addition of a significant amount of impervious surfaces in the vicinity of Edwards Point. Consequently, stormwater runoff is expected to increase substantially. An addition of approximately 1.5 acres of impervious surfaces may adversely impact those surface waters receiving contaminated stormwater runoff. The quality of stormwater runoff generated from roadways and parking areas may degrade receiving waters if the runoff is untreated before being discharged. Runoff is expected to have characteristics similar to urban runoff and may be contaminated with polycyclic aromatic hydrocarbons, metals, and other toxic substances. To prevent and avoid degradation of the Union Oil Marsh, stormwater runoff will require treatment prior to discharge to the marsh. In addition, stormwater should also be treated before discharge to Puget Sound.

Groundwater at the UNOCAL site is contaminated by 3 separate plumes of free floating petroleum fuels. Recovery of spilled fuels from the groundwater has been addressed by the installation of recovery wells. However, because operation of these wells has been sporadic, only approximately 25 percent of the estimated 30,000 gallons of fuel has been recovered thus far. Contaminated soils on site are probably a continuing source of groundwater contamination. Mitigating onsite groundwater contamination could require operation and maintenance of existing recovery wells for several years.

(d) Plants and Animals. Potential contamination of water and sediment in adjacent marsh and marine environments by stormwater runoff may adversely impact flora and

fauna in these environments. Depending on the nature of stormwater runoff contaminants, their concentrations and properties, the effects of these pollutants on these ecosystems may be short and long term and include both chronic and acute effects. Bioconcentration and/or bioaccumulation of pollutants may result in reductions in community productivity, decreased biodiversity and adverse impacts to both resident and migratory animals. By far the greatest potential impacts to these environments would be from an accidental spill of a toxic or hazardous material that subsequently entered the stormwater drainage system. The transport of such contaminants from the Edwards Point area by Puget Sound currents could also result in adverse impacts to marine flora and fauna in other parts of Puget Sound. Bald eagles, great blue herons and other sensitive species which are frequent visitors to these areas may be adversely affected by increased vehicle traffic (Attachment A). Eagles and other animals that are relatively intolerant of increased human activities may be displaced by normal ferry operations.

Accumulation of contaminants could be exacerbated by construction of a floating breakwater if the breakwater restricts littoral transport of contaminants. If accumulation of contaminants occurs, there may be a localized effect on marine benthos and epibenthos (See Attachment A).

A potential enhancement opportunity exists for anadromous fish. Anadromous fish passage to the Union Oil Marsh and upstream spawning habitat could be enhanced by creating an open channel connection to the Sound.

(2) Built Environment

(a) Environmental Health. As noted for the other alternatives, there is a small risk of accidental discharge of hazardous materials to the environment from vehicles transporting these substances. Noise associated with terminal activities is not expected to be a problem. The vegetated hillside separating Woodway residences from the proposed terminal and associated infrastructures is expected to prevent any noticeable increases in noise levels.

(b) Land and Shoreline Use. Adverse impacts to land and shoreline use in the vicinity of Alternative 3 are not anticipated as a result of proposed development activities. Access and egress to the terminal will not interfere with access to either the Marina Beach Park

or the Edmonds Harbor and adjacent areas. Relocation of the terminal to Edwards Point may result in enhanced access and increased recreational opportunities in the area of the existing terminal and downtown Edmonds if the existing pier structure is removed. By contrast, normal ferry terminal operations for Alternative 3 may interfere with existing Indian and commercial fishing activities.

(c) Transportation. Of all the alternatives, Alternative 3 is likely to have the most beneficial influence on existing area traffic problems. Because the holding lane area is located off SR 104, a major artery to the Edmonds waterfront, traffic congestion should be relieved during terminal use. This is expected to improve local automobile circulation in both directions on SR 104. Removal of the ferry terminal infrastructures from the commercial waterfront area should eliminate existing or potential future parking problems (e.g., competition for parking between business patrons and ferry users). Relocation of parking areas to the Edwards Point UNOCAL property would likely increase commercial and recreational parking in the vicinity of the existing terminal. The below grade railroad crossing provision of this alternative is expected to prevent any conflicts between different modes of transportation (e.g., rail and auto traffic).

d) Public Services and Utilities. The creation of additional, relatively isolated parking areas may create security problems in the area of proposed parking facilities. Consequently, additional police services in the area may be necessary. Additional storm drains and electrical services may be required to convey stormwater runoff and to light parking areas, and holding lanes.

SUMMARY

This analysis and evaluation of the three proposed ferry terminal relocation alternatives serves as a preliminary report on the potential environmental impacts and SEPA issues for each alternative. Findings presented in this document are based on those existing resources identified in the preliminary environmental site review (Attachment A) and site inspections conducted by Herrera Environmental Consultants, Inc. This report is not an environmental impact statement but is intended to document known existing natural resources, to identify potential impacts to these resources from ferry terminal construction, relocation, and operations, and to guide the decision making process. Some of the more significant environmental concerns identified for each of the proposed alternatives are listed below:

(1) Union Oil Marsh - Alternatives 1 and 2 will not exert any adverse impacts on the Union Oil Marsh. Potential adverse impacts to the marsh are limited to Alternative 3. Because untreated stormwater runoff cannot be directly discharged to the marsh, it is unlikely that water quality or wetland hydrology will be adversely affected by Alternative 3. Wildlife that use the wetland which are intolerant or sensitive to disturbance (e.g., migratory waterfowl) may be displaced by normal ferry terminal operations.

(2) Eelgrass Habitat - Both Alternatives 1 and 2 would result in the loss of between 0.2 and 0.4 acres of eelgrass habitat. The estimated costs of replacing these resources may exceed $400,000. Because of the lack of eelgrass beds at Edwards Point, Alternative 3 would have the least impact on these resources. Removal of the existing terminal, which is common to all alternatives, may permit eelgrass recolonization of the area now occupied by the terminal. Conversely, if the pier provides wave attenuation/scour protection, removal of the existing pier may have adverse impacts on eelgrass beds.

(3) Noise and aesthetics - Alternative 1 is expected to be similar to existing conditions.

Alternative 2 may result in increased noise levels for nearby apartment or condominium residents. Also, this alternative will adversely affect the existing view of nearby apartment residents.

For Alternative 3, existing vegetation and topography are expected to prevent any significant increases in noise levels. Views of the Sound from Woodway are not expected to be obscured by the ferry terminal.

(4) Air - Alternative 1 is not expected to have any significant adverse effects on existing air quality.

Both Alternatives 2 and 3 will result in the relocation of holding lanes and will likewise result in the relocation of air quality problems associated with ferry passenger vehicles.

(5) Water - Alternative 1 is similar to existing conditions. Contaminants in untreated stormwater runoff from ferry terminal infrustructures will continue to adversely impact receiving waters.

Relocation of or construction of new stormwater runoff discharge lines for Alternatives 2 and 3 could result in adverse impacts to receiving waters. Contaminated ground water exists at the UNOCAL site (Alternative 3). Contaminated ground water poses a potential significant risk to environmental and human health. Cleanup of the groundwater is expected to require several years of effort.

(6) Soils and Sediments - Because Alternatives 1 and 2 are similar to existing conditions, no significant impacts are anticipated.

An estimated 150,000 to 300,000 cubic yards of contaminated soils exist in the lower yard of the UNOCAL site. Hence, there may be a potential liability issue in acquiring the site for Alternative 3. Use of a floating breakwater for Alternative 3 may result in the accumulation of contaminated sediments near the existing stormwater outfall and disruption of littoral transport patterns. Use of a rubblemound breakwater for Alternative 3 would result in short-term increases in suspended sediment concentrations and the loss of existing benthos. A rubblemound breakwater would increase habitat diversity by creating a subtidal rocky habitat.

(7) Plants and Animals - Alternatives 1 and 2 will have similar adverse affects on eelgrass communities and dependent flora and fauna. Both of these alternatives will result in the loss of eelgrass habitat through the construction of a new ferry terminal. However, eelgrass habitat loss may be reduced if eelgrass colonizes the area now occupied by the existing pier (i.e., after the existing pier is removed). There will be short-term adverse impacts from pier construction and removal activities due to increased suspended sediment concentrations.

In addition to short- term impacts to marine flora and fauna related to pier construction, use of a floating breakwater for Alternative 3 may have some adverse impacts on sediment accumulation and littoral transport rates. A rubblemound breakwater would result in loss of mixed sand and mud subtidal habitat and short-term increases in suspended sediment. A positive impact of a rubblemound breakwater is an increase in habitat diversity (i.e., rocky subtidal habitat).

(8) Traffic Congestion - Alternative 1 will not eliminate conflicts between rail and ferry passenger traffic. In addition, it is unlikely that this alternative will significantly reduce automobile congestion in the central business or commercial waterfront areas.

The below grade access/egress lanes proposed for Alternative 2 will eliminate the conflict between ferry passenger auto and rail traffic. Relocation of the holding lanes and associated infrustructures may reduce existing automobile congestion in the central business and commercial waterfront areas.

Alternative 3 is likely to have the most positive impact on existing auto traffic problems because it is the furthest removed from current problem areas. The above grade access/egress will prevent conflicts between rail and ferry passenger automobiles.

(9) Land and Shoreline Use - Alternative 1 would result in the loss of Anderson Marine, but would otherwise not affect existing land and shoreline use. Potential impacts to commercial and Indian fishing activities are expected to be similar to existing conditions.

The acquisition of the Safeway/Goldies property for Alternative 2 would result in the loss of the Senior Center, several small businesses and Safeway. Construction of the below grade access/egress lanes and bulkhead would alter the existing beach topography. Potential impacts to commercial and Indian fishing activities are expected to be similar to existing conditions.

Alternative 3 would not adversely affect any existing businesses. Existing recreational activities are not expected to be adversely affected by Alternative 3. Relocation of the ferry terminal to Edwards Point may adversely affect commercial and Indian fishing activities.

(10) Public Services and Utilities - Additional storm drains and electrical services may be required (a) to convey stormwater runoff and (b) to light parking areas/holding lanes.

Similar services will be required for Alternative 2. In addition, a stormwater pumping station may be required for the below grade access/egress.

Alternative 3 will also likely require similar additional electrical and stormwater runoff facilities. Because of the isolation at Edwards Point and potential security problems, additional police services may also be required.

(11) Parks - None of the alternatives has the potential to adversely affect nor expand any of the existing waterfront parks.

Alternative 2 could potentially result in the construction of a small upland park in the vicinity of Safeway.

Alternative 3 could potentially enhance the existing Union Oil Marsh through the use of perimeter trails and interpretive signs along the southern boundary of the area. In addition, construction of an open channel connecting Puget Sound and the Marsh would improve anadromous fish access to the marsh, possibly improve spawning success, and create additional channel habitat.

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ATTACHMENT A

PRELIMINARY ENVIRONMENTAL

SITE REVIEW

EXISTING CONDITIONS

INTRODUCTION

The following preliminary site review focuses on existing conditions of soils, drainage, and the marine environment of the Edwards Point and existing Edmonds Ferry Terminal sites. The information provided in this report provides a foundation for future environmental documents, identifies existing natural resources, and identifies some potential environmental issues and concerns. In addition, information in this report is intended to assist planners and to help guide the planning process. Other environmental issues related to specific alternatives and potential impacts will be addressed in the final site review report.

SOILS

The soil survey for Snohomish County published by the Soil Conservation Service (Debose & Klungland 1983) identifies and maps the soil series that occur in the Edwards Point and existing terminal vicinity. The soil map units of this area are shown in Figure 1. These soils consist primarily of gravelly sandy loams, silt loams, Mukilteo muck and urban land (which is composed of fill material or has been developed). Soil conservation survey soils information is limited in that estimates and other data only apply to a soil depth of 5-6 feet below the surface. Furthermore, small inclusions of different soils may occur in mapped areas of a specific soil.

Uplands around the Union Oil of California (UNOCAL) tank farm and the area south of the Deer Creek Fish Hatchery and west of State Route (SR) 104 are primarily Alderwood and Everett gravelly sandy loams. The Alderwood soils, which occur on moderate to steep slopes from 2 to 70 percent, are moderately well drained, moderately deep soils over a weakly cemented, thin hardpan. Permeability of the Alderwood soils is moderately rapid above the hardpan and very slow through it. Depth to the hardpan ranges from 20-40 inches. The hardpan acts as an aquiclude that commonly causes overlying materials to landslide, depending on the existing slope, drainage and groundwater conditions (DOE 1979). In addition to the Alderwood and Everett gravelly sandy loams, which have similar characteristics and properties, there is a unit of Kitsap silt loam in the vicinity of the large water tank on the crest of the hill overlooking Edwards

Point (Figure 1). The Union Oil Marsh soil is a Mukilteo muck and the waterfront area is developed or fill material.

Contamination

Soils on the UNOCAL property, located adjacent to the southern edge of the Union Oil Marsh, are contaminated with petroleum hydrocarbons, diesel fuel, gasoline, and asphalt plant wastes (WDOE 1990; Miller 1991 pers. comm.) According to the Washington State Department of Ecology (WDOE), soils are suspected of being contaminated by non-halogenated organic solvents and polycyclic aromatic hydrocarbons (PAHs). Surface water, groundwater, and sediments also may be polluted with these substances. The WDOE has recently conducted a site hazard assessment of the UNOCAL property. The lower yard area was assigned a Washington ranking method rating of one. This rank indicates that site contamination poses potentially significant environmental and human health risks.

UNOCAL's Edmonds facility has been operation since 1920. the facility is a bulk storage and distribution center. Products contained onsite include unleaded and leaded gasoline, aviation gasoline, heating oils and fuel oil. The asphalt plant, which has been dismantled, operated from 1920 to 1974 (Ecology & Environment, Inc. 1987).

GeoEngineers, a geotechnical and geoengineering firm which has been retained by UNOCAL, has conducted several studies on contaminated soils at this site. GeoEngineers has divided the property into two units, the lower yard and the upper yard. The lower yard, which adjoins the southwest corner of the Union Oil Marsh and consists of an unlined catchment basin called Lake McGuire, a connected skimmer pond, and other structures, has been studied extensively (Figure 2). An estimated volume of 150,000 to 300,000 cubic yards of contaminated soils occurs in the lower yard area. Soils are contaminated to a depth of twelve feet or more (Miller 1991 pers. comm.; Figure 2). Hand borings, test pits and wells have been used to document site contaminants. Sheen, odor, vapor concentration and total petroleum hydrocarbon (TPH) tests have been conducted to identify the extent of contaminated soils. Results of these analyses are shown in Figures 2 through 5.

Upper yard contamination studies are being conducted and should be complete by late summer 1991. There is reportedly substantially less contamination in the upper yard

(Miller 1991 pers. comm.). In the past, emulsified asphalt was sprayed on the slopes of the tank farms to retard and eliminate vegetation and weed growth.

Subsurface hydrocarbon contamination was characterized at the fuel terminal in a Phase I Site Assessment of the Edmonds Fuel Terminal completed in 1986 (GeoEngineers 1986). That study identified three separate plumes of free-floating product in lower-lying portions of the terminal. UNOCAL is currently operating a product recovery system to mitigate two of the three plumes. Recovery wells are shown in Figure 3. These recovery wells were installed in 1987 but have only operated sporadically.

A visual site inspection was conducted on April 1, 1991 by Herrera Environmental Consultants (HEC). Weather conditions were cool and cloudy. A photo record was made of the Marsh, Lake McGuire, the drainage channel, and tank farm. No sheen was observed in the open water portions of the Marsh, Lake McGuire, the skimmer pond or the drainage channel nor was any odor of petroleum products observed. Approximately 50-60 percent of the substrate in the catchment basin was covered with emergent freshwater marsh vegetation, grasses and other plants. Unvegetated areas were covered by a hard tar-like petroleum product. In these bare areas, concentrations of toxicants were too high for vegetation to tolerate (Miller 1991, pers. comm.)

Slope Stability and Some Physical Soil Characteristics

The Alderwood and Everett gravelly sandy loams have slight to severe development limitations because of their slopes, drainage, erosivity, and associated physical properties (Debose & Klungland 1983). Soil properties and site conditions that are generally favorable to development, with minor limitations that are easily overcome, have been given a slight rating. A severe development limitation designation indicates that soil properties or site features are so unfavorable that special planning, design or maintenance is required to overcome or minimize the limitations. These ratings were developed for shallow excavations, small dwellings, and roads using soil permeability, shrink-swell potential, erosivity and other physical properties as criteria.

EDMONDS WAY DRAINAGE BASIN

Existing Drainage System

R.W. Beck and Associates (1990) recently conducted a study of the environmental resources, major basin features, sensitive areas and hydrologic problems of the Edmonds Way Basin for the City of Edmonds. The Edmonds Way Basin covers approximately 1,321 acres and is comprised of two major drainage systems, the Edmonds Way (SR 104) trunk storm drain and Willow Creek. This basin is composed of a network of natural features and man-made facilities including large and small storm sewer pipes, streams, wetlands, ditches and detention systems.

Basin boundaries and the primary drainage conveyance systems are illustrated in Figure 6. The SR 104 trunk storm drain, which drains the upper portion of the basin, conveys stormwater runoff directly to Puget Sound. This conveyance system is presently overloaded, surcharges, and requires improved maintenance as well as system wide structural improvements in order to function properly and to handle projected future flows. The other primary drainage consists of Willow and Shellebarger Creeks which conduct flows into the Union Oil Marsh. The marsh in turn drains into Puget Sound via a drainage channel and a 1100 foot long, 48 inch diameter culvert with a tide gate. The outfall is located just south of the Port of Edmonds Marina facilities.

Fisheries

Willow Creek, which is sometimes referred to as Deer Creek or "Unnamed Creek" (Walker 1991 pers. comm.), is the sole water supply for the Deer Creek Fish Hatchery located at the southeast corner of the Union Oil Marsh. The Laebugten Salmon Chapter of Trout Unlimited operates the hatchery and provides Chinook and Coho salmon smolts to the Washington Department of Fisheries which are released in other areas. Natural resource management agencies could provide no information on either resident or anadromous fish population trends, distribution or usage of the Marsh, Willow or Shellebarger Creeks.

R.W. Beck (1991) identified the presence of juvenile salmonids including Coho and Chinook Salmon and trout in the marsh and its drainage channel in May and June of 1990. However, no extensive quantitative population study was conducted and the

origin of these fish remains uncertain. It was thought that these fish may have escaped from the Deer Creek Fish Hatchery. Whether these juveniles survived the winter or are part of a resident or anadromous fishery remains unknown.

An inventory of physical and biological conditions identified a limited amount of fair to poor spawning habitat in Willow and Shellebarger Creeks, but several barriers to fish passage and an assortment of other problems which make an anadromous fishery unlikely were also documented (R.W. Beck 1991). Adult anadromous fish entry and passage through the 1100 foot long culvert that drains the marsh were identified as problems. Nearshore drift gravel accumulation had almost completely plugged the opening of the outfall at the time of the study. By contrast, the outfall opening was recently observed to be mostly clear (Castelle 1991 pers. comm.). Shallow, braided stream structure through the marsh, the temporary weir at the Deer Creek Fish Hatchery, and other probable fish barriers also were identified (Table 1). Lack of suitable spawning habitat, low stream flows and accumulations of fine sediment in potential spawning gravels reduce the probability of successful salmonid reproduction. However, no definitive, extensive studies have been conducted to either prove or refute the existence of resident or anadromous fish populations. No fish were observed in the drainage channel during HEC's site visit in April 1991, but visibility was poor because of diffuse light conditions and water turbidity.

Wildlife

The Union Oil Marsh and the narrow riparian corridors of Willow and Shellebarger Creeks provide significant habitat for a variety of birds including songbirds, waterfowl, great blue herons, and bald eagles. Herons roost in the mature trees located near the Fish Hatchery (R.W. Beck et al. 1991). Small mammals such as raccoons, opossums, skunks and rodents that are habituated to more urbanized, isolated habitats probably are attracted to the abundant prey and other resources of the marsh, which is designated as a wildlife sanctuary by the City of Edmonds. Insects and amphibians are abundant and provide a rich food base for predatory animals. Extensive, localized studies documenting habitat quantity and quality, fish and wildlife populations and their trends have not been conducted. Bald eagles and great blue herons, two sensitive species of concern, have been sighted frequently and are known to use the marsh and other nearby open space. However, no information on the nesting distribution or rearing habitat value of these areas exists. There has been a confirmed report of bald eagles

breeding in nearby Woodway but no confirmed reports of great blue heron nesting (WDNR and WDW 1991; Penland 1990 pers. comm.). During the April 1991 site visit, individuals of both sensitive species were observed, as were Killdeer, sparrows, blackbirds, teal, and mallards. All of these birds, except the eagle, were observed in the lower marsh area.

Union Oil Marsh

Several studies have documented the existing conditions of the wetland vegetation in the 23 acre Union Oil Marsh. Originally, part of a much larger saltwater marsh ecosystem that covered much of the Edmonds shoreline, historical development activities and installation of a tide gate reduced the marsh to its present size and changed it into a freshwater, emergent wetland.

Approximately two-thirds of the marsh have been classified as a palustrine emergent wetland, which is composed primarily of cattails (R.W. Beck et al. 1991; Watershed Co. and Coot Co. 1987). The southwestern third of the wetland is reverting back to an estuarine, intertidal, emergent wetland composed of salt tolerant species due to recent (1988) seasonal restoration of the tidal, saltwater influence. The tide gate on the culvert connecting the marsh to the Sound is open from May through November. Because winter high tides and stormwater runoff events cause flooding of the adjacent Harbor Square development to the north, the tide gate flap is closed during the winter months. Partial restoration of the tidal regime has permitted salt tolerant species, including saltgrass, Baltic rush, American three square, fleshy jaumea and Pacific silverweed, to reclaim the southwestern portion of the marsh adjoining UNOCAL's Lake McGuire.

The marsh provides significant habitat to a variety of animals as noted previously. Functional values of this ecosystem include flood storage and detention, sediment and nutrient retention, treatment and storage of toxicants borne in urban runoff, and a wide variety of educational and recreational opportunities. According to R.W. Beck (1991), the marsh presently performs many of these functions to a moderate degree.

MARINE ENVIRONMENTS

Intertidal/Subtidal

Two documents, the Washington Coastal Zone Atlas Series (CZA) (WDOE 1979) and Puget Sound Environmental Atlas (1987), synthesize much of the available, existing information on biological resources in Puget Sound. Information included in these documents includes the distribution of commercially important fish and shellfish, known critical biological areas, and also some physical and chemical information. The following discussion summarizes information included in these documents s well as other studies of the intertidal zone in the Edmonds area.

The CZA identifies an accumulation of mixed fine materials between the UNOCAL pier and the southern breakwater of the Edmonds Harbor. Extensive nearshore drift deposition of fine materials in the area between the Edmonds Harbor breakwater and the UNOCAL pier extends in a south by southwest direction out towards the end of the UNOCAL pier. According to historical records, this formation has existed for many years though its size and shape have fluctuated (Van Wormer 1988). This accumulation of fine sand was verified during HEC's April 1 visit during a -0.2' low tide. While the coastal drift figure indicates that the beach substrate is homogeneous around the pier, a band of mixed gravel (0.2 to 7 cm diameter) approximately 15 to 20 meters wide was observed between the mean high water mark to near the 0' level. Relatively small (100 to 200 m^2) discrete aggregations of mixed cobble and small boulder were observed on the north and south sides of the pier respectively. Most of the intertidal area was comprised of sand.

Particle size distribution and composition coupled with the broad, gently sloping tideflats of the Edwards Point area are indicative of an area with moderate to low wave energies and a moderate to sheltered exposure. Waves in the 0.5 to 2' wave class, which occur frequently in this area, are capable of moving silt to gravel size materials, whereas waves in the 2 to 4' height class, which possess sufficient energy to move larger cobble size materials, occur less frequently (Figure 8).

The prevalence of smaller sand and fine materials and relative lack of larger materials indicate that the intertidal area is relatively stable and generally not susceptible to shoreline erosion. The intertidal and shallow subtidal area is generally characterized by

expansive sand flats intermixed with mixed gravel, mixed cobble and small boulders in the vicinity of the UNOCAL pier as noted above. These shallow tideflat areas extend west for approximately two hundred meters before gradually dropping off into deeper water near the end of the UNOCAL pier. The fine sands overlay large sedimentary-type rocks (Van Wormer 1988). A relatively extensive narrow band of land above the mean high water mark is susceptible to coastal flooding (Figure 9). The area delineated in Figure 9 indicates the approximate area flooded by the near record 8.5' high tide of December 15, 1977. This area has about a 1 percent chance of being flooded in any one year.

Marine Flora and Fauna

There are no known extensive studies of the intertidal and subtidal area specific to Edwards Point. Descriptive, qualitative studies of the community composition including algal and eelgrass communities have been conducted as part of the Port of Edmonds Feasibility study on the expansion of permanent moorage facilities. These evaluations were conducted in areas south of Edwards Point, towards Point Wells. Additional studies have examined juvenile salmonid use of bulkhead and marina areas of Edmonds Harbor, the artificial reefs in the area, and biomass studies of benthic invertebrates in the vicinity of the Brackett's Landing Jetty.

Some of the biological resources identified in the Edwards Point area include subtidal and intertidal kelp and eelgrass communities (Figure 7A), a glaucous-winged gull and pigeon guillemot nesting area, dungeness crab, and bottom fish resource areas (Figures 10, 11). Pacific hake, English sole, Dover sole, Pacific cod, and rockfish species are taken by commercial and sport fishermen in areas 36 and 41 delineated in Figure 11.

Edwards Point is part of an accustomed salmon fishing area for the Lummi, Swinomish, Suquamish, and Tulalip Indian Tribes (Figure 12). In addition, a line extending between Edwards Point and Apple Cove Point is the boundary between salmon resource areas 9 and 10. Normal ferry terminal operations at Edwards Point may interfere with commercial and tribal fishing activities.

Productive clam beds at Edwards Point are used by the general public and are listed as a public shellfish site (WDF 1989). However, they are commercially uncertifiable due to their proximity to sewage outfalls and the potential for pathogen accumulation in these

shellfish. Although Edwards Point is not indicated as a sensitive area (Figure 13), several species listed as sensitive have been observed repeatedly using the intertidal and subtidal habitat including bald eagle, great blue heron, brant geese, murre, and rhinoceros auklet. Migratory waterfowl. auklets, and murre are seasonal residents (Van Wormer 1988).

Edmonds is a secondary area of concern for bottomfish disease (Evans-Hamilton, Inc. et al. 1987). Elevated contaminant levels in sediments are thought to be responsible for relatively high levels of tumors (neoplasms), pretumorous growths (preneoplasms) and other cellular abnormalities (megalocytic hepatosis) observed in English sole (*Parophrys vetulus*) in areas of concern. A sample of 10 or more English sole caught in the Edmonds area were found to have no neoplasms, 4.8 percent had preneoplasms and 9.5 percent had megalocytic hepatosis. Because English sole are a mobile animal and may have developed an abnormality in a location other than where captured, it is not possible to identify where the abnormality was originally induced.

HEC's site visit confirmed the presence of mixed marine algal and eelgrass beds in the intertidal zone. These areas are extremely productive and support a diverse assemblage of marine invertebrates. Location of these marine plant communities appeared to be restricted to the general area around the UNOCAL pier (Figure 7A). The status and subtidal extent of these communities is largely unknown in the Puget Sound region (Mumford 1990). The approximate extent and densities of marine algae and eelgrass for the different sites is indicated in Figures 7B and 7C. Site photos provide visual records of these communities (Attachment B). The importance of eelgrass communities as nursery areas for a variety of commercially valuable species such as shrimp, crab, and herring, as well as other nongame species, is well known.

Dungeness crab and spot shrimp are known to prefer shallow subtidal eelgrass and marine kelp communities during part of their life cycles (Bumgartner 1990; Armstrong et al 1987; Dinnel et al 1986). Perch, juvenile salmonids and other fishes forage and seek shelter from predators in these communities. The Washington Department of Fisheries is aggressively continuing to study the importance of these areas and has a policy of generally not permitting additional losses of these communities from development activities (Buckley 1991 pers. comm.).

A compilation of the characteristic flora and fauna of the intertidal and subtidal habitats in the Edmonds area lists those species known to occur in the area (Table 2). In addition to the mixed brown, green, and red algal communities and eelgrass beds, intertidal organisms observed during HEC's site visit included numerous barnacles and mussels on the larger cobble and boulder substrate and pier pilings, anemones, amphipods, and other crustaceans. Many siphon shows were observed and clam diggers were collecting horse clams, littleneck clams, cockles, butter clams, and other molluscs. Sixty to seventy brant geese were observed feeding in the intertidal zone during the site visit. The intertidal and subtidal habitats of this area support a rich, diverse community of benthic and epibenthic marine invertebrates.

Serwold (1990) has documented baseline and post development recovery of marine invertebrate biomass for four zones in the intertidal area of Brackett's Landing, which is located just north of the existing Edmonds Ferry Terminal. This continuing multi-year study is monitoring the recovery and successional changes of the invertebrate biota in the Brackett's Landing area. Samples of marine invertebrates and biomass determinations have been made for the sand zone, newly created gravel zone, cobble zone, eelgrass, and tide pool/reef zones. Numerous samples were taken at various elevations in each zone and total biomass estimates per zone estimated from these results. This study has indicated that the intertidal zone is very productive. Total biomass for the different zones is variable. Sandy substrates, which are most prevalent at Edward's Point, were the most productive substrate in the intertidal area at Brackett's Landing (Table 3). Total biomass and coverage area have not changed substantially for the sandy, rocky and cobble substrates since the construction of the reef in 1989 (Serwold 1990). Eelgrass beds, by contrast, have diminished in size and density, which may be due in part to substrate erosion from littoral transport. Monitoring activities studying the successional changes and recovery of these zones are projected to continue through the summer of 1993. A summary of baseline biomass (1986) and post development biomass (1990) for the different zones is presented in Table 4. A list of the flora and fauna found in the Brackett's Landing life zones is presented in Table 2.

Limited information is available of the distribution and population trends of the flora and fauna in nearshore subtidal habitats. Artificial reef studies near the existing Edmonds Ferry Terminal have been conducted (Finn 1991 pers. comm.). Fishes of the shallow subtidal habitat in the Edmonds area are listed in Table 2. Juvenile chum and pink salmon appear to prefer shallow, nearshore subtidal habitat for their early life history

period (Heiser and Finn 1970). These areas provide refuge from predators and also an abundance of food, which is important to growth and survival. Fry and fingerlings selectively use nearshore areas to avoid predation by larger fish, according to Heiser and Finn (1970). Activities that force these juveniles into deeper water may cause stress and increased mortality from predation. Other species of fish are drawn to these productive areas. Marine mammals and diving birds are attracted to the invertebrate and fish resources of kelp beds and other intertidal and subtidal habitats. Sea lions were observed north of the UNOCAL pier in the shallow subtidal area during HEC's site visit.

POTENTIAL IMPACTS

A number of potential direct and indirect impacts may occur to the existing environments in the Edwards Point area as a result of construction of a new ferry terminal and associated infrastructures. Depending on the location of ferry terminal infrastructures (e.g., parking areas, holding lanes, etc.), the extent of modifications to the existing UNOCAL pier and/or construction of a new pier, potential impacts could include loss of intertidal and subtidal habitat, disruption and displacement of resident and migratory fish and wildlife, mobilization and/or dispersal of contaminated sediments, loss of eelgrass and marine algal communities, and impaired water quality and functional values of the Union Oil Marsh. Relocation of the ferry terminal to Edwards Point and ferry traffic in the vicinity may interfere with tribal fishing activities (Fransen 1991 pers. comm.; Meyers 1991 pers. comm.).

If considerable dredging or filling activities are required at the UNOCAL site to accommodate ferry traffic and/or associated infrastructures, direct losses of eelgrass and marine algal communities and their associated species assemblages may result. Deterioration of intertidal and subtidal plant communities may result from pollutants in urban runoff from associated ferry terminal infrastructures (e.g., parking areas, holding lanes, etc.), which could adversely affect a number of commercially valuable species. Reductions of these preferred intertidal and subtidal habitat may be detrimental to the reproductive success, recruitment and abundance and therefore population size of salmon, dungeness crab, spot shrimp, perch, herring and also nongame species. Losses of these communities may also adversely affect populations of migratory species that use these areas on a seasonal basis, particularly if suitable alternative habitats are limited. Displacement and behavioral modifications of these species may result from development activities. Losses of intertidal and subtidal habitat may contribute to

changes in the quality and quantity, distribution and availability of these habitat types, and have adverse cumulative effects on associated resident and migratory species.

If petroleum products, their associated fractions, or other toxicants exist in buried sediments in the vicinity of the UNOCAL pier or the Union Oil Marsh drainage channel outfall, dredging activities or associated modification and development activities may mobilize these contaminants. This may result in adverse acute or chronic effects to local benthic and epibenthic communities sensitive to these contaminants. In particular, deposit and filter feeders and burrowers may be negatively affected by changes in sediment quality because of their life histories and behavior. If contaminants bioaccumulate or bioconcentrate, adverse acute or chronic effects may occur to higher trophic level organisms as well. Entrainment of contaminants in the water column may also result in the export of contaminants to other sites via littoral drift and adverse impacts to communities where these contaminants are deposited.

Sediment and water quality in the Union Oil Marsh, or in marine waters in the vicinity of a new ferry terminal may be degraded depending on the location of parking lots, holding lanes, and stormwater runoff conveyance systems, and the location of the discharge pipe. If the area of impervious surfaces increases, proportional increases in urban stormwater runoff will also occur. Concentrations of polynuclear aromatic hydrocarbons and other toxicants in urban runoff also may increase. Depending on the quantity and quality of this urban runoff, circulation patterns, and whether stormwater runoff is discharged directly to the Sound or treated, degradation of water and sediment quality of receiving waters may occur. If stormwater runoff is discharged directly to the Sound, pulses of high concentrations of toxicants could occur, especially during smaller storm events where the quantity of stormwater runoff is low. Under these circumstances, toxicant concentrations may be minimally diluted.

Similarly, locating ferry terminal infrastructures in the Union Oil Marsh vicinity and the discharge of untreated stormwater directly to the Marsh could result in surface, groundwater, and sediment quality deterioration. Construction activities and/or the location of ferry terminal infrastructures in the lower yard area of the UNOCAL property may mobilize known soil contaminants. Filling in portions of the Marsh for development of parking areas or other infrastructure would result in the direct loss of habitat area, reduced capacity of the marsh to perform previously mentioned functions, and affect marsh dependent fish and wildlife.

DATA GAPS AND ADDITIONAL NEEDS

1) Sediment and soil quality in the vicinity of the UNOCAL pier, SR 104 stormwater outfall and Union Oil Marsh outfall needs to be examined and evaluated.

2) Computer modelling to identify probable increases in the quantity and quality of urban runoff from proposed infrastructure development and to evaluate the capacity of the existing sewage treatment facility to potentially treat this additional runoff. Study and evaluate the need to treat runoff. Could toxicants in the terminal infrastructure runoff degrade water and sediment quality of the receiving system?

3) Evaluate the socioeconomic impacts of development alternatives on existing intertidal and subtidal habitats and associated communities. Identify the amount of habitat loss associated with different development alternatives.

4) Identify and map eelgrass beds and marine algal communities in the subtidal and intertidal areas.

5) Identify and evaluate the importance of intertidal, subtidal and Union Oil Marsh habitats to sensitive species, including bald eagle, great blue heron, rhinoceros auklets and murres.

6) Conduct a detailed study of Shellebarger and Willow Creeks, and the Union Oil Marsh to determine if it supports an anadromous fishery or if, through the use of mitigation and enhancement, it could support such a fishery in the future.

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Table 1. Some physical characteristics, problems, and spawning and rearing habitat quality in Willow and Shellebarger Creeks. Source: R.W. Beck 1991.

Stream Sec.	Avg Width	Avg Depth	Land Use	Spawn. Habitat	Rear. Habitat	Comments	Existing Problems
1	5	1.5	Union Oil (industrial)	Poor	Poor	Well defined channel, thick silt, saltwater influen.	
2	7	1	Union Oil (industrial)	Poor	Fair	Well defined channel, thick silt, saltwater influen.	
3	7	1.5	Native & invading veg.	Poor	Fair	Marsh habitat Braided channel	Fish pass. difficult.
4	2	0.5	Native & invading veg.	Poor	Poor	Marsh habitat Braided channel	Fish pass. difficult.
5	4	0.5	Native & invading veg.	Fair	Good	Riffle, Run, Pool sequence in well defined channel.	
6	3	0.5	Fish Hatchery (Chinook)	Fair	Good	Riffle, Run, Pool sequence in well defined channel.	
7	3	0.5	Fish Hatchery (Chinook)	Poor	Poor	Hatchery intake weir.	Weir is a temporary barrier.
8	3	0.5	Residential	Fair	Fair	Culverts and barriers	Barriers to passage.
9	2.5	0.5	Residential	Poor	Poor	Curlvert barrier and steep gradient.	Barrier to passage.

Table 2. Characteristic Flora and Fauna of the Intertidal and Subtidal Zones in the Edmonds Area. Source: Harmon date unknown.

1. Mammalia

a. Harbor Seal
b. Killer Whale

2. Aves

a. Glaucous Gull
b. Mew Gull
c. Comon Crow
d. Blue Heron
e. Common Loon
f. Common Tern
g. Western Sandpiper
h. Least Sandpiper
i. Common Snipe
j. Sanderling
k. Dunlin
l. Killdeer
m. Kingfisher
n. Red Wing Blackbird
o. Marsh Wren
p. Western Grebe
q. Mallard Duck
r. Greater Scaup
s. Surf Scoter
t. Pelagic Cormorant

3. Pices

a. Tidepool Sculpin
b. Kelp Greenling
c. Cabezon
d. Copper Rockfish
e. Black Rockfish
f. Yellowtail Rockfish
g. Lingcod
h. Roughback Sculpin
i. Pacific Staghorn Sculpin
j. Midshipman
k. Sturgeon Poucher
l. Shiner Perch
m. Pile Perch

3. Pices (cont.)

n. Starry Flounder
o. Sand Sole
p. Rock Sole
q. Dover Sole
r. Butter Sole
s Pacific Herring
t. Tubesnout
u Crescent Gunnel
v. Pipefish
w. Threespine Stickleback
x. Sandiance
y. Ratfish
z. Fingerling Salmon
aa. CO - Sole
bb. Dogfish

4. Crustacea

a. Gammarid Ampipods
b. Corophium Amphipods
c. Caprellid Amphipods
d. Isopods
e. Tanadaceans
f. Cumaceans
g. Leptostracans
h. Harpacticoid Copepods
i. Chthamalus dalli
j. Hemigrapsis nudus
k. Balanus glandula
l. B. Cariosus
m. Pugetia producta
n. P. gracilis
o. Cancer magister
p. C. oregonensis
q. Crago sp.
r. Upogebia pugettensis
s. Callanassa californiensis
t. Heptacarpus sp.
u. Pandulus danae
v. Pagurus hirsutiuscula

5. Annelida

Errentian polychaetes

a. Polynoid
b. Polydont
c. Neried
d. Gonladid
e. Eglycerid
f. Nepthyid
g. Lumbrineried
h. Onuphid
i. Phyllodocid
j. Syilid

Sedentarian

K. Capetellid
l. Ophelid
m. Abarenicolid
n. Pectinarid
o. Cirratullid
p. Orbinid
q. Spionid
r. Ampharetid
s. Terebellid
t. Serpulid
u. Sabellid
v. Chaetopterids
w. Maldanid

6. Mollusca

Pelecypoda

a. Psephidia lordi
b. Myselia tumida
c. Macoma inconspicua
d. Tellina carpenteri
e. Axionopsida serricatus
f. Mya arenaria
g. Nemocardium cent.
h. Nunculata minuta
i. Macoma nasuta
j. M. secta
k. Saxidomus giganteus

Table 2. Continued

6. Mollusca

Pelecypoda

l. Protothaeca staminea
m. Clinocardium nuttullii
n. Mytilus edulis
o. Crossostrea gigas
p. Panope generosus
q. Tresus capa
r. Chlamys spp.
s. Pododesma machiros.

Gastropoda

t. Littorina sitkana
u. L. scutula
v. Margarites pupillus
w. Nassarius mendicus
x. Thais lamellosa
y. Polinices lewisii
z. Lacuna variegata
aa. Collisella pelta
bb. Notoacmea persona
cc. N. scutum
dd. Armina californica
ee. Dirona albolineada

Amphinuera

a. Mopalia lignosa
b. Katherina tunicata

7. Echinodermata

a. Strongylocentrotus drob.
b. Henricia lebluscula
c. Evasterias troschellii
d. Cucumaria miniata
e. Parastichopus californicus
f. Pycnopodia helianthoides
g. Dendraster excentricus

8. Coelenterata

a. Tealia corlacea
b. T. crassicornis
c. Anthopleura elegantissima

8. Coelenterata

d. Ptilosarcus gurneyi
e. Epiactis prolifera
f. Metridium senile
g. Obelia longissima

9. Tunicata

a. Styela gibbsii
b. Cnemidocarpa finmarkiensis
c. Corella willmeriana

10. Porifera

a. Haliclona sp.
b. Halichondria sp.

11. Protozoa

a. Foriminifera

12. Algae

Chlorophyceae

a. Enteromorpha intestinalis
b. Ulva lactuca

Phaeophyceae

c. Fucus gardneri
d. F. distycus
e. Nereocystis luetkeana
f. Alaria marginata
g. Laminaria saccharina
h. Costeria costata
i. Desmarestia mundo
j. D. intermedia
k. Cystoseira geminata
l. Sargassum muticum
m. Scytosiphon lomentaria

Rhodophyceae

n. Pophyra perforata
o. Endocladia muricata
p. Prionitis lanceolata
q. Callophyllis edentata
r. Rhodoglossum spp
s. Gymnogongrus platyphyllus
t. Gigartina cristata
u. G. exasperata
v. Iridada cordata
w. Agaradhiella tenera
x. Plocamium paciticum
y. Microcladia borialis
z. Polyneura latissima
aa. Ptilota asplenioides
bb. Rhodoptilum plumosa
CC. Pterosiphonia dendroidea
dd. Polysiphonia bipinnata
ee. Rhodomeia larix
ff. Odonthalia floccosa

gg. Cyanophyceae (blue greens)
Bacillariophyceae (diatoms)
hh. Centric
ii. Pennate
Pyrophyceae (dinoflagellates)

13. Anthophyta

a. Zostera marina
b. Salicornia virginica
c. Distichlis spicata
d. Triglochin maritimum
e. Juncus effusus
f. Spartina thompsoni
g. Cattails
h. Sand Spurry

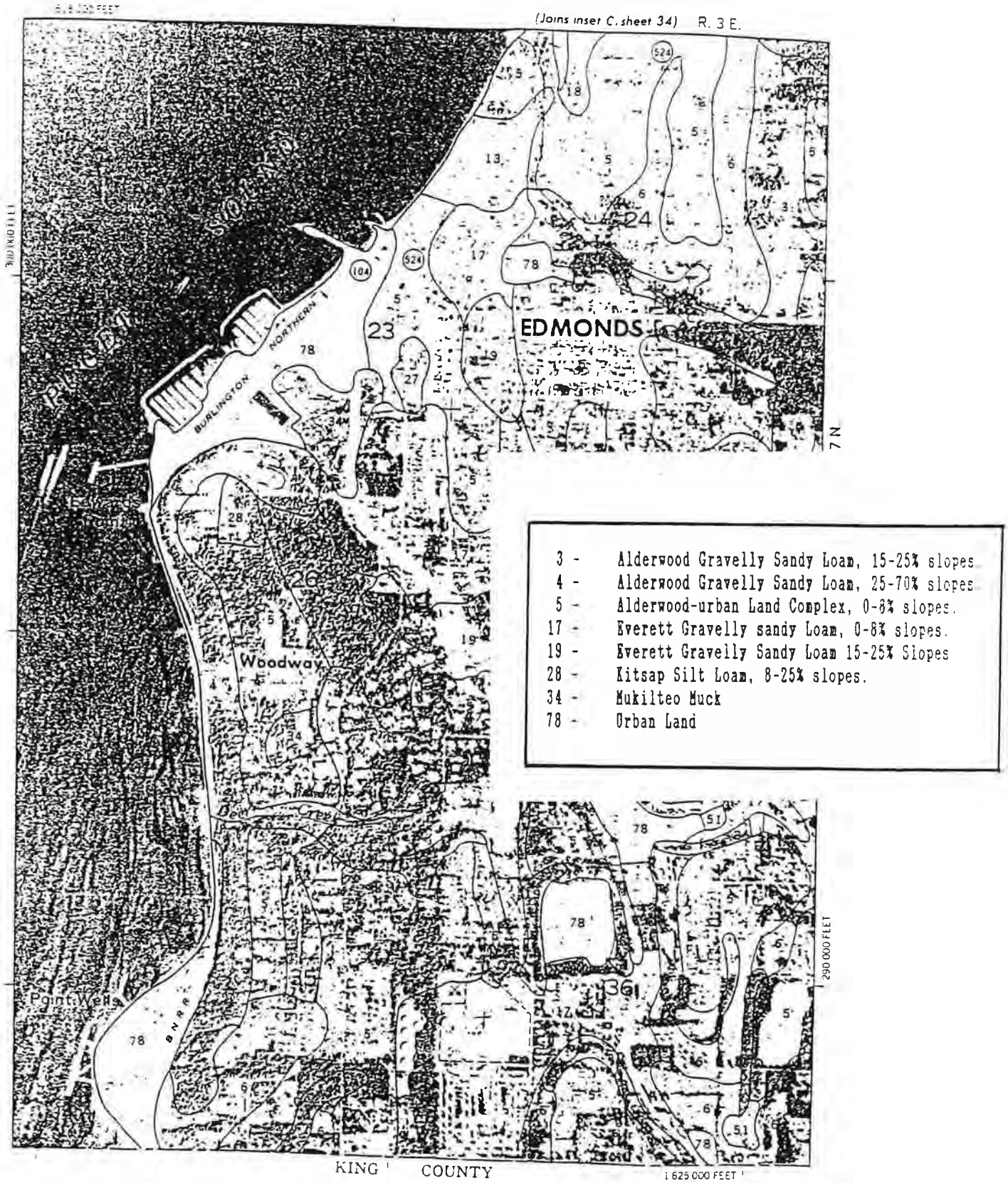
Table 3. Biomass (1990) determinations for substrate zones in the intertidal area at Brackett's Landing. Source: Serwold 1990.

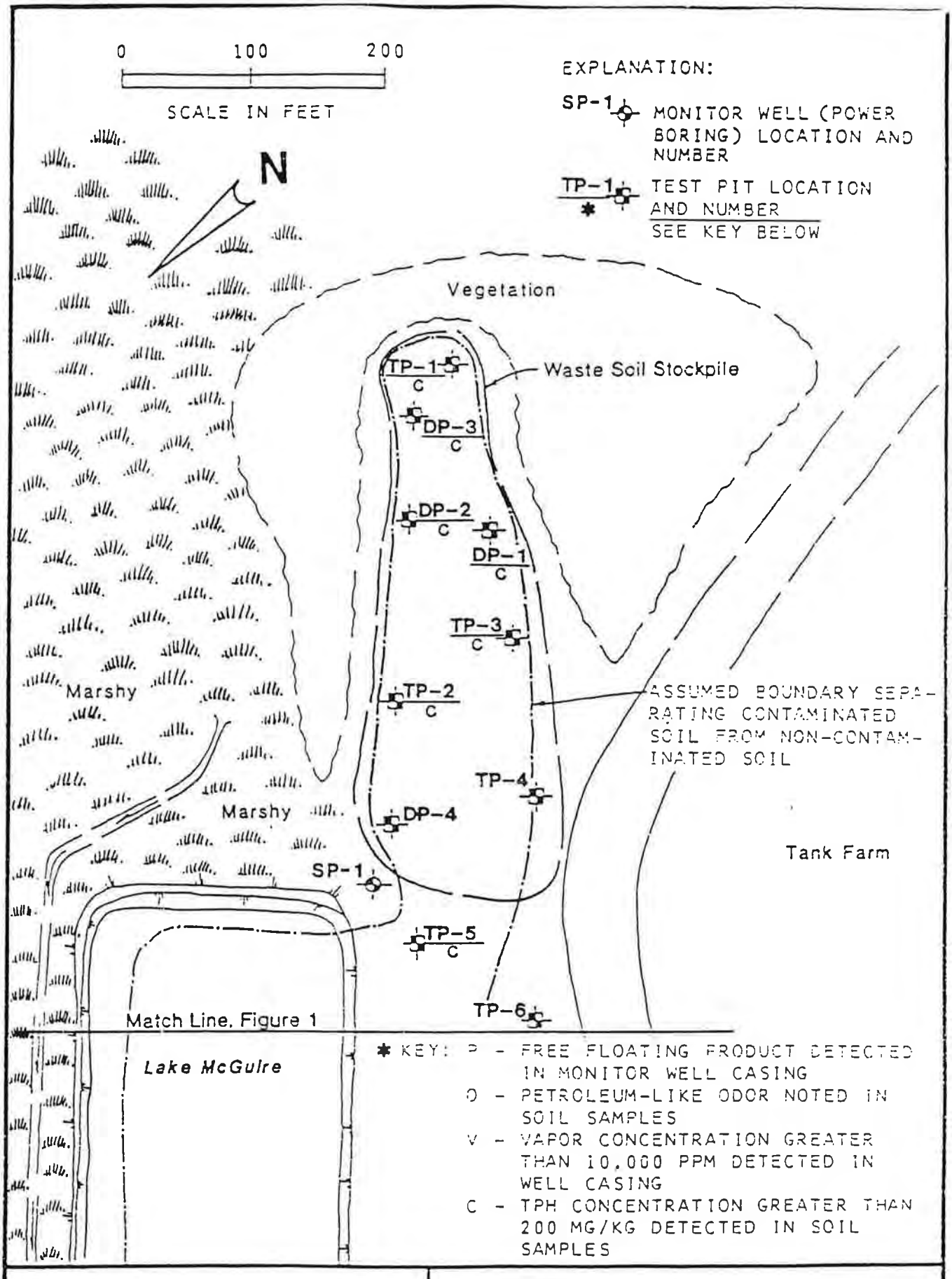
Zone Studied	(1) Area Covered feet²	(2) Biomass lbs / ft²	(1)(2)	Total Biomass Per Zone
Reef Barnacle	2,608	.124	323.4	514
Reef Fucus	4,232	.305	1,290.8	2,052
Reef Ulva	3,744	.297	1,112.0	1,768
Reef Basal	1,316	.940	955.0	1,519
Sandy				
-1 to 0'	58,032	.040	2,721.3	2,721
0 to +1'	17,960	.009	161.6	162
+1 to +3'	7,136	.004	28.5	29
+3 to +6'	6,112	.001	3.1	3
Mixed Gravels with Sandy Mud				
-1 to 0'	6,822	.061	416.1	416
0 to +1'	6,368	.061	388.5	389
+1 to +3'	4,976	.055	273.7	274
1.5" Gravels				
-1 to 0'	1,712	.048	82.2	82
+1 to +3'	4,662	.055	256.4	256
+3 to +6'	14,360	.023	330.2	330
Cobble Sand				
0 to 3'	11,480	.005	57.4	57
Eelgrass Patches				
0 to -1'	1,152	.034	39.2	39
Tide Pool Rocks	1,872	.940	1,789.7	2,798
				13,427

Table 4. Brackett's Landing biomass losses, 1986 - 1990. Baseline, 1986; Post Reef Development, 1990. Source: Serwold 1990.

Reef/Substrates	Biomass 1986	Biomass 1990	Biomass Loss (1986-1990)
Reef substrates	41,196	8,651	32,545
Other substrates	4,807	4,737	70
Eelgrass	3,781	39	3,742
Pilings	6,259	NA	6,259
Totals	56,043	13,427	42,616

Figure 1. Soils of the Edwards Point area and vicinity. Source: SCS 1983. Scale 1:24,000.

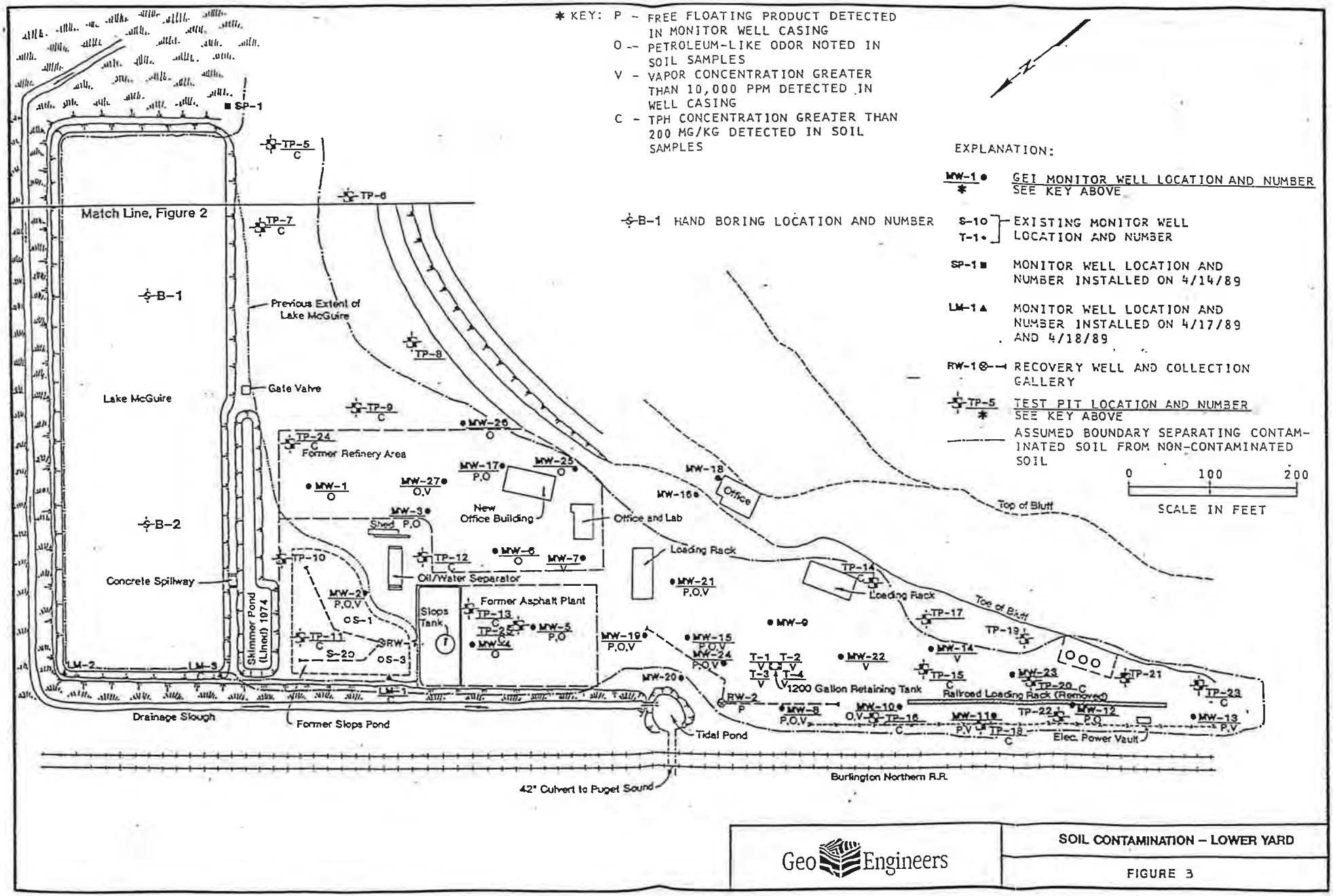




Geo Engineers

SOIL CONTAMINATION – LOWER YARD

FIGURE 2

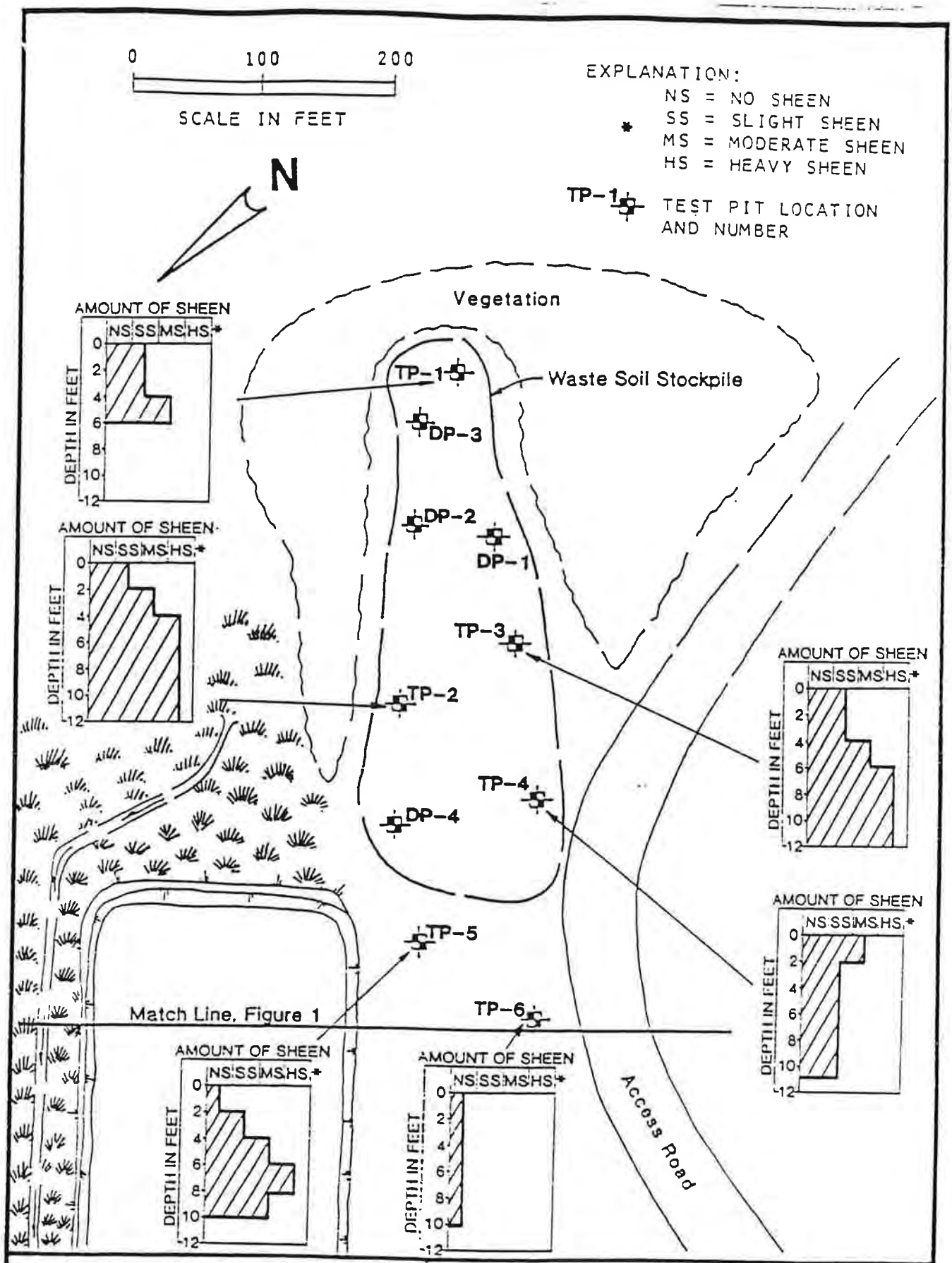


Geo Engineers

SOIL CONTAMINATION – LOWER YARD

FIGURE 3

REDUCED FROM 11X17



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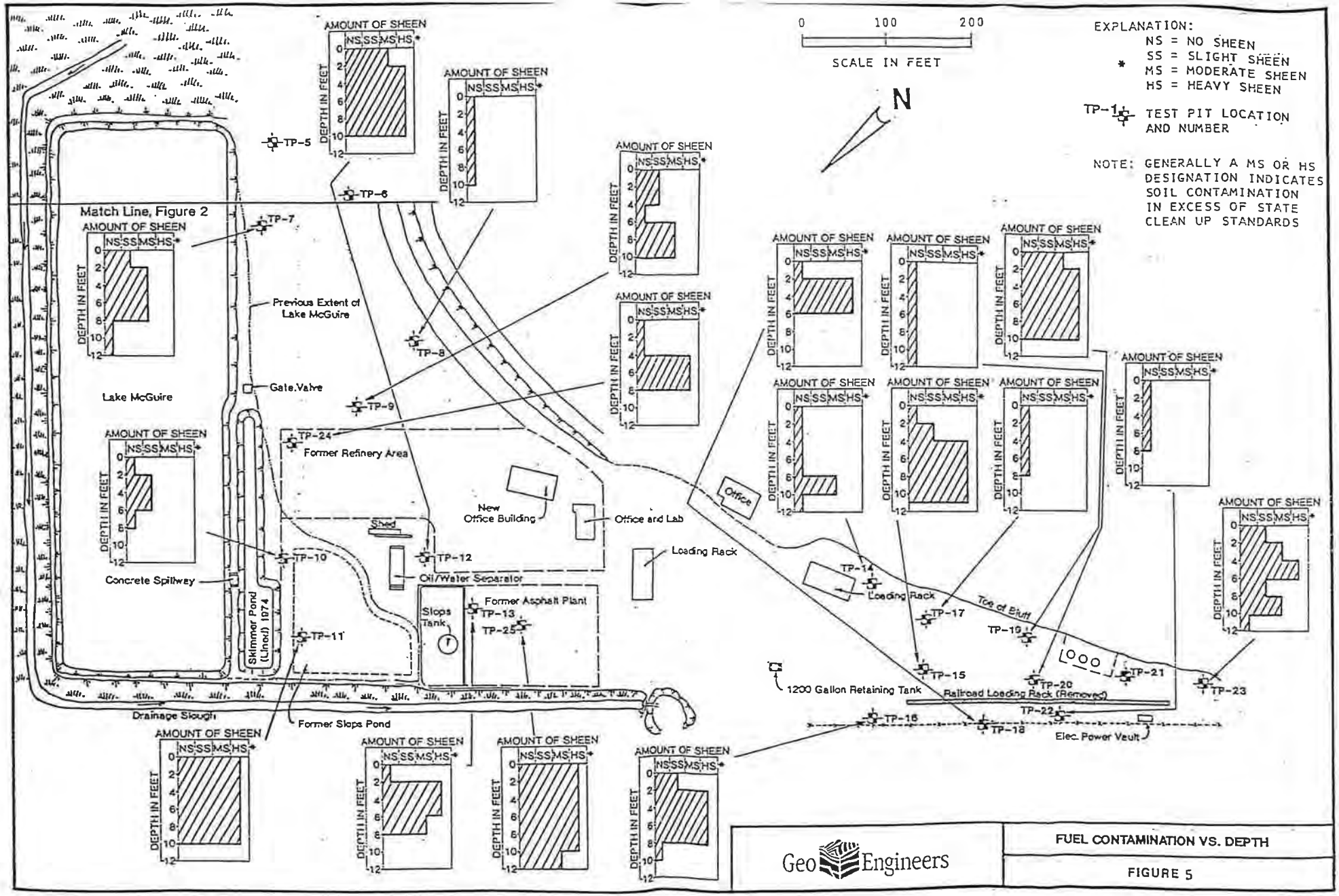
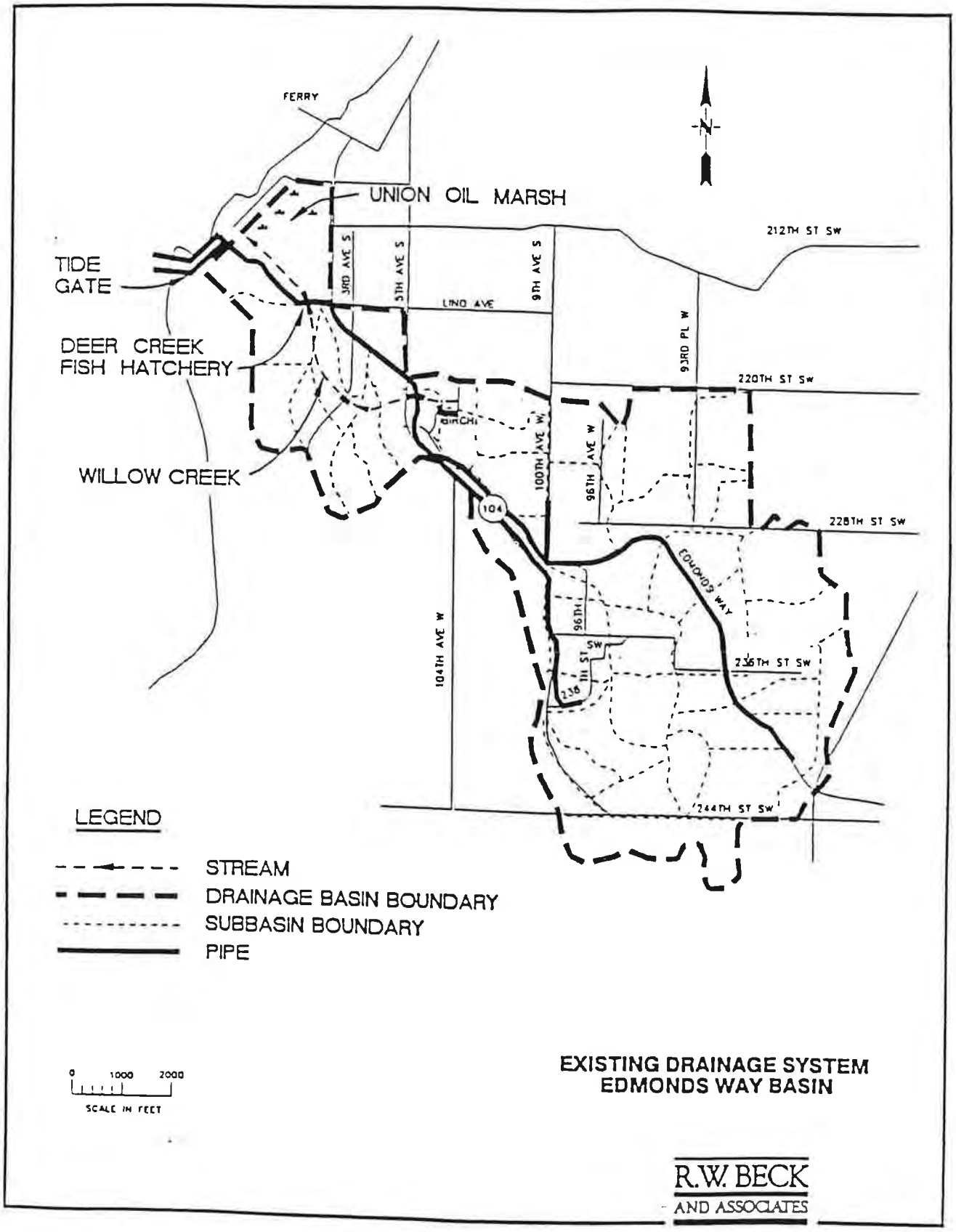
SITE PLAN

FIGURE 4



REDUCED FROM 11X17

FIGURE 6


FERRY
UNION OIL MARSH
TIDE GATE
DEER CREEK FISH HATCHERY
WILLOW CREEK
212TH ST SW
3RD AVE S
5TH AVE S
9TH AVE S
LIND AVE
93RD PL W
220TH ST SW
BIRCH
100TH AVE W
98TH AVE W
104
228TH ST SW
EDMONDS WAY
96TH
104TH AVE W
236TH ST SW
236
244TH ST SW
LEGEND
STREAM
DRAINAGE BASIN BOUNDARY
SUBBASIN BOUNDARY
PIPE
0 1000 2000
SCALE IN FEET
EXISTING DRAINAGE SYSTEM
EDMONDS WAY BASIN
R.W. BECK
AND ASSOCIATES

Land Cover/Land Use

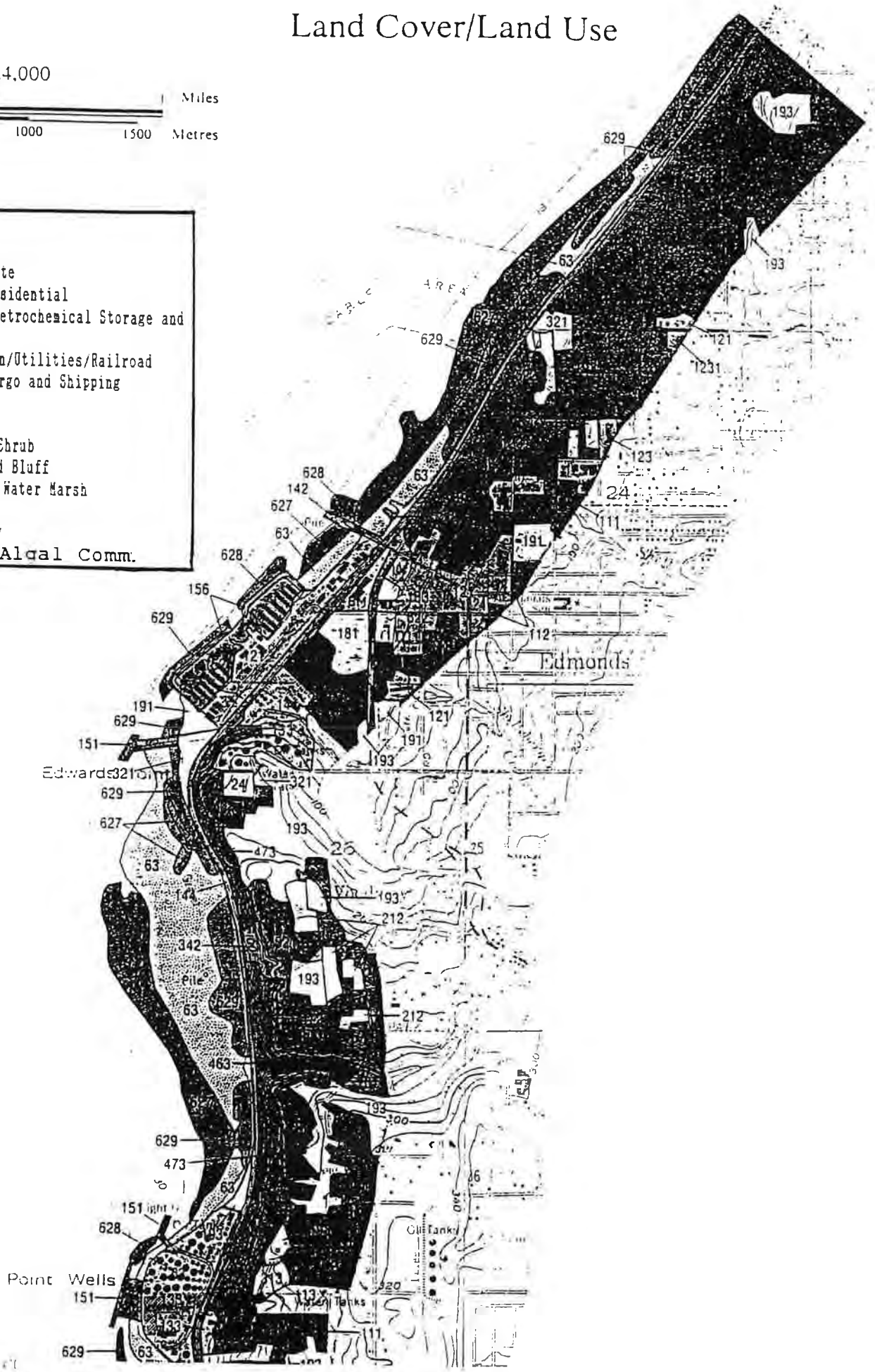
Scale 1:24,000

5 Miles

500 1000 1500 Metres

FIGURE 7A

63 - Beach Substrate
111 - Non-wooded Residential
133 - Industrial, Petrochemical Storage and Processing
144 - Transportation/Utilities/Railroad
151 - Commercial Cargo and Shipping
191 - Park
193 - Urban Wooded
321 - Successional Shrub
473 - Mixed Forested Bluff
622 - Coastal Fresh Water Marsh
627 - Seagrass
628 - Kelp Community
629 - Other Algal Comm.



Source: WA Coastal Zone Atlas 1979 Vol 5 Plate SN 11

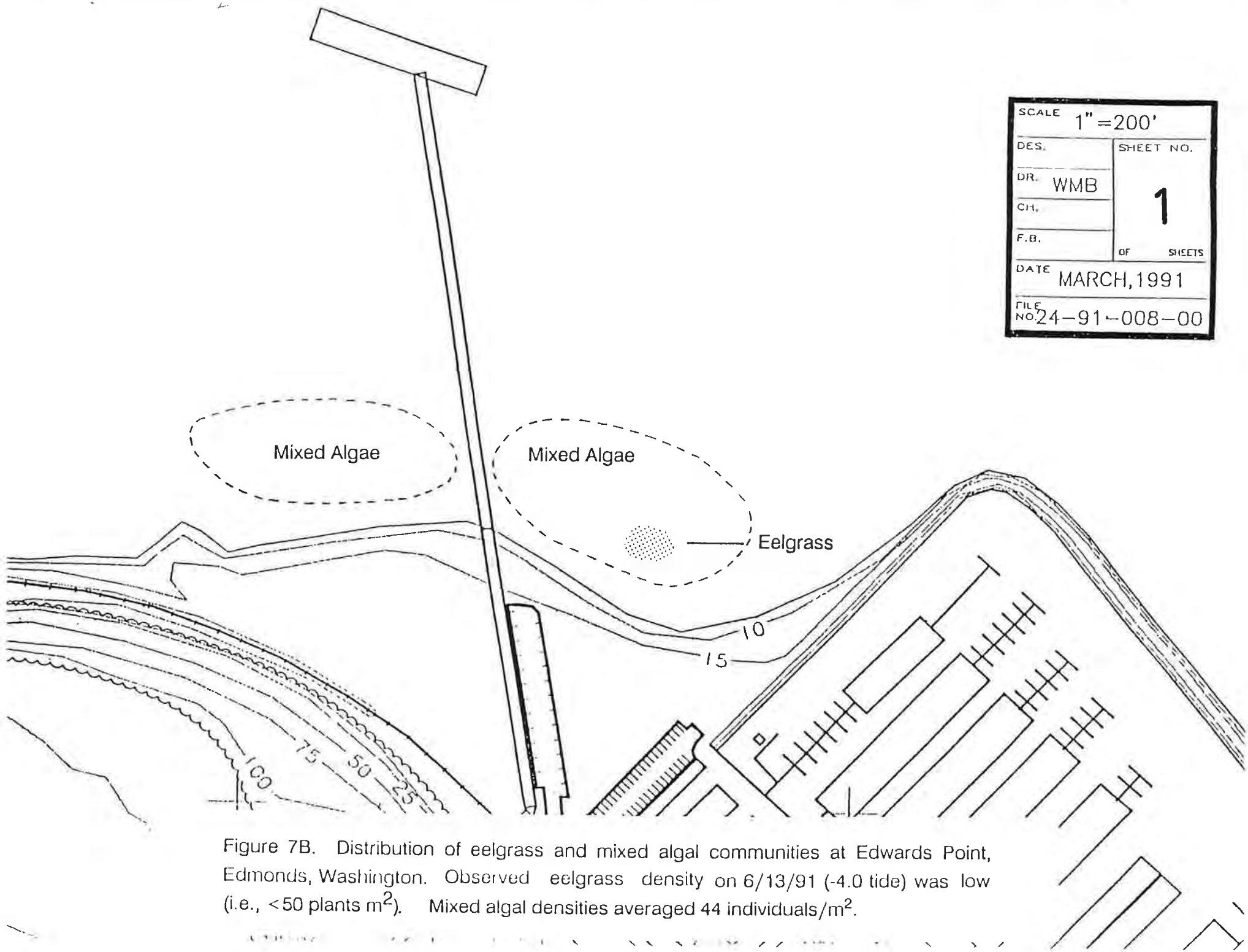


Figure 7B. Distribution of eelgrass and mixed algal communities at Edwards Point, Edmonds, Washington. Observed eelgrass density on 6/13/91 (-4.0 tide) was low (i.e., <50 plants m^2). Mixed algal densities averaged 44 individuals/m^2.

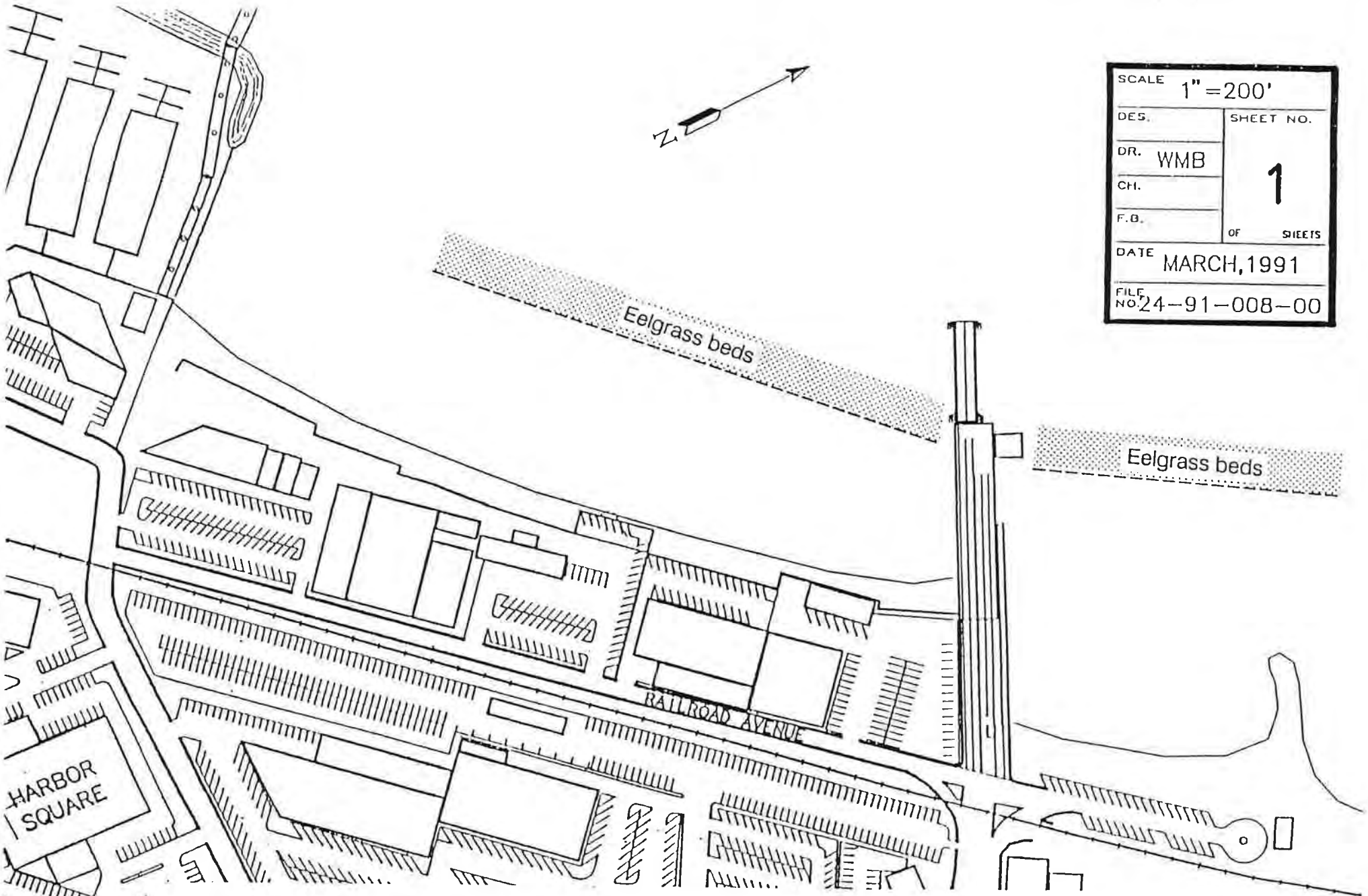


Figure 7C. Distribution of eelgrass beds in the vicinity of the Edmonds Ferry Terminal, Edmonds, Washington. Density of individual plants observed on 6/13/91 (-4.0 tide) averaged 158 individual plants/m^2 (n=10). Seaward extent of eelgrass beds is approximate.

Coastal Drift

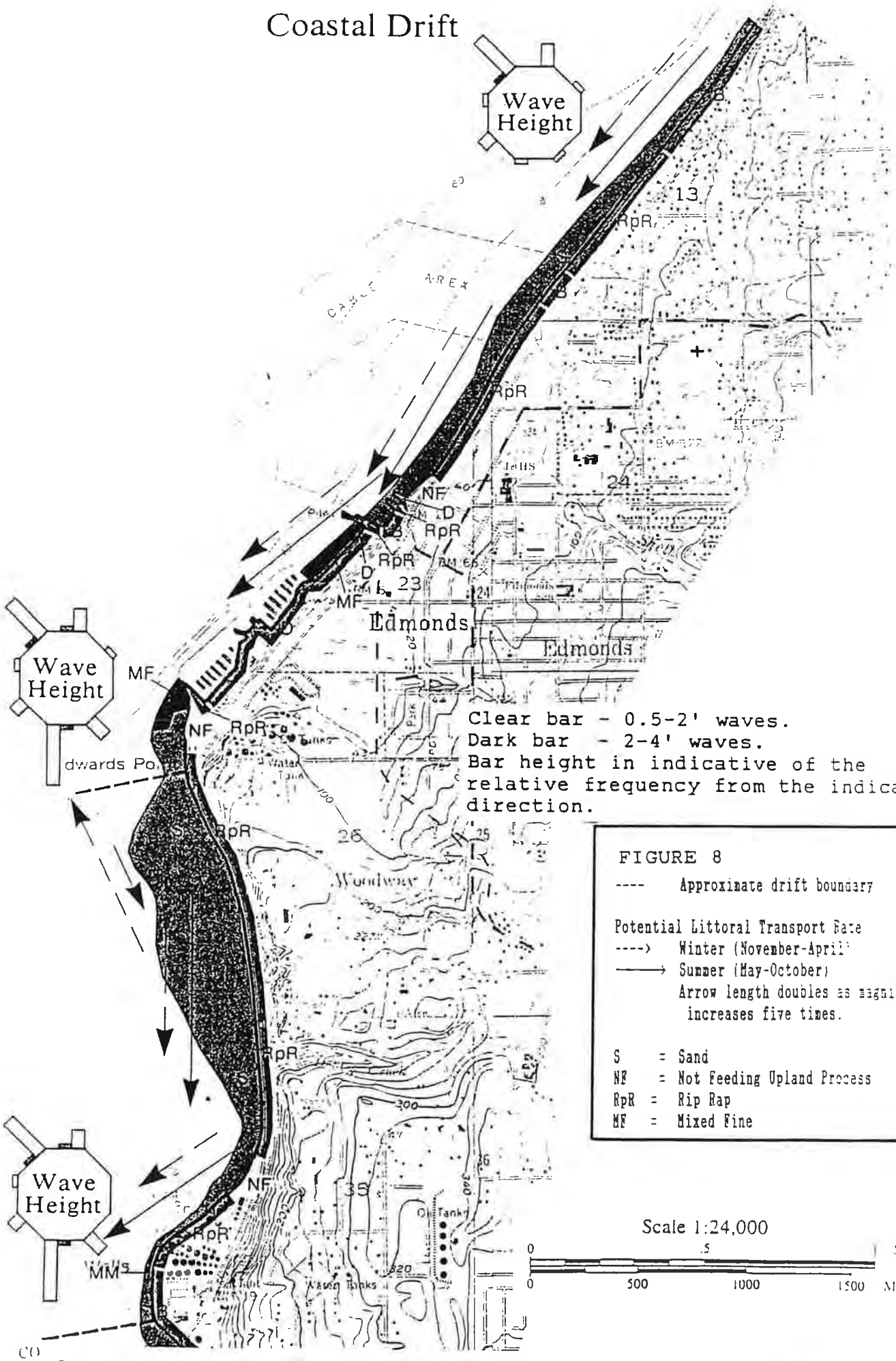


FIGURE 8

---- Approximate drift boundary

Potential Littoral Transport Rate

----› Winter (November-April)

———› Summer (May-October)

Arrow length doubles as magnitude increases five times.

S = Sand
NF = Not Feeding Upland Process
RpR = Rip Rap
MF = Mixed Fine

Scale 1:24,000

0 .5 Miles

0 500 1000 1500 Metres

Source: WA Coastal Zone Atlas. 1979. Vol. 5, Plate SN 11.

Coastal Flooding

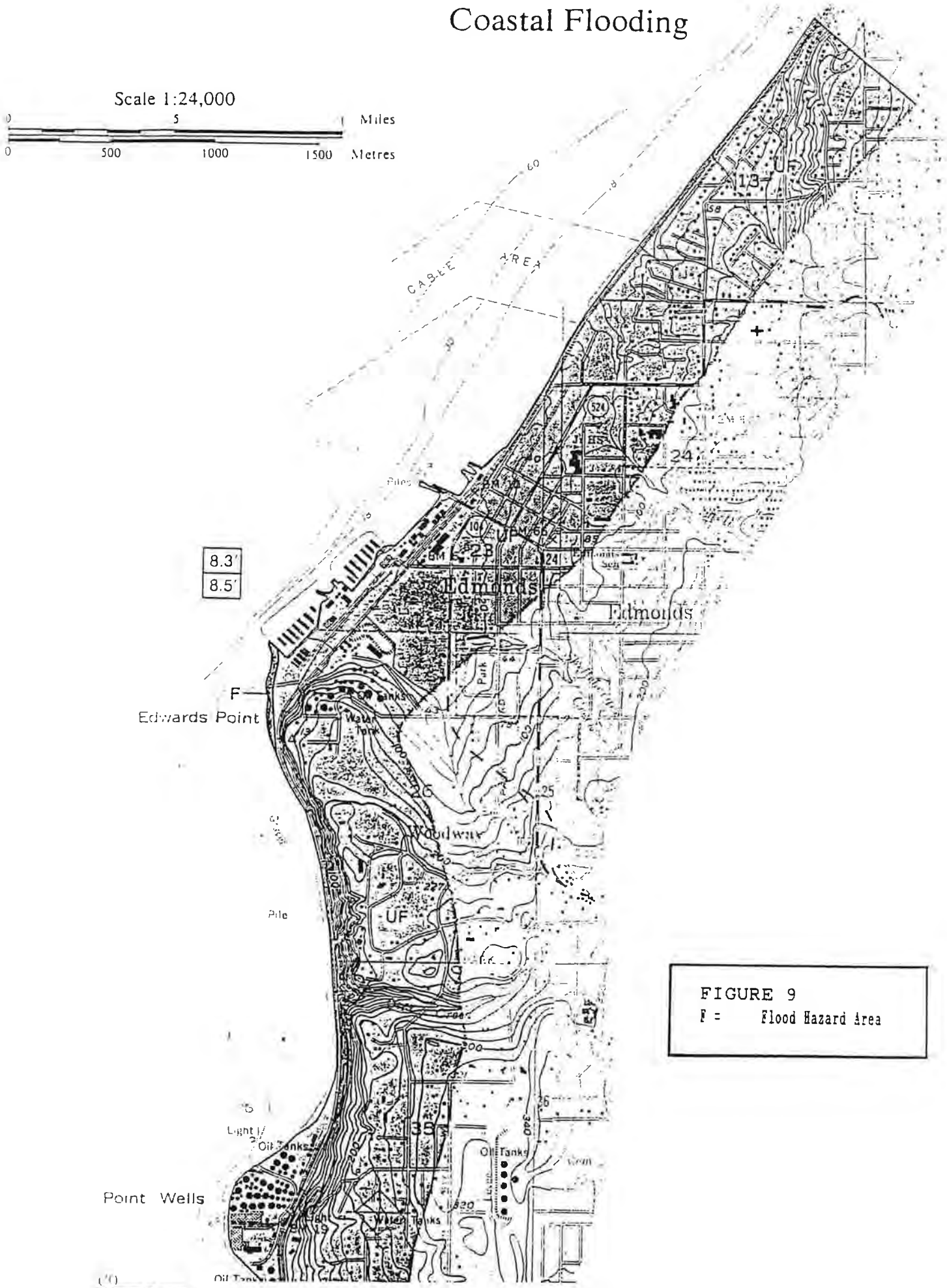
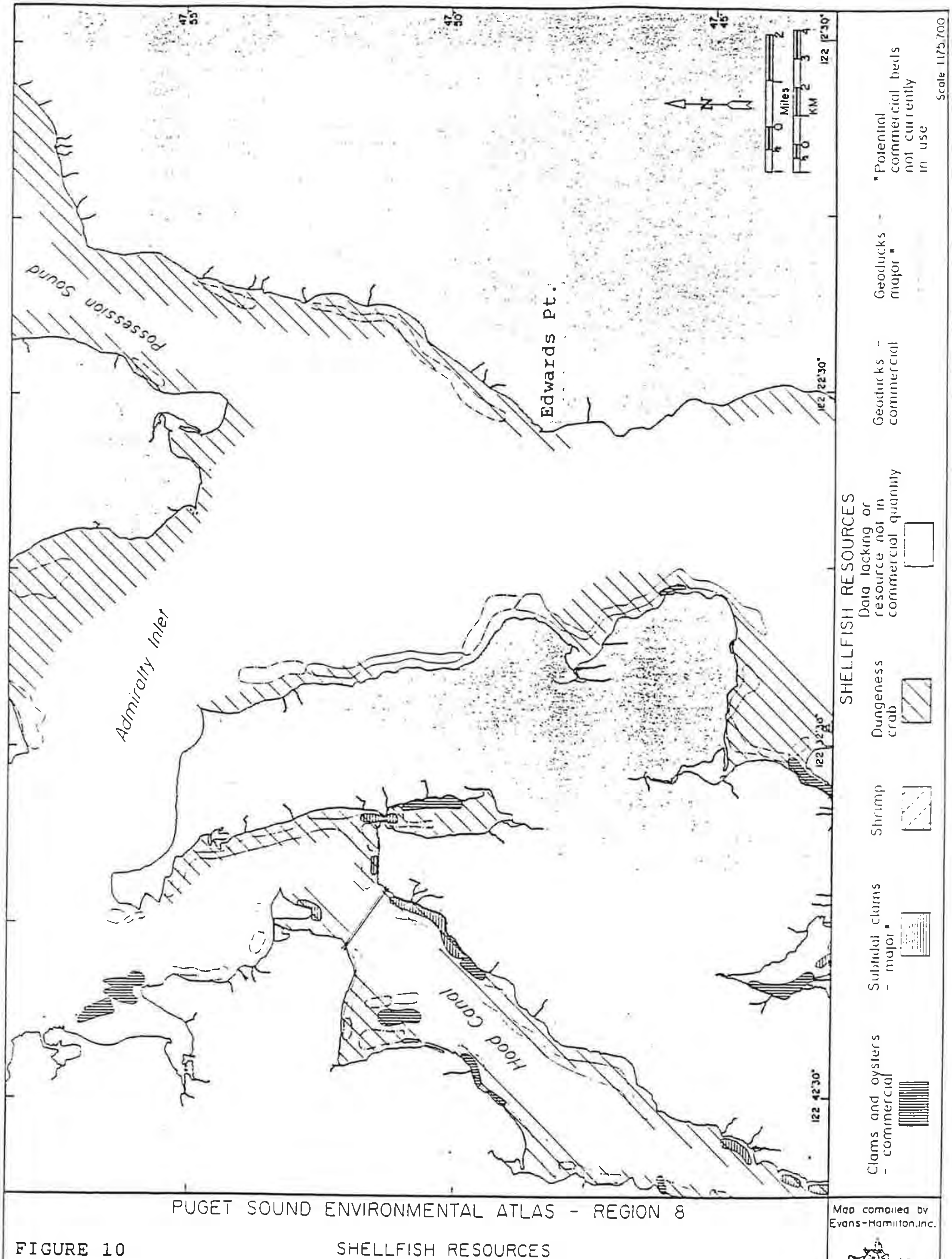


FIGURE 9
F = Flood Hazard Area

Source: WA Coastal Zone Atlas. 1979. Vol. 5, Plate SN 11.



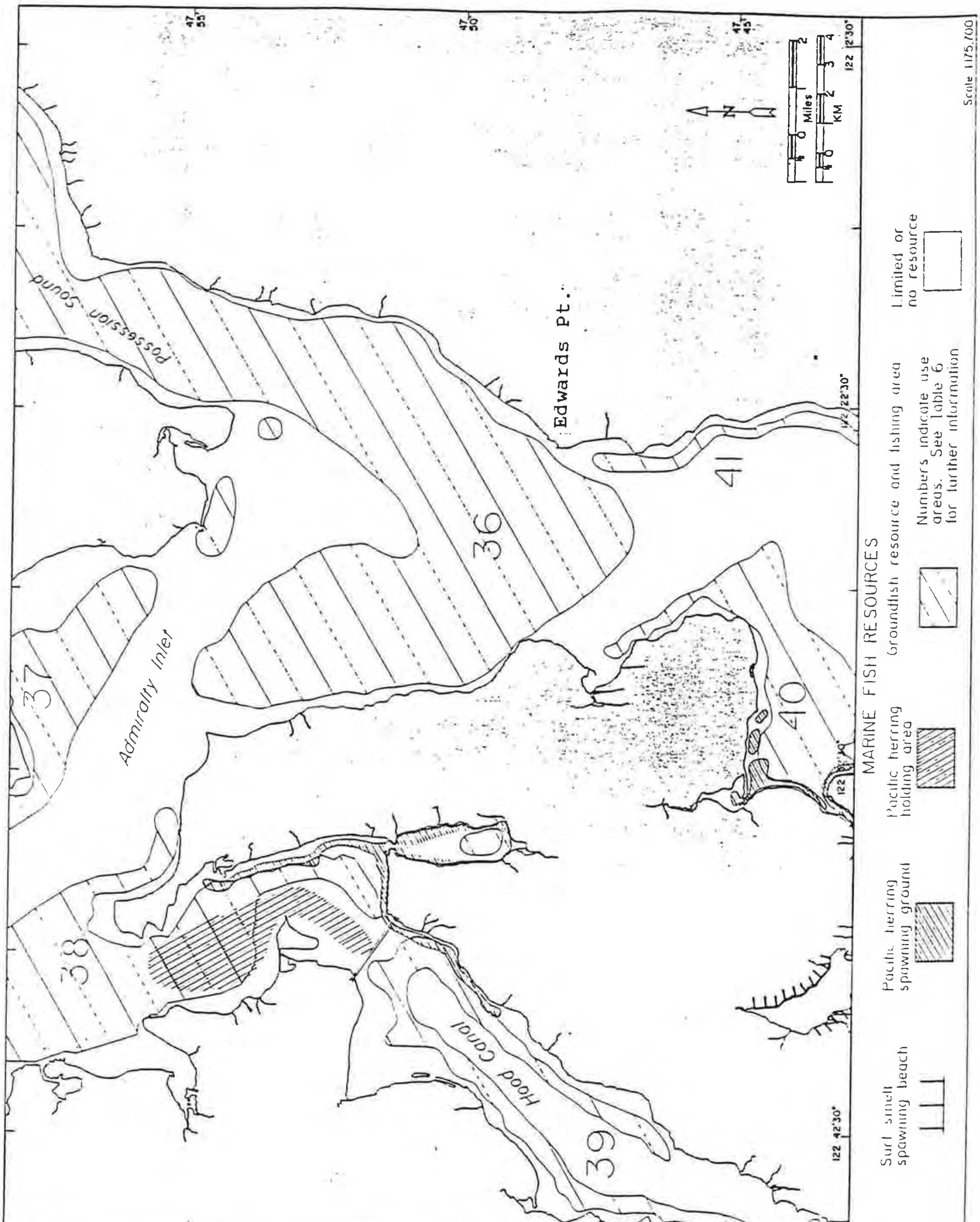
PUGET SOUND ENVIRONMENTAL ATLAS - REGION 8

FIGURE 10

SHELLFISH RESOURCES

Map compiled by Evans-Hamilton, Inc.

Cartography by O.R.Systems,Inc.



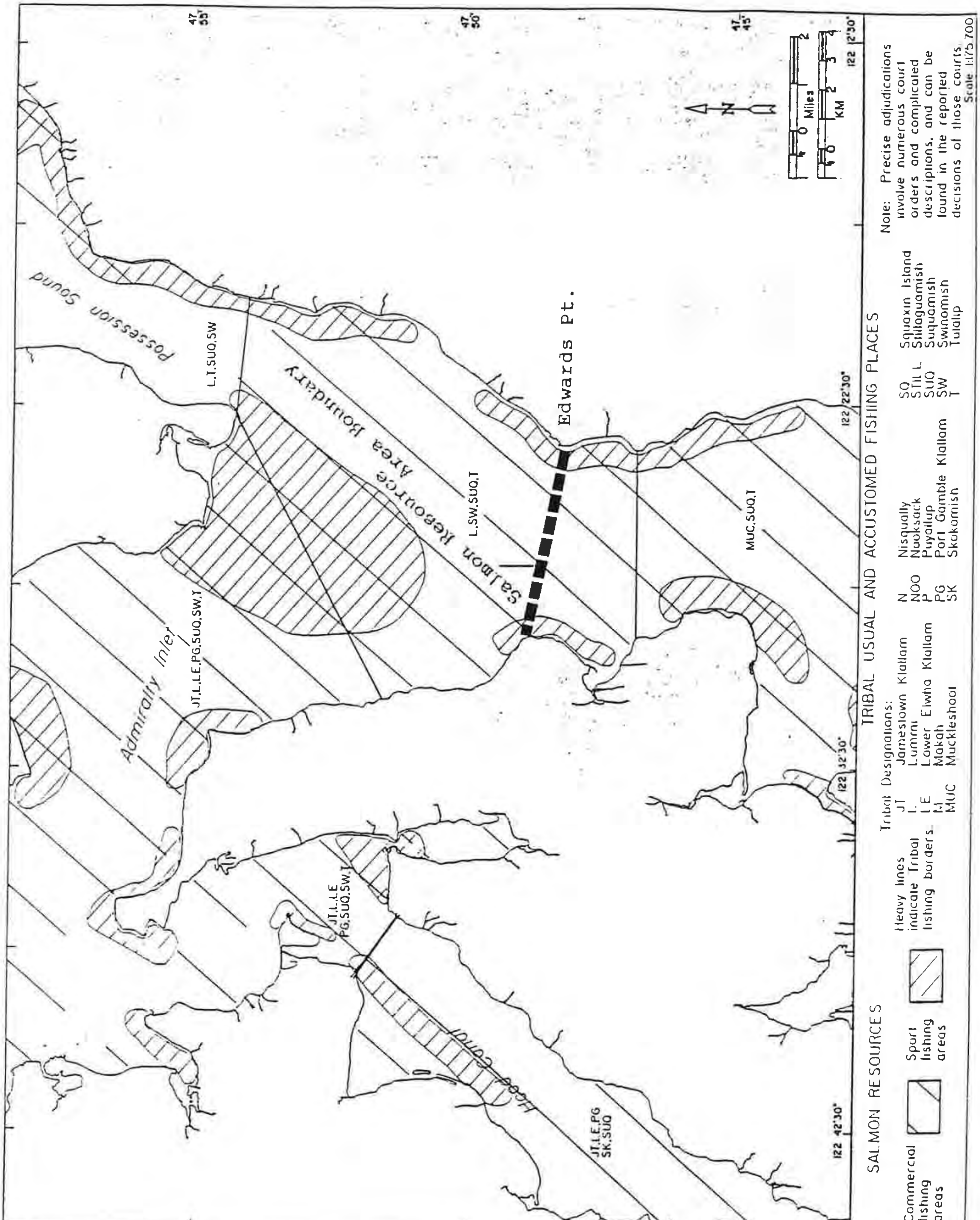
PUGET SOUND ENVIRONMENTAL ATLAS - REGION 8

FIGURE 11

MARINE FISH RESOURCES

Map compiled by Evans-Hamilton, Inc.

Cartography by D.R.Systems,Inc.



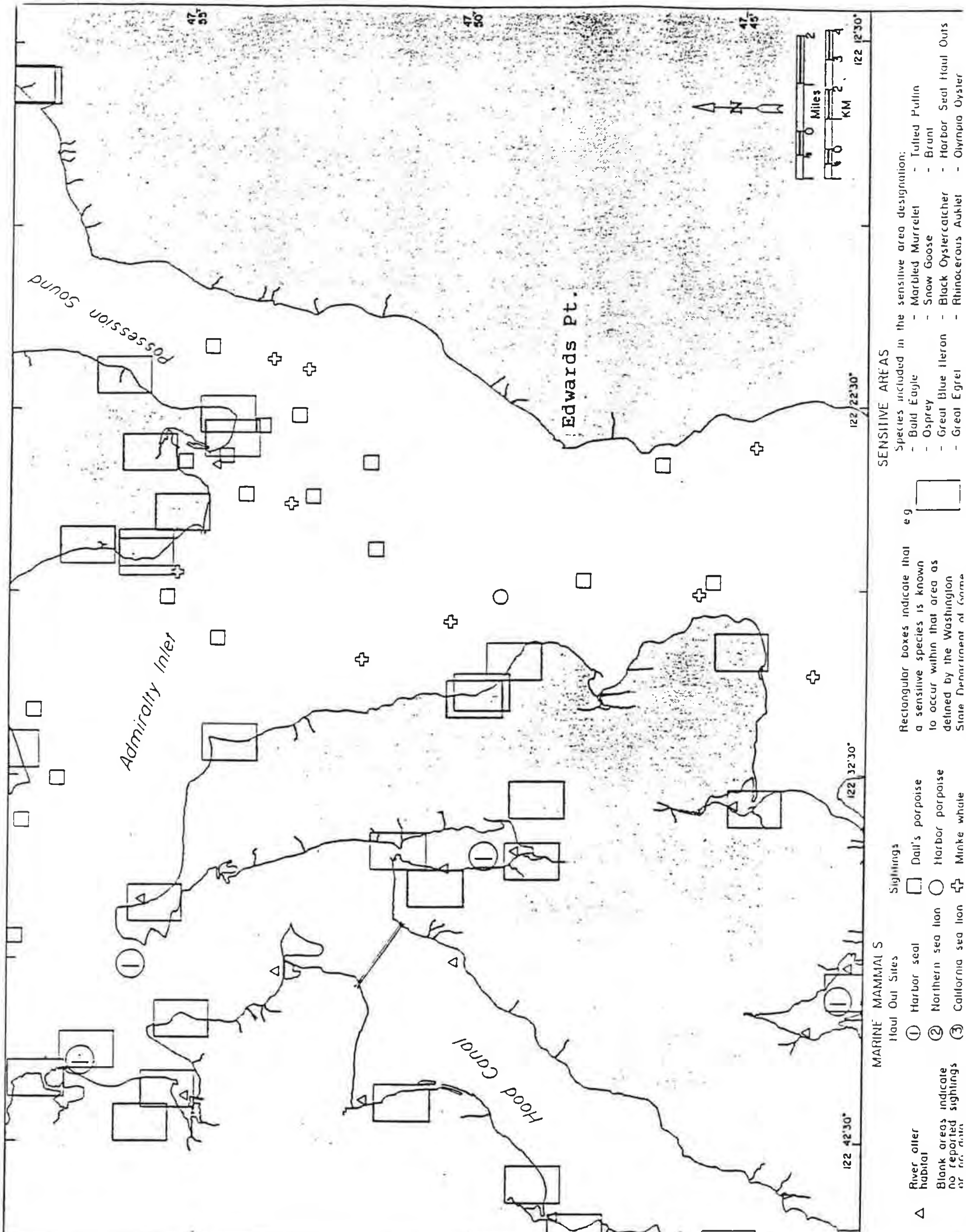
PUGET SOUND ENVIRONMENTAL ATLAS - REGION 8

FIGURE 12

SALMON RESOURCES, TRIBAL USUAL AND ACCUSTOMED FISHING PLACES

Map compiled by Evans-Hamilton,Inc.

Cartography by D.R Systems Inc



PUGET SOUND ENVIRONMENTAL ATLAS - REGION 8

FIGURE 13

MARINE MAMMALS, SENSITIVE SPECIES

Map compiled by Evans-Hamilton,In

Cartography by O.R.Systems,Inc.

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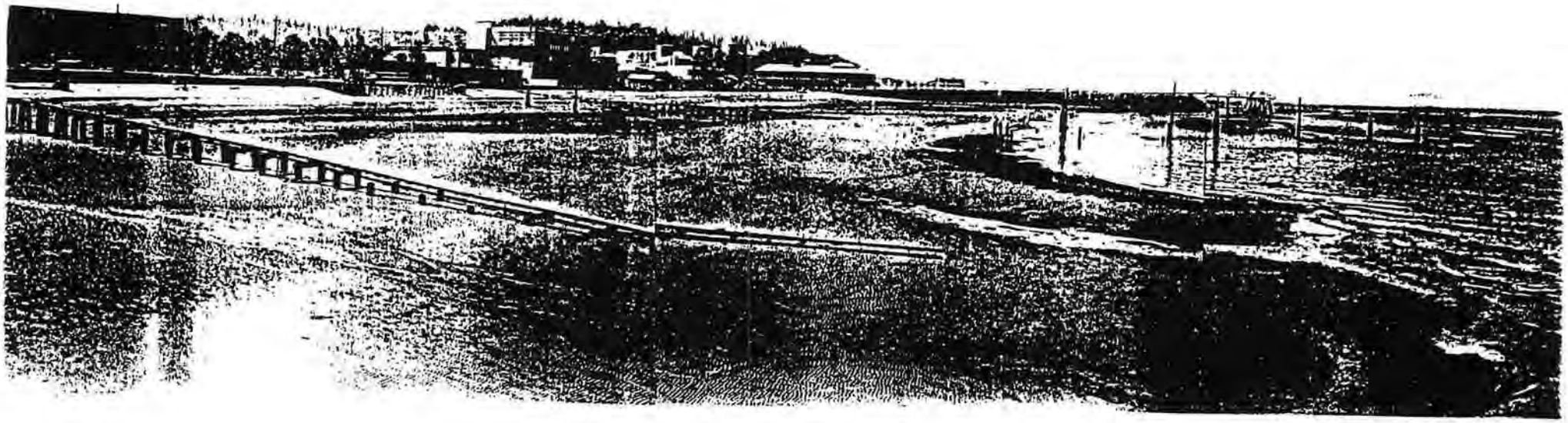
APPENDIX B

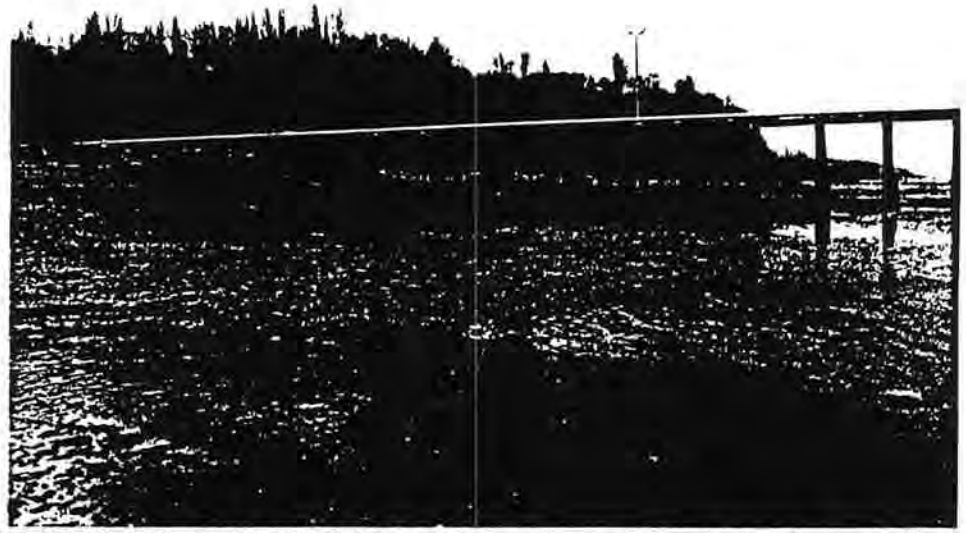
EELGRASS PHOTOS

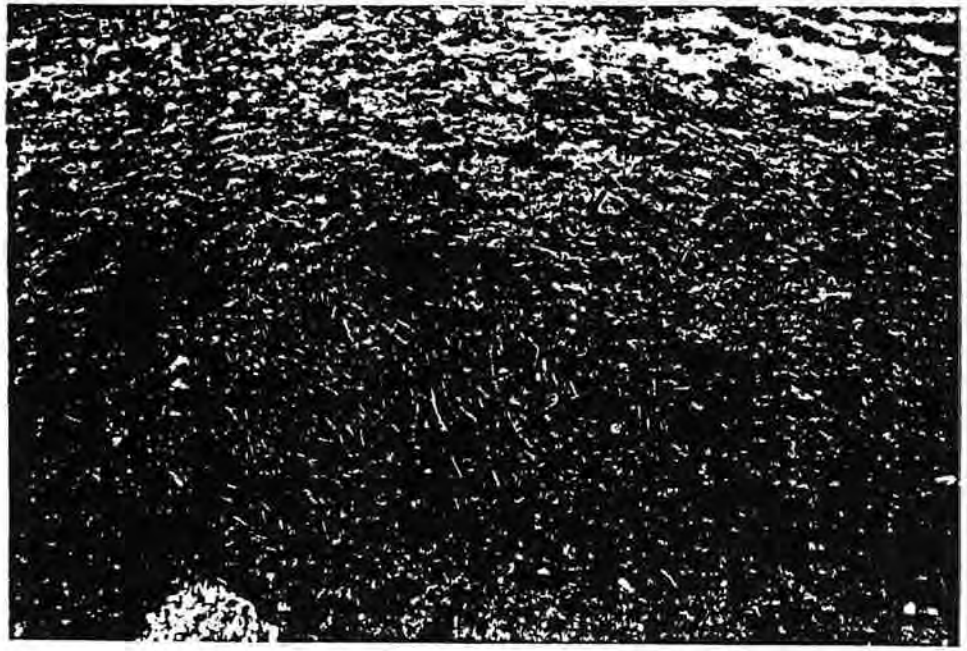
Dense eelgrass communities located north of the Edmonds Ferry Terminal Photos taken at a -3.6 tide on June 14, 1991 looking south from near the end of the Bracketts Landing Jetty.

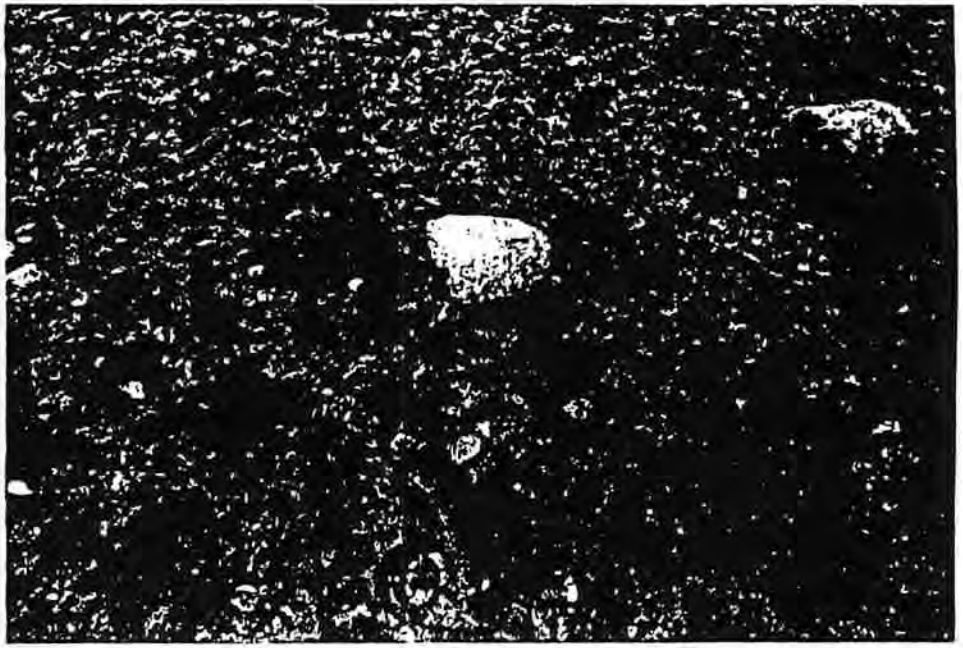
Dense eelgrass communities located south of the Edmonds Ferry Terminal. Photos taken at a -3.6 tide on July 11, 1991 looking south by southeast from end of the south pedestrian walkway on the Edmonds Ferry Terminal.



Sparse eelgrass and mixed algal communities located on the north side of the UNOCAL pier at Edwards Point, Edmonds. Photos taken at a -0.2 tide on April 1, 1991 looking southeast.







Appendix B

EDMONDS FERRY TERMINAL

NAVIGATION FEASIBILITY ANALYSIS

WIND AND WAVE AFFECTS ON BERTHING AT POINT EDWARDS

Prepared by

REID MIDDLETON, INC.

for

City of Edmonds

June 4, 1991

Summary

This report provides an analysis of the affects of wind and waves on ferry operations at the existing Edmond's Terminal site and at the proposed Edwards Point site. Available meteorological data was correlated to ferry system records (such as Pilot Logs), and to news reports for the past ten years. The environmental forces of wind and wave limiting ferry operations are complex and interactive and it is not possible within the scope of this analysis to fully determine the relative affect of one versus the other. In large measure, the ability to maneuver and land a ferry is based on the operators skill and judgement, and cannot be predicted by an analysis of this type.

Ferry operations at the existing site were found to be primarily affected by wind. An "affect" is at least one incident when operations were curtailed, a berthing cannot occur and is aborted, special assistance such as a tug is required, or damage to the berth might occur. Based on the known wind data correlated to the ferry pilot logs, ferry vessel operations are affected at the existing site on average four to five times per year.

Southerly wind velocity at the existing site is lower than at the proposed site due to the shielding provided by Edwards Point and the Edmonds Marina. At the proposed Edwards Point site the ferry operations may be affected by winds an average of eight times per year.

Waves generated by wind also will impact operations. Wave heights at the existing site were developed corresponding to a sustained velocity of 35 mph. Considerable shielding is afforded the existing site and operations are affected by waves on average once per year. At the proposed site waves may impact operations an additional two times per year.

In summary, the existing site is affected by wind and/or waves on average four to five times per year. It is projected that the proposed site will be affected by winds and waves on average ten times per year. Of those events impacting operations, 96% occur between October 1 and April 30. Based on the pilot logs, typically no more than two runs are affected during any one day when weather limits operations, and the schedule returns to normal thereafter. Significant variance in the weather occurs year to year and any one year may experience up to one and a half times the average observed operational difficulties due to weather.

Purpose

This report provides information on wind and waves at the existing and proposed ferry terminal sites pursuant to Task I of the Scope of Work. Thereafter, pursuant to Task II of the Scope, information on storm events was correlated to the ferry system records to determine under what conditions ferry operations were affected by the weather. The environmental forces of wind and wave limiting ferry operations are complex and interactive, and it is not possible within the scope of this analysis to fully determine the relative affect of one versus the other. In large measure, the ability to maneuver and land a ferry is based on the operator's skill and judgement, and cannot be predicted by an analysis of this type.

Introduction

This study includes four components: 1) an analysis of storm events and their impact on ferry operations which occurred in the ten year period from 1980 to 1990, 2) a comparison of short term wind records at the existing and proposed site, 3) wave hindcasting analysis based on wind duration curves developed for the 1-year, 10-year, and 100-year storm, 4) a wave refraction analysis for the existing terminal site and the proposed Edwards Point site.

Methodology

National Oceanic and Atmospheric Administration (NOAA) wind data for the past ten years was obtained and reduced for Seatac and Paine Field airports. Storm events were then culled from the daily weather observation logs. Observations at Paine Field were taken once an hour from 6:45 am to 8:45 pm. Wind speed recordings at Seatac Airport where taken every hour, 24 hours per day. In addition, news accounts were researched to identify storm events which may have affected operations.

Winds affecting the Edmonds area are predominately southerly or northwesterly. All records of storm events with either a sustained velocity of 20 mph or greater or with a peak gust of 25 mph or greater were identified. Over 300 events with these velocities were identified over the past ten years. Based on these events, operations logs from the ferry system were obtained for the same dates. The logs indicated that when gusts exceed 35 mph at either Seatac or Paine Field ferry landings may be affected. Therefore, the wind data was reduced to reflect only wind events with gusts of 35 mph or greater.

Southerly winds predominate and were found to be the principal cause of limited operations. Of the 112 wind events identified with gusts over 35 mph, only four events which affected ferry operations were associated with northerly winds and three of those four occurred in the last two years.

With the revised threshold, the impact of these events was further analyzed by researching pilot house logs from the ferries on the Edmonds-Kingston run and the Mukilteo-Clinton

run. These logs were available from 1984 to the present. Information on events prior to 1984 were obtained from newspaper reports.

In addition to the long term wind record available from Seatac and Paine Field, short term wind records at the Unocal pier and the existing ferry terminal have been collected. The airport data was compared to this site specific data to determine probable true velocities, and both sites were compared to see if there were differences.

Design wave heights and wave refraction analysis were predicted using the Automated Coastal Engineering System (ACES) developed by the Army Corp of Engineers. ACES utilizes the JONSWAP method to predict the significant wave heights for the given wind duration and fetch lengths. Wind data for the 100-year design wave was obtained from wind duration curves developed by the Army Corp of Engineers from wind records at Seatac Airport and at Westpoint sewage treatment plant.

Wave refraction values were also predicted using ACES. A basic assumption of the wave refraction analysis is that the contours are nearly straight and parallel to shore. Because of the variability in the shoreline along Edmonds coastline this method is somewhat limited.

Winds

Storm events with recorded wind gusts greater than 35 mph that occurred from 1980 to 1990 are shown in Table 1. This data is based on daily weather observation records from Seatac Airport and Paine Field Airport. These speeds represent one-minute-averaged wind speeds recorded hourly. The peak gust represents the highest one-minute averaged wind speed recorded in a ten minute period per hour.

All wind speeds referred to herein are recorded wind velocities at either Seatac or Paine Field. Actual wind velocities at the terminal are usually greater. (see "Site Comparison" below) However, only two months of data has been acquired for the terminal, thus all analyses have been performed with NOAA data as the basis.

The affect of high winds on ferry operations vary greatly. The minimum recorded wind gust which affects ferry operations was identified as 35 mph. The Edmonds ferry was delayed during the storm of December 31, 1990. The December storm had recorded wind gusts from the south at 36 mph at Paine Field. During certain tide and current conditions, landings in 37 mph gusts have required a tug assist (*Yakima*, Nov. 5, 1985) or have resulted in broken piling (*Cathlamet*, Jan. 17, 1986). On average, 20% of the storm occurrences with gusts in the range of 35 to 44 mph, will have an impact on ferry operations.

When wind gusts exceed 44 mph, ferry operations are almost always affected. During the storm of November 13-16, 1981, with winds gusting to 52 mph at Paine Field, many

Washington State Ferries were shut down. On December 3, 1982 gusts of 46 mph were reported at Paine Field, minor delays in ferry operations around Puget Sound occurred.

Table 2 shows the number of high wind events that have occurred from 1980 to 1990 based on wind records from Paine Field and Seatac Airport. Storm events with gusts from 35 to 44 mph occur on average fifteen times per year. Storm events with winds greater than 44 mph occurred on average two times per year. Therefore, at the present site, on average, ferry landing are affected by winds four times per year. The affect is typically limited to one or two crossings in any given day, although severe events have caused operations to be affected for as long as four hours.

Significant variance in the weather occurs year to year and any one year may experience up to one and a half times the average observed operational difficulties due to weather. This method, (operations are affected by 20% of the storm events with gust between 35 and 44 mph and by 100% of the storm events with gusts greater than 44 mph) predicts 6 days for which ferry operations would be affected during 1990. Research of the ferry pilot logs indicated there were 7 days in which weather had an impact on ferry operations on the Edmonds-Kingston run during 1990.

Winds greater than 35 mph blowing from the north, occur on average only once every couple of years, but are much more likely to cause delays or complete shutdown of ferry operations. The *Yakima* tied up in Kingston to wait for a shift in northerly winds gusting to 37 mph on February 1, 1989, and both the *Yakima* and *Tillikum* reported difficulties on December 28, 1990 when wind gusted to 43 mph from the north.

Site Comparison - Winds

Short term wind records at the Unocal pier and the existing ferry terminal have been collected. A ferry berthing study is currently being conducted by Charles Jahren of the University of Washington Department of Civil Engineering at the Edmonds Ferry Terminal. As part of the project, anemometers have been placed on the existing ferry terminal and on the Unocal Pier. Figure 1, shows one-minute-averaged wind speed recordings taken from February 27 to March 7, 1991, for both sites.

The peak wind speed at the Unocal site is generally greater than the wind speed at the existing terminal. On two occasions, March 6, and 7, the difference in recorded wind speed is greater than 25 mph. During southerly storms, wind velocities are between 10 and 30 percent higher at the Unocal site than at the existing site. Southerly winds, on the pier at Edwards Point, approach directly over water and are unaffected by the shoreline or structures. Winds at the existing site are slowed as they cross land and the marina. Therefore, the threshold velocity for recorded winds at Seatac and Paine Field which affect ferry operations is on average 20% lower than at the existing site. Gusts of approximately 30 mph may affect operations at the proposed site. The data (Table 1) indicates that on average gusts of greater than 30 mph occur 19 times per year. At the proposed site, the

gust affecting all operations is also lowered by 20% to approximately 40 mph. Gusts of 40 mph occur on average 5 times per year. Therefore, assuming all operations are affected when gusts exceed 40 mph, and 20% of operations are affected for gusts from 30 to 40 mph, operations will be affected at the proposed site on average, eight times per year. Of those events impacting operations, 96% occur between October 1 and April 30.

Waves

An analysis of the deep water significant wave heights at the existing ferry terminal and at the Unocal site was conducted using wave hindcasting methods. The significant wave height is the average of the highest 1/3 waves; it does not represent the highest wave that can occur. The estimated deep water significant wave height is dependent on two main parameters, the duration of the wind, and the fetch (distance over water on which the wind blows). Figure 2, shows the design fetch lengths for Edmonds Coastline. The affective fetch for southerly winds is 9.4 miles, while the affective northerly fetch is 8.2 miles.

The predicted wave heights for these fetch lengths are shown in Table 3. Two wave heights are of concern: 1) the 100-year significant wave height, which will be used for the design of the ferry terminal, and 2) the wave conditions at which ferry operations are impacted.

Wind velocity duration curves have been developed by the Army Corp of Engineers. These duration curves can be used to predict the 100-year storm event. The predicted 100-year significant wave height for winds blowing from the south is 5.9 feet, and from the north is 3.7 feet.

Wind velocity duration curves for 1-year and 10-year storm events have been formulated from the wind data at Paine Field and Seatac Airport. For southerly winds, the 1-year duration curve indicates that a wind speed of 35 mph has a duration of just under an hour. This corresponds to a wave height of 2.2 feet. For the 10-year storm a wind speed of 35 mph would have a duration of 1.5 hours which would correspond to a 3.0 foot wave. For a northerly wind of 35 mph, the 1-year wave height would be 1.5 feet, and the 10-year wave height would be 2.0 feet.

Wave Refraction

A wave refraction analysis was performed to determine the wave height at the location of the ferry berth for both the existing site and the Unocal site based on the deep water significant wave height values for the 1-year, 10-year, and 100-year storms.

The speed of a wave is dependent on the depth of the water. As a wave approaches a coastline at an angle a portion of the wave is in shallow water and travels slower than the portion of the wave in deeper water. Thus waves arriving at an angle to a coastline tend to refract. Energy in the waves are concentrated or dispersed depending on the local bathymetry.

The refraction analysis for waves approaching the Edmonds coastline from the northwest and from the southwest are shown in Figures 3 and 4. Waves approaching from the northwest arrive relatively parallel to the coastline and therefore are only slightly refracted. At the existing ferry terminal, a "U-shaped" underwater depression exists. This "U-shaped" area tends to disperse the wave energy. The 100-year design significant wave height decreases from a deep water value of 3.7' to a value of 3.3' in fifteen feet of water depth. The small underwater headland near the existing Unocal dock tends to concentrate the wave energy. The significant wave height increases from 3.7' to 4.1' in fifteen feet of water.

The wave refraction diagram for waves approaching from the south shows the sheltering of the existing ferry terminal site by Edwards Point and the Port of Edmonds breakwater. The design wave height decreases from a deep water value of 5.9' to a 4.1' wave in fifteen feet of water depth. Because of the large incident angle between the waves approaching from the south and the headland at the Unocal Site, there is no concentration of wave energy at the headland. The design wave approaching this area decreases in height from 5.9' in deep water to 4.6' in ten feet of water. However, at the proposed terminal location at the end of the existing pier, little energy has been lost.

Site Comparison - Waves

Using the deepwater value of 2.2 feet for the threshold of impact on ferry operations, one additional day may be lost due to wave action at the existing ferry terminal.

At the proposed site, wind generated waves from the south are unshielded. Thus, lower winds will result in a similar wave height as the one affecting the existing site. A sustained wind velocity of 25 mph will result in the similar wave height at the proposed site as the one observed to affect the existing site. A 25 mph wind velocity occurs on average ten times per year (Table 1). However, only those events when gusts have not exceeded 40 mph can be added to the number of events to arrive at a total. Conditions with gusts over 40 mph occur on average four times per year. In addition, 20% of the winds over 30 mph have been included in the wind affects discussed above and cannot be included here. On every occasion when the winds are at a sustained velocity of 25 mph, gusts of 30 mph occur. Thus, subtracting the four events per year when gusts exceed 40 mph, as well as subtracting the four events per year when gust exceed 30 mph (20% of those cases) from the ten average events with sustained velocities of 25 mph, leaves two additional events when waves may impact operations.

For northerly wind generated waves, both the existing and the proposed site will be affected equally. In addition, the probability of northerly winds with sustained velocities which would affect operations is low (on average less than one event per year), and thus no further analysis will be developed.

Conclusion

Based on the analysis of weather data correlated to the ferry systems records, over the past ten years operations have been affected at the existing site on average four to five times per year. An "affect" is at least one incident when operations were curtailed, a berthing cannot occur and is aborted, special assistance such as a tug is required, or damage to the berth might occur.

Both wind and wave activity is predicted to be greater at the proposed site. A threshold condition was established for the existing site and then used to analyze the proposed site. Based on this analysis, operations at the Edwards Point site may be affected up to ten times per year.

Of those events affecting operations, 96% occur between October 1 and April 30. Based on the pilot logs, typically no more than two runs are affected during any one day when weather limits operations, and the schedule returns to normal thereafter. Significant variance in the weather occurs year to year and any one year may experience up to one and a half times the average observed operational difficulties due to weather.

FIGURE 1: RECORDED WIND SPEEDS

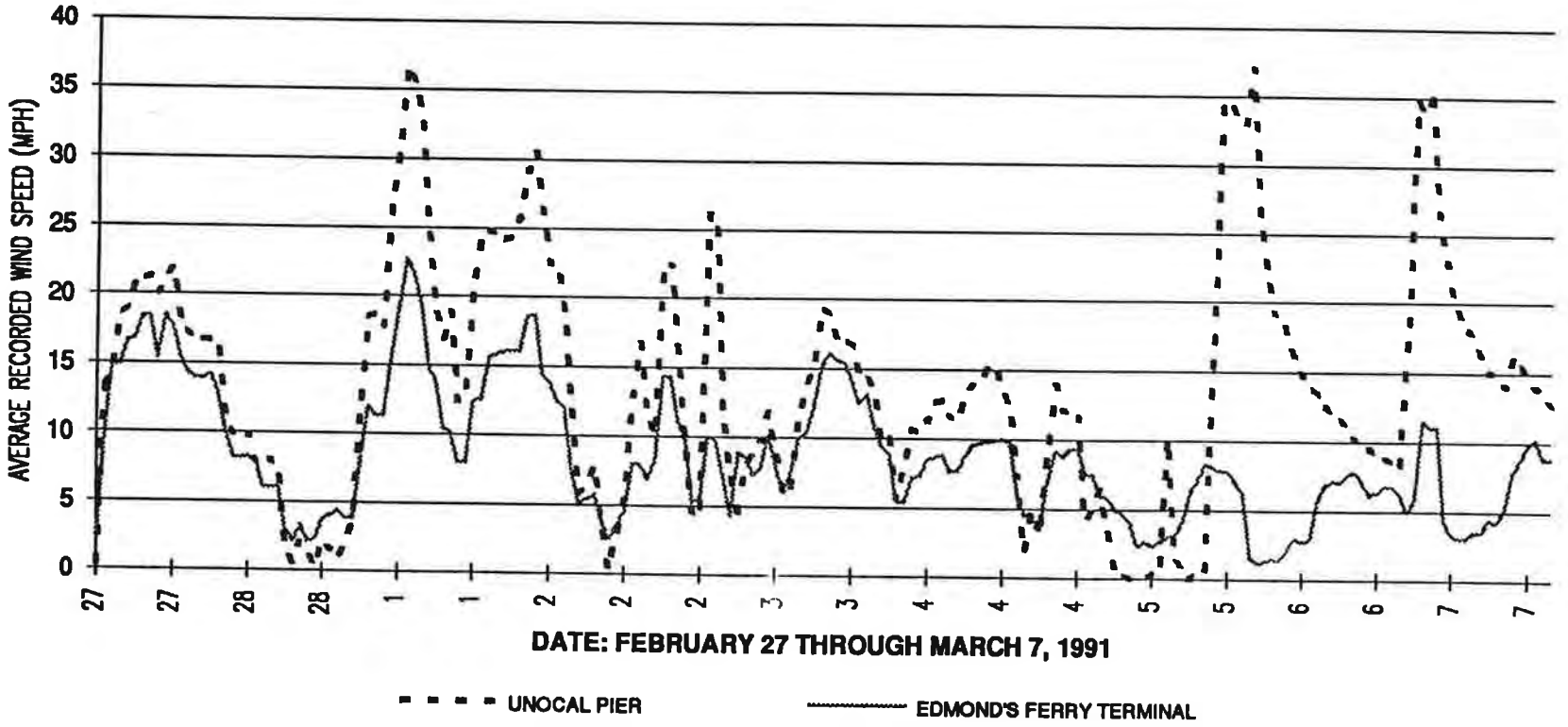
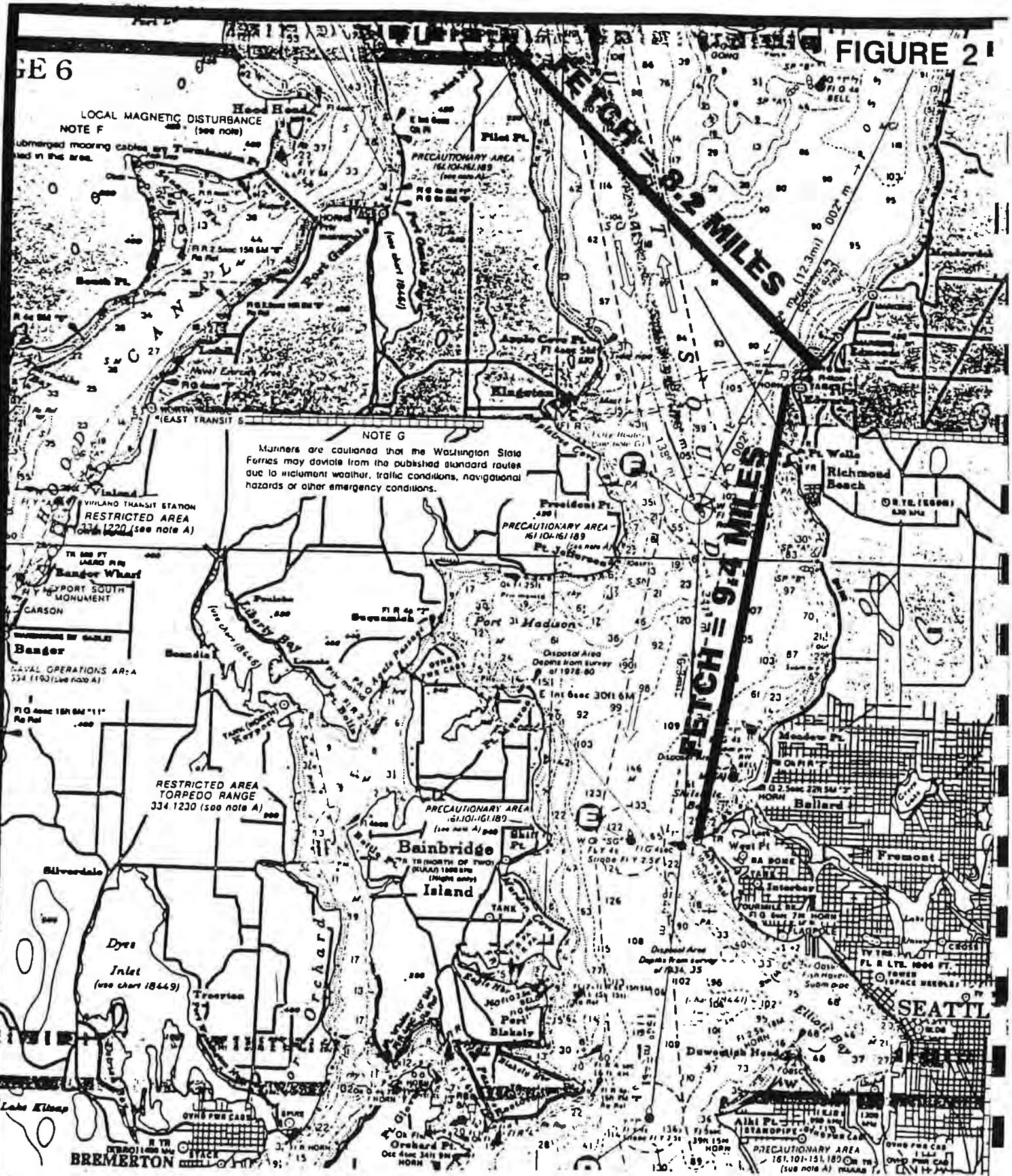


FIGURE 2



CITY OF EDMONDS

DESIGN FETCH

EDMONDS FERRY TERMINAL SITE ANALYSIS

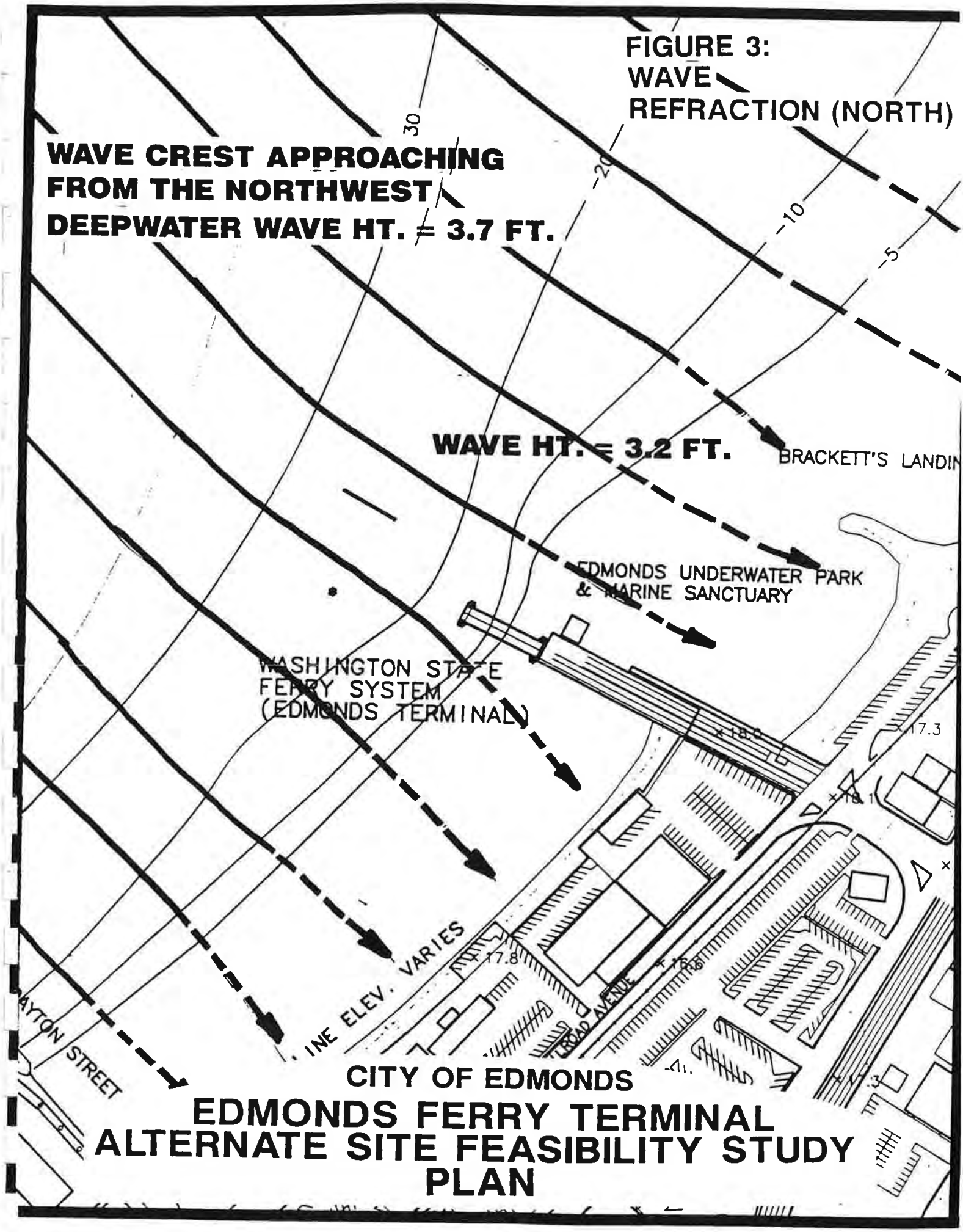


FIGURE 3:
WAVE
REFRACTION (NORTH)
WAVE CREST APPROACHING
FROM THE NORTHWEST
DEEPWATER WAVE HT. = 3.7 FT.
30
20
10
5
WAVE HT. = 3.2 FT.
BRACKETT'S LANDIN
EDMONDS UNDERWATER PARK
& MARINE SANCTUARY
WASHINGTON STATE
FERRY SYSTEM
(EDMONDS TERMINAL)
+18.8
17.3
+18.1
17.8
+16.6
BROAD AVENUE
INE ELEV. VARIES
AYTON STREET
CITY OF EDMONDS
EDMONDS FERRY TERMINAL
ALTERNATE SITE FEASIBILITY STUDY
PLAN

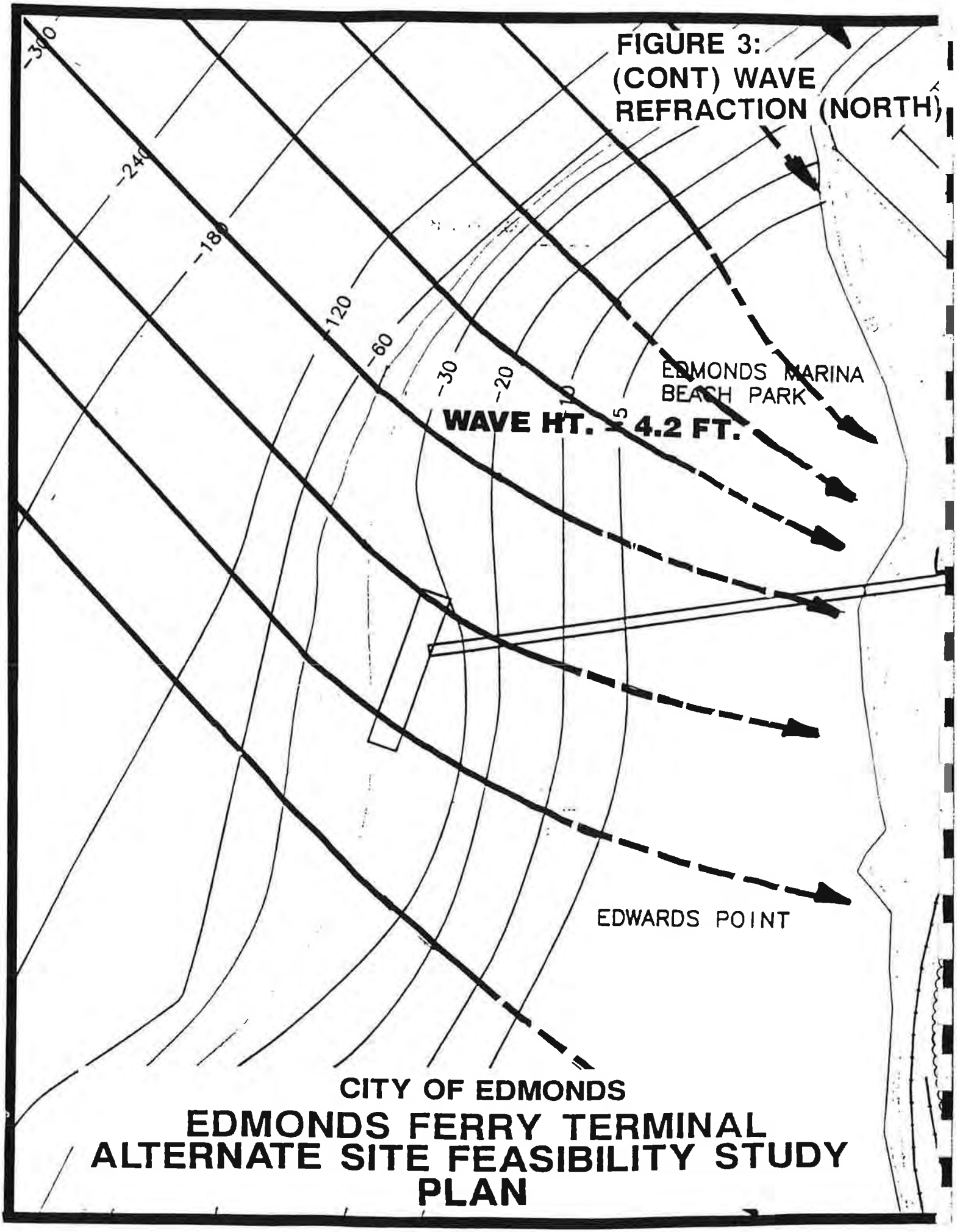
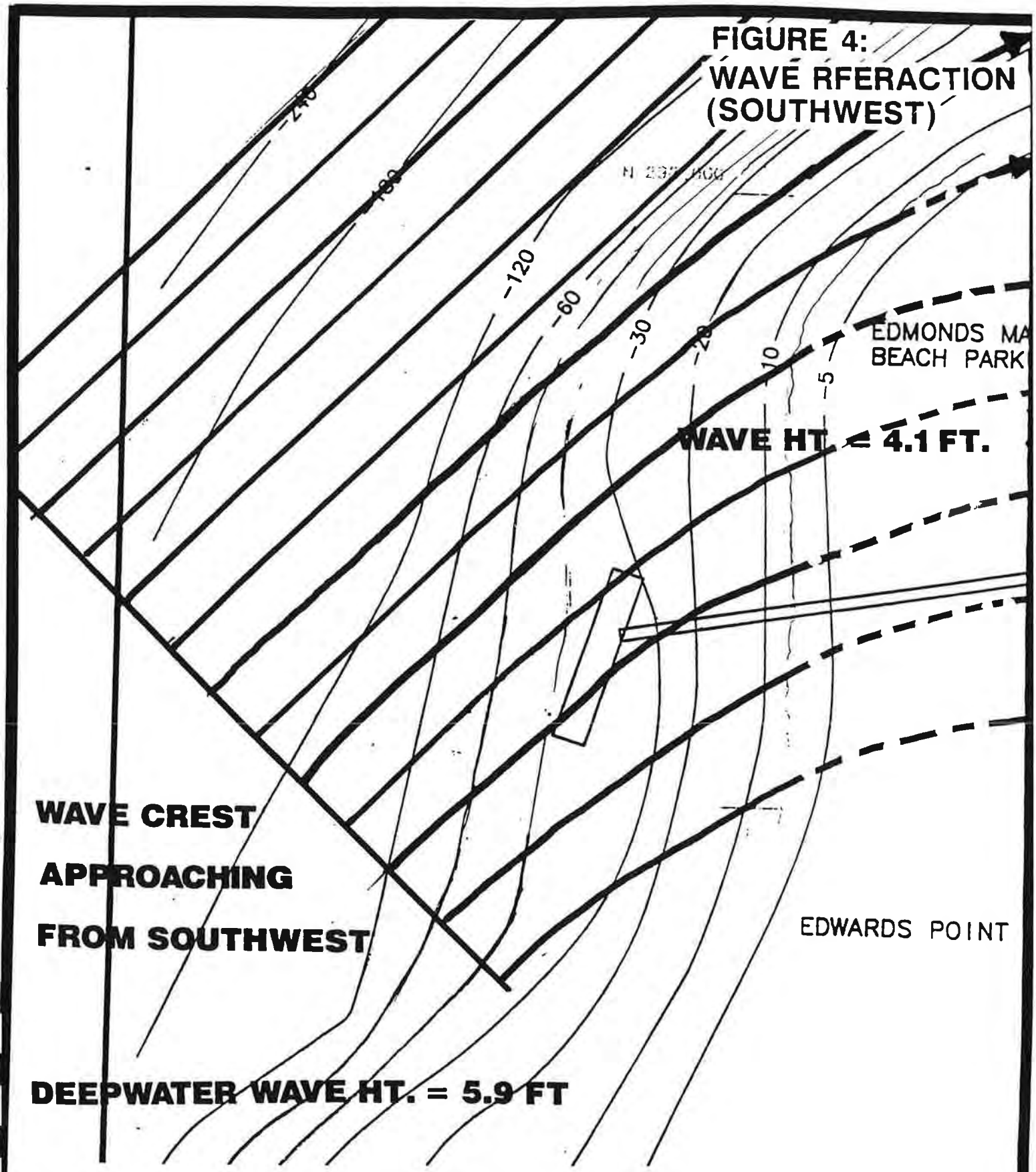


FIGURE 3:
(CONT) WAVE
REFRACTION (NORTH)
-300
-240
-180
-120
-60
-30
-20
-10
-5
EDMONDS MARINA
BEACH PARK
WAVE HT. = 4.2 FT.
EDWARDS POINT
CITY OF EDMONDS
EDMONDS FERRY TERMINAL
ALTERNATE SITE FEASIBILITY STUDY
PLAN



CITY OF EDMONDS

EDMONDS FERRY TERMINAL ALTERNATE SITE FEASIBILITY STUDY PLAN

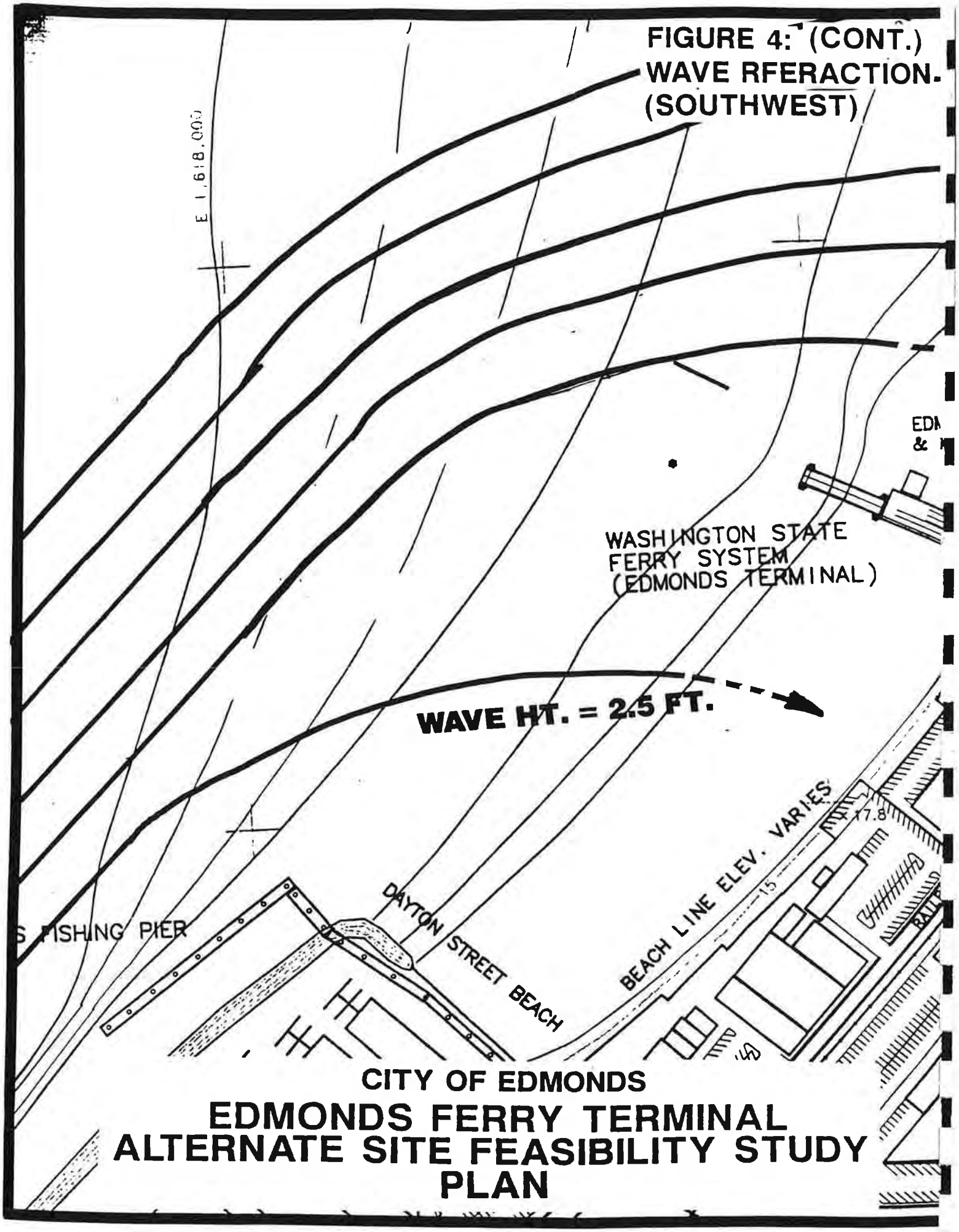


FIGURE 4: (CONT.)
WAVE RFERACTION.
(SOUTHWEST)
E 1,618,000
WASHINGTON STATE
FERRY SYSTEM
(EDMONDS TERMINAL)
WAVE HT. = 2.5 FT.
BEACH LINE ELEV. VARIES
17.8
15
DAYTON STREET BEACH
S FISHING PIER
CITY OF EDMONDS
EDMONDS FERRY TERMINAL
ALTERNATE SITE FEASIBILITY STUDY
PLAN

Appendix C

Edmonds Ferry Terminal

Breakwater Analysis at Point Edwards

for

CITY OF EDMONDS

Washington State Department of Transportation

July 1, 1991

Summary

An analysis of the existing wind and wave conditions at the existing Edmonds Ferry Terminal location and at a proposed location at Edwards Point indicated that protective measures at the Point Edwards site would be required to maintain the existing level of service for ferry operations. A breakwater at the Edwards Point site would be required to protect the terminal from storm waves approaching from the south. Two types of breakwaters were analyzed for effectiveness and cost: 1) a rubblemound breakwater and 2) a floating breakwater.

The rubblemound breakwater is designed as a detached breakwater similar in cross section to the existing Port of Edmond's breakwaters. The detached breakwater is more economical and sensitive to the environmental conditions at the site than a breakwater extending to the shore. Because of the bathymetry at the site, the base of the rubblemound breakwater will encompass a large area at its western edge. The major cost of the breakwater will be the material. Additional cost may be associated with the placement of the material in deep water. The total estimated cost for the construction of the rubblemound type breakwater is estimated at $17 million.

A floating breakwater design was analyzed based on existing Western Washington floating bridge pontoons. The amount of wave attenuation by a floating structure is dependent on the incident wave characteristics and the structure characteristics. A threshold wave height value of 2.2 feet, with a period of 3 seconds, was determined to impact ferry operations. The design floating breakwater will reduce this wave to 0.7 feet behind the structure. The 100-year wave height of 5.9 feet is reduced to 3.3 feet behind the structure. The cost of constructing a new floating pontoon type breakwater is approximately $18 million.

Currents in the area are mainly influenced by the tide and the local bathymetry. The ebb and flood currents run approximately parallel to the shore. Due to local bathymetry, eddies form between the existing Unocal dock and Port of Edmonds breakwater. The average current ranges from 0.2 to 0.4 feet per second.

Berthing is affected by both wind, waves, and currents. Because wind and wave action is interactive and complex, it is difficult to fully determine whether wind or waves control in any given situation. Both the rubblemound and floating type breakwaters will attenuate the wave energy passing into the berthing area, but will have little effect on the wind conditions at the site.

Rubblemound Breakwater

A typical rubblemound breakwater consists of a quarry spall inner core with layers of larger rock on the outside (Figure 1). The design structure analyzed for the Edwards Point site was similar to the existing breakwaters at the Port of Edmonds. The top elevation of the design rubblemound breakwater is set at +18.5 feet with a crest width of 6 feet. The

side slopes of the breakwater are 1.5:1. The design breakwater is detached from shore, beginning at the -10 contour, and extends out approximately 800 feet to the western toe. The total crest length is 650 feet (Figure 2).

A detached breakwater is more economical and does not interrupt the longshore movement of sediment. There is a net transport of sediment to the north along the coast at Edwards Point. Evidence of sediment movement is shown by the buildup of sediment on the southern side of the Port of Edmond's southern breakwater. The detached breakwater will enable the natural movement of sediment along the coast to continue. A detached breakwater is also beneficial in that the shallow water marine habitat is unaffected.

Because of the bathymetry at the Edwards Point site, the western edge of the breakwater is in deep water and the area which the base of the breakwater covers is large.

Construction of rubblemound breakwaters is a relatively simple procedure. Barges can be used to transport and place the material. Special construction methods may be required at the Edwards Point site due to the large depth at the western end of the breakwater. The major cost for the rubblemound breakwater will be the material. A probable estimated cost for the Edwards Point rubblemound breakwater is $17 million.

The breakwater is located on the southern side of the double berth facility. Major storm waves in Puget Sound approach from the southwest at Edwards Point. Storm waves approaching from the north occur less frequently. With the southern rubblemound breakwater, the effects of northerly storms at the Point Edward site will be the same as is currently experienced at the existing site.

Floating Breakwater

While the use of floating breakwaters is relatively new compared to the use of rubblemound breakwaters, research has been conducted and structures have been built which show the ability of floating breakwaters to reduce the wave energy which passes to the protected side of the breakwater. Floating breakwaters reduce the transmitted wave energy through reflection and damping.

Floating breakwaters are often characterized by the amount of wave energy which is transmitted past the breakwater. Wave energy is proportional to the square of the wave height. A transmission coefficient, Ct, describes the amount of reduction in wave height that the incident wave will experience as it interacts with the floating structure. The amount of wave height reduction expected from a floating breakwater is a function of the incident wave height, wave period (or wave length), breakwater width, breakwater depth, and the angle at which the wave approaches the breakwater.

The wider a floating breakwater is, the greater protection from waves it provides. Likewise the shorter the wave period (length) the less energy will pass a given structure.

A wave with a length of approximately five times the width of a floating breakwater will not be effectively attenuated by the breakwater. Since a wider breakwater will be more effective for any given wave, a wave approaching at an angle will "see" a wider section in its direction of travel, and thus will experience a greater reduction.

Deeper draft in a structure also acts to reduce the transmitted wave height, although greater breakwater width is more effective than greater depth in reducing transmitted waves. This is due to the fact that the largest wave motion occurs near the surface of the water and decreases with water depth.

The pontoons of the floating bridges designed and constructed for Western Washington, while not specifically designed for breakwater use, can be utilized as effective floating breakwaters. The pontoon section analyzed for use at the Edwards Point site was the pontoon designed for the Hood Canal Bridge temporary replacement sections. These sections are 60 feet wide, 18 feet deep, and 360 feet long (Figure 3). Two sections would be required at the southern side of the ferry berths (Figure 4). The pontoons would be oriented such that waves approaching from the southwest would approach directly toward the face of the breakwater.

The threshold design wave height which affects ferry operations at the Edwards Point site was determined to be 2.2 feet, with a period of 3 seconds. This would correspond to a deep water wavelength of 46 feet. For this wave characteristic and the floating breakwater characteristic, the transmission coefficient would be 0.2 to 0.3. This would correspond to a transmitted wave height of 0.7 feet.

For the 100-year storm event, the design wave height is 5.9 feet with a period of 4.7 seconds. This corresponds to a deep water wavelength of 113 feet. This length is less than two times the width of the floating breakwater and therefore will be attenuated by the structure. The transmission coefficient for the 100-year design wave would be 0.5 to 0.6. This would correspond to a transmitted wave of 3.5 feet.

The cost for constructing a floating breakwater consisting of two pontoons with anchoring systems would be approximately $18 million dollars. Occasionally, pontoons from other projects are available. The pontoons from the old I-90 project recently sold for $1,000 to $76,000. The Department of Transportation District Engineer in charge of the temporary replacement pontoons for the Hood Canal Bridge, which are currently being stored at Port Gamble, indicated that these pontoons have been designated for a future project and are not available.

Currents

Currents along the Edmonds coast were analyzed as part of the Edmond's Public Fishing Pier design. The main influence of the currents at the site are the tidal fluctuation in Puget Sound and the local bathymetry. The current at the site flows to the south during flood

tide and to the north during ebb tide. During periods of slack tide, the current flows offshore near the southern Port of Edmonds breakwater. Due to local bathymetry, eddies form near Edwards Point. The average speed of the current is 0.2 to 0.4 fps.

Limitations

Because the environmental forces of wind and wave are complex and interactive it is not possible within this scope to fully determine whether waves or wind control. A breakwater at the Edwards Point site will be effective in reducing the impacts of waves on ferry operations. Because of the relatively low elevation of the top of the breakwater, little attenuation of wind will be provided by either type of breakwater.

The estimated costs of the breakwaters do not include permitting and mitigation. As with any coastal construction project, the time and monetary cost of obtaining approval for the project must be considered. However, floating structures result in less environmental impacts on existing bottom conditions, current flow, and littoral processes.

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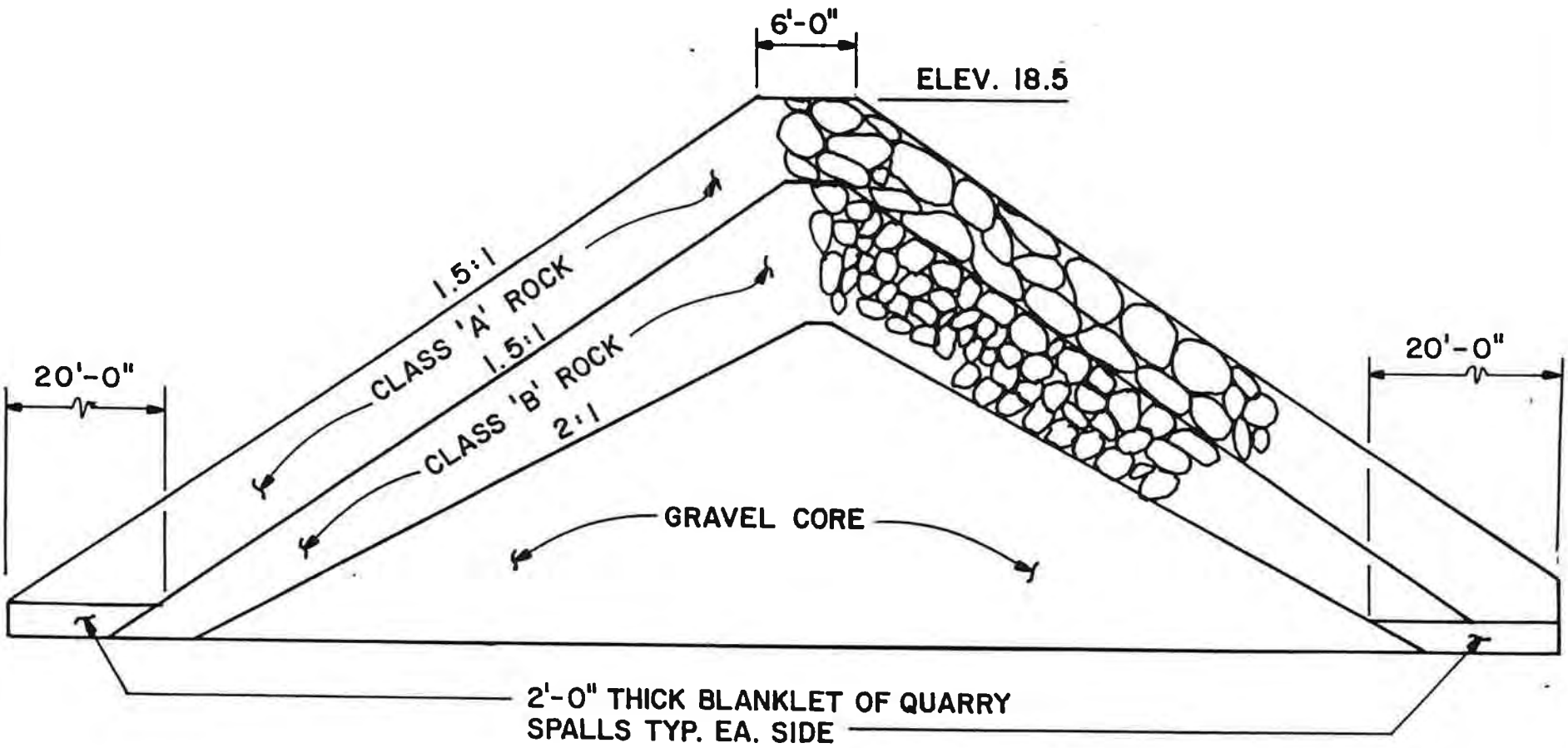

FIGURE 1 RUBBLEMOUND BREAKWATER (TYP. SECTION)

SCALE: 1" = 10'

EDMONDS FERRY TERMINAL ALTERNATIVE SITE ANALYSIS

REID MIDDLETON
19031 33rd Ave. W., Suite 301
P.O. Box 6638
Lynnwood, WA 98036-6638
206/775-3431

24-91-008 JULY 1,1991

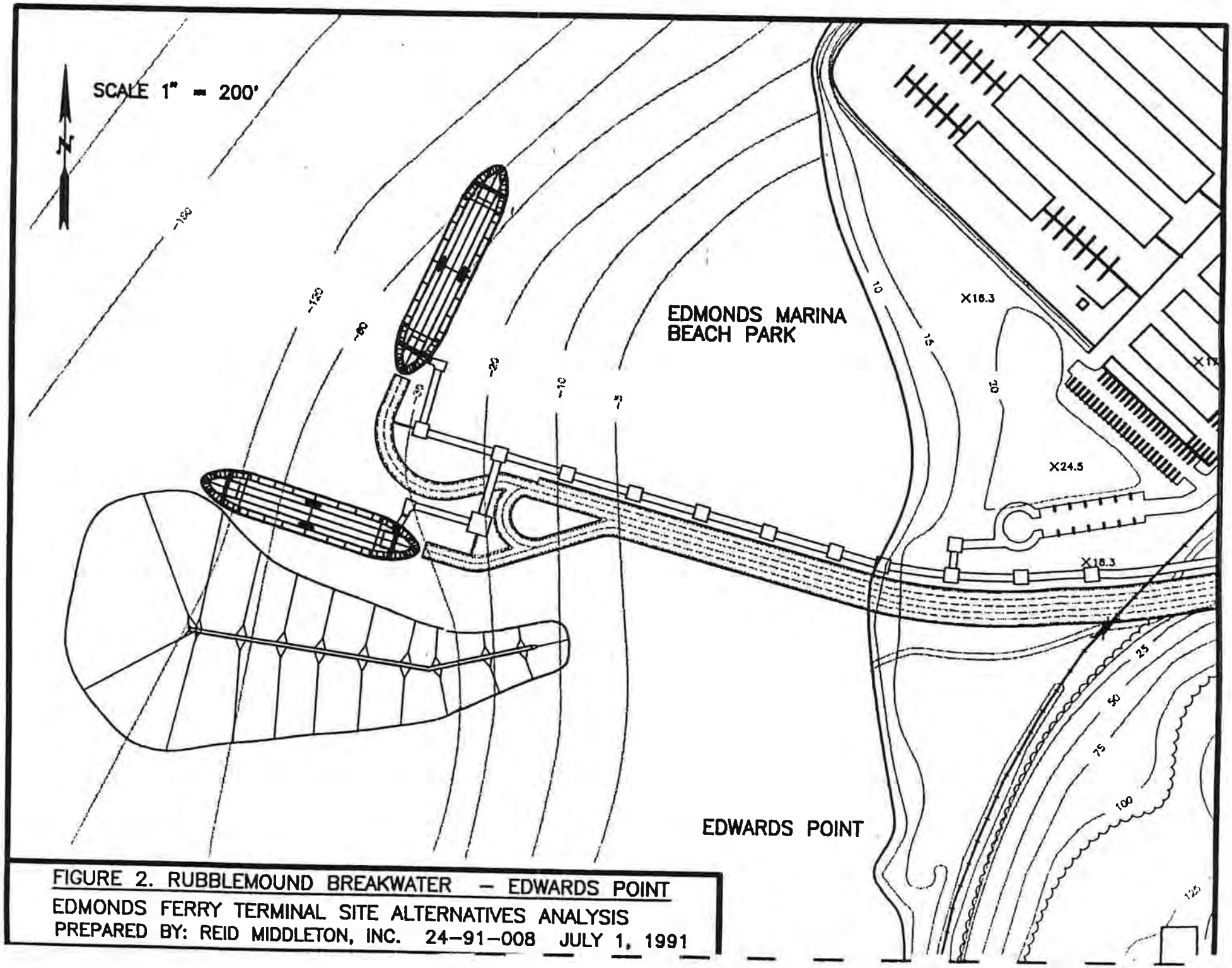

FIGURE 2. RUBBLEMOUND BREAKWATER – EDWARDS POINT
EDMONDS FERRY TERMINAL SITE ALTERNATIVES ANALYSIS
PREPARED BY: REID MIDDLETON, INC. 24-91-008 JULY 1, 1991

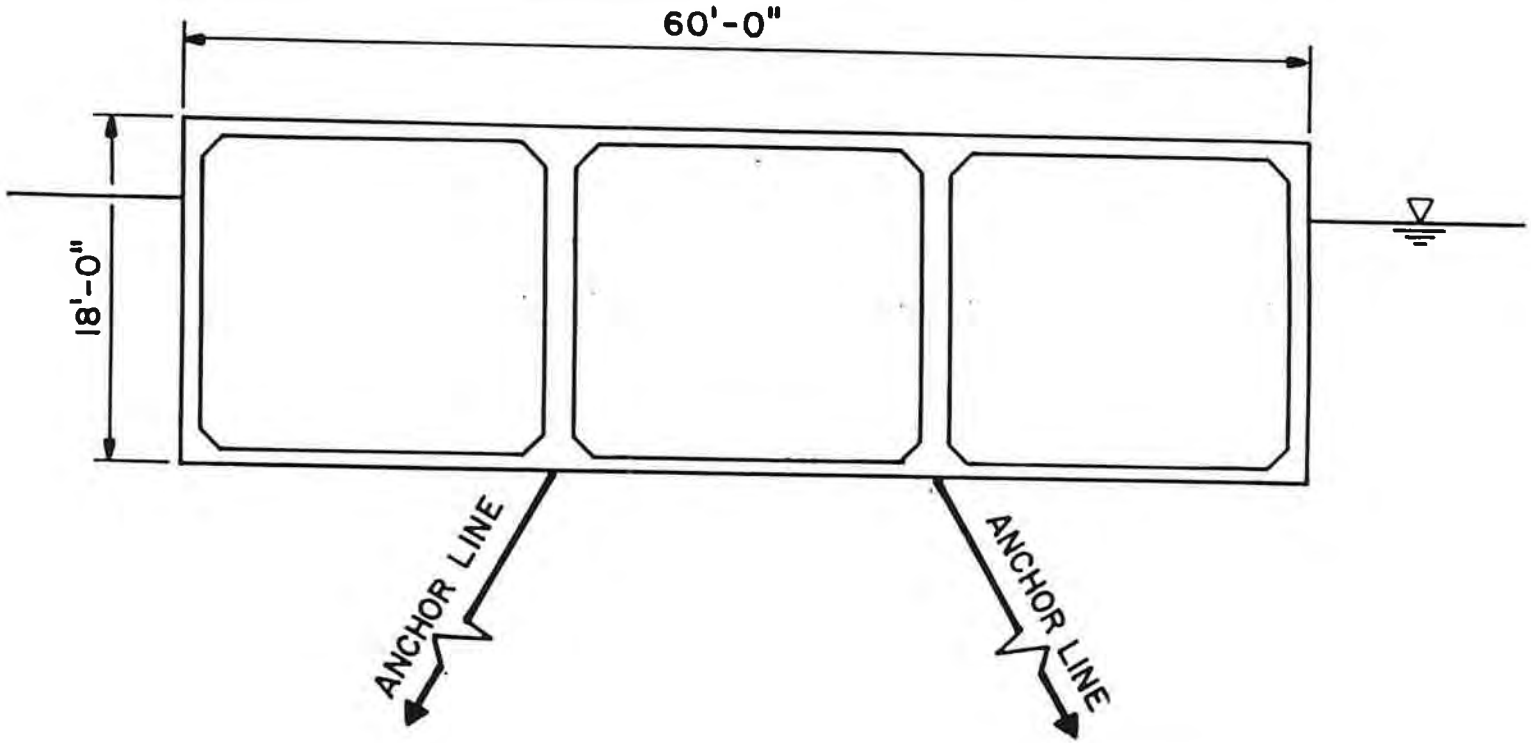

FIGURE 3 FLOATING BREAKWATER (TYPICAL SECTION)

SCALE: 1" = 10'

EDMONDS FERRY TERMINAL ALTERNATIVE SITE ANALYSIS

REID MIDDLETON
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24-91-008 JULY 1, 1991

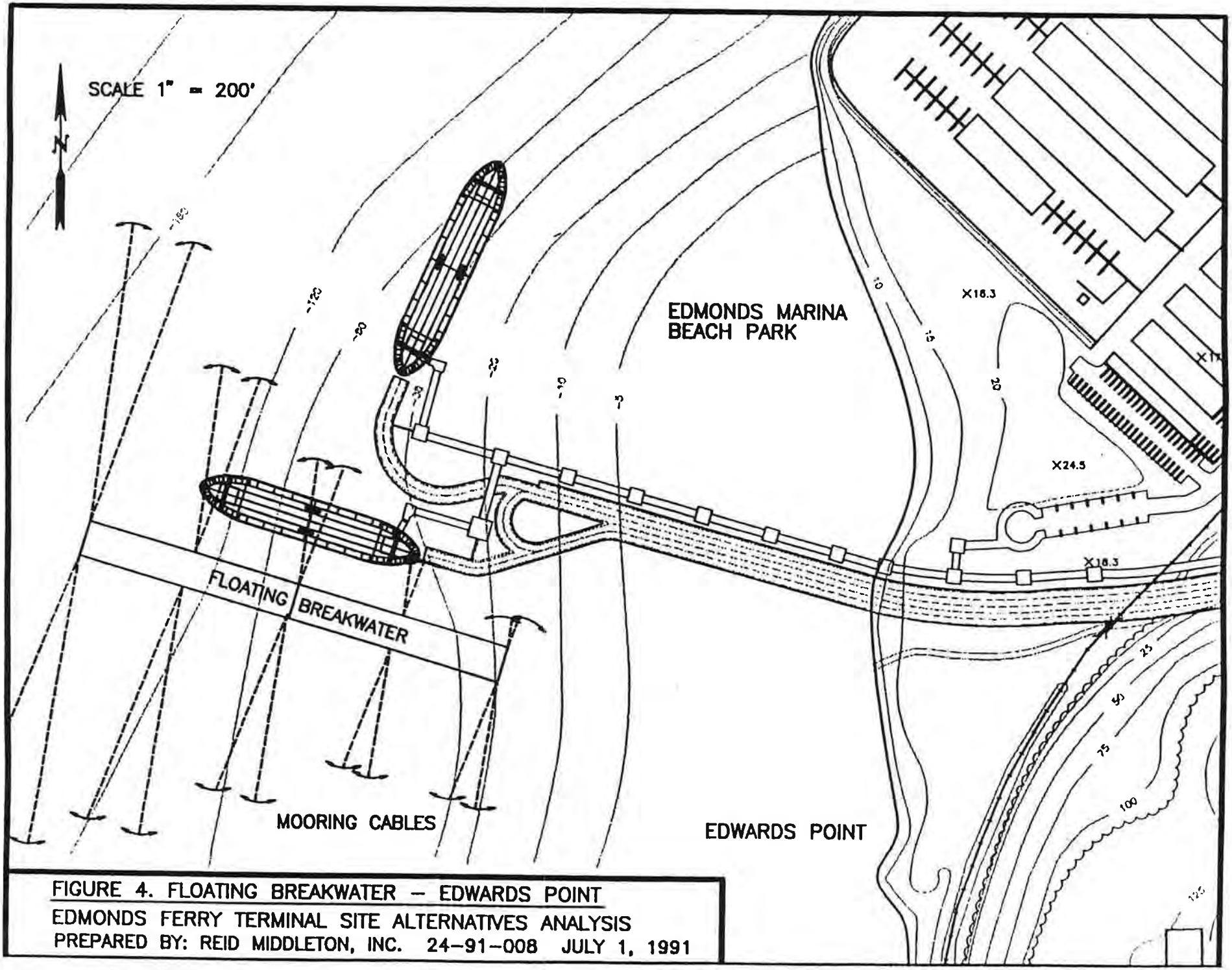


FIGURE 4. FLOATING BREAKWATER – EDWARDS POINT
EDMONDS FERRY TERMINAL SITE ALTERNATIVES ANALYSIS
PREPARED BY: REID MIDDLETON, INC. 24-91-008 JULY 1, 1991

Appendix D

Edmonds Ferry Terminal Study

Comparison of Acquisition Costs of Alternative Schemes

Prepared by
Property Counselors
310 Galland Building
1221 Second Avenue
Seattle, Washington 98101

October 1991

Introduction

The Edmonds Ferry Terminal Study has identified four potential schemes for providing new or upgraded terminal facilities on the Edmonds Waterfront. Cost of site acquisition is one of several economic and non-economic criteria to be used in evaluating alternatives. This memo provides a comparison of acquisition costs.

This analysis does not represent an appraisal of any of the parcels considered. Rather, it consists of an estimate of value based on a consistent set of assumptions. The actual acquisition cost of any of the parcels considered will be determined by formal appraisals and negotiations and may differ significantly from these comparisons.

This memo is organized in four sections:

Introduction

Parcel Identification

Market Value Relationships

Comparative Acquisition Costs

Parcel Identification

The four ferry terminal schemes involve access routes which, in most cases, extend outside existing street rights of way. The parcels affected directly by the alternative access/terminal schemes are identified in Table 1. The table summarizes information on ownership, land area, nature of improvements, and assessed value. All data in the table are taken from the tax records of the Snohomish County Assessor's Office. Affected parcels are described generally below.

Table 1
Ferry Terminal Alternatives
Description of Directly Affected Parcels

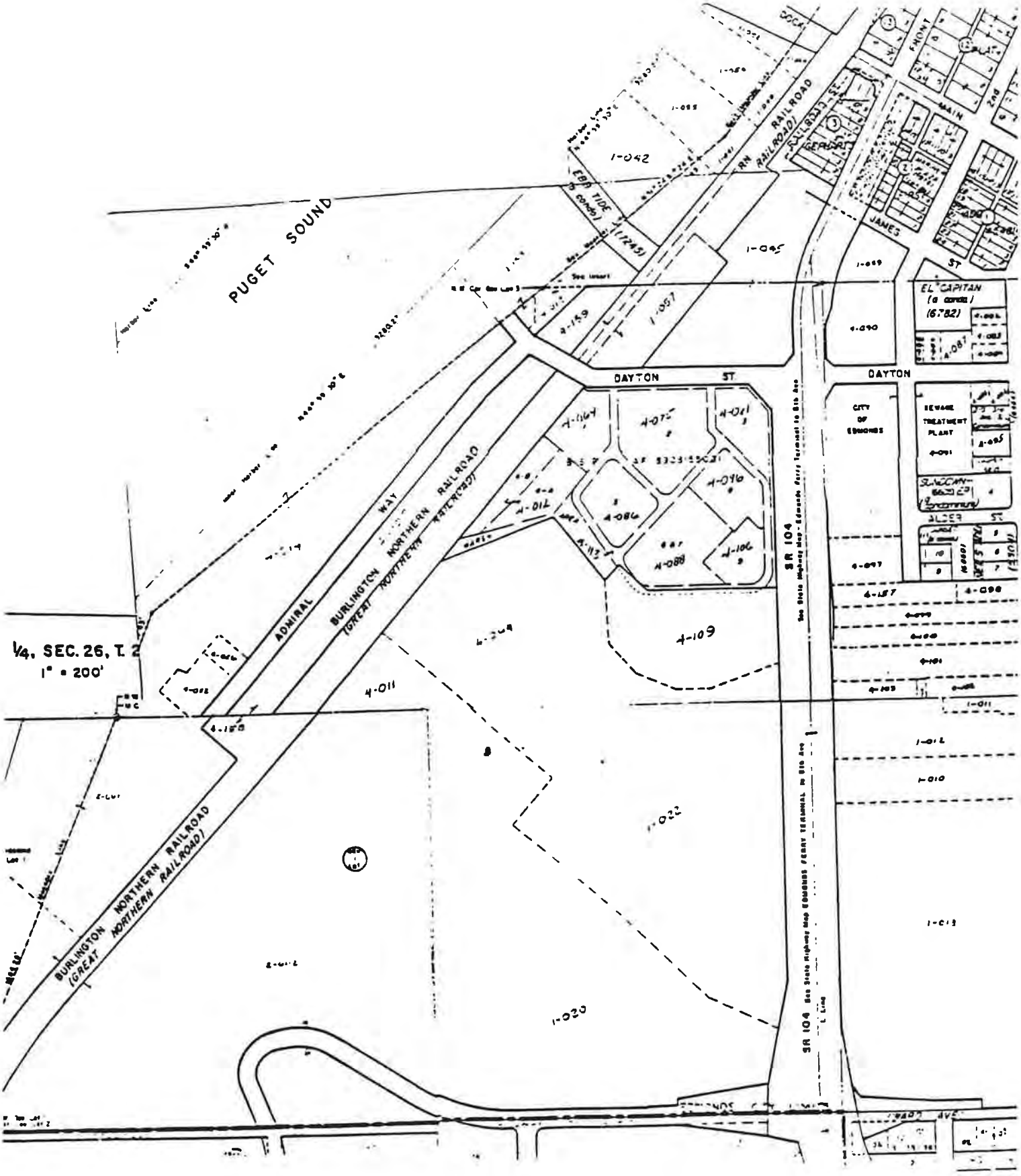
	Parcel Number	Acres	Improvements	ASSESSED VALUE		
				Land	Improvements	Total
Scheme 1						
Andersen Marine	232703-1-038	0.42		$ 238,000		$ 238,000
	232703-1-040	0.60	13,200 sf Boathouse	350,000	$ 138,300	488,300
	232703-1-052	0.13		141,900		141,900
	232703-1-054	0.36		405,000		405,000
Scheme 2a						
Safeway	232703-1-045	4.28	51,485 sf	549,600	1,326,000	1,875,000
Burlington Northern	232703-1-057	2.86		234,000	10,200	244,200
City	232703-1-042	1.62	20,257 sf Senior Center and Housing	---	---	---
Scheme 2b						
Harbor Square	232703-4-012	1.22	17,870 sf		675,000[a]	
	232703-4-109	3.64				
	232703-4-113	2.23				
Other Port	232703-4-158	4.32				
	232703-4-159	0.60				
City Property	232703-4-153	0.64				
Vorwick Trust Property	232703-4-013	0.36	17,064 sf	387,200	1,054,700	1,441,900
Scheme 3						
Unocal	262303-1-020	19.36		1,410,000		1,410,000
	262303-2-002	26.60		2,063,000	4,324,000	6,388,000
	262303-3-003	3.55		300,500		300,500
	232603-4-011	1.39		13,900		13,900

[a]leasehold improvements valued as personal property

Source: Snohomish County Assessor's Office
Property Counselors

Scheme 1

The first scheme takes advantage of the existing access and provides a new terminal and loading area to the south of the existing dock. The affected parcels are four separate parcels comprising the Andersen Marine site. Total



Parcel Numbers

(last four digits shown)

site area is 1.51 acres. There is an existing 13,200 square foot boathouse on the site.

Scheme 2a

This scheme calls for the access route to diverge from SR 104 north of Dayton Street, cross over the shopping center site (formerly Safeway) cross under the railroad tracks, and across the City-owned senior center property. The southern two-thirds of the shopping center site, the Burlington Northern property south of the station, and the senior center property would be committed to the ferry system. The northern third of the shopping center site would be available for reuse and the two-story senior housing structure on the southern portion of the City property would not be affected. The shopping center property is 4.28 acres in size with 51,000 square feet of gross building area; the Burlington Northern property (including the station and rail right-of-way) includes 2.86 acres; and the senior center property includes 1.62 acres and 20,257 square feet of building area (including the two-story housing building).

Scheme 2b

This scheme calls for the access route to diverge from SR 104 south of Dayton Street, pass along the north side of the marsh, across the southern portion of the Harbor Square development, through Building 4 of Harbor Square, under the railroad tracks, between the Arnie's restaurant building and TJ Bayshore buildings, and across City-owned park land. The access route would eliminate Building 4, circulation area behind two other Harbor Square Buildings, parking at the TJ Bayshore Building, and City park land. It should be noted that the land under Harbor Square is owned by the Port and the buildings owned by private investors (and carried as personal property on the tax rolls).

Scheme 3

This scheme calls for the access route to diverge from SR 104 at the Woodway City limits, pass along the base of the hillside on the Unocal property, and over the railroad tracks. All the affected properties are owned by Unocal. The access route and parking would consume the lower portions of the property. The hillside, representing about 50% of the total land area, would be available for reuse.

Market Value Relationships

It is beyond the scope of this analysis to provide an appraisal of individual affected parcels. However, it is possible to apply a value factor (expressed as a range of value per square feet) to provide an estimated land value for comparative purposes. These factors vary according to the general locational characteristics of the property. In some cases, it is possible to determine such a factor by considering actual sales in the downtown Edmonds area. In other cases, it is necessary to consider general relationships in the broader region. The derivation of several factors is described below.

Waterfront Commercial

Assessed values of the privately owned commercial parcels are equivalent to $25 per square foot. This value is at the upper end of the range for commercial parcels on other waterfront outside of downtown Seattle or Lake Union. In cases where approximately half of the parcel is tidelands, a value of $15 - $20 is an appropriate maximum, given the traditional relationship of tide land value as 25% of adjacent upland value.

Retail/Commercial Sites

The City of Edmonds had an appraisal prepared for the shopping center property. The contributory land value was considered at $13 per square foot and the total property value as $2,950,000. This land value is within the typical range for shopping center parcels with good access and visibility in suburban areas.

Business Park

Harbor Square is an example of a business park featuring both commercial uses (office, retail, hotel, and athletic club) and industrial uses (boat manufacturing and repair). The commercial uses with good exposure can support land values up to $10 per square foot (approaching those of the commercial sites above) while the industrial sites support a lower value. Harbor Pointe is an example of a business park with limited commercial use. Land prices for finished lots are $6 per square foot. Equivalent prices for unfinished parcels (raw land) would be $4 to $5.

Residential

The hillside areas of the Unocal site are considered to be attractive for multifamily residential development. Assuming RM2.4 zoning (minimum lot area of 2,400 square feet per unit) and a 20% circulation factor, the gross density of the site could be 15 units per acre. Further, assuming a supportable land price of $20,000 (10% of a $200,000 average unit cost) a land price of up to $7 per square foot could be supported.

Summary

The existing improvements to a property may or may not contribute additional value. In some cases, the highest and best use of a property ma be a different use than the current use. In such cases, the improvements may have only limited value. In other cases the value of the improvement is equivalent to its depreciated replacement cost. Assessor's office improvement values are determined by this method.

It must be emphasized that these value relationships do not reflect any extraordinary site condition. In particular, they do not reflect any extraordinary environmental clean-up costs. To the extent that such costs may be high (as is likely the case for the Unocal property) the actual property value should be correspondingly less.

Comparative Acquisition Costs

The factors described in the previous section can be applied to provide a comparison of acquisition costs for the alternative schemes. Several points should be clarified before making the comparison:

- As discussed above, the acquisition costs are based on the assumption that no extraordinary clean-up costs are incurred. This is equivalent to assuming that the seller bears the cost of the clean-up or that the acquisition cost is reduced dollar by dollar for such costs. Further, the estimates do not include the costs of relocation of any of the businesses occupying the affected parcels.
- Acquisition costs are estimated for City and Port owned property as well as privately owned property. Such an approach properly reflects the true cost of each scheme. However, the various parties may receive other consideration depending on how they organize to implement a selected alternative.
- Portions of parcels identified for acquisition are not required for terminal facilities and would be available for reuse. The value of these parcels are estimated. However, the reuse value will not represent an offset at the time of acquisition. It will likely be realizable in the future, and may include a premium at that time.
- Finally, the estimated acquisition costs are provided for comparison purposes only and should not be considered as formal appraisals for individual parcels.

Table 2 provides the comparison of estimated acquisition costs.

Table 2
Ferry Terminal Alternatives
Estimated Acquisition Cost Comparison

	Parcel Size (sf)	Land Value per sf	Estimated Land Value (000s)	Estimated Improvement Value (000s)[a]	Total Estimated Value (000s)	Value Reuse Portions (000s)
Scheme 1						
Andersen Marine	65,800	$15 - $20	$ 990 - $1,320	$140	$1,130 - $1,460	$ 0
Scheme 2a						
Safeway	183,200	$12 - $14	$2,240 - $2,610	$560 - $590[b]	$2,800 - $3,200[c]	$680 - $790
Senior Center	70,600	15 - 20	1,060 - 1,410	0[d]	1,060 - 1,410	---
Burlington Northern	124,600	3 - 5	380 - 620		380 - 620	
Total					$4,240 - $5,230	
Scheme 2b						
Harbor Square						
232703-4-012	53,100	$ 8 - $10	$ 420 - $ 530	$650	$1,070 - $1,180	
232703-4-109	158,600	3 - 5	480 - 790		480 - 790	
232703-4-113	22,500	5 - 8	110 - 180		110 - 180	
Subtotal					$1,660 - $2,150	
Other Port Property 4-158	30,000	$10 - $12	$ 300 - $ 360		$ 300 - $ 360	
Vorwick Trust Prop	8,000	20 - 25	160 - 200		160 - 200	
City	27,900	15 - 20	420 - 560		420 - 560	
Total					$2,540 - $3,270	
Scheme 3						
Unocal Hillside	1,140,000	$ 5 - $ 7	$5,700 - $7,980	$ 0	$5,700 - $ 7,980	$5,700 - $7,980
Unocal Lowlands	1,080,000	3 - 4	3,240 - 4,220	$ 0 - $4,320	$3,240 - $ 8,640	
Total					$8,940 - $16,620	$5,700 - $7,980

[a] estimated at assessors value unless otherwise noted

[b] estimated at residual of value by income approach less land value

[c] estimated by income approach

[d] estimated as no contributory value

Note: All estimates subject to the qualifications presented in the supporting narrative

Source: Property Counselors

Key assumptions and results for each scheme are as follows:

Scheme 1 - Total estimated value is $1.1 to $1.5 million with no portion of the property available for reuse.

Scheme 2a - Total estimated value is $4.2 to $5.2 million, with a potential reuse value of the north portion of the site as $680,000 to $790,000. The Burlington Northern property is considered at relatively low unit value because of its current use in parking and its limited potential for higher use.

Scheme 2b - Total estimated value is $2.5 to $3.3 million. This estimate is probably the least definitive in that value factors are applied to portions of parcels (in the case of Harbor Square and the Vorwick Trust property). It is possible that loss of portions of these parcels--circulation in the case of Harbor Square and parking in the case of TJ Bayshore Building--could have wider effects on the balance of the parcel.

Scheme 3 - Total estimated value is $8.9 to $16.6 million. The disparity in these estimates is due largely to treatment of the value of improvements. If the existing improvements are considered to have contributory value, the overall acquisition cost would be higher. The full value of the hillside portion would be recoverable through reuse as a multifamily housing development.

The comparison can be further summarized as follows:

	Total Estimated Value	Value Net of Reuse
Scheme 1	$1.1 - $ 1.5 million	$1.1 - $1.3 million
Scheme 2a	4.2 - 5.2 "	3.6 - 4.4 "
Scheme 2b	2.5 - 3.3 "	2.5 - 3.3 "
Scheme 3	8.9 - 16.6 "	3.2 - 8.6 "

Appendix E

EDMONDS FERRY TERMINAL DESIGN POLICIES AND CRITERIA

BUSINESS/COMMERCE

TOPIC: COMMERCIAL POTENTIAL	EXISTING	ALTERNATE 1 ANDERSON AT-GRADE	ALTERNATE 2 MIDTOWN BELOW-GRADE	ALTERNATE 3 EDWARDS PT. ABOVE-GRADE
CRITERIA				
1 Provisions for opportunity to expand the waterfront commercial district	—	— —	+	+ +
2 Impacts on existing businesses	—	— —	○	+ +
3 Provisions for opportunity to expand the Edmonds Central Business District (CBD)	—	—	+	+ +
4 Integration of downtown and waterfront	—	—	+	+ +
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

EDMONDS FERRY TERMINAL DESIGN POLICIES AND CRITERIA

COMMUNITY

	TOPIC: COMMUNITY BENEFITS AND IMPACTS FOR EDMONDS AND WOODWAY	EXISTING	ALTERNATE 1 ANDERSON AT-GRADE	ALTERNATE 2 MIDTOWN BELOW-GRADE	ALTERNATE 3 EDWARDS PT. ABOVE-GRADE
	CRITERIA				
1	Impact on view corridors at street level	—	O	O	+ +
2	Impact on view corridors at beach level	—	—	—	+
3	Impact on view of ferry boat	O	O	O	— —
4	Provision for public waterfront access	O	O	+	+ +
5	Provision for expansion of waterfront recreation areas	—	O	+	+ +
6	Impacts on community services (i.e., senior center)	O	O	— —	O
7	Provisions for direct auto routes to community businesses/facilities	—	—	+ +	+ +
8	Provisions for direct pedestrian routes to community businesses/facilities	—	—	+ +	+ +
9	Impacts of traffic in residential areas	—	—	+	+ +
10	Parking impacts in residential and commercial areas	—	—	+	+
11					
12					
13					
14					
15					

EDMONDS FERRY TERMINAL DESIGN POLICIES AND CRITERIA

ECONOMY

	TOPIC: ECONOMICS OF THE FACILITY	EXISTING	ALTERNATE 1 ANDERSON AT-GRADE	ALTERNATE 2 MIDTOWN BELOW-GRADE	ALTERNATE 3 EDWARDS PT ABOVE-GRADE
	CRITERIA				
1	Monetary cost of site cleanup	O			
2	Monetary cost of the dock facility (excluding overhead loading)				
3	Monetary cost of navigational protection (breakwater)				
4	Monetary cost of overhead passenger loading including provision for weather protection for pedestrian walkways				
5	Monetary cost of the access\egress roadway				
6	Monetary cost of property acquisition, including leased and feasible "surplused" properties				
7	Monetary cost of relocating disrupted facilities, including community services, businesses, parking lots, roadways, utilities				
8	Monetary cost of permitting, (i.e., SEPA , wetland mitigation)				
9	Monetary cost of mitigating marine environment (eel grass) impacts				
10	Ability to promote joint development among various agencies for shared costs (City, County, State, Port, Businesses, etc.)	O	O	+ +	+
11	Provision for non-ferry-related facilities that provide operating revenues	O	O	+ +	+ +
12	Ability to be phased into a set of discrete projects for long term budgeting	O	+	O	−
13	Relative values of operating costs				
14	Relative values of maintenance costs				
15					

EDMONDS FERRY TERMINAL DESIGN POLICIES AND CRITERIA

ENVIRONMENT

	TOPIC: ENVIRONMENTAL IMPACTS CRITERIA	EXISTING	ALTERNATE 1 ANDERSON AT-GRADE	ALTERNATE 2 MIDTOWN BELOW-GRADE	ALTERNATE 3 EDWARDS PT. ABOVE-GRADE
1	Impacts on wetlands	○	○	—	—
2	Impacts on marine habitat/eel grass ecosystem disruption	○	— —	—	—
3	Noise impacts	—	—	—	—
4	Impacts of lighting	—	—	— —	○
5	Impacts of auto emissions due to disruption of auto traffic	— —	—	○	○
6	Opportunity to enhance existing ecosystems (underwater sanctuary, salmon spawning stream, wetland)	○	+	+	+ +
7	Impacts on parks/opportunity to augment existing parks	○	○	+	+ +
8	Environmental issues of UNOCAL site acquisition	○	○	○	— —
9	Impacts on commercial fishing grounds	○	○	○	○
10	Impacts on Indian fishing grounds	○	○	○	—
11					
12					
13					
14					
15					

EDMONDS FERRY TERMINAL DESIGN POLICIES AND CRITERIA

CONSTRUCTION ISSUES

	TOPIC: IMPACTS OF CONSTRUCTION CRITERIA	EXISTING	ALTERNATE 1 ANDERSON AT-GRADE	ALTERNATE 2 MIDTOWN BELOW-GRADE	ALTERNATE 3 EDWARDS PT. ABOVE-GRADE
1	Impacts on business operations during construction	—	—	— —	+ +
2	Impacts on ferry service during construction	— —	—	O	O
3					
4					
5					
6					
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EDMONDS FERRY TERMINAL DESIGN POLICIES AND CRITERIA

FERRY OPERATIONS

	TOPIC: OPERATION COSTS & LEVEL OF SERVICE CRITERIA	EXISTING	ALTERNATE 1 ANDERSON AT-GRADE	ALTERNATE 2 MIDTOWN BELOW-GRADE	ALTERNATE 3 EDWARDS PT ABOVE-GRADE
1	Provision for efficient loading and unloading (throughput of traffic)	— —	—	+ +	+ +
2	Impacts to service due to "storm" conditions	○	○	○	—
3	Provisions for a secured paid area	—	+	+	+ +
4	Required staffing - onsite (ticketing, holding area traffic control)	— —	—	+	+
5	Required staffing - offsite (traffic control)	— —	—	+ +	+ +
6	Time requirement before implementing new facility	+ +	+	—	— —
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8					
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10					
11					
12					
13					
14					
15					

EDMONDS FERRY TERMINAL DESIGN POLICIES AND CRITERIA

TRANSPORTATION

TOPIC: IMPACTS ON EFFECTIVE/SAFE TRANSPORTATION PATTERNS/MODES	EXISTING	ALTERNATE 1 ANDERSON AT-GRADE	ALTERNATE 2 MIDTOWN BELOW-GRADE	ALTERNATE 3 EDWARDS PT. ABOVE-GRADE
CRITERIA				
1 Provisions for future types of ferries and ferry service incl. Passenger Only Service	— —	+	+ +	+ +
2 Impacts on transit operations	—	—	+ +	+
3 Provision for high occupancy vehicle opportunities	—	○	+ +	+ +
4 Provision for bus unloading/layover/loading	—	○	+ +	+
5 Provision for joint use areas (park-n-ride/overload, etc.)	—	○	+	+ +
6 Provision for additional parking & park-n-ride facilities	— —	—	+	+ +
7 Direct auto/passenger drop off and pick up location & routes	○	○	+ +	+
8 Provision for separation of pedestrian, transit, vehicle modes	○	—	+ +	+
9 Impacts on at-grade crossing conflicts with BNRR	—	○	+ +	+ +
10 Opportunity to reduce traffic and minimize backups on SR 524, SR104, and city roads	— —	○	+	+ +
11 Impacts on circulation efficiency for all modes	—	○	+	+
12 Impact on emergency access to the waterfront/ferry/port	—	○	+	+ +
13 Opportunity to reduce conflicts between local & ferry traffic	— —	—	+	+ +
14 Coordination with future mass transit modes	—	○	+ +	+

EDMONDS FERRY TERMINAL DESIGN POLICIES AND CRITERIA

USERS

	TOPIC: USER BENEFITS & COSTS CRITERIA	EXISTING	ALTERNATE 1 ANDERSON AT-GRADE	ALTERNATE 2 MIDTOWN BELOW-GRADE	ALTERNATE 3 EDWARDS PT. ABOVE-GRADE
1	Opportunity to reduce waiting/loading time	O	+	+ +	+ +
2	Walking distance and grade	O	−	−	− −
3	Directness of passenger and vehicle routes	O	−	+ +	+ +
4	Availabilty of wide range of transportation modes including pedestrian/rail/bike	O	+	+ +	+
5	Handicap Access/ Ease of use	O	O	O	−
6	Impacts of grade changes	O	O	−	− −
7	Opportunities for interaction between ferry users & local service businesses	O	+	+	− −
8	Opportunities for provision of services for ferry riders	O	O	+	O
9					
10					
11					
12					
13					
14					