

**PRELIMINARY REPORT OF GEOLOGICAL VISUAL SITE  
RECONNAISSANCE  
THORNDYKE RESOURCE OPERATIONS COMPLEX,  
TWIN CONVEYORS  
JEFFERSON COUNTY, WASHINGTON  
A PORTION OF SECTIONS 6, 7, 8, 17, 18 AND 19,  
T 27 N, R 1 E, W.M.**

**PROJECT NO. 102-01024  
FEBRUARY 11, 2003**

**Prepared for:**

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LOG ITEM

# 19

Page 39 of 114

**TABLE OF CONTENTS**  
KA Project No. 102-01024

1.0 INTRODUCTION..... 1

    1.1 Site Location..... 1

    1.2 Project Description ..... 2

2.0 RECONNAISSANCE SUMMARY ..... 2

    2.1 Section A ..... 2

    2.2 Section B..... 3

    2.3 Section C..... 3

    2.4 Section D ..... 3

    2.5 Section E..... 3

3.0 VISUAL GEOTECHNICAL EVALUATION..... 3

4.0 CONCLUSIONS AND RECOMMENDATIONS..... 6

5.0 REPORT LIMITATIONS..... 7

REFERENCES..... 8

FIGURE 1 – SITE VICINITY MAP

FIGURE 2 – SITE PLAN, Sections A through E

FIGURE 3 – SLOPE MAP

FIGURE 4 – GEOLOGIC MAP

APPENDIX A – PROJECT DESCRIPTION AND FACT SHEET

LOG ITEM  
# 19  
Page 40 of 114

*Note: This report is subject to modification as a result of the completion of the SEPA analysis (Environmental Impact Statement) being undertaken as part of the governmental permitting process.*

February 11, 2003

KA Project No.102-01024

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**Preliminary Report of Geological Visual Site Reconnaissance  
Thorndyke Resource Operations Complex, Twin Conveyors  
Jefferson County, Washington  
[A Portion of Sections 6, 7, 8, 17, 18 and 19, T 27 N, R 1 E, W.M.]**

**1.0 INTRODUCTION**

The following report has been prepared at your request and summarizes our reconnaissance visits to the site made September through December 2001. The objective of these site reconnaissance visits was, in a preliminary fashion, to visually identify areas where the conveyor belt would encroach on potentially sensitive slopes or areas of other possible geologic hazard. Plans generated by Team 4 Engineering, LLC. dated January 2, 2002 were reviewed as part of our scope of work. Our work was performed in general conformance with our proposal P01-116P dated March 21, 2001 and signed by yourself on March 25, 2001.

**1.1 Site Location**

The project area is located in the eastern portion of Jefferson County, Washington as shown on Figure 1. The project area is part of the Thorndyke Block, an area covering approximately 21,000 acres along Highway 104. The proposed Twin Conveyors will traverse through portions of Sections 6, 7, 18, and 19, of T 27 N, R 1 E, W.M. on property owned by Pope Resources Company, a Delaware Limited Liability Partnership. Adjacent sections 8 and 17 include landforms that were evaluated because of their proximity to the Twin Conveyor corridor. Access to the project area is provided by forestry service roads currently maintained by Olympic Resource Management. The Twin Conveyors will have a length of

LOG ITEM

#19

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Page 91 of 114

approximately 3.3 miles, terminate into a Single Conveyor, and continue on to a Pier on the Hood Canal shoreline. The single conveyor portion of the project is not analyzed in this report.

## 1.2 Project Description

A detailed T-ROC Central Conveyor and Pier project description and fact sheet are provided in Appendix A at the end of this document.

Each of the proposed Twin Conveyors will measure approximately five feet in width, including the metal framing support. It is our understanding that the foundation design for the conveyor framing is being provided by others. In addition to the Twin Conveyors, the project will require room for utilities and a 14-foot wide all weather forestry service road, which will parallel the conveyors. In areas where the Twin Conveyors will impact existing forestry service roads, the proposed road paralleling the conveyors will replace existing forestry service roads. Replaced forestry service roads will be regraded and replanted.

The Twin Conveyors will originate at the existing Shine Pit and extend south along the route of a ridgeline. Along the Twin Conveyors portion of the project it is anticipated that only minor grading will be required, primarily related to access development and minor ground smoothing.

Based on the plans provided by Team 4 Engineering LLC., dated February 10, 2003, it appears that in most areas where the Twin Conveyors parallel a steep slope, they will generally be set back 50 or more feet back from the top of the slope. As the Twin Conveyors are currently aligned, there are isolated areas where they are within 50 feet of steep slopes. It is also understood that in areas where the route traverses a slope, specific grading considerations may be required, i.e. cut and fill slope recommendations and filling requirements.

## 2.0 RECONNAISSANCE SUMMARY

For the purpose of the study, the Twin Conveyors have been divided into five sections (A-E) as described below. They are generally shown on Figure 2 of this report.

### 2.1 Section A

Beginning at the Shine Pit, Section A is approximately 1800 feet in length and aligned in a roughly east-west direction. This section of the Twin Conveyors goes up the face of a relatively steep 2H:1V (Horizontal:Vertical) slope approximately 100 feet in height. The slope has been recently logged and is presently vegetated with forest brush and shrubs. At the time of our site visits there were no visible signs of erosion or slide activity in this section.

## 2.2 Section B

From the west end of Section A, Section B extends approximately 4,700 feet to the south parallel to the existing forestry service road T-1900, paralleling a descending slope to the east of the Twin Conveyors. This descending slope has grades on the order of 1.75H:1V or steeper for most of its length and is approximately 90 feet in height. The majority of Section B has been logged and is relatively clear with revegetation beginning. At the time of our site visits there was no visible evidence of erosion or slope instability in this section.

## 2.3 Section C

Section C, approximately 4,700 feet in length, begins near Pheasant Lake with roughly the first half of the section traversing through a mature forested area on a slightly ascending slope. Following the intersection of the Twin Conveyors with forestry service road T-1950, the second or south half of Section C ascends a ridge and then runs across the descending general 2H:1V slope below Shine Lookout. The south portion of this section has been recently logged and is relatively clear of vegetation. At the time of our site visits no visible evidence of erosion or slide activity was noted in this section.

## 2.4 Section D

Section D, approximately 4,700 feet in length, begins on the south portion of the slope area below Shine Lookout. Section D descends a slope of moderate grade mixed with areas that are gently sloping and vegetated with young trees and forest growth. The southern portion of Section D traverses through a valley onto an ascending slope. At the time of our site visits no visible evidence of erosion or large-scale soil movement was observed in this section.

## 2.5 Section E

Section E, approximately 1,575 feet in length, the southern-most section is a plateau area, which begins near the top of a north-south trending valley. The section continues to the south to the edge of the plateau. A steeply descending slope lies beyond. Vegetation in Section E is primarily comprised of relatively young alders and associated understory growth with scattered mature cedars.

## 3.0 VISUAL GEOTECHNICAL EVALUATION

As a basis for the following conclusions and recommendations, we have reviewed geologic, slope stability, and Soil Conservation Service (SCS) (United States Department of Agriculture/Soil Conservation Service, 1975) maps of the area, made several reconnaissance visits to the site, and reviewed the Jefferson County Unified Development Code (Ordinance No. 03-0702-01). The Jefferson

County Unified Development Code, dated January 16, 2001 and amended July 2, 2001 mandates a standard slope set-back of 30 feet or a setback based on acceptance of a geotechnical report meeting Jefferson County criteria. For the purposes of this project a preliminary slope setback recommendation of 50 feet is proposed.

Distances, slope angles, and elevations referenced in this report are based on measurements made using small, hand-held instruments, and various maps. Measurements referenced in this report should be considered approximate.

As previously noted, portions of the proposed Twin Conveyors have been logged and are in varying states of regrowth. However, some form of ground cover (rooted vegetation and/or logging slash) is present on all portions of the route. No areas of significant surface erosion were observed at the time of the site visits.

As shown by the topography indicated on the Vicinity Map (Figure 1) and the various site drawings, the Twin Conveyors route topography ranges from nearly level, to rolling areas, to areas of steep slope. Areas of steepest slope are located at the north and south ends of the conveyors. Field measurements of these slopes generally indicate slope grades on the order of 2H:1V. Within Section B, where the route parallels the steep slopes, the slope grades are generally on the order of 1.75H:1V and steeper.

The *Coastal Zone Atlas of Washington*, Jefferson County volume, does not cover the project area (Washington State Department of Ecology, 2002). However, the map *Relative Slope Stability in East-Central Jefferson County* (Washington State Department of Natural Resources, Division of Geology and Earth Resources, 1976) covers the route and indicates that the Twin Conveyors traverse three different areas of slope consideration: slopes considered to be stable, slopes considered unstable, and slopes considered normally stable but may become unstable if modified. A copy of a portion of this map is presented as Figure 3 of this report. Section A, B, and the north portion of Section C parallels slopes mapped as unstable, however, there were no visible indications of erosion or landslide concerns at the time of the site visit. The south portion of Section C parallels slopes that are normally considered stable. Section D crosses slopes normally considered stable, and grades southward into areas of slope considered stable. Section E is generally in an area of stable slopes.

During our reconnaissance visits to the site, no visual indications of large-scale or deep-seated, rotational-type landsliding were observed on the slopes mapped as unstable or on the slopes mapped as being

considered normally stable. It should be noted that vegetation limited our site reconnaissance in some areas of the Twin Conveyors.

Geologic maps of the area generally indicate that Vashon Glacial Till underlies major portions of the Twin Conveyors with underlying Advance Outwash being exposed in the steeper slope areas. The till is a glacially over-riden, unsorted mixture of silt, sand and gravel in a dense to very dense condition where unweathered or undisturbed (See Figure 4). The geologic map of eastern Jefferson County (Washington State Department of Ecology, 1980) indicates that at some locations the till is covered by a few feet of Recessional Outwash, glacial drift, or recent sediments. The Advance Outwash exposed on the steeper slopes is typically a mixture of sands and gravels having varying silt content. In general, the Advance Outwash grades coarser upwards.

Soil Conservation Service (SCS) maps (United States Department of Agriculture/Soil Conservation Service, 1975) indicate that soils within the proposed Twin Conveyors are characterized as having been developed on glacial terrace structures having slopes ranging from 0 to 30 percent. Soil series occurring along the Twin Conveyors are listed below:

- AIC Alderwood gravelly sandy loam, 0 to 15 percent slopes (Glacial till parent material)
- DaC Dabob very gravelly sandy loam, 0 to 15 percent slopes (Glacial till parent material)
- DaD Dabob very gravelly sandy loam, 15 to 30 percent slopes (Glacial till parent material)
- EvC Everett gravelly sandy loam, 0 to 15 percent slopes (Glacial outwash parent material)
- EvD Everett gravelly sandy loam, 15 to 30 percent slopes (Glacial outwash parent material)
- HuC Hoypus gravelly loamy sand, 0 to 15 percent slopes (Glacial outwash parent material)
- SnC Sinclair gravelly sandy loam, 0 to 15 percent slopes (Glacial outwash parent material)
- SnD Sinclair gravelly sandy loam, 15 to 30 percent slopes (Glacial outwash parent material)

During our reconnaissance of the project area no surface water flows, springs, or seeps were observed on the slope areas. It should be noted that most of our reconnaissance was performed during what is considered the dry season of the year. In areas of flatter or depressed ground surface conditions where standing water was observed (i.e., lakes, ponds, and associated wetland areas), it appears that the till acts as an aquatard. Due to the potential for sandier zones to be included within the glacial till, it is possible that during periods of prolonged or heavy rainfall during the wet season, zones of perched water may develop, particularly in the slope areas.

LOG ITEM  
# 19  
Page 45 of 114

#### 4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our understanding of the conceptual development plan for the conveyor, site observations and review of pertinent geologic reference materials, it is our opinion that the site conditions are generally suitable for the type of development planned. We believe that the primary considerations controlling the development will be related to route length, slope grades, and potential slope stability concerns, both on the small and large scale, i.e. location specific and project specific. It is not anticipated that foundation support considerations will hamper development of the conveyor.

In some areas the existing forestry service roads are adjacent to or within 50 feet of steep slopes. At the time of our site visits to these locations, there was no significant impact to the slopes resulting from the proximity of the forestry service roads to the slopes.

The following recommendations outline in general terms additional studies we feel are warranted at the site and preliminary scopes of work. At your request we would be pleased to provide formal proposals with additional detail and estimated cost for these additional studies.

- Prior to grading activities for Section A, it is recommended that several exploratory test pits be excavated along the Twin Conveyors route. These explorations would provide a basis for geotechnical recommendations directed at minimizing any potential impact to the slope. This exploration would be accomplished primarily for project design purposes and not for permitting.
- In the alignment of Section B in the area of Station 67+00, the Twin Conveyors encroach into this report's 50-foot setback approximately 10 feet, but are still consistent with Jefferson County's 30 foot setback. The 50 foot setback presently recommended in this report is preliminary. With additional site/slope study, it may be possible to reduce the 50 foot preliminary setback to or nearer to the 30 foot Jefferson County required minimum setback. This area is approximately 100 feet in length and does not appear to pose a significant impact to the slope.
- In portions of Section C and Section D, which run parallel to slopes descending from Shine Lookout, it is recommended that exploratory test pits be placed prior to grading activities. The purpose of the test pits would be to provide recommendations for cut/fill grading, surface drainage runoff and steepness of graded slopes (both temporary and permanent) to minimize any possible impacts to the slope. This exploration would be accomplished primarily for internal design purposes and not for initial permitting.

LOG ITEM  
# 19  
Page 46 of 114



**5.0 REPORT LIMITATIONS**


This visual reconnaissance report has been prepared as part of the permitting application process and as an aid to Team 4 Engineering LLC., for preliminary consideration in the design and planning of the referenced development. The conclusions and recommendations in this report and recommendations for additional studies are based on our interpretation of site conditions, as they presently exist, and anticipated future construction activities. The soil conditions described in this report are based only on limited visual observations and map review and should be considered preliminary and subject to modification with additional study.

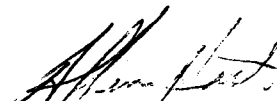
NOTE: Although we have viewed surface soil exposures as part of this study, we have not conducted laboratory testing of the site soils or evaluated the site for the potential presence of contaminated soil, and have not evaluated or addressed ground water conditions or concerns except as noted in this report. The evaluation of possible environmental or geo-environmental considerations is beyond the scope of this report.

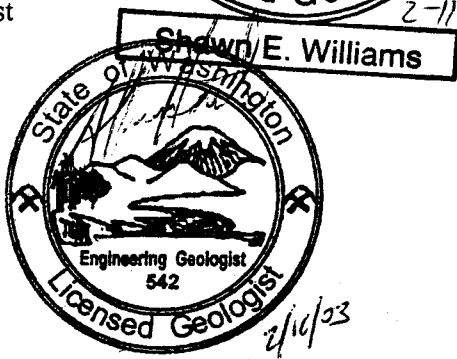
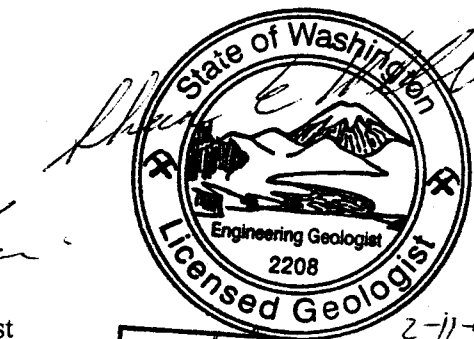
Within the limitations of scope, schedule, and budget for this work, it is warranted that the work has been done in accordance with generally accepted practices followed in this area at the time this report was made. No other warranty, expressed or implied is made.

Should you have any questions or desire preparation of cost estimates for additional studies, please call our office at (360) 598-2126.

Sincerely,  
Krazan & Associates, Inc.

  
Shawn E. Williams, RG, REA  
Senior Environmental Geologist

  
Allen L. Hart, RG/CEG, CPG  
Senior Engineering Geologist



**ALLEN L. HART**

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LOG ITEM  
#19  
Page 47 of 119

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**REFERENCES**

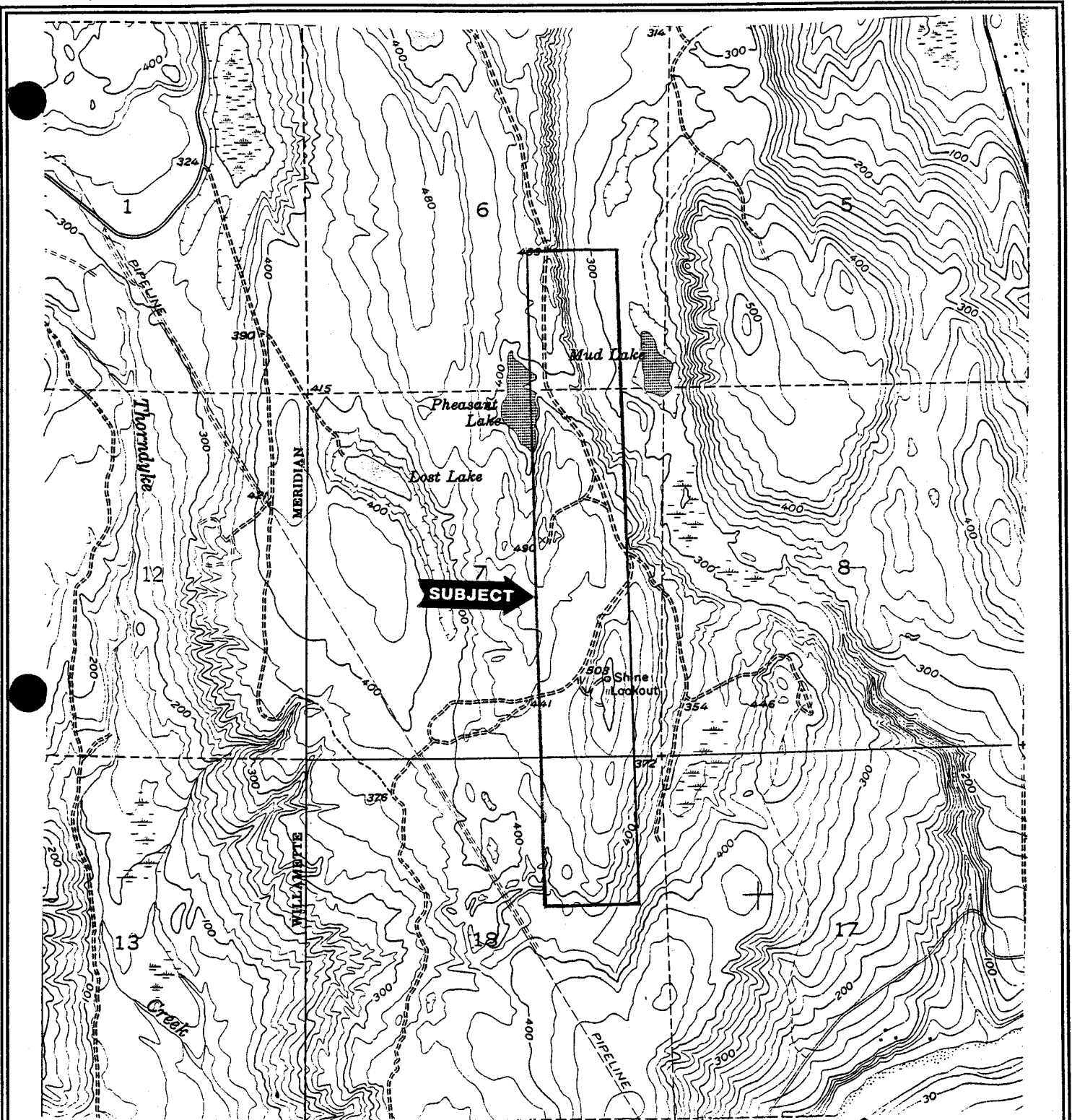
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LOG ITEM  
# 19  
Page 48 of 114



Note: Map adapted from Lofall, WA. USGS Quadrangle.

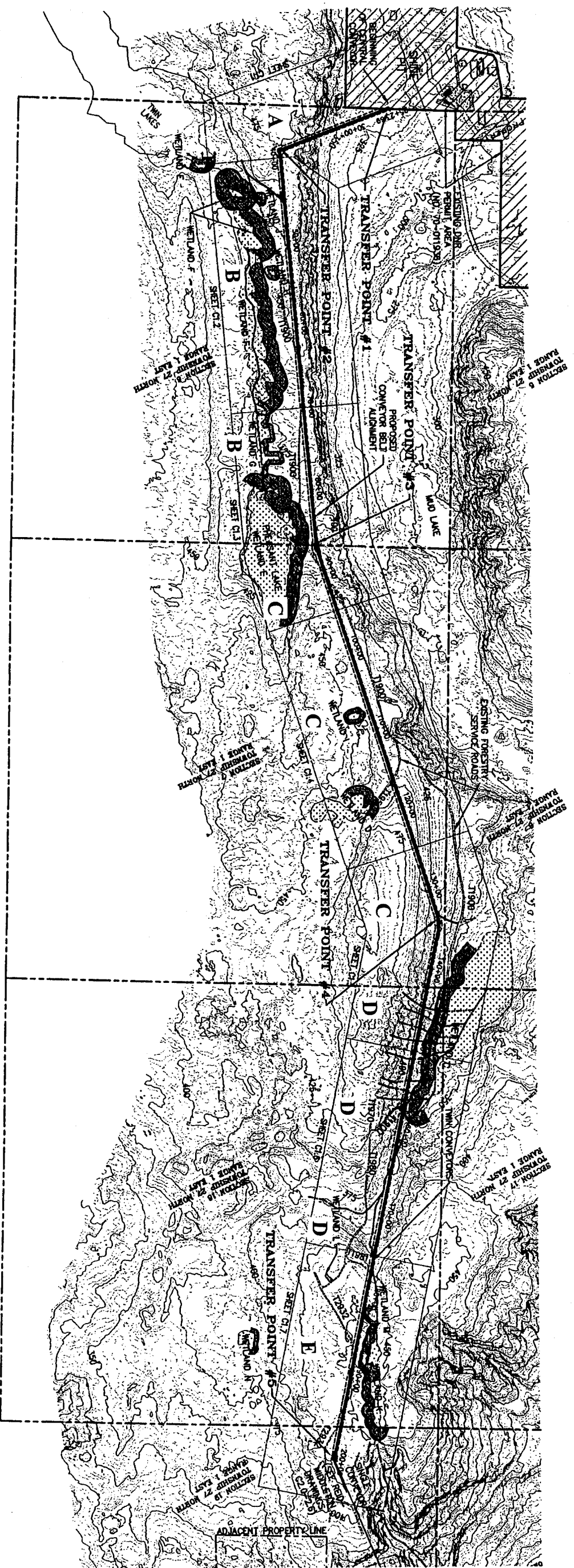


**FIGURE 1 – SITE VICINITY MAP**

**KRAZAN & ASSOCIATES, INC.**  
 20714 State Route 305-Suite 3C  
 Poulsbo, WA 98370  
 360-598-2126

Location: Jefferson County, Washington  
 Job No. : 102-01024  
 Client: Team-4 Engineering  
 Date: 2-11-03

LOG ITEM



LOG ITEM  
# 19  
Page 50 of 114

# Site Plan

North Conveyor Alignment Sections A through E

Figure 2

No Scale

Drawn By: SEW  
Revised By: SEW

Job Number: 102-01024

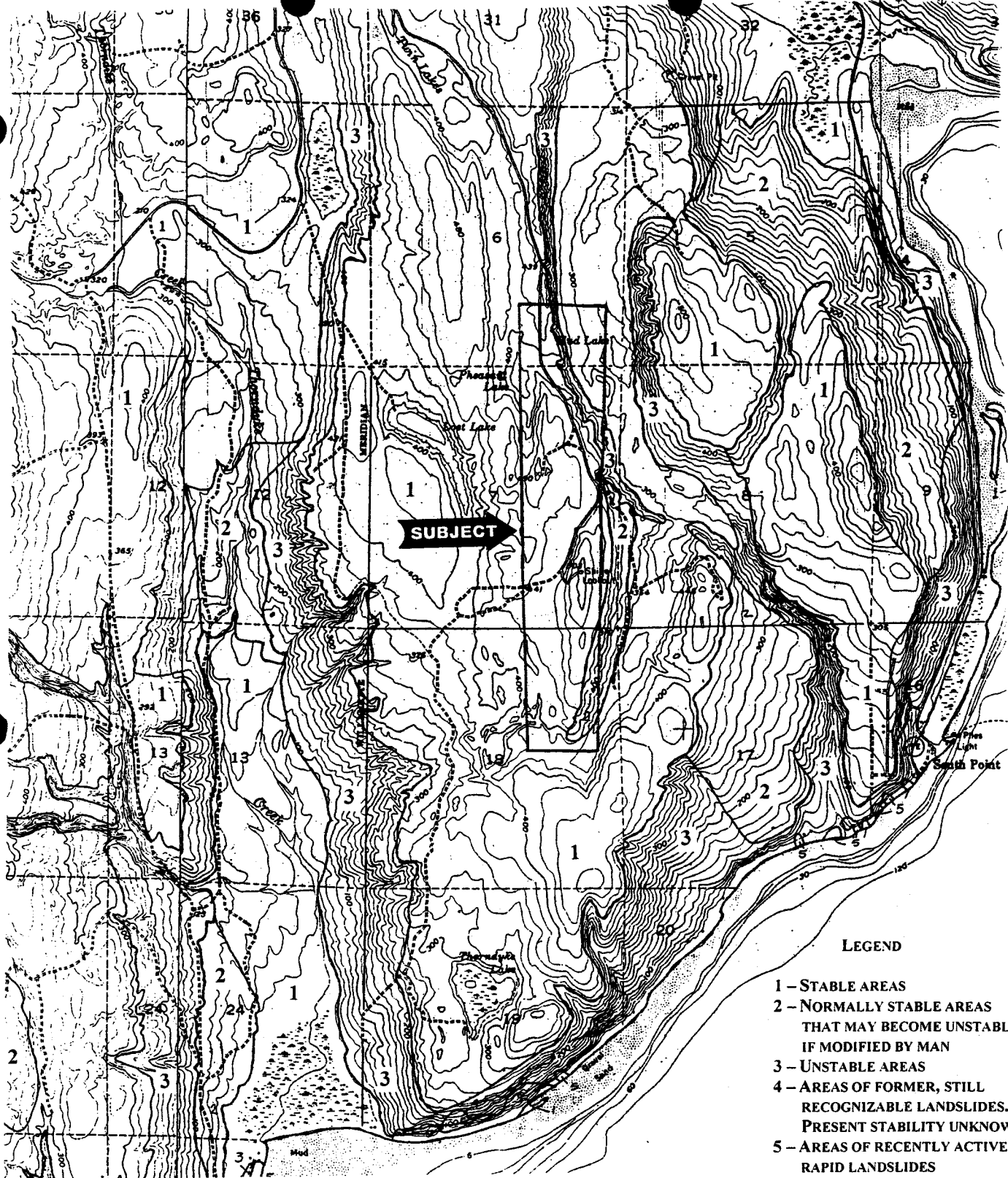
Date: February 11, 2003

Drawing Number: 2  
Drawing Type: Site Map

Note: Site Plan Developed From Plan Provided By Team-4 Engineering Dated 2/10/03



**Krazan** & ASSOCIATES, INC.



Note: Map adapted from Relative Slope Stability in East-Central Jefferson County, Washington, dated 1976.

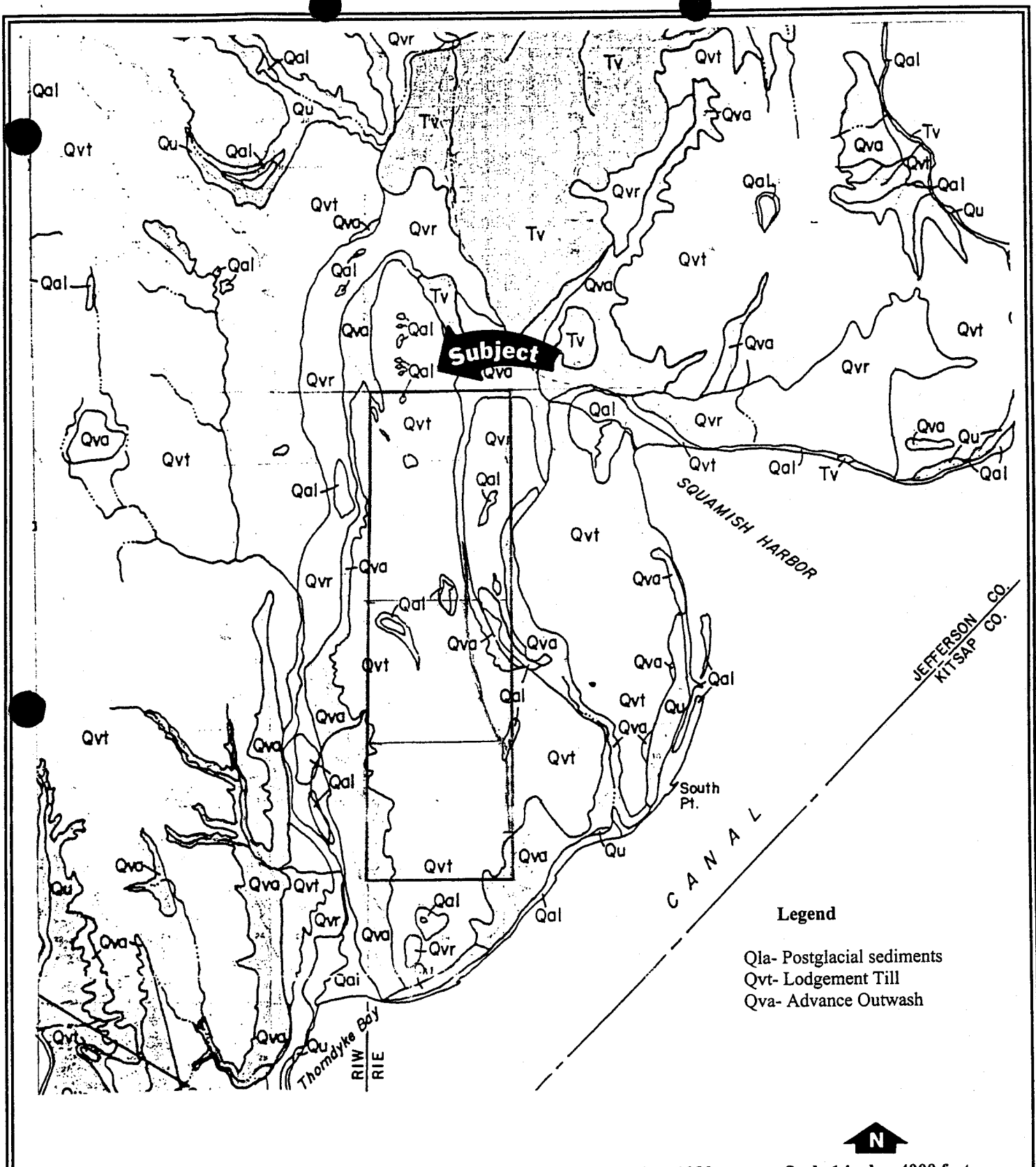
**KRAZAN & ASSOCIATES, INC.**  
 20714 State Highway 305 NE, Suite 3C  
 POULSBO, WA 98370  
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**FIGURE 3 - SLOPE MAP**

Location: Jefferson County, Washington  
 Job No. : 102-01024  
 Client: Team-4 Engineering  
 Date: 2-11-03



# 19  
 Page 51 of 114



Note: Map adapted from Geologic Map of Eastern Jefferson County, dated November, 1980.

Scale 1 inch = 4000 feet

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**FIGURE 4 - GEOLOGIC MAP**

Location: Jefferson County, Washington  
 Job No. : 102-01024  
 Client: Team-4 Engineering  
 Date: 2-11-03

LOG ITEM  
 # 19

*Appendix A*

LOG ITEM

# 19

Page 53 of 114

# CENTRAL CONVEYOR AND PIER PROJECT DESCRIPTION

## Purpose

This application is for a permit to build a Central Conveyor and Pier to move sand and gravel from the T-ROC Operations Hub to Hood Canal for marine transport by barges and ships.

## Introduction

Fred Hill Materials, Inc. (FHM) conducts its primary sand and gravel mining and processing operations in Jefferson County at the existing Shine Pit, which is the Operations Hub for the Thorndyke Resource Operations Complex (T-ROC). T-ROC encompasses both existing and proposed expanded operations in and around the Shine Pit.

FHM has undertaken a planning and development process to identify and then pursue its business objectives into the mid-21<sup>st</sup> century. As a result of this planning process, including analysis of the geologic resources and critical environmental areas within the Thorndyke Management Area (Thorndyke Block), FHM has established a series of proposals, which, if approved, would result in:

- Continued growth of existing activities (Shine Pit), including opening of new extraction areas approximately one mile west and south of the Shine Pit (Wahl and Meridian)
- Development of a marine transportation system for the delivery of sand and gravel (Central Conveyor and Pier)

## General Location

T-ROC is located within the approximately 21,000-acre Thorndyke Block, which is a portion of the Pope Resources 72,000-acre Hood Canal Tree Farm. The Thorndyke Block is located in Jefferson County on the Toandos Peninsula, which is south and west of the Hood Canal Bridge. The area is locally known as the Upper Coyle Peninsula.

## General Description of Central Conveyor and Pier

The proposed four-mile Central Conveyor originates at the southwest corner of the Shine Pit, travels south through the Thorndyke Block (within an approximately 34-acre easement), bridges



over Thorndyke Road (just south of mile post 3), crosses a 14.7-acre parcel of waterfront property (owned by Hood Canal Sand and Gravel, LLC) and terminates at the end of the proposed 1,000-foot Pier on Hood Canal.

The Pier will originate at Hood Canal Sand and Gravel's waterfront property approximately five miles southwest of the Hood Canal Bridge, one mile northeast of Thorndyke Bay, and 1.25 miles southwest of South Point.

The Central Conveyor's route was specifically selected to avoid and/or minimize impacts to environmentally sensitive areas (steep slopes, wetlands, streams, and their associated buffers). An Environmental Impact Statement (EIS) will be prepared that will examine any identifiable probable significant adverse environmental impacts of the proposal and, if required, will propose and evaluate possible mitigating measures that could become conditions of approval if accepted by Jefferson County.

The Pier is designed for ships and barges of various sizes and displacements to transport sand and gravel. Only ships will require opening of the Hood Canal Bridge. Only U.S. flagged ships will call at the Pier. At this time, the particular ships required for transport of sand and gravel at the proposed Pier are not available on the West Coast. It is anticipated that these ships will become available in approximately eight to 12 years after the Pier's construction and will be used subject to market demand.

### Proposed Pier Operations

Initially, only barges will call at the Pier. Typical barge capacity is 5,000 dead-weight U.S. short tons (dwt).

In Year 1 of Pier operations, it is anticipated that the volume of sand and gravel transported by barge will be 2 million U.S. short tons (tons).

By Year 10, the volume of sand and gravel transported by barge is expected to reach 4 million tons annually.

In the first year that U.S. flagged ships become available (Year 8 to 12 of Pier operations), it is anticipated that 600,000 tons of sand and gravel will be transported by ship.

By Year 25, the volume of sand and gravel transported by ship is expected to reach 2.75 million tons annually.

By Year 25, it is anticipated that the combined volume of sand and gravel transported by ship and barge will reach 6.75 million tons annually (i.e. 4 million tons via barge and 2.75 million tons via ship), subject to market demand.

(For further details, see *Central Conveyor and Pier Facts Sheet*.)

## History

The Thorndyke Block was logged in the early 1900s, with most of the logging having taken place in the 1930s. After a significant forest fire in 1939, much of the forest re-seeded naturally.

Currently, the area is managed as commercial forestland with periodic logging of small acreage units and predominant replanting of Douglas fir. Much of the commercial forestland crossed by the proposed Central Conveyor was logged within the past 10 years. Old tree stumps, small Douglas firs, forest brush, and shrubs dominate the landscape. In areas that were recently logged, second growth Douglas fir and stands of alder dominate.

Mining of sand and gravel in the general area of the Shine Pit began in 1959 to supply materials for the building of the Hood Canal Bridge revetment on the Jefferson County side. Since that time, various operators have mined sand and gravel in the same vicinity and provided truck delivery of materials.

In December 1979, FHM took over operation of the Shine Pit and obtained a Surface Mine Reclamation Permit (No. 70-011936) issued by the Washington State Department of Natural Resources (WSDNR). Since then, FHM has continuously operated the pit.

In addition to the WSDNR surface mining reclamation permit, FHM operates under a Washington State Department of Ecology (WSDOE) Sand and Gravel General Permit (No. WAG 50-1120), which regulates the treatment and control of stormwater. All stormwater that falls on the existing 144-acre Shine Pit is prevented from leaving the site through application of infiltration techniques.

In June 1999, Ace Paving obtained a Jefferson County Conditional Use Permit (No. ZON98-0041) to operate a portable asphalt batch plant located on five acres within the 144-acre Operations Hub/Shine Pit. Ace Paving operates under its own Washington State Department of Ecology (WSDOE) Sand and Gravel General Permit (No. WAG 50-1237). The stormwater that runs off the asphalt batch plant site goes directly into FHM's central stormwater treatment and control system.

In March 2001, to prepare for the impending depletion of sand and gravel supplies at the existing Shine Pit, FHM submitted to WSDNR a preliminary application for the 156-acre Wahl Extraction Area as an expansion of the existing Shine Pit

In April 2002, FHM submitted a Mineral Resource Lands Overlay (MRL) application to Jefferson County. The submission complied with the new requirements (effective January 2001) of the Jefferson County Unified Development Code (UDC).

In September 2002, WSDNR determined that the March 2001 FHM application for the Wahl Extraction Area would need to be resubmitted as a new permit, independent of the existing permit. In addition, Jefferson County UDC requirements will be applicable.

In December 2002, Jefferson County approved a modified application for MLA-02-235, a Mineral Resource Land Overlay (MRL) designation for 690 acres, located approximately a mile west and south of FHM's existing T-ROC Operations Hub. This MRL designation formally recognizes the existence of commercially viable deposits of sand and gravel; provides for appropriate notification of adjacent landowners regarding likely future mineral resource activities in this designated area; and allows FHM to apply for specific excavation permits greater than 10 acres in size under the requirements of the Jefferson County UDC. The MRL designation alone does not authorize specific mining activities within the MRL.

### Existing T-ROC Operations

T-ROC *currently* consists of five major activity components at the existing 144-acre Shine Pit:

1. Sand and gravel extraction area
2. Operations Hub, including
  - portable crushing, washing, and sorting equipment for sand and gravel
  - portable equipment for recycling of concrete waste
  - stockpile areas
  - trucks and loaders
  - scale house, maintenance building, caretaker home, well, and outbuildings
  - Rock-To-Go access road (forestry service road T-3100) to Hwy. 104
3. Portable conveyors used to move sand and gravel from the extraction area to the Hub
4. Asphalt batch plant (operated by Ace Paving)
5. Mined acreage in various stages of reclamation

In 2003, it is anticipated that the volume of sand and gravel transported by truck will be 500,000 tons, including sand and gravel used in asphalt mix. In approximately 10-15 years, the annual volumes of sand and gravel transported by truck are projected to reach 750,000 tons and remain constant due to the saturation of the local market.

Current and future volumes of sand and gravel transported by truck will be supported by the existing configuration of the T-ROC Operations Hub.

### Continued Growth of Existing Activities

Current truck-based operations are expected to deplete the sand and gravel extraction area at the existing Shine Pit by 2004, requiring the opening of a new extraction area.

The analysis of geological resources within the Thorndyke Block, combined with the public concern with the visual impacts of existing mining operations, led FHM to propose a new extraction area approximately a mile west and south of the existing Shine Pit. This new extraction area (Wahl) is outside the public's general view shed.

The proposed 156-acre Wahl Extraction Area is located west of Wahl Lake and is anticipated to have sufficient volumes of sand and gravel to supply truck-based operations for 20 years. After the Wahl Area is depleted, new permits would be sought to mine in the Meridian Extraction Area (a portion of MLA-02-0235).

Sand and gravel will be transported from the proposed Wahl and prospective Meridian Extraction Areas to the T-ROC Operations Hub via a 1.25-mile conveyor (located in an easement of approximately nine acres) referred to as the Wahl Conveyor. This conveyor will be built adjacent to an approved forestry service road. Much of the commercial forestland crossed by the proposed Wahl Conveyor has been logged within the past 10 years.

Since the extraction area located in the existing Shine Pit is nearing exhaustion, FHM reiterates that the proposed Wahl Extraction Area and Conveyor (a portion of MLA-02-235) are necessary to provide a continued supply for *existing* FHM truck-based operations.

Application for the Wahl Extraction Area and Wahl Conveyor has been initiated and will be considered in parallel to this application for the Central Conveyor and Pier.

In addition, FHM has initiated the process of gaining permission to accept concrete rubble from outside sources.

#### Development of Marine Transportation System

Should FHM receive necessary approvals for the proposed Central Conveyor and Pier, the extraction rates from the Wahl Extraction Area will accelerate due to the added marine delivery. This acceleration would advance the time frame for application for excavation permits in some or all of the remaining MRL area (Meridian Extraction Area).

The prospective 525-acre Meridian Extraction Area is located generally south of Wahl Lake, and contains the remainder of MLA-02-235. FHM expects that as excavation is completed in the Wahl Extraction Area, permits for expansion of mining into some or all of the Meridian Extraction Area will be submitted. The exact timing of a prospective application for the Meridian Extraction Area will be a function of numerous variables, including but not limited to future market demand and successful development of marine transport capabilities (i.e. the Central Conveyor and Pier).

Upon construction of the Central Conveyor and Pier, reconfiguration of the T-ROC Operations Hub will be needed to accommodate the processing of increased volumes of sand and gravel. The reconfigured Operations Hub will be located on a 100-acre area within the existing 144-acre Shine Pit.

## Summary

Under currently planned proposals, if approved, T-ROC would include:

- a 100-acre **Operations Hub** located within the existing Shine Pit, where up to 7.5 million tons of sand, gravel and recycled concrete will be processed annually and transported by trucks (750,000 tons), barges (4 million tons), and ships (2.75 million tons)
- a proposed 156-acre extraction area (**Wahl Extraction Area**), where sand and gravel would be mined to supply truck-based operations and initial years of marine operations
- a prospective 525-acre extraction area (**Meridian Extraction Area**), where up to 40 years of sand and gravel would be mined
- a proposed 1.25-mile conveyor (**Wahl Conveyor**) connecting the Wahl Extraction Area and subsequent Meridian Extraction Area to the Operations Hub
- a proposed 4-mile conveyor (**Central Conveyor**) connecting the Operations Hub to a 1,000-foot Pier located on Hood Canal, where ships and barges would be loaded up to 300 days a year, up to 24 hours a day

# CENTRAL CONVEYOR AND PIER FACTS SHEET

## 1.0 CENTRAL CONVEYOR

The proposed Central Conveyor will move sand and gravel from the T-ROC Operations Hub (at the existing Shine Pit) to a Pier on Hood Canal for marine transport by barges and ships. The Central Conveyor will be approximately four miles long and is made up of the Twin Conveyors and Single Conveyor. The Twin Conveyors are located at the northern portion of the Central Conveyor originating at Shine Pit. The Single Conveyor is located at the southern portion of the Central Conveyor, originating at the end of the Twin Conveyors and terminating at the end of the Pier.

Central Conveyor belts travel on self-lubricating rollers forming a U-shaped trough that carries sand and gravel. Failsafe sensors on each head pulley motor automatically shut down operation along the entire conveyor system in case of belt failure. Covers are installed over the Central Conveyor's belts to keep out rain and wind, preventing fugitive dust, sand, or gravel from escaping. Pans are installed under the Central Conveyor's return belt over all stream crossings. Conveyor enclosures are at the Thorndyke Road crossing and from the shoreline to the end of the Pier. Enclosures include a roof, painted metal siding and solid floor (or a grated walkway with a pan under the return belt).

Each of the six segments of the Central Conveyor terminates at a transfer point, where sand and gravel on the incoming conveyor segment will drop into a hopper and funnel onto the next conveyor segment. The Central Conveyor shifts direction slightly at Transfer Points 2, 3, 4, and 5. A utility shed at each transfer point will enclose the conveyor and hopper to protect electrical equipment, contain fugitive dust, and minimize noise. This shed will include a head pulley and electric motor, unpowered tail pulley, hopper, and the return belt cleaning equipment.

### **Twin Conveyors**

Location:	Station 25+23.69 to 200+00
Easement:	60 feet
Length:	3.3 miles long
Width (each conveyor)	5 feet wide
Gap between conveyors:	4 feet
Segments between transfer pts:	4 of varying lengths

### **Single Conveyor**

Location:	Station 200+00 to 237+90
Easement:	60 feet north of Thorndyke Road; 300 feet south of Thorndyke Road
Length:	0.7 miles long
Width:	6 feet
Segments between transfer points:	2 of varying lengths

### **Color**

Scheme:	Natural to blend into environment
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<b>Belts</b>	Power:	Electric motor at head pulley (tail pulley unpowered)
	Rollers:	Self-lubricating
	Material:	Composite
	Speed (approx):	6 miles per hour
<b>Assembly</b>	Frame:	Steel channel, open box
	Height (approx.):	5 feet
	Vertical support:	Pair of steel channel, open box legs at 20-foot intervals
	Color(s):	Natural to blend into existing environment
<b>Cover</b>	Material:	Light metal
	Shape:	Half-moon
	Height above belt:	2 feet 6 inches
	Height above ground:	7 to 8 feet
	Location:	Station 25+23.69 to 211+50 (to Thorndyke Road) Station 214+00 to 228+00 (beginning of Pier)
<b>Pan</b>	Location:	Station 144+00 to 165+00 (at stream crossings)
	Ground clearance:	Approximately 2 feet
	Location:	Station 226+00 to 228+00 (bluff to Pier)
	Ground clearance:	Approximately 5 to 60 feet
<b>Enclosures</b>	Location:	Thorndyke Road (Station 211+50 to 214+00)
	Components:	Metal roof/siding, solid floor
	Dimensions:	12 feet high by 13 feet wide
	Location:	Shoreline (Station 228+00 to 234+35)
	Components:	Metal roof/siding, pan under return belt, grated walkway
	Dimensions:	10-12 feet high by 13 feet wide
	Location:	Pier Loadout (Station 234+35 to 237+90)
	Components:	Metal roof/siding, solid floor
	Dimensions:	15 feet high by 15-18 feet wide
<b>Transfer Point</b>	Transfer Point 1:	Station 25+23.69
	Transfer Point 2:	Station 39+27.09
	Transfer Point 3:	Station 87+16.4
	Transfer Point 4:	Station 134+44.87
	Transfer Point 5:	Station 200+00
	Transfer Point 6:	Station 221+55
<b>Utility Shed</b>	Size:	12 feet by 16 feet
	Material:	Wood and metal
	Lighting:	Interior only
	Location:	Transfer Points 1, 2, 3, 4, 5, and 6
<b>Wiring</b>	Electrical Power:	Underground
	Control Lines:	Underground
<b>Wildlife Crossings</b>	Typical clearance:	2 feet below return belt
	Large mammal crossings:	4-6 feet clearance below return belt every 300 feet (approx.)

LOG ITEM

# 19

Page 61 of 114

## **2.0 PIER**

The proposed Pier consists of a stationary and retractable load-out conveyor supported on pilings spaced at 100-foot intervals and two support structures. Perpendicular to the Pier in deep water are eight dolphins (six breasting and two mooring dolphins) connected by a grated catwalk. The Pier will be painted to blend into the existing environment and constructed in a manner that will minimize visual intrusion and glare. While the conveyor supported by the Pier will be enclosed, the Pier will be constructed largely of open steel girders to minimize shading effects. The Pier begins at approximately the Ordinary High Water (OHW) mark. Pilings will support the trusses (and enclosed conveyor), support structures, and breasting and mooring dolphins.

Two open steel structures will support the conveyor near the end of the Pier. The first structure is located approximately 650 feet from the shoreline. It supports the conveyor and has an overall height of 91 feet above MLLW (85 feet MSL). The second structure supports both the conveyor and the retractable (load-out) conveyor. The load-out conveyor will have an overall height of 76 feet above MLLW (70 feet MSL).

Two maintenance/storage buildings will be located on dolphins. An enclosed control room with access stairways, storage area, restroom, and holding tank is located within the second support structure. These facilities will not increase the area of over-water coverage.

Lighting of the intertidal and subtidal portions of the Central Conveyor and Pier will be kept to the minimum required for safe operation. Lighting of the water surface will be minimized with location, color, shielded and/or directional fixtures. During non-operation hours, lights will be turned off except as needed for maritime safety requirements.

<b>Pier</b>	Location:	5 miles southwest of Hood Canal Bridge; 1 mile northeast of Thorndyke Bay; 2 miles southwest of the community of Shine; 1.25 miles southwest of Southpoint
	Total Length:	990 feet, measured at Ordinary High Water (OHW) mark
	Stationary Conveyor:	Station 228+00 to 236+75
	Length:	875 feet
<b>Station 228+00 to 233+00</b>		Station 228+00 is supported by pilings, marks the beginning of the Pier at approximately the OHW mark.
	Length:	500 feet
	Truss Height:	10 feet
	Truss Width:	13 feet
	Top Elevation:	32 feet above MLLW (26 feet MSL)
	Invert Elevation:	22 feet above MLLW (16 feet MSL)
	Clearance (Water):	11 feet MHHW (16 feet MSL)
	Clearance (Beach):	25 feet above MLLW (19+ feet MSL)
<b>Station 233+00 to 234+35</b>		Station 233+0 begins the incline toward the first support structure.
	Length:	135 feet
	Truss Height:	12 feet
	Truss Width:	13 feet

LOG ITEM

# 19  
Page 62 of 114



Top Elevation: Slopes from 32 feet MLLW to 91 feet MLLW (26 feet MSL to 85 feet MSL)  
Invert of Conveyor: Slopes from 22 feet MLLW to 76 feet MLLW (16 feet MSL to 70 feet MSL)

**Station 234+35 to 236+75**

Station 234+35 is supported by the first steel support structure. Station 236+75 is supported by the second steel support structure.

Length: 240 feet  
Truss Height: 15 feet  
Truss Width: 18 feet  
Top Elevation: 91 feet above MLLW (85 feet MSL)  
Invert of Conveyor: 76 feet above MLLW (70 feet MSL)

**Station 236+75 to 237+90**

This modular enclosed distribution (load-out) conveyor pivots and retracts to conform to various vessel loading configurations.

Length: 180 feet (extended)  
Truss Height: 15 feet  
Truss Width: 15 feet  
Top Elevation: 76 feet above MLLW (70 feet MSL)  
Invert of Conveyor: 61 feet above MLLW (55 feet MSL)

**Color  
Pilings**

Channel Elevation at end of Pier: -79 feet MLLW (-73 feet MSL)  
Scheme: Blend into existing environment  
Material: Hollow steel round  
Diameter: 18-inch (truss supports)  
30-inch (support structures)  
30-inch (dolphins)  
18-inch (catwalk supports)  
Spacing: 100-foot (truss supports)  
50 feet (catwalk supports)  
Number: 4 each (truss supports)  
16 each (support structures)  
12 each (dolphins)  
3 each (catwalk supports)

**Support Structures**

Support No. 1: Station 234+35 to 234+65 (approximately 650 feet from shoreline, as measured from center)  
Materials: Steel  
Dimensions: 30 feet by 30 feet  
Top Elevation: 76 feet above MLLW (70 feet MSL)  
Overall Height (including conveyor): 91 feet above MLLW (85 feet MSL)

Channel Elevation (measured at center of support): -13 feet MLLW (-7 feet MSL)

LOG ITEM  
# 19  
Page 63 of 114

Support No. 2: Station 236+55 to 236+95  
Materials: Steel  
Dimensions: 40 feet by 40 feet  
Top Elevation: 61 feet MLLW (55 feet MSL)  
Overall Height  
(at conveyor): 91 feet MLLW (85 feet MSL)  
(at load-out conveyor): 76 feet above MLLW (70 feet MSL)  
Channel Elevation  
(measured at center  
of support): -52 feet MLLW (-46 feet MSL)

**Control Room** Location: Support Structure No. 2  
Dimensions: 20 feet by 40 feet by 20 feet  
Material: Metal

**Maintenance and Storage Buildings**  
Location: Two innermost breasting dolphins  
Dimensions: 10 feet by 10 feet  
Material: Metal roof/siding, solid floor

**Breasting and Mooring Dolphins**  
Water depth range: -37 feet to -64 feet MLLW (-43 feet to -58 feet MSL)  
Typical depth: -50 feet MLLW (-42 feet MSL)  
Shallowest depth: -37 feet MLLW (-31 feet MSL)  
Pilecap dimensions: 20 feet by 20 feet, 7-feet thick  
Pilecap material: Concrete  
Pilecap invert elevation: 15 feet MLLW (9 feet MSL)

**Maintenance Catwalk**  
Material: Galvanized aluminum or steel  
Width: 5 feet  
Length: 710 feet  
Railings: 36 to 42 inches high  
Elevation: 22 feet MLLW (16 feet MSL)

### **3.0 ROADS AND PARKING**

A gravel forestry service road will provide access for forest firefighting, logging, and Central Conveyor maintenance. It will parallel the Central Conveyor and connect to the network of existing forestry service roads in the Thorndyke Block. The majority of the route realigns an existing forestry service road; abandoned routes will be re-graded and reforested. A turnout/parking area for a maintenance vehicle will be provided at each transfer point.

Access to the Central Conveyor south of the Thorndyke Road will be via an existing gravel road that leads to a parking area for employees working at the Pier. The southernmost portion of the road/walkway will be constructed of concrete for greater erosion protection.

<b>Gravel Road</b>	Location:	Central Conveyor (Station 25+23.69 to 211+50, 214+00 to 217+50)
	Width:	14 feet
	Length:	3.6 miles
<b>Concrete Road</b>	Location:	Single Conveyor (Station 217+50 to 222+00)
	Width:	24 feet
	Length:	450 feet
<b>Concrete Walkway</b>	Location:	Single Conveyor (Station 222+00 to 226+00)
	Width:	12 feet
	Length:	400 feet
<b>Parking</b>	Location:	Employee Pier Parking (Station 214+50 to 215+50)
	Number of stalls:	10
	Surface:	Gravel
<b>Parking/Turnout</b>	Location:	Transfer Points 2, 3, 4, and 5
	Surface:	Gravel
	Location:	Transfer Point 6
	Surface:	Concrete
<b>Roads, Walkways And Parking</b>	New:	7.3 acres
	Abandoned roads:	6.3 acres
	Net increase:	1.0 acres

#### **4.0 VESSEL DESCRIPTIONS**

The Pier is designed for ships and barges of varying sizes and displacements to transport sand and gravel. Only ships will require opening of the Hood Canal Bridge. It is anticipated that the first ships will call at the Pier 8 to 12 years after the Pier's construction.

	<b>Barge</b>	<b>Typical Barge</b>	<b>Ship</b>
Maximum Length (feet)	400	240	745
Maximum Width (feet)	100	60	110
Maximum Draft (feet)	25	16	45
Volume Range (dwt's)	2,500 to 20,000	5,000 to 7,000	20,000 to 65,000
Estimated Loading Time (hrs.)	1 to 8	2 to 3	8 to 24

#### **5.0 PROJECTED VOLUMES\***

In U.S. Short Tons (tons)

<b>Individual Year of Operation</b>	<b>Barge</b>	<b>Ship</b>	<b>Combined</b>
Year 1 of Pier Operation	2,000,000	0	2,000,000
Year 10 of Pier Operation	4,000,000	**600,000	4,600,000
Year 25 of Pier Operation	4,000,000	2,750,000	6,750,000

\* Subject to market demand.

\*\* First year shipping volume. U.S. flagged ships are projected to become available in Years 8 to 12 of Pier operation and not specifically in Year 10.

#### **6.0 OPERATION**

The Pier will be used up to 300 days a year, which excludes 65 days annually for holidays, tribal fishing, inclement weather, and periods of non-use.

<b>Frequencies</b>	<b>Barge</b>	<b>Ship</b>
Avg. Berthings Per Day	3	---
Avg. Berthings Per Month	---	0 to 6
Max. Berthings Per Day (either/or)	6	1
Max. Number of Vessels Berthed		
At Any Given Time (either/or)	2	1

LOG ITEM  
# 19  
Page 66 of 114