MEMORANDUM

To: Board Members
Alaska Industrial Development and Export Authority

From: Alan Weitzner
Executive Director

Date: October 27, 2021

Subject: Skagway Ore Terminal Evaluation
Update to Resolution No. G21-05

In March 2021, AIDEA's Board approved Resolution No. G21-05 authorizing staff to engage ASRC Energy Services (AES) to provide professional engineering services at the Skagway Ore Terminal (SOT). Staff's principal objective was to evaluate, at a budgetary level, the reinvestment requirement to modernize the terminal facilities and right-size the facility for an anticipated future level of export volumes of ore based on a broad scope of potential mineral development in the region. The SOT Evaluation – Final Report October 2021 prepared by AES is attached to this memorandum.

PROJECT BACKGROUND

The Port of Skagway is the closest ice-free, deep water port to most of the Yukon Territory. Lead and zinc ore have been exported from Skagway for over 100 years. In 1968, White Pass/Pacific Arctic Railway and Navigation Company (White Pass) entered into 55 year uplands and tidelands leases with the Municipality of Skagway, built the original ore storage terminal building and shiploader (open conveyor system) in the Skagway Harbor and began to operate the facility as the Skagway Terminal Company (STC).

From 1968 to 1986, White Pass transported lead and zinc ore and concentrates from the Faro mine in the Yukon Territory to the facility and loaded the ore and concentrates onto cargo vessels using the open conveyor system. In 1986, Bowhead Equipment Company, began operating the terminal and loading ore onto ships from that facility. At this point, over 50,000 tons of low-grade zinc and lead ore concentrate passed through the terminal each month.

During an inspection by U.S. Fish and Wildlife around 1983, the Alaska Department of Environmental Conservation (ADEC) became aware of lead and zinc contamination in the railroad right-of-way, at the ore-loading facility, at other upland areas and within the Skagway Harbor. This resulted in ADEC issuing a Notice of Intent to Issue a Compliance Order to White Pass related to this contamination in December 1988. Subsequently, a Compliance Order was signed by White Pass for remediation and a Long Term Material Release and Tracking Prevention Program was established with the state.

Part of the remediation plan was a relocation or sale of the ore terminal to a responsibly focused private party. In 1990, the 16th Legislature determined to appropriate $25 million dollars so that AIDEA would purchase and make improvements to the SOT, maintaining jobs and economic development within the Skagway community. This was supported by the Municipality of Skagway through Resolution 90-17R and by Governor Cowper. AIDEA completed the purchase and land sub-lease with White Pass in July 1990, and subsequently invested in capital improvements in order to:

- bring stability to Skagway's then major year-round industry;
- fund essential environmentally efficient renovations to the terminal including enclosing the ship loader and installing a negative air pressure system in the facility; and
- open the door to additional economic growth by marketing the terminal to other potential users within Alaska and Canada's Yukon Territory.

AIDEA's total investment to-date in the SOT has been approximately $32.9 million. AIDEA holds a sublease with STC who in-turn holds a lease through the Pacific and Arctic Railway Navigation Company, a subsidiary of White Pass, with the Municipality of Skagway for the ground the terminal occupies. Mineral Services, Inc. is the operator of the facility under direct agreements with the facility users. For the avoidance of any doubt, AIDEA:

1. Has never been the operator of the SOT;
2. Does not hold any tidelands lease within the Skagway port basin; and
3. Does not have any ownership or control of the associated Ore Dock within the Skagway Harbor.

Many of the mines associated with the terminal were closed in the Yukon Territory, which forced full time use of the terminal to come to a halt in 1992 – shortly after the purchase. From 1992 to its last shipment and closure in 1998, the terminal was used on an intermittent basis only. In 2003, AIDEA's Board approved a $4 million plan to demolish the aging storage building at the SOT. Subsequently, terminal improvements were made in 2007 and the SOT was reopened with an agreement from Capstone Mining, a Canadian mining company for the transshipment of copper concentrate from the Minto Mine. Pembridge Resources acquired the Minto Mine from Capstone Mining Corporation in June of 2019 and is currently contracting use the SOT through the end of the sub-lease term to ship up to 40,000 tons of copper concentrate per year to a smelter in Japan.

AIDEA MISSION

The SOT is an AIDEA owned development project authorized through Resolution No. G90-03 and Resolution No. G91-08 under AS 44.88.172. AIDEA's purpose is to promote, develop, and advance the general prosperity and economic welfare of the people of Alaska. AIDEA's ownership of the facility is consistent with its mission to create and maintain jobs and facilitate economic development in Alaskan communities.

Under current operations, approximately 20,0000 tons are shipped through the terminal in 2020 contributing up to 12 jobs at the terminal (2 full time, 2 part time plus 8 during ship loading 4 times a year for a 24 hour period), plus jobs associated with the trucking of the concentrates from Northern Canadian mines to Skagway. Mineral concentrate shipping operations normally occur on

a year-round basis, enhancing employment in a community otherwise heavily dependent on the summer tourist season.

EVALUATION SUMMARY

AIDEA's lease is set to expire in March of 2023. The 2021 evaluation of the SOT terminal included a boots-on-the-ground visual assessment of the AIDEA owned facilities. This was to understand the baseline condition of the terminal as a starting point for exploring the feasibility of upgrading the terminal in order to handle multiple users and a theoretical maximum through-put of 750,000 tons/year of ore. The footprint of the current terminal could handle a maximum of 1,500,000 tons of ore. The concentrate storage building as currently configured following agreements with Capstone Mining in 2007 can handle approximately 350,000 tons per year, but is limited to a single user.

To accommodate a modern, more efficient facility available to multiple users, the study suggests AIDEA make improvements to include: a new radial-arm ship loader, transfer conveyor, replacement of ancillary buildings, expanded concentrate storage shed, and various other improvements to improve production and efficiencies.

The study concluded that the rough order of magnitude potential development costs of all components of the terminal to modernize, increase efficiencies, and allow multiple terminal users is approximately $25 million to $54 million and would take approximately three years to design, permit, procure, and construct.

CONCLUSION

AIDEA's sub-lease with White Pass is set to expire on March 16, 2023. White Pass's 55-year lease with the Municipality of Skagway is set to expire on March 19, 2023. At the recent Southeast Conference, the Municipality of Skagway's Mayor, Mr. Andrew Cremata, has announced that the municipality has no intention of renewing the White Pass related leases once they expire.

As identified in the AES report, the existing shiploader is at the end of its useful design life and requires major refurbishment and heavy maintenance work for continued operation. The conditional assessment shows several facility components in poor condition with several components able to be re-utilized in a re-developed facility. While an investment level of $25-54 million was identified for a modernized facility to meet a theoretical maximum through-put of 750,000 tons/year of ore from multiple users, there are variations that can be made to the final profile.

The key issue is the ongoing support for this type of industrial activity within the Skagway Harbor and the economic feasibility supporting a re-investment in the facilities at $25-54 million. Based on the current configuration of the port and location of the SOT, the evaluation report identified increasingly significant limitations on SOT availability to current and potential users given the order of priority to cruise ship traffic. Any restructuring of the port to address this declining availability to industrial activity remains subject to the determination of the Municipality of Skagway's planning and investment for the port post-expiry of the current leases.

AIDEA staff's assessment is that:

1. Renewal of the SOT lease for future operation is no longer an option;
2. The Skagway community is focused predominately on cruise ship activity which will maintain a priority for availability within the Skagway Harbor;
3. Availability for industrial activity within the Skagway Harbor post-expiry of AIDEA's sub-lease is unknown;
4. Viable commercial mines coming online within the next few years that could benefit from the SOT re-development appears unlikely;
5. The amount of investment required to modernize and upgrade the terminal at this time is not justified given the lack of potential users in a position to contract for capacity; and
6. The commercial viability of the market does not currently warrant the amount of capital required for a re-development of this scope and scale.

Based on the above, it is our conclusion to allow the AIDEA sublease with White Pass to expire in March of 2023.

Attachments:
Skagway Ore Terminal Evaluation – Final Report October 2021

moffatt & nichol

SKAGWAY ORE TERMINAL

Evaluation - Final Report
October, 2021

Produced For:

AIDEA
Alaska Industrial Development and Export Authority

In Association With:

ONE CREW · ONE JOURNEY

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Seal Page

The engineering material and data contained in this report was prepared by or under the direction of a registered professional engineer:

10/08/2021

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Glossary

$2021	Value in 2021 Dollars
AIDEA	Alaska Industrial Development and Export Authority
B.C.	British Columbia
CSB	Concentrate Storage Building
CEMA	Conveyor Equipment Manufacturers Association
DWT	Dead Weight Tonnage
ft	Feet
GT	Gross Tonnage
Kip	1,000 Pounds
LOA	Length Overall
m	Meter
m^2	Square Meters
MOS	Municipality of Skagway
MCC	Motor Control Center
MM	Million
PARN	Pacific and Arctic Railway and Navigation Company
SOT	Skagway Ore Terminal
SOW	Scope-of-Work
STPH	Short Tons Per Hour
Tonnes	Metric Tonnes
TPH	Tonnes Per Hour
TPY	Tonnes Per Year
US$	United States Dollar(s)
YTD	Year to Date

1. Introduction

1.1. Scope-of-Work

The Alaska Industrial Development and Export Authority (AIDEA) has retained the services of Arctic Slope Regional Corporation (ASRC) and Moffatt & Nichol (M&N) to perform a facility site assessment and to explore options for AIDEA's future involvement with the Skagway Ore Terminal (SOT). The scope-of-work (SOW) includes developing an Opinion of Probable Construction Cost (OPCC) for upgrading the facility to accommodate future ore storage and shipping needs. This report describes the condition of the existing facilities, compares upgrade alternatives, and provides an opinion of probable construction cost for the recommended alternative.

1.2. SOT Background and History

The Skagway Harbor has been used to export mineral concentrates since the early 1900's. To provide history and background into AIDEA's involvement with the Skagway Ore Terminal (SOT), AIDEA was brought into the SOT in 1990 to provide environmentally responsible oversight and to help revitalize the terminal into a cleaner, safer, and economically productive facility. Prior to AIDEA's involvement, the terminal had previously been in operation for nearly 90 years. Following environmental remediation requirements administered by ADEC on White Pass, AIDEA purchased the ore-terminal buildings using state appropriated funds from the 16th Legislature. The purchase was supported by the State, AIDEA Board of Directors, and the Municipality of Skagway resolution 90-17r. Upon completion of the purchase and land sub-lease in July of 1990, AIDEA invested in capital improvements at the SOT; enclosing the previously open ship-loader, as well as creating a negative pressure system within the facility to contain fugitive dust. AIDEA has never been the operator of the SOT and only owns the above-ground terminal assets and leases the land in a sublease agreement with White Pass that expires in March 2023.

The SOT currently receives ore from the Minto mine in B.C. Pembridge Resources acquired the Minto Mine from Capstone Mining Corporation in June of 2019 and is currently utilizing the SOT to ship about 40,000 tonnes of copper concentrate per year to a smelter in Japan.

Through its lease, PARN has controlled the Skagway waterfront for many years. That lease will expire in 2023, at which point control of the waterfront will revert to the Municipality of Skagway. There have been several waterfront development plans and studies prepared for Skagway over the past 10-15 years, including:

- *Skagway Port Development Plan, 2008, KPMG, CH2M-Hill, and Sandwell*
- *Skagway's Yukon Port Project, 2010*
- *The Gateway Project, An Application by the Municipality of Skagway, Alaska, For TIGER III Discretionary Funding (2011), Skagway 42115*
- *SCML Project – Feasibility Study for Skagway Ore Terminal Modifications and Expansion, Revision 1, 2011, R&M Consultants, Inc.*
- *Skagway Ore Terminal Development Plan, 30 April 2013, by URS*
- *Skagway Ore Terminal Storage Building Expansion, Functional Performance Specification, 11 June 2014, AUSENCO and ARCADIS*
- *Skagway Ore Terminal Storage Building Expansion, Shiploader Recommendations, 21 July 2014, AUSENCO and ARCADIS*
- *Port of Skagway Port Governance Analysis, Final Report, 13 July 2017, Moffatt & Nichol*
- *Municipality of Skagway Port Economic Analysis, Final Report, 13 July 2017, Moffatt & Nichol*
- *Municipality of Skagway Port Environmental and Regulatory Compliance, Final Report, 12 July 2017, Moffatt & Nichol*
- *Municipality of Skagway Short Term Needs, Phase I, 15 July 2017, Moffatt & Nichol*

- *Municipality of Skagway: Strategic Planning & Execution of Cruise-Related Facilities, Waterfront Strategic Vision Draft Plan, February 22,2020, Bermello Ajamil & Partners*
- *Skagway Port Master Plan Project, Ongoing 2021, PDC Engineers*

Each of these documents provides additional background information which may be useful but is outside the SOW of this report.

The existing covered and uncovered storage areas were designed to be capable of supporting a combined 1,500,000 tonne per year operation. The development of infrastructure to support 1,500,000 tonnes of ore per year would require extensive upgrades to the facility beyond the scope of this project. In the event that there was an unexpected regional surge in mining the facility could be upgraded to accommodate the future demand.

It is our understanding that AIDEA is assessing the feasibility of developing the SOT to handle a theoretical maximum future throughput of 750,000 tonnes of ore concentrate per year. The existing shiploading and concentrate storage infrastructure is not sufficient to accommodate either the increased throughput or multiple ore sources without modification or a significant increase in year-round ore shipping. The 750,000-tonne target throughput is based on the potential output of the mines discussed in section 6.1 of this report. Each mine has an estimated annual throughput ranging from approximately 60,000 tonnes to 450,000 tonnes. Two or more of these mines coming online simultaneously would fall within the range of the target throughput. The target tonnage value is also supported by the maximum historical annual throughput of 642,000 tons that occurred during the 1991 season.

The improvements considered primarily consist of a new shiploader, new transfer conveyor, new conveyor and loader support structures, new concentrate storage building, conveyor upgrades, replacement of ancillary buildings, and various other site improvements. The improved layout will better allow the facility to serve multiple mine sources.

2. Existing Conditions

The Skagway Ore Terminal was originally constructed circa 1968 to accommodate the shipment of lead-zinc ore concentrate. Since that time, the facility has gone through a number of redevelopments, repairs, and upgrades. The facility currently consists of a mix of structures from the original 1960s vintage shiploader and conveyor system to the ore storage building and other improvements constructed c. 2007.

A site visit was conducted by M&N and ASRC Consulting & Environmental Services, LLC (ACES) personnel on 04/21/2021. The site visit included a walkthrough and high-level inspection of AIDEA owned assets within the SOT lease area. The inspection was limited to visual techniques only and did not include a detailed inspection of individual structural elements. Many components of the facility would require significant time, special access techniques, and non-destructive testing to complete a thorough inspection suitable to assess their condition in detail. The inspection was sufficient to determine the general condition of the primary structures and components based on readily observable and visible conditions.

In general, the facility can be described as in Satisfactory condition. With regular maintenance upkeep, and some repairs, the facility could be kept in operation at its current capacity for at least another decade.

Elements of the facility have been assigned qualitative condition assessment ratings of “good”, “fair”, or “poor”, based on visual observations of the structures. These observations intended to provide a conclusive assessment of the condition or remaining life of components of the facility. It is recommended that all elements to remain in service be subject of a detailed and thorough condition assessment. Table 2-1 displays the qualitative condition rating for each of the primary structures.

FIG- 1, included in the appendices, shows the existing site configuration.

TABLE 2-1 CONDITION EVALUATION TABLE

ITEM	CONDITION	NOTE
Concentrate storage building	Good	Minor superficial damage only.
Concentrate storage pad	Poor	Deterioration of walls, slab mostly intact, may not be adequate for expansion.
Truck unloading & washdown	Good	Minor superficial damage only.
Office	Fair	Older structure, some deterioration, wear and tear.
Crew change	Fair	Older structure, some deterioration, wear and tear.
Mcc (motor control center)	Good	Replacement or upgrades necessary to accommodate expansion.
Maintenance shop	Poor	Older structure, some deterioration, wear and tear.
Equipment washdown	Poor	Older structure, with corrosion and deterioration from wear and tear.
Water treatment skid	Good	Replacement or upgrades likely necessary to accommodate expansion.
Lab building	Good	Replacement or upgrades likely necessary to accommodate expansion.
Wash skid and clean water sump	Good	Replacement or upgrades likely necessary to accommodate expansion.
Reclaim conveyor (conveyor #1)	Good	Maintenance and upgrades necessary to accommodate expansion.
Reclaim conveyor enclosure	Poor	Sheetmetal in poor condition, frame could be rehabilitated.
Conveyor dust extractor/blower	Fair	Older, could be upgraded.
Transfer conveyor	Fair	Replacement necessary to accommodate expansion.
Mid-span tower	Fair	Replacement necessary to accommodate expansion.
Shiploader	Poor	See R&M Consultants, Inc. condition assessment report c.2014.
Ore dock	N/A	Not an AIDEA asset, see M&N condition assessment report c.2012.
Reclaim feeders	Good	Variable feed, capable of supporting expansion with additional feeders.
Fuel tanks	Good	Inspected from exterior only, reportedly drained and not in use.
Water/sewer utilities	N/A	Functional, would be replaced or upgraded as part of expansion.

2.1. Shiploader

The existing shiploader is in poor condition. Most of the loader structure is not accessible without specialized equipment, so it was not inspected in detail. A 2013 inspection report prepared for AIDEA by R&M Consultants, Inc. (R&M) describes in detail the condition of the structure and makes recommendations for repair. At the time of our site visit, it was unclear if any repairs had been made, however, we observed localized areas of deterioration like those observed in the 2013 R&M report. Additional inspection and repairs are recommended if the shiploader is to remain in service.

2.2. Conveyor System

The reclaim conveyor, conveyor #1, is in good condition. It is expected that its service life may be extended long-term with regular maintenance, repairs, and upgrades to the drive components. Record drawings indicate that the conveyor was installed c. 1968 with a design capacity of 1,500 stph.

The reclaim conveyor enclosure was found to be in poor condition with the sheetmetal exhibiting signs of advanced corrosion, including areas where the metal was completely rusted through. Framing members for the enclosure were generally in fair condition with widespread surface corrosion, however, there were localized areas of more advanced corrosion with section loss.

The transfer conveyor was found to be in fair condition. The service life of the conveyor itself could be extended long term with regular maintenance, repairs, and upgrades to the drive components. The record drawings indicate that the transfer conveyor was installed c.1968 with a design capacity of 1,500 stph.

The transfer conveyor enclosure was found to be in fair condition with minor deterioration and surface corrosion throughout. Localized areas of more advanced corrosion and deterioration were observed.

The mid-span tower was found to be in fair condition. Steel framing members generally exhibit surface corrosion with localized areas of more advanced corrosion and deterioration. Structural repairs and upgrades could be made to extend the useful life of the structure.

2.3. Shiploader and Transfer Conveyor Support Substructure

The foundations for the shiploader and mid-span tower were outside the SOW of the inspection. A condition assessment report prepared by M&N in 2012 indicates that no defects were observed on the conveyor transfer support structure or the ship loader support structure. The underwater inspection indicated the piles supporting each structure were protected from corrosion by sacrificial anodes. The anodes were observed to have approximately 90% of their section remaining in 2012. These anodes may be nearing the end of their useful life and should be considered for replacement if the structures are to remain in service.

2.4. Ore Dock (Non-AIDEA Asset)

The Ore dock is not an AIDEA asset, however it is integral to SOT shiploading operations. Like much of the facility, the dock was originally constructed in c.1968 and has undergone several repairs and upgrades over the years. The evaluation of the Ore Dock was outside the SOW of this project. A condition assessment report prepared by M&N in 2012 indicates that various elements of the structure range from good to critical condition. The condition assessment report estimated $7.6MM ($2012) in recommend repairs to the dock structures. It can be assumed that additional damage and deterioration has occurred since the time of that assessment.

2.5. Concentrate Storage Building

The Concentrate Storage Building (CSB) was constructed c.2007 and is in good condition. The structure is used to house and store ore concentrate delivered by truck until it can be loaded onto ships. The framing members and sheetmetal are in good condition with only localized areas of damage and deterioration. The truck unloading bay was similarly in good condition. The structure is capable of storing approximately 35,000 tonnes depending on the type of concentrate and handling methodology.

Currently, ore concentrate is dumped from tandem trucks after they enter the truck unloading bay. The trucks are then washed before they exit the loading bay. The dumped ore is moved onto the main floor of the CSB and is stacked into piles using front-end loaders. Smaller equipment like skid-steers is also used in some situations. The ore concentrate is stacked in a manner to allow equipment to place more material and to allow transport to the feeders. Ore concentrate is transferred to the feeders by front-end loaders. The material is stacked in a hopper and metered onto the reclaim conveyor by the feeders. In order to maintain proper moisture content of the ore concentrate, a lime mixture is worked into the stored material to reduce moisture content prior to shipping.

2.6. Concentrate Storage Pad

The concentrate storage pad previously served as the foundation and floor for the original concentrate storage building. When the building was demolished, the pad was left in place. The pad is mostly vacant but is used for storage of some equipment. The pad should be considered in fair to poor condition. The foundation stem walls were observed to show signs of spalling, cracking, and deterioration. The slab itself may be suitable for future use, although there is damage and deterioration on its surface which should be repaired. A detailed evaluation should be conducted before determining the suitability of the pad and foundations for future expansion.

2.7. Laboratory Building

The laboratory building contains sampling equipment and serves as the transfer point between the reclaim conveyor and the transfer conveyor. A large sump below the conveyor transfer point collects drainage water from the conveyor gallery and the CSB. A separate lab room houses a workstation for analysing the concentrate. The laboratory building was found to be in good condition with only localized areas of minor damage and deterioration noted. The lab equipment and other non-structural elements were not assessed but are reportedly functional and adequate.

2.8. Office and Crew Change

The office and crew change structures are in fair condition. The office was added, and the crew change building was remodelled, in 1991. The structure has areas of localized damage, corrosion, and deterioration from normal usage. The office building is used for administrative and operational purposes. The crew change portion of the building contains lockers, and break and bathing facilities for employee use.

2.9. Equipment Washdown and Maintenance Shop Buildings

The equipment washdown and maintenance buildings are in poor condition. The sheetmetal and steel framing elements are corroded with localized areas of section loss. Concrete foundation elements and appurtenances were found to have areas of localized damage. The equipment washdown building is used for washing down equipment used in ore concentrate handling operations, including the front-end loaders and skid steers. The Ore trucks are not washed down in the equipment washdown building. The maintenance shop is used for servicing and maintaining ore concentrate handling equipment.

2.10. Motor Control Center / Electrical Building

The motor control center (MCC)/ electrical building is in good condition. The concrete structure did not show signs of damage or deterioration. The MCC houses electrical panels and equipment used to control the various electric motors and electrically powered equipment throughout the facility. Some of the electrical equipment appears to be very old and some was replaced during the 1991 renovations or more recently. The condition of the electrical components was not assessed.

2.11. Fuel Storage Tanks

According to the terminal operator, the fuel storage tanks have been drained and the flanges have been capped. The tanks were not in service at the time of inspection. The fuel storage tanks appeared to be in good condition with no observed damage or deterioration. The tanks were observed from the exterior, at a distance only.

2.12. Water/Sewer Utilities

The office and crew change buildings are served by a potable water line and a septic system. The equipment washdown and truck unloading bay are also served by a water line. The underground water and sewer utilities were not inspected. The staff did not report any issues with service. The septic tank is shown as existing on the 1991 drawings. The material and exact age of the septic tank is unknown, but it is likely in need of replacement.

3. Multi-Use Berthing Considerations

The current shiploader conflicts with some large cruise vessels. Its proximity to the berth face means that vessels with flying bridges, outboard life rafts, or other hull protrusions can interfere with the loader. This limits how and where these cruise vessels can currently berth at the Ore Dock. Each of the conceptual alternatives set the new shiploader structure further back from the berth face to mitigate conflicts.

Any future improvements to the SOT should consider the schedule constraints imposed by cruise ships which have preferential use of the Ore Dock during the summer cruise season. Skagway has become a popular stop for cruise ships in the recent years, and provisions are needed to ensure that bulk ore and cruise ship industries can meet their future demands. The current arrangement is that cruise ships have priority for the use of Ore Dock over bulk vessels. The arrival and departure of cruise ships are scheduled and published months in advance, and the schedules are rigidly maintained which provides good visibility for scheduling of bulk vessels.

Table 3-1 summarizes the number of consecutive 3-day periods that the Ore Dock was unoccupied during the Cruise Ship season for years 2007 to 2019, and the number of consecutive 2-day periods that the Ore Dock was unoccupied during the cruise ship season for years 2013 to 2019. The data for years 2007 to 2012 has been referenced from the report “SKAGWAY ORE TERMINAL DEVELOPMENT PLAN” dated April 30, 2013, while the data for years 2013 to 2019 has been obtained from the Municipality of Skagway’s cruise ship schedules. The data from the “SKAGWAY ORE TERMINAL DEVELOPMENT PLAN” does not include times that the Ore Berth was unoccupied for two or more consecutive days.

TABLE 3-1 HISTORIC ORE BERTH OCCUPANCY

Ore Berth Occupancy During Cruise Ship Season			
Year	Cruise Ship Season	Times Ore Berth Unoccupied For Two Or More Consecutive Days	Times Ore Berth Unoccupied For Three Or More Consecutive Days
2007	MAY 7 - SEP 27		18
2008	MAY 5 - SEP 27		20
2009	MAY 4 - SEP 23		20
2010	MAY 5 - SEP 29		21
2011	MAY 6 - SEP 23		19
2012	MAY 4 - SEP 25		19
2013	MAY 3 - SEP 25	16	10
2014	MAY 2 - SEP 25	18	12
2015	MAY 5 - SEP 24	19	15
2016	APR 29 - SEP 27	18	17
2017	MAY 2 - SEP 28	21	7
2018	MAY 1 - OCT 3	20	16
2019	APR 29 - OCT 3	15	10

In recent years, the number of consecutive 2 and 3-day periods in which the Ore Dock was unoccupied has been on the decline. Information for the 2020 and 2021 cruise seasons has not been included in Table 3-1 due to the impact COVID-19 has had on cruise travel.

The ability to load bulk vessels more effectively during the cruise ship season is consequential in avoiding payments of demurrage penalties resulting from extended loading times. If a bulk vessel cannot load its contracted load within the window of two consecutive cruise ship arrivals, it will have to wait for the next

available window which can result in demurrage penalties. Paying demurrage charges to vessel operators will make the operations less profitable and will reduce the competitiveness of the terminal compared to other terminals.

Assuming five hours of non-loading time, the current shiploader with its 750 stph effective loading rate can load a 50,000 ST consignment within a 72-hour window, while a new shiploader with an effective loading rate of 1,200 stph can load the same shipload within a 48-hour window. Taking advantage of smaller loading windows will become more important with increased number of cruise ship visits.

Replacing the existing shiploader with a new shiploader with a better effective loading rate will provide the facility with the means of avoiding demurrage penalties, increasing the profitability and competitiveness of the operations.

4. Improvements & Upgrades Considered

The existing shiploader is at the end of its useful design life and requires major refurbishment and heavy maintenance work for continued operation. The existing shiploader is capable of loading one hold at a time resulting in multiple vessel movements to load all holds on a vessel. Considering that a Handymax Vessel contains 5 holds and that each hold needs to be filled in approximate 30% increments, to load 5 holds, the vessel needs to be warped 15 times. The time taken to warp the vessel will reduce the effective loading rate of the conveyor system.

The existing shiploader relies on bulldozers to be lowered by crane into the hold of the vessel for the trimming of the vessel hold. Trimming is the name of the operation for evenly distributing the material within a vessel's hold. The existing shiploader cannot load material into the vessel hold evenly because of its limited hold coverage. The existing shiploader lacks the ability to move parallel with the vessel and the boom conveyor has limited shuttling capability, not enough to reach the far side of the wider vessels. Lowering and operating equipment within the hold is slow and potentially unsafe. Due to the current throughput and relatively infrequent ore loading of vessels, the apparent impacts are less evident.

While the existing conveying system has a design throughput of 1,500 stph, the effective loading rate for the system is reduced to 700 to 900 stph because of time lost to vessel movements and trimming of holds. The tying and untying of the vessels and trimming are time consuming, labor intensive and hazardous operations which needs to be improved upon when replacing the existing shiploader.

The new shiploader should be capable of:

- Loading 750,000 metric tonnes in a calendar year.
- Loading more than one hold to reduce vessel warping.
- Trimming the vessel hold without utilizing external equipment.
- Installation with minimal impact on the ongoing operations for bulk and cruise ships.
- Improving current effective loading rate to reduce vessel loading times and avoid demurrage costs.
- Loading of vessels in environmentally conscientious manner.
- Improving safety by reducing vessel movements.

Given the above-mentioned criteria, M&N considered an Agrico™ shiploader, a radial shiploader, and a mobile shiploader for replacement of the existing shiploader. Each of the considered shiploader alternatives satisfy the criteria with varying levels of effectiveness.

A travelling shiploader, while considered to be the most effective shiploader type in terms of vessel hold coverage, would not be a suitable option for the replacement of the existing shiploader. This option has been dismissed due to requiring extensive construction time which will impede the current bulk and cruise ship operations. Furthermore, the costs of replacing the existing shiploader with a travelling shiploader would be beyond what can be justified based on a maximum 750,000 tonnes per annum operation. As such the travelling shiploader was not further investigated as it is not deemed viable option.

4.1. Shiploader Options

4.1.1. Agrico™ Shiploader

An Agrico™ shiploader is capable of slewing (revolving about a pivot point on a horizontal plane) and shuttling (boom conveyor moving in and out inside the outer main truss). The combination of slewing and shuttling functions allows this type of shiploader to cover as many as three holds on a bulk vessel. If the vessel's gear (vessel's onboard crane) prevents the shiploader from slewing to the adjacent hold while the boom conveyor is extended out, the boom conveyor truss can be retracted to allow the shiploader to avoid the vessel's gear and reach into the adjacent hold. Depending on the tide conditions, whether the bulk

vessel has any gear and height of the shiploader support platform, this shiploader may cover the adjacent holds to the hold directly opposite to the shiploader without retracting the boom conveyor.

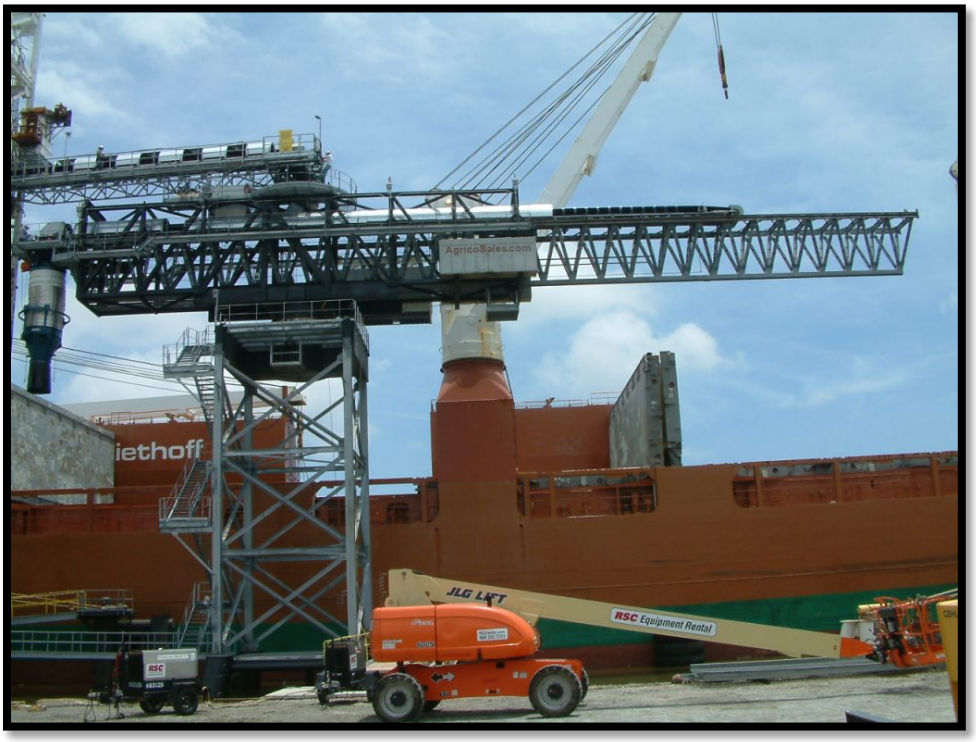


FIGURE 1 AGRICO™ SHIPLOADER

Figure 1 shows an Agrico™ shiploader in the parked position. The shiploader can be parked with its boom conveyor parallel to the berth face when cruise ships are at the berth. The effective loading rate can be improved to 1,200 to 1,400 stph from the current 700 to 900 stph with this type of shiploader. With the improvements to the effective loading rate, it would be possible to load a 50,000 dead weight tonnage (DWT) vessel within a loading window of 2-days. The improved loading times will provide the operator with better means of avoiding demurrage penalties paid to bulk vessel operator and reduce the risk of impacting cruise operations.

The Agrico™ shiploader lacks the ability to luff (move up and down about a pivot axis). The height of the supporting platform should be high enough to allow for the boom conveyor to stay above the vessel's hatch when loading an empty vessel at high tide conditions. As a result of this limitation in movement the loading point into the shiploader would be higher compared to the radial shiploader. This requires more conveyor length to reach the loading point of the shiploader as the transfer conveyors must be constructed under a certain maximum slope. The greater heights of the shiploader's boom conveyor necessitates use of a Cleveland cascade type chute for gentler handling of material as dropping material from the heights of the boom conveyor will create considerable amount of dust.

The combination of the Agrico™ shiploader and Cleveland cascade would allow for environmentally conscientious loading of vessels without the need for any external equipment for trimming. The design of the shiploader will need to consider the plugged chute condition as one of the design condition scenarios. The structural loads resulting from the Cleveland chute's plugged condition is significant. The shiploader will require more than one Cleveland cascade chute if it is used for more than one type of commodity, since a Cleveland cascade chute is not a self-cleaning type of chute. The dead weight of this type of shiploader and its support platform is estimated to be approximately 2,000 kips.

Refer to Appendix A, Fig-2 for a layout associated with installing an Agrico™ shiploader.

4.1.2. Radial Shiploader

A radial shiploader is capable of slewing (revolving about a pivot point on a horizontal plane), shuttling (boom conveyor moving in and out inside the outer main truss) and luffing (moving up and down about a pivot axis). The combination of slewing, shuttling and luffing functions allows this type of shiploader to cover as many as three holds on a bulk vessel. The coverage may be a bit lesser than what can be achieved with an Agrico™ type shiploader. If the vessel's gear (vessel's onboard crane) prevents the shiploader from reaching the adjacent hold while the boom conveyor is extended out, the boom conveyor can be retracted and luffed up to allow the shiploader to reach into the adjacent hold.

FIGURE 2 RADIAL SHIPLOADER

Figure 2 shows a radial shiploader with the boom conveyor shuttle back and the boom in the luffed-up position. The shiploader can be parked with its boom conveyor lowered down and parallel with the berth face when cruise ships are at the berth. The effective loading rate can be improved to 1,100 to 1,300 stph from the current 700 to 900 stph with this type of shiploader. With the improvements to the effective loading rate, it would be possible to load a 50,000 DWT vessel within a loading window of 2 days. The improved loading times will provide the operator with better means of avoiding demurrage penalties paid to bulk vessel operator.

The radial shiploader's ability to luff allows the boom conveyor to stay above the vessel's hatch when loading an empty vessel at high tide conditions. As a result of this capability in movement the loading point into the shiploader can be lower than what is required for the Agrico™ shiploader. This reduces the conveyor length to reach the loading point of the shiploader. The lower hights of the shiploader's boom conveyor can make the use of Cleveland cascade chute redundant as the material can be dropped into the hold from lower heights reducing dust generation.

The combination of the radial shiploader and a directional feeding spoon would allow for environmentally conscientious loading of vessels without the need for any external equipment for trimming. The directional feeding spoon can rotate 360 degrees about a vertical axis allowing the operator to direct material into the

corners of the hold. The design of the shiploader will need to consider the plugged chute condition as one of the design condition scenarios. The structural loads resulting from the directional feeding spoon's plugged condition is considerably lower than what needs to be considered for the Cleveland cascade chute. The directional loading spoon is a self-cleaning type of a loading chute and can be shared by more than one type of commodity. The dead weight of this type of shiploader and its support platform is estimated to be approximately 1,000 kips.

Refer to Appendix A, Fig-6 for a layout associated with installing a radial shiploader.

4.1.3. Mobile Shiploader

A mobile shiploader can move both perpendicular and in parallel to the berth face and can luff up or down (move up and down about a pivot axis). The loading spoon can be a directional one to aim material into the corners of the hold being loaded. The combination of mobile shiploader's movements with respect to berth face, its luffing function and capability to aim the spoon within the holds allows this type of shiploader to cover one hold on a bulk vessel without the need for external equipment. Each Mobile shiploader has a design capacity limited to 1,000 stph and two Mobile shiploaders are required to load two separate holds at the desired throughputs equivalent to Agrico™ and radial shiploaders. When repositioning the vessel to load adjacent holds the shiploader needs to be luffed up and driven away from the berth face to allow for vessels movement and to have the shiploader out of the way of the vessel's gear (vessel's onboard crane).

FIGURE 3 MOBILE SHIPLOADER

Figure 3 shows a mobile shiploader with the boom conveyor's spout positioned over the hold. The shiploader can be driven back after disconnecting it from the chute of the conveyor feeding it.

The mobile shiploader can be parked inside a maintenance shed on the loading dock with its boom conveyor lowered down. The maintenance shed will also hide the mobile shiploaders from the view of the visiting cruise ships. The effective loading rate of can be improved to 850 to 1,150 stph from the current 700 to 900 stph with this type of shiploader. With the improvements to the effective loading rate, it would be possible to load a 50,000 DWT vessel within a loading window of 2.5 days. The improvement to loading times will not be as significant as the improvements achievable by Agrico™ or radial shiploaders.

The mobile shiploaders loading point height is comparable to radial shiploader's loading point and as a result would not require extended conveyor lengths to reach the transfer point. The luffing movement (move up and down about a pivot axis) allows the boom conveyor to stay above the vessel's hatch when loading an empty vessel at high tide conditions. The lower heights of the shiploader's boom conveyor can make the use of Cleveland cascade chute redundant as the material can be dropped into the hold from lower heights reducing dust generation.

The combination of the mobile shiploader and a directional feeding spoon would allow for loading of vessels without the need for any external equipment for trimming. The directional feeding spoon can rotate 360 degrees about a vertical axis allowing the operator to direct material into the corners of the hold. The shiploader will need to be detached from the feeding conveyor in between vessel movements which will result in some material fall out which will need clean up. The design of the shiploader will need to consider the plugged chute condition as one of the design condition scenarios. The structural loads resulting from the directional feeding spoon's plugged condition is considerably lower than what needs to be considered for the Cleveland cascade chute. The directional loading spoon is a self-cleaning type of a loading chute and can be shared by more than one type of commodity. The dead weight of this type of shiploader is estimated to be approximately 300 kips.

Refer to Appendix A, Fig-9 for a layout associated with installing a mobile shiploader.

4.2. Evaluation of Shiploading Options

The layouts for the three shiploader options are represented by; Fig. 2 for Agrico™, Fig. 6 for radial, and Fig. 9 for mobile shiploader. In addition to the referenced layouts, elevation views are included for each shiploader. The three shiploader options can be compared to one another according to the following criteria to determine the more suitable alternative for replacing the existing shiploader.

4.2.1. Constructability

This is a measure of the ease for constructing the new facilities and infrastructure required by the new shiploader while allowing the current operations to continue uninterrupted.

Comparing the three shiploader options, the radial shiploader only requires one platform to support the new shiploader. The Agrico™ shiploader requires two because of the transition from one conveyor to the next conveyor to reach the loading point of the shiploader. The mobile shiploaders require two platforms to support two independent shiploaders with lower throughputs. The platform for the new radial shiploader can be constructed behind the berth face, allowing bulk and cruise ship operations to continue uninterrupted. After the construction of the new radial shiploader platform and delivery of the radial shiploader, the construction can be finalized by disconnecting the flow from the reclaim conveyor to the existing shiploader and installing the new chute to connect the 200-foot-long conveyor to the new shiploader.

4.2.2. Loading efficiency

This is a measure of how efficient the new shiploader will be in loading the vessels.

This measure compares the new shiploader options in terms of the effective loading rate. The effective loading rate results from dividing the total material transferred to the vessel by the total time taken to load the vessel. The events unrelated to the functions of the shiploader, such as weather events and break down of conveyors upstream of the shiploader, do not contribute to the total time. Agrico™ shiploader has a better coverage of vessels holds and requires the least amount of time to swivel from one hold to the next hold since its boom is elevated. A radial shiploader has the second-best coverage and it is not as efficient as the Agrico™ shiploader in swinging from one hold to the next hold since the shiploader may need to shuttle the boom conveyors backwards and luff up to clear obstacles when switching between two holds. The mobile shiploader is the least efficient since it can only cover two holds without repositioning, compared

to three holds covered by the other two options. Estimated values for the effective loading rates for each alternative are included in sections 4.1.1,4.1.2, and 4.1.3.

4.2.3. Capital Costs

This is a measure of the costs associated with developing the infrastructure required for each of the shiploader options.

The radial shiploader only requires one platform and one conveyor. Agrico™ and mobile shiploader's general arrangements require two platforms and two conveyors. The weight of the radial shiploader is considerably lower than the Agrico™ shiploader which will result in savings for the costs associated with construction of its support platform's structures.

The -30% to +50% costs associated with the supply, installation, and commissioning of the shiploaders alone are $9 MM for the Agrico™, $8.5 MM for the radial and $2.5 MM for each of the two mobile shiploaders.

The radial shiploaders costs will be considerably lower mainly because of requiring one platform.

4.2.4. Operating Costs

This is a measure of the operating costs associated with electricity usage and labour requirements to operate each of the shiploader options.

Agrico™ shiploader will have a higher electricity utilization mainly because of the power required by longer conveyor lengths and to elevate material to a loading point which is higher than the other options.

A mobile shiploader will have more labour requirements because of the activities resulting from attaching and detaching of the shiploaders between bulk vessel loadings and activities resulting from clean-up operations. Any time the chute work is detached and attached a minute amount of material will be spilled which will require clean up by the operators.

4.2.5. Environmental Concerns

This is a measure of effectiveness of the equipment in preventing spills and generating dust that can be released to the environs.

Agrico™ shiploader equipped with a Cleveland cascade chute and radial shiploader are ranked equally while the mobile shiploader because of the clean-up requirements between ship loadings is ranked lower.

4.2.6. Aesthetics

This is a measure of how pleasing the facilities and equipment are to the onlookers. The looks of the facility matter since the berth is shared by both bulk and cruise ship vessels.

In this category the mobile shiploader is ranked higher since the mobile shiploaders can be pulled back into a covered shed in between the bulk vessel loadings.

4.2.7. Shiploader Ranking

A ranking system was developed to aid in the selection of a preferred alternative. Each shiploader is ranked qualitatively on criteria established in sections 4.2.1 through 4.2.6. A rank of 1 through 5 is assigned for each criteria with 5 being the best rank. Table 4-1 tabulates the ranking for each of the three shiploader configurations.

TABLE 4-1 SHIPLOADER RANKING

Shiploader Rankings	Agrico™	Radial	Mobile
Constructability	3	4	2
Loading Efficiency	4	3	2
Capital Cost	2	4	2
Operating Cost	3	4	2
Environment	4	4	2
Aesthetics	3	4	5
Total Score:	**19**	**23**	**15**

According to the tabulated results in Table 4-1, the radial shiploader with a total score of 23 would be the best shiploader option for replacement of the existing shiploader. This ranking system provides a simple metric for evaluating each of the criteria and does not place weight on one criteria over another. There may ultimately be additional criteria which impact the decision to select a particular shiploader configuration over the others.

4.3. Conveyor System

The existing conveyor system's Reclaim Conveyor (Conveyor No.1) and belt feeders No.1 and No. 2 can be reutilized for the purposes of all shiploader replacement options. Mechanical components on these conveyors can be replaced to extend their useful life. Belt feeders No.1 and No.2 are 48-inch belt conveyors running on 20-degree picking idlers at 75 fpm. Each of these belt feeders have a design throughput of 1,000 stph for a combined design throughput of 2,000 stph. Two additional belt feeders will be installed within the new concentrate storage building. The existing Reclaim Conveyor is a 48-inch belt conveyor running on 35-degree idlers at 350 fpm and has a design throughput of 1,500 stph at 62% CEMA loading. The lower CEMA loading of Reclaim Conveyor is partly due to lack of control measures to adjust the flow of material into Reclaim Conveyor and prevent spillages. The Reclaim Conveyor does not have any skirting to hold material centered on the conveyor belt. Adding skirting to this conveyor will provide better control to load the conveyor to a higher level. Skirting needs to be added from the farthest up stream feed point to the Reclaim Conveyor past the last feeder downstream. Adding skirting to Reclaim Conveyor will create a minute amount of drag which can be overcome by replacing the existing drive unit with a new drive unit. At a CEMA loading of 85%, the Reclaim conveyor can achieve a design throughput of 2,000 stph matching the design throughput from two belt feeders.

It is possible to also increase the design throughput of the Reclaim Conveyor by speeding up its belt. Increasing the belt speed from 350 fpm to 470 fpm the design throughput can be increased to 2,000 stph while the loading remains at 62% CEMA loading matching the current setup with no skirting on the conveyors. Speeding of the belt conveyors will require replacing of its belt to a higher rating and will require the replacing of its carry and possibly return side idlers.

By providing better control measures such as adding skirting to the conveyor and by increasing its speed with the installation of a new drive unit, belt and idlers, the design throughput can be increased to over 2,000 stph.

The design throughput of all new transfer conveyors resulting from improvements to the shiploading equipment must match the improved design throughput of 2,000 stph. All new conveyors can be based on 42-inch belt running on 35-degree idlers at 500 fpm. The new conveyors will be loaded to 75% of the allowable CEMA recommended loading. The requirements for the number of new conveyors, their lengths and routing differ for each shiploader option.

Refer to Appendix A, Fig-2, Fig-6, and Fig-9 for transfer conveyor layouts associated with each of the shiploader options.

4.4. Concentrate Storage Building

There are many factors that will influence the final required size of the concentrate storage building, many of which are not know currently, as follows:

- The geometry of concentrate storage building, including the height of the sidewalls, the width of the structure and the roof pitch,
- The use of containment walls to allow stacking of material against the walls,
- The method of loading the concentrate storage building,
- The bulk density of the ore or concentrate,
- The angle of repose of the material,
- The number of tenants,
- The sequence of trucking between the mine and Skagway,
- Year-around or seasonal mining operations, and
- The shipping window between Skagway and the smelter.

The existing CSB has an estimated storage capacity of 35,000 tonnes and therefore can accommodate a throughput exceeding 350,000 tpy depending on the size and frequency of shipments. The size of the concentrate storage building must be increased to accommodate the additional throughput and maintain reasonable shipping intervals. If we assume shipments from Skagway to a smelter occur uninterrupted year-around, and that each shipment is approximately 40,000 tonnes, throughput would be about 760,000 tpy based on 19 shipments, one every 19 days on average. For this type of operation, a concentrate storage building with a capacity of 5 to 10% of annual throughput is typical. This assumes a year-around operation from a single mine with relatively uniform concentrate deliveries to Skagway. It also assumes year-around berth availability. Refer to section 3 Multi-use berthing considerations, for limitations on ore loading operations during the cruise season. To allow for delays, a 50 to 60,000-tonne capacity concentrate storage building is appropriate.

Alternatively, if shipping operations were suspended to accommodate the 16-week summer cruise ship season, the total storage capacity required within the CSB would be 235,000 tonnes. Building a large CSB to accommodate a busy summer cruise ship season would add considerable cost to the project, require 6 ore ships to haul-off, and would result in an under-utilized CSB shed if throughputs were less than 750,000 tpy.

Figure 4 displays a graphical representation of the required storage volume assuming regular shipments year-round and where the berth is closed to ore shipping for 16-weeks to accommodate the summer cruise season.

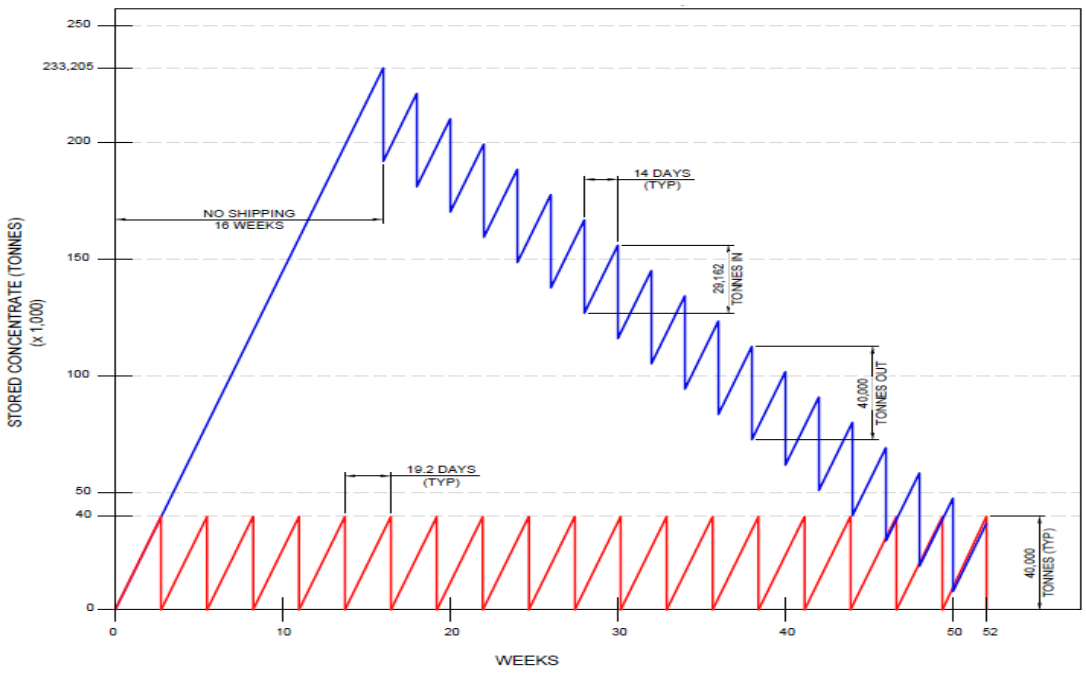


FIGURE 4 STORED CONCENTRATE

Where there are multiple tenants, separation walls will be required between tenants which will result in some reduction in net storage capacity per square foot. It may also require separate truck unloading and equipment storage area.

Two previous reports, one by URS in 2013 and the other by AUSENCO-ARCADIS in 2014 looked at expansion options for the existing storage concentrate storage building. AUSENCO recommended lengthening the existing 150-foot-wide structure, with a 60-foot-high ridge to allow for future flexibility, including the possible addition of an overhead conveyor system. The ridge will be about 10 feet higher than the existing concentrate storage building and should be coordinated with the adjacent helicopter operations; marker lights may be required along the ridge. A structure higher than the existing building will require heavier foundations and strengthening of a partition of the existing building due increased snow loads. However, a 60-hight structure would allow for a future overhead conveyor system.

The existing concentrate storage building has a 4:12 pitch roof and occupies 280 lineal feet (42,000 square feet, Stockpile A below) of the of the original building footprint, leaving an additional 440 feet of slab, perimeter containment walls, and foundations. Given the uncertainties about future uses of this facility and to provide flexibility, we recommend adding 220 feet to the existing structure or one-half of the remaining slab area, which will capture two of the existing openings to the reclaim conveyor. We further recommend using a 6:12 roof pitch for the addition (Stockpile B below) to provide a slightly higher material stacking height and allow for a future overhead conveyor system. Assuming two tenants will be occupying the building, a second truck unloading station will be required. The expanded concentrate storage building will allow for 750,000 tpy throughput from either one or two tenants. Figure 5 shows 4:12 and 6:12 roof and stockpile configurations.

It is anticipated that the additional storage area would be constructed as an extension to the existing concentrate storage building. The building would be constructed on the existing concentrate storage pad. It is anticipated that the construction would require new foundations for the structure and repairs made to the floor slab. A geotechnical investigation and inspection program is recommended to determine the adequacy of the existing concentrate storage pad for the new structure.

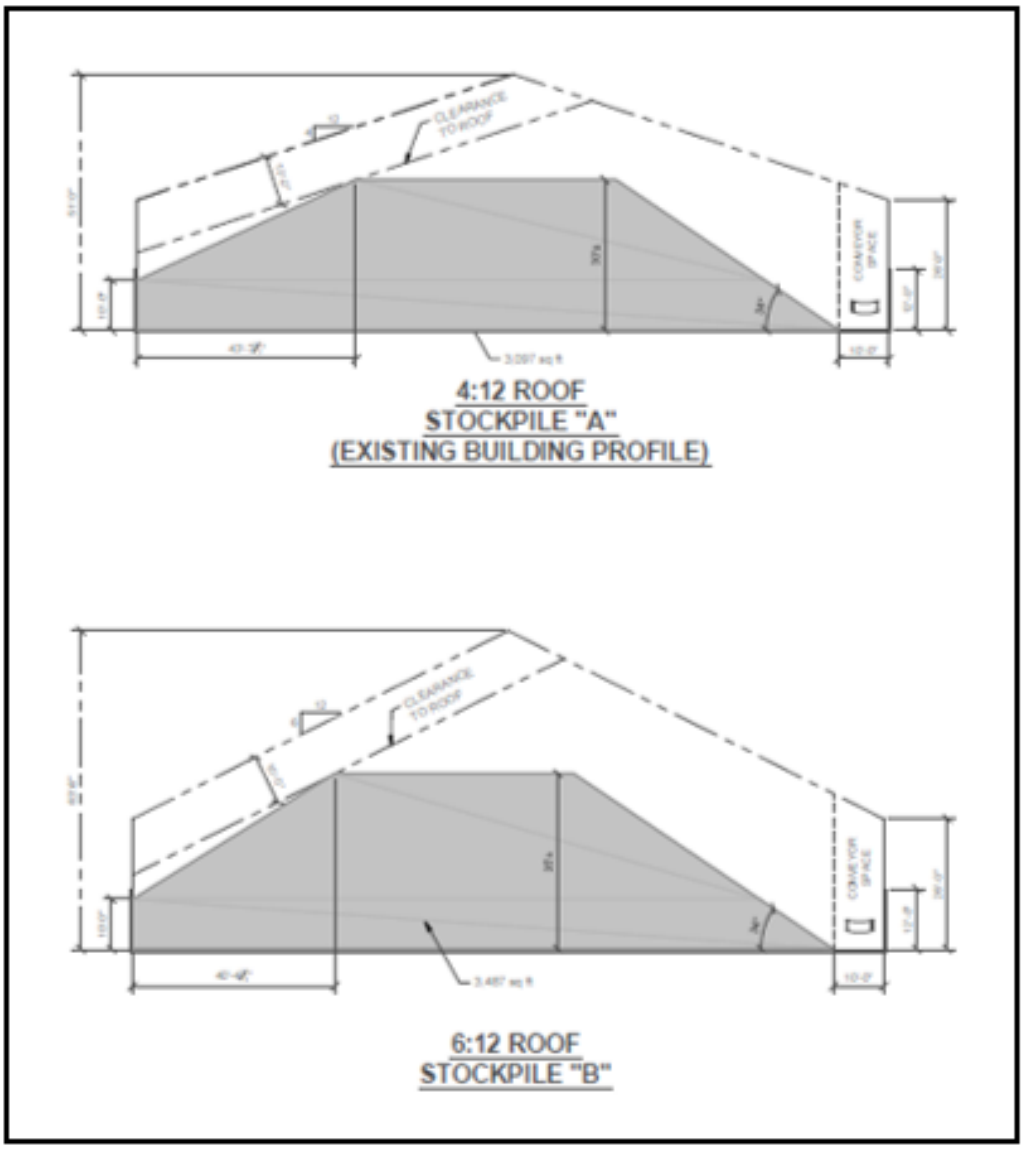


FIGURE 5 ROOF ALTERNATIVES

4.5. Ancillary Structures and Site Improvements

Replacement of several of the ancillary structures is recommended to replace aging infrastructure and to keep up with the additional throughput.

4.5.1. Office Building

A new office building should be constructed due to the age of the existing structure and to provide more space for staff. It is recommended to relocate the office building to the northeast entrance of the lease area to improve check-in and security protocols and to separate office staff from the industrial area of the facility. The building can be constructed from traditional wood framing, or may be made portable, similar to a job office. A portable structure could be relocated on the site to accommodate future operational needs.

4.5.2. Crew Change Building

The crew change building would be replaced with a pre-engineered metal building similar to the existing structure. It would include expanded locker and bathing areas as well as an employee breakroom. The building would be constructed with galvanized framing members. The footprint of the building will increase to accommodate additional staff, but removal of the adjacent office building will allow for a net increase to site space and parking.

4.5.3. Washdown and Maintenance Buildings

Due to the condition of the washdown and maintenance buildings, it is recommended to replace them with a new combined washdown and maintenance building. The combined structure would feature two bays divided by an internal wall. The combined footprint of the building makes more efficient use of the limited available space. The building would be constructed as a pre-engineered metal building with galvanized framing members. The building would be setup similar to the existing structures, with an increased footprint.

4.5.4. Lab Building

The lab building superstructure will be replaced with a new galvanized metal building structure. The building replacement is dictated by the new geometry of the transfer conveyor. The existing drainage sump below the transfer and sampling equipment will remain. The new building will feature an expanded lab area. It is anticipated that much of the existing lab equipment could be re-used.

4.5.5. Motor Control Center

The MCC building is expected to remain. It is recommended to replace the motor control panels and equipment when the new drives and electrical components are installed. Replacement of the electrical components should include the existing primary transformer and panel located adjacent to the building.

4.5.6. Water and Sewer Improvements

New water and sewer service should be provided for each of the new buildings. Waterline improvements would be limited to connection of the new structures. The sewer system includes a septic system of unknown construction date which is expected to need to be replaced. The new office building will require a separate septic system due to its distance from the rest of the structures.

4.5.7. Site Improvements

A new perimeter security fence and security gate is recommended to control access to the facility. New paving will be applied along the west side of the site where the buildings are being replaced. The access road does not appear to be in need of re-paving; however, maintenance of the road should be considered once truck traffic increases.

4.5.8. Fuel Storage Tanks

Removal of the fuel storage tanks is not necessary to accommodate the considered improvements. The fuel storage tanks may be removed or left in place for future use. With the increase in truck traffic to Skagway a dedicate truck fuelling facility at the SOT has the potential to generate additional revenue and create more jobs. Future use of the fuel storage tanks is not considered in the conceptual layout figures and is not reflected in the opinion of probable construction cost.

5. Cost Projections

5.1. Considered Improvements

An opinion of probable construction cost was developed for the considered site improvements, including the radial loader configuration. The opinion of probable construction cost is a Class 5 estimate consistent with AACE International 56R-08 having an accuracy range between -30% to +50% with a confidence interval of 90%. The total estimated construction cost is $25 MM to $53.6MM ($2021).

6. Economics

6.1. Market

The 2013 *Skagway Ore Terminal Development Plan* identified five mining projects in the Yukon with the potential to ship concentrates or ore to Skagway: Casino, Wellgreen, Selwyn, Whitehorse Copper Tailings Reprocessing and Reclamation and Tulsequah Chief. At the time, all five projects had approached AIDEA about using the SOT to ship ore products. Other potential mines include the Kude Ze Kayah and Silvertip projects.

6.1.1. Casino Mine Project - Western Copper and Gold Corporation

The Casino Mine Project, proposed by Western Copper and Gold Corporation, is a gold-silver-copper-molybdenum deposit located approximately 190 miles northwest of Whitehorse. Extensive drilling on the property started in 1992 and a feasibility study was completed in January of 2013 that predicts an internal rate of return for the project of 20.1%. This would be an open-pit mine with about a 22-year life. The mill would produce up to 450,000 tonnes of concentrate per year, averaging approximately 250,000 tonnes per year. There is no firm date to begin construction of the mine.

6.1.2. Wellgreen Project - Prophecy Platinum Corporation

The Wellgreen Project is located approximately 20 miles northwest of Burwash Landing near milepost 1110 on the Alaska Highway. It is a complex ore that will contain nickel, copper, cobalt, gold, platinum, and palladium in the concentrate. The deposit was discovered in 1952, has had many owners since that time and saw minor production in 1972/73. Prophecy Resources acquired the property in 2010. The Preliminary Assessment was based upon a 32,000 tonnes per day mill rate to yield approximately 57,000 tpy of concentrate. There is currently no firm start-up date.

6.1.3. Selwyn Project - Selwyn Chihong Mining Ltd.

The Selwyn Project is a large lead-zinc deposit located approximately 220 miles northeast of Whitehorse and approximately 479 road miles from the SOT or approximately 142 miles closer than trucking to Stewart. Exploration of this deposit began in 1973 and was acquired by Selwyn Resources Ltd. in 2005. Selwyn Chihong Mining Ltd. was formed as a joint venture in 2010 to advance the project. Despite the large size and relatively high grade of the deposit, long transportation distances, remote location and the attendant high development and operating cost have challenged project development. The current operation is envisioned at a 3,500 tonnes per day production rate to yield approximately 350,000 tpy of concentrate. The project appears to still be in advanced exploration with no announced start-up date.

6.1.4. Whitehorse Copper Tailings Reprocessing and Reclamation Project - Eagle Industrial Minerals Corporation

The Whitehorse Copper Tailings Reprocessing and Reclamation Project proposes the reprocessing of iron ore tailings at the Whitehorse Copper Mine site near the Mt. Sima Road in the Yukon Territory. Magnetite, which was not originally mined at the Whitehorse Copper Mine, would be extracted from existing tailings, and trucked to the SOT. Eagle Industrial Minerals Corporation is proposing to process 12,000 tons of tailings per day, for six to seven months during periods of snow free conditions, producing up to 350,000,000 tons per year of magnetite ore over an estimated mine life of up to seven years. There is no know start-up date for this project.

6.1.5. Tulsequah Chief Project - Chieftain Metals Inc.

The Tulsequah Chief project is located approximately 50 miles south of Atlin, BC and about 100 miles northwest of Telegraph Creek, BC. The deposit was discovered in the early 1900's and has been under exploration and development since 1928, including production of approximately 575,000 tons of ore by

Cominco in the late 1940s and early 1950s. The deposit is a high-grade lead-zinc-copper-silver-gold deposit. A feasibility study completed in 2012 is based upon an underground mine with an ore production rate of 2,000 tons per day to yield 80-120,000 tonnes of concentrates a year. The project was unsuccessful in obtaining a permit to construct a road to Atlin, B.C. It seems unlikely this mine will produce concentrates to be shipped through the SOT.

6.1.6. Kude Ze Kayah (KZK) Project - BMC Minerals

This is a zinc, silver, copper, gold, and lead project located 115 km south of Ross River and 150 km north of the Alaska Highway in South Central Yukon. The project is currently undergoing an Executive Committee Screening Assessment with the Yukon Environment and Socio-Economic Assessment Board. The Draft Screen Report contains a recommendation to proceed subject to 16 recommended mitigations measures and 4 monitoring measures. It is currently projected that the mine will produce on average 150,000 tonnes of concentrate with a mine-life of 9 years. The plan is to ship the concentrates through Stewart, BC. The SOT is approximately 130 km closer to the mine than Stewart. The project is still in the exploration phase with no firm start-up date.

6.1.7. Silvertip Project - Coeur Mining

Silvertip is a silver-zinc-lead underground mine located in northern British Columbia just west of Watson Lake, B.C. 25 km south of the Alaska Highway. The site was first drilled in 1957. Coeur ceased operating the mine in 2020 due to world economic conditions. Coeur is planning a steady state mining rate of 365,000 tonnes of ore a year. Despite being about 180 km closer to Skagway, the mine has been shipping its concentrate through Stewart, B.C.

6.1.8. Minto Mine - Pembridge Resources

Minto Mine is a copper-gold-silver mine that has been commercially producing mineral concentrate since October 2007. The mine was previously owned by Minto Explorations Ltd., a wholly owned subsidiary of Capstone Mining Corporation. The mine has subsequently been acquired by Pembridge Resources. The mine was expanded twice since 2007, increasing throughput by more than 100%. Until recently this was an open pit mining operation with conventional crushing, grinding, and flotation to produce copper concentrates with significant gold and silver credits. In June 2012, results of the pre-feasibility study Phase VI were released and extended the estimated mine life to 2022. The mine is now producing 100% of the ore working underground.

Except for Minto, none of the mines listed above seem destined to generate ore or concentrates within the next 5-10 years. In URS's 2013 report *Skagway Ore Terminal Development Plan* (Table 09 Annual Throughput Projections), six of the above mines were projected to be producing mineral products by 2021, except for Minto, none have. At higher production rates, Coeur's Silvertip mine might consider Skagway rather than Stewart based on a 180 km (360 km round trip) shorter haul.

6.2. Transportation

The Klondike Highway has linked Skagway with Whitehorse since World War II. It is used by mining trucks, trucks supplying fuel and materials to Whitehorse, recreational vehicles, and for domestic travel. There is considerable bus traffic related to tourism during the summer months – May through September.

The Klondike Highway connects Skagway with Whitehorse and the Alaska Highway. Key points along the route include:

- U.S. Customs checkpoint at milepost (MP) 6.8.
- White Pass Summit at MP 14.3 (elevation of 3,292 feet).
- British Columbia, Canada (MP 14.7).
- Canadian Customs checkpoint is at MP 22.5.
- Yukon Territory, Canada (MP 49.2).

- Carcross is at MP 65.
- Alaska Highway at MP 97.7.

Whitehorse, the capital of the Yukon Territory, is 13.0 miles northwest of the Alaska and Klondike Highway intersection. The roadway section varies, but generally consists of two 12-foot lanes (one for each direction of travel) with two-foot shoulders. In Skagway, where the Klondike Highway turns into State Street, the roadway is 22 feet wide curb to curb.

Overall, the highway is in fair condition with safety features appropriate for the established speed limits. The speed limit in Skagway is 25 MPH increasing to 35 MPH beyond the Skagway River Bridge (after MP 1.8). The speed increases to 40 MPH from MP 3.0 to the Canadian Border. Roadway grades exceed 8.0% in several locations between Skagway and White Pass.

A bridge over the Skagway River at MP 1.8. has a 5 MPH speed restriction for vehicles weighing over 100,000 lbs. The design loading is MS18. The Capt. William Moore Creek Bridge, at MP 11.2 was recently replaced with an engineered fill adjacent to the bridge, which remains in place as a tourist overlook.

Upon departing or arriving in Skagway, trucks must use State Street to travel the 1.5 miles between the Port and the northeast end of town. By Skagway Municipal Code, trucks are not allowed on Main Street. State Street has a 25 MPH speed limit, minimal crosswalks, and no stop lights. The only stop sign on State Street appears directly at the Port.

The Yukon's closest access to the Pacific Ocean by road is at Haines and Skagway, Alaska, and Stewart, British Columbia; all three are ice-free. There are no bulk handling facilities in Haines. Stewart has been loading mineral concentrates from Coeur's Silvertip mine onto ships at the Stewart Bulk Terminal. The Stewart bulk terminal has a concentrate storage building and loader system; however, the details of the facility are not readily available. The Stewart World Port deep sea wharf, which was constructed c. 2015 is planned to include a concentrate storage building, conveyor system, and a traveling shiploader under future phases of development. Table 6-1 provides travel distances between the listed mines and Skagway or Stewart.

TABLE 6-1 TRAVEL DISTANCES

Travel Distances from Mine to Skagway, AK and Stewart, BC					
Mine	Northing	Easting	Distance To Skagway	Distance To Stewart	Remarks
Minto	62°37'20.44"N	137°13'36.84"W	265 miles (426 KM)	807 miles (1298 KM)	From town of Minto
Casino	62°44'19.38"N	138°49'49.99"W	265 miles (426 KM)	807 miles (1298 KM)	From town of Minto
Wellgreen	61°27'46.99"N	139°40'14.82"W	316 miles (508 KM)	854 miles (1375 KM)	From nearest point on Alaska Hwy (YT-1E)
Selwyn Chihong	62°34'54.01"N	129°35'29.50"W	479 miles (770 KM)	621 miles (1000 KM)	From nearest point Robert Campbell Hwy (YT-4E)
Whitehorse Copper Mine	60°38'21.46"N	135° 3'22.37"W	109 miles (176 KM)	651 miles (1048 KM)	
Tulsequah Chief	58°43'0.00"N	133°35'0.00"W	158 miles (254 KM) via barge	445 miles (716 KM) via barge	No roads near this site
Silvertip	59º 55' 34" N	130º 20' 27" W	301 miles (485 KM)	422 miles (680 KM)	
Kude Ze Kayah	61º 27' 24" N	130º 36' 02" W	434 miles (698 KM)	516 miles (831 KM)	

Copper concentrate currently being trucked from the Minto Mine arrives in 30-tonne tandem side-dump trailers (60 tonne total). The trailers have fabric covers over the load and are required to be washed prior to departing the SOT. The trucks cross the Yukon River during the ice-free summer months on a ferry and over an ice bridge during the winter. The ferry transports one truck at a time. The side-dumps are lined to prevent the load from freezing to the bed during the winter. There are periods during the spring and fall when trucking stops, awaiting the ice to go out in the spring, and waiting for the river to freeze in the fall. The Mine is about 50 miles northwest of Carmacks, Yukon and 265 miles from Skagway. Other ores or concentrates, for example lead and or zinc, may require the use of sealed shipping containers or pods.

The number of mining trucks entering Skagway depends on the volume of trucks the MOS will permit to travel through the city, mine production rates, and the number of trucking days per year. The actual amount each truck hauls per trip will vary based on factors including those unique to individual mining operations, road load limits, weather conditions, and the type of ore being hauled.

6.3. Shipping

It is anticipated that ores or concentrates will be shipped on Handymax bulk carriers with a capacity of about 40,000 tonnes; however, ships as small as 12,000 tonnes and as large as 50,000 tonnes may also be used. Smelters generally prefer uniformly spaced shipments. A maximum theoretical throughput of 750,000 tpy will require 19 – 40,000 tonne shipments, or one ship every 19 days year-around. It will be the responsibility of the mine to schedule the shipments. Where there is more than one tenant, the shipments would need to be coordinated between the mines and with cruise ship arrivals during the summer months.

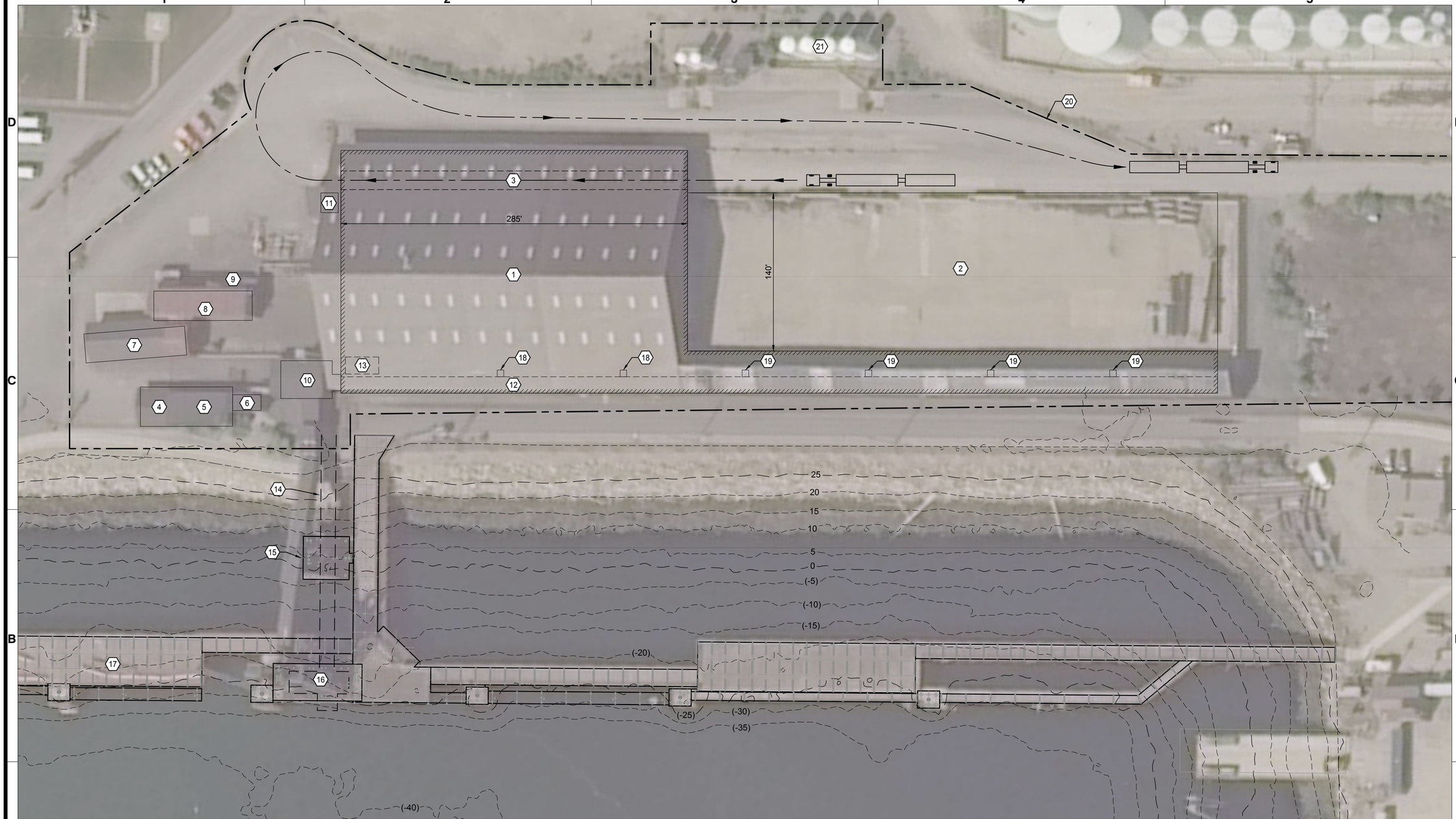
7. Recommendations

The following are the recommended improvements needed to expand the existing SOT to a theoretical maximum capacity of 750,000 tpy throughput:

- Replace the existing shiploader with a radial shiploader with an effective loading rate of 1100 - 1300 stph, including a new transfer conveyor from the concentrate storage building to the loader,
- Construct a new pile-supported loader platform and an intermediate conveyor support platform,
- Upgrade the existing reclaim conveyor to a capacity of 2000 stph,
- Based on a year-around shipping operation, add 220 feet by 150 feet of additional concentrate storage to the north and immediately adjacent to the existing concentrate storage building, including a new, covered truck offloading station,
- Replace the roofing and siding on the entire conveyor enclosure north of the existing storage concentrate storage building,
- Remove and replace the existing equipment wash and vehicle maintenance buildings,
- Construct new crew change and office buildings,
- Upgrade site utilities: electric, communications, water, and wastewater, and
- Upgrade site security.

The estimated construction cost of the above improvements is approximately $25 MM to $53.6MM ($2021), not including planning-level and construction contingencies. Once a decision is made to proceed with the expansion program, it will take about 3 years to design and construct the improvements, assuming there are no permitting or local issues that would impact the schedule.

Appendix A



SITE KEYNOTES

1. CONCENTRATE STORAGE BUILDING
2. CONCENTRATE STORAGE PAD / FOUNDATION
3. TRUCK UNLOADING AND WASHDOWN AREA
4. OFFICE
5. CREW CHANGE
6. MCC
7. MAINTENANCE SHOP
8. EQUIPMENT WASHDOWN AREA
9. WATER TREATMENT SKID
10. LAB BUILDING
11. WASH SKID AND CLEAN WATER SUMP
12. RECLAIM CONVEYOR IN BELOW GRADE GALLERY
13. CONVEYOR DUST EXTRACTOR BLOWER AND CONVEYOR CLEANUP VACUUM SKID
14. TRANSFER CONVEYOR
15. MID-SPAN TOWER
16. SHIPLOADER
17. ORE DOCK
18. RECLAIM FEEDER
19. RECLAIM FEEDER (FUTURE)
20. AIDEA LEASE AREA

EXISTING SITE CONDITIONS

SCALE: 1" = 40'

N

40' 0' 40' 80'

SCALE: 1"=40'

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

EXISTING SITE CONDITIONS

880 H STREET, STE 208
ANCHORAGE, AK 99501
907-677-7500
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Dwn by: RAC	Cad by: VS
Reviewed by: CB	M&N Project No.: 211077-01
Submitted by: SUBMITTER'S NAME MOFFATT & NICHOL	Drawing code:
	Drawing Scale: Plot scale: 1:1 (0 SHEET)

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FIG-1

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File: Q:\AK\211077-01\20 CADD_Active_exhibits\211077-01_FIG-1; Plotted: 6/23/2021 1:01 PM by CUPPLES, ROB; Saved: 6/23/2021 10:30 AM by RCUPPLES

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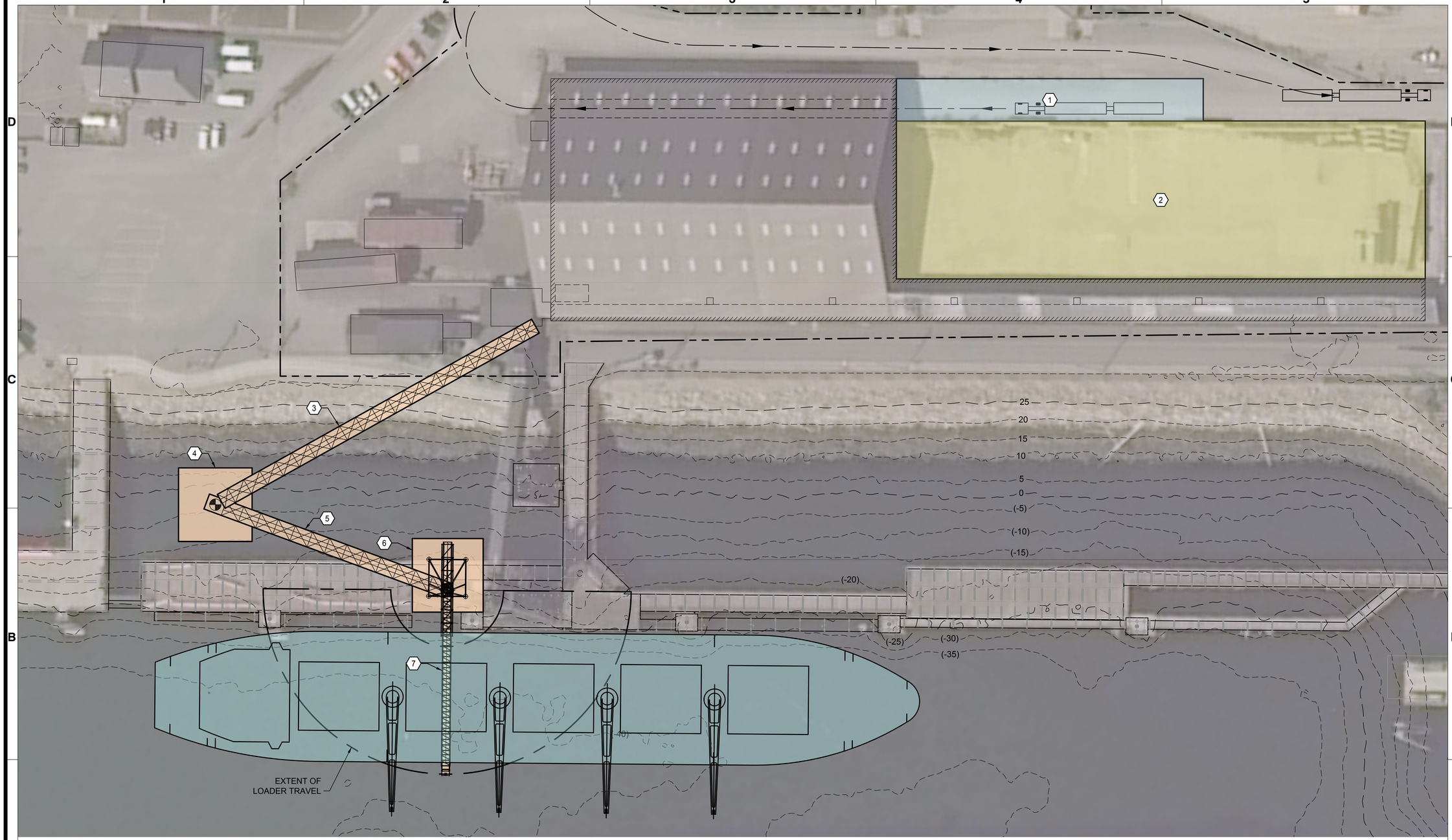

OPTION 1 - AGRICO SHIPLOADER

SCALE: 1" = 40'

NOTES:
1. SEE FIG-3 FOR SHIP LOADING PLANS.
2. SEE FIG-4 & FIG-5 FOR SHIP LOADING SECTIONS.

SITE KEYNOTES

1. 250LF ENCLOSED TRUCK UNLOADING EXTENSION
2. 70,000SF CONCENTRATE STORAGE BUILDING EXPANSION
3. TRANSFER CONVEYOR (300LF±)
4. 60'x60' MID-SPAN TOWER CONVEYOR SUPPORT PLATFORM
5. TRANSFER CONVEYOR (200LF±)
6. NEW 60'x60' LOADER PLATFORM
7. AGRICO SHIPLOADER

N

40' 0' 40' 80'

SCALE: 1"=40'

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

OPTION 1 - AGRICO
LOADER PLAN

Designed by: CB	Date: 5/21/2021
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Reviewed by: CB	Drawing code:
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FIG-2

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File: Q:\AK\211077-01\20 CADD_Active_exhibits\211077-01_FIG-2; Plotted: 6/23/2021 1:01 PM by CUPPLES, ROB; Saved: 6/23/2021 10:54 AM by RCUPPLES

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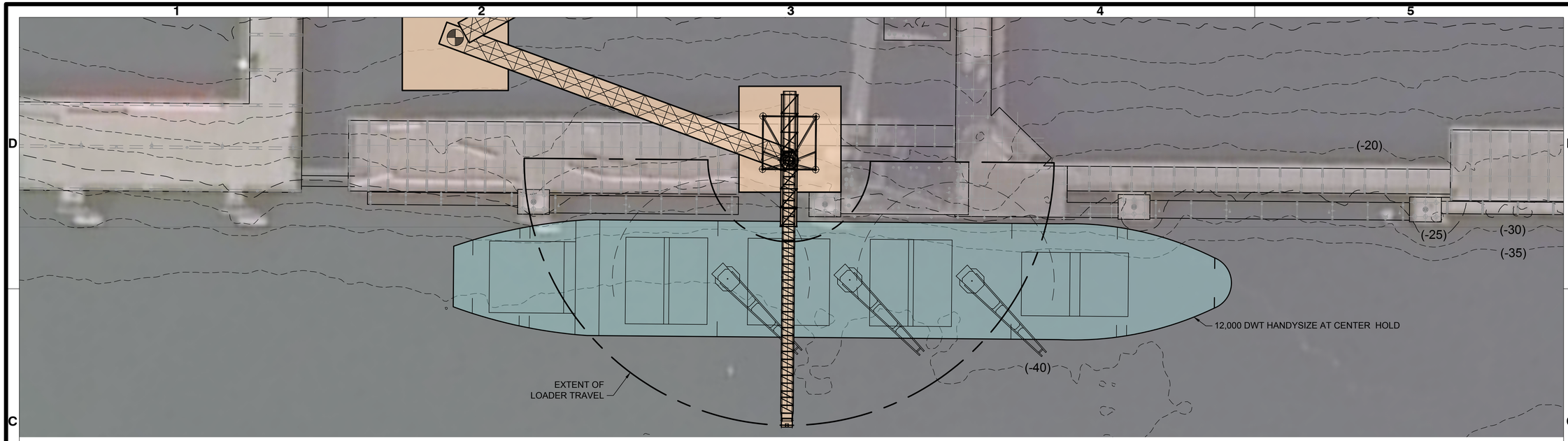
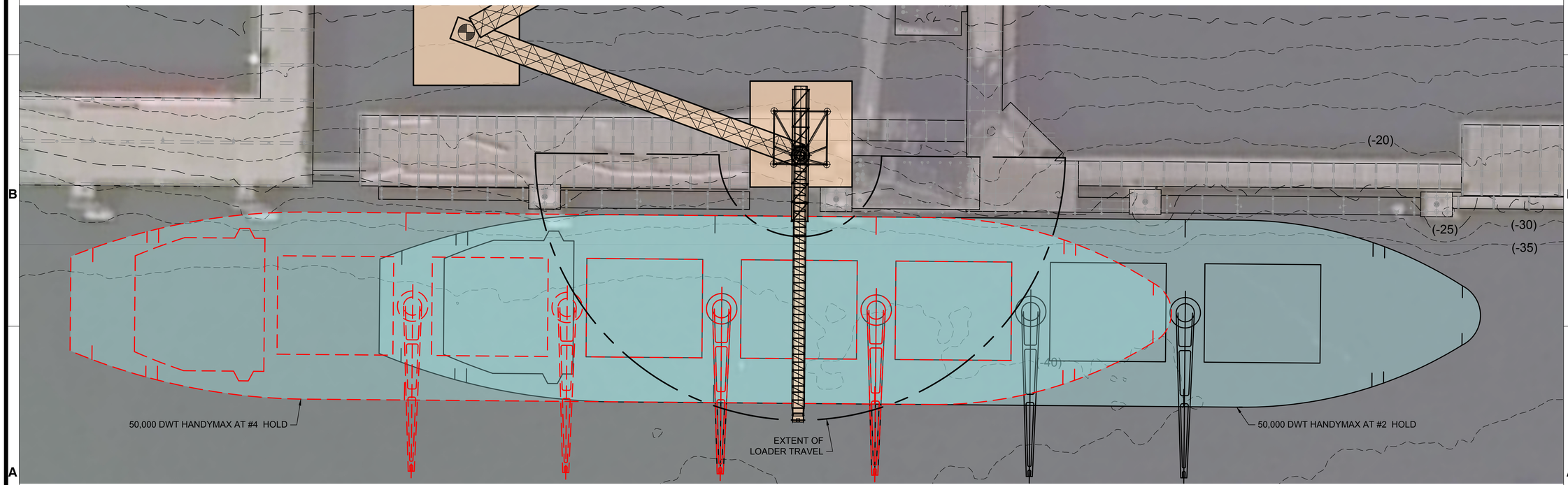


OPTION 1 - 12,000 DWT HANDYSIZE AT AGRICO SHIPLOADER

SCALE: 1" = 30'



OPTION 1 - 50,000 DWT HANDYMAX AT AGRICO SHIPLOADER

SCALE: 1" = 30'

30' 0' 30' 60'

SCALE: 1"=30'

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

OPTION 1 - SHIP LOADING PLAN

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Reference No.

FIG-3

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File: Q:\AK\211077-01\20 CADD\ Active\ exhibits\211077-01 FIG-3; Plotted: 6/23/2021 1:02 PM by CUPPLES, ROB; Saved: 6/23/2021 1:

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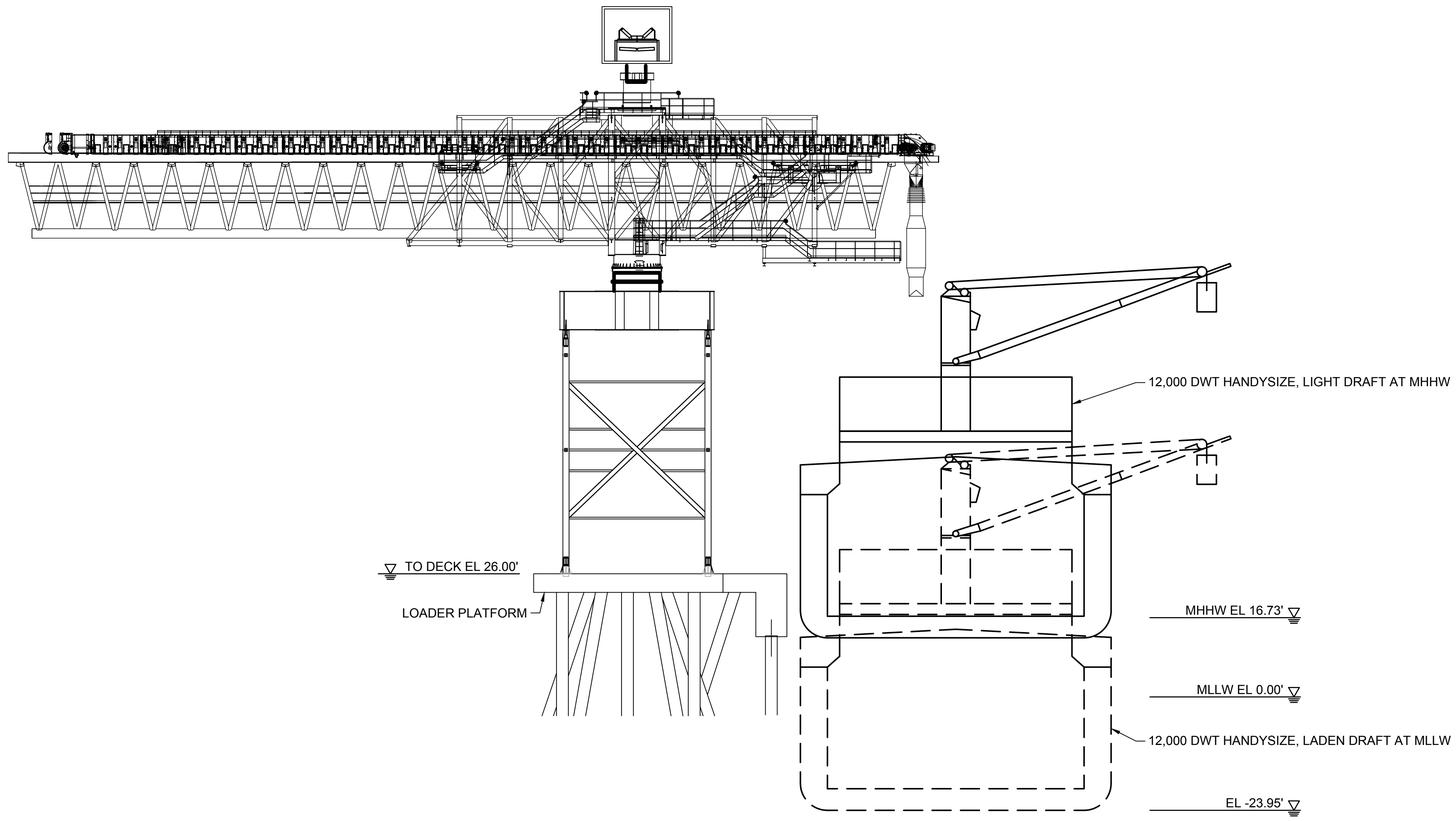

OPTION 1 - 12,000 DWT HANDYSIZE AT AGRICO SHIPLOADER SECTION

SCALE: 1" = 16'

16' 0' 16' 32'

SCALE: 1"=16'

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

OPTION 1 - SHIP LOADING SECTION

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Submitted by: SUBMITTER'S NAME MOFFATT & NICHOL		Drawing Scale: Plot scale: 1:1 (D SHEET)	

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Sheet Reference No.

FIG-4

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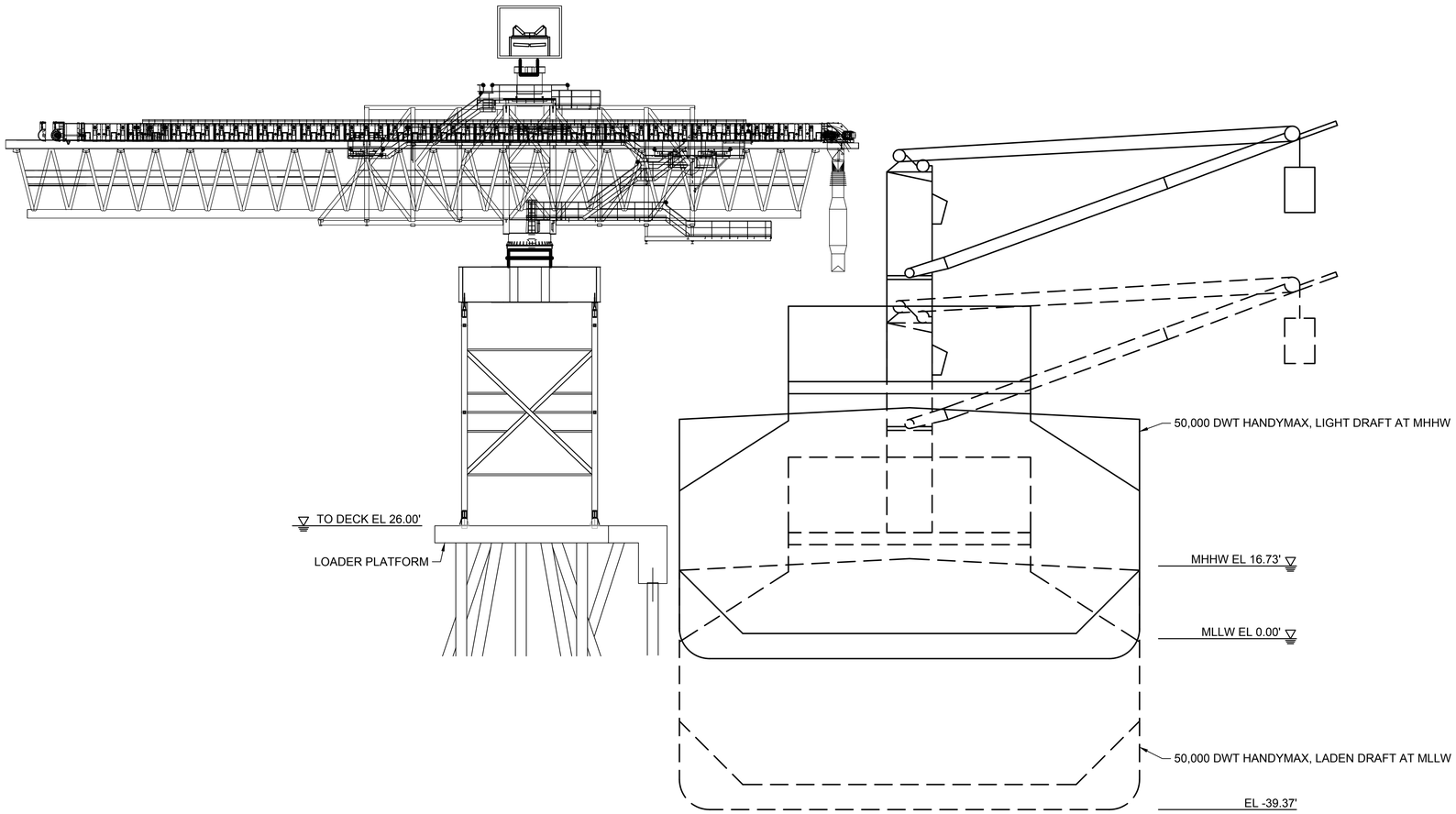

OPTION 1 - 50,000 DWT HANDYMAX AT AGRICO SHIPLOADER SECTION

SCALE: 1" = 16'

16' 0' 16' 32'

SCALE: 1"=16'

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

OPTION 1 - SHIP LOADING SECTION

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Date:	5/21/2021
M&N Project No.	211077-01
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Drawing Scale:	Plot scale: 1:1 (D SHEET)
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Ckd by:	VS
Reviewed by:	CB
Submitted by:	SUBMITTER'S NAME MOFFATT & NICHOL

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FIG-5

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File: C:\AK\211077-01\20 CADD_Active_exhibits\211077-01 FIG-5; Plotted: 6/23/2021 1:03 PM by CUPPLES, ROB; Saved: 6/23/2021 10:52 AM by RCUPPLES

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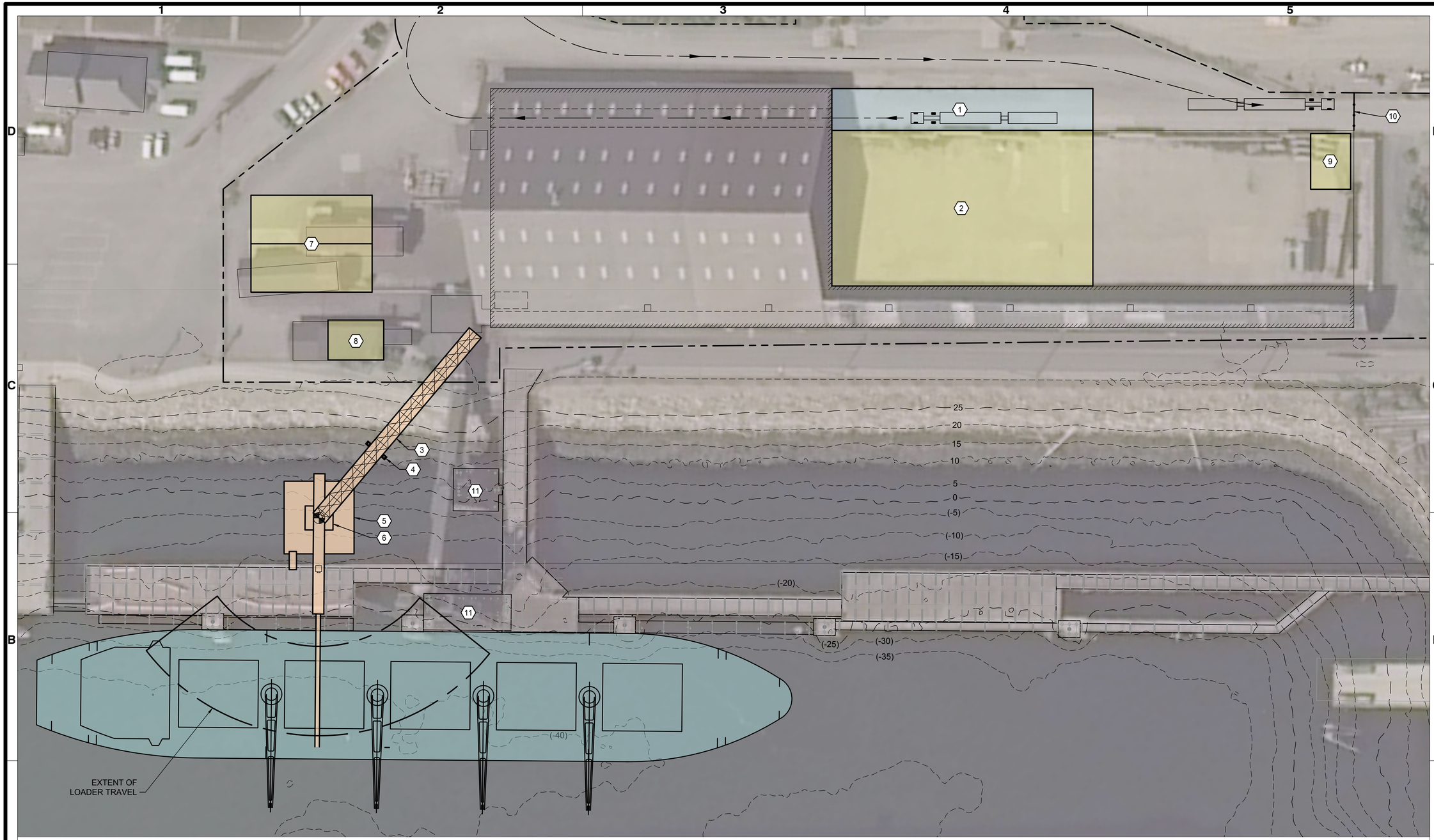

OPTION 2 - RADIAL SHIPLOADER

SCALE: 1" = 40'

SITE KEYNOTES

1. 215LF ENCLOSED TRUCK UNLOADING EXTENSION
2. 28,000SF CONCENTRATE STORAGE BUILDING EXPANSION
3. TRANSFER CONVEYOR (200LF±)
4. TRANSFER CONVEYOR SUPPORT
5. RADIAL SHIPLOADER
6. 60'x60' LOADER PLATFORM WITH 6'x15' CATWALK
7. 8,000SF COMBINATION WASHDOWN AND MAINTENANCE BUILDING
8. 1,500SF CREW CHANGE BUILDING
9. 1,500SF OFFICE BUILDING
10. SECURITY GATE
10. EXISTING PLATFORMS TO REMAIN

NOTES:
1. SEE FIG-7 FOR SHIP LOADING PLANS.
2. SEE FIG-8 FOR SHIP LOADING SECTIONS.

N

40' 0' 40' 80'

SCALE: 1"=40'

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

OPTION 2 - RADIAL LOADER PLAN

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FIG-6
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File: Q:\AK\211077-01\20 CADD\ Active\ exhibits\211077-01 FIG-6; Plotted: 6/23/2021 1:03 PM by CUPPLES, ROB; Saved: 6/23/2021 10:56 AM by RCUPPLES

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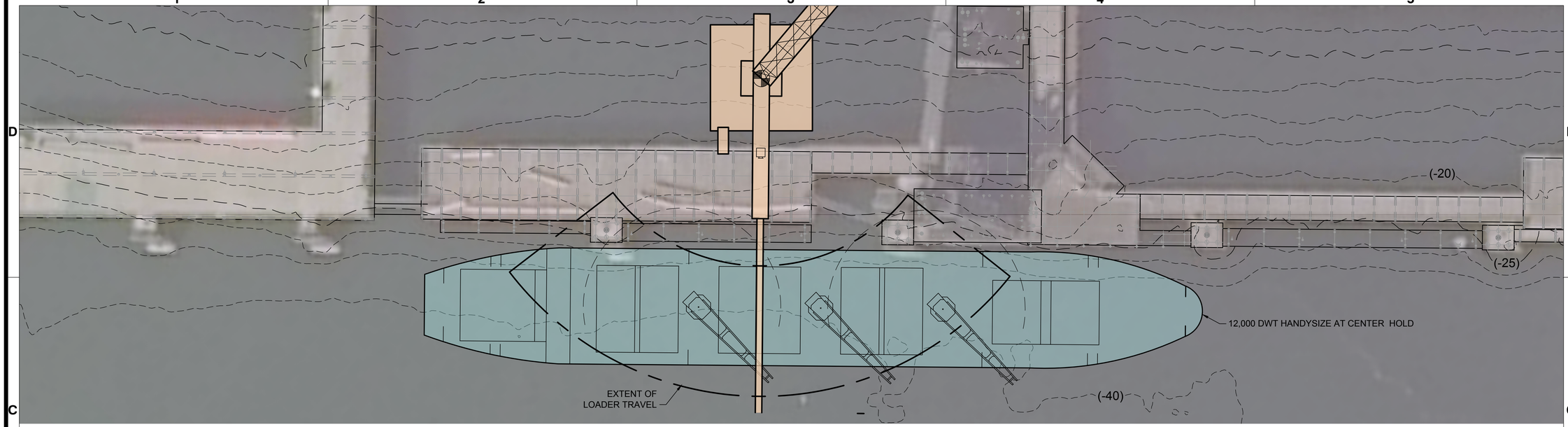
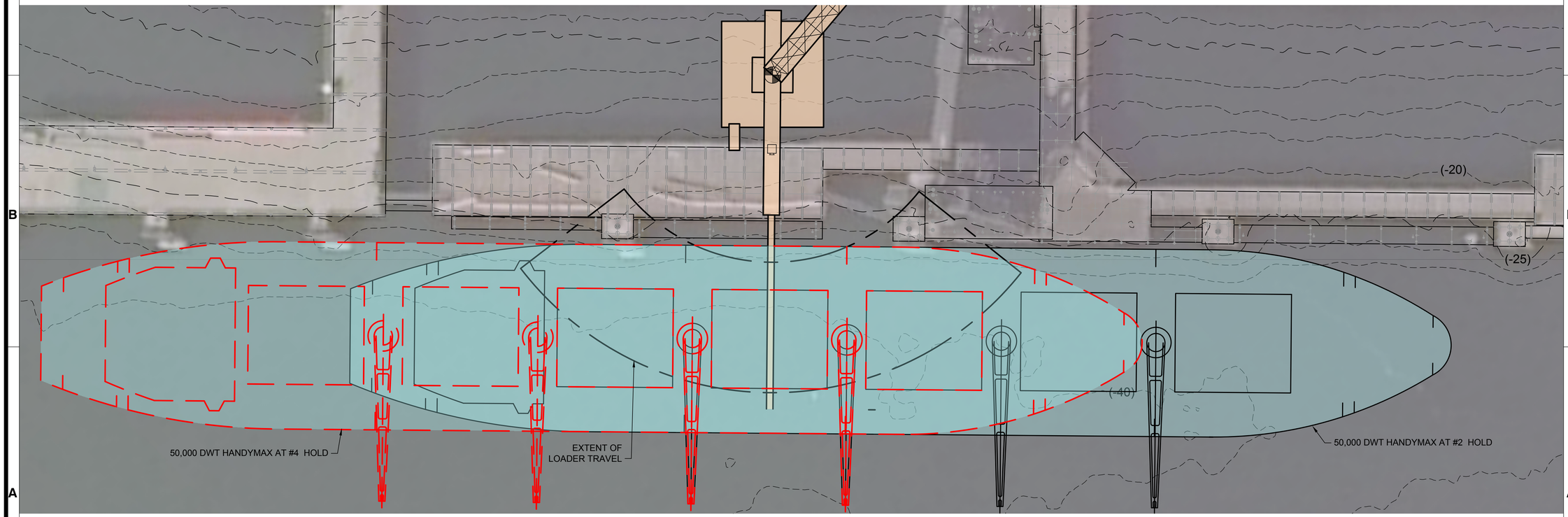


OPTION 2 - 12,000 DWT HANDYSIZE AT RADIAL SHIPLOADER

SCALE: 1" = 30'



OPTION 2 - 50,000 DWT HANDYMAX AT RADIAL SHIPLOADER

SCALE: 1"=30'

30' 0' 30' 60'

SCALE: 1"=30'

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

OPTION 2 - SHIP LOADING PLAN

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FIG-7

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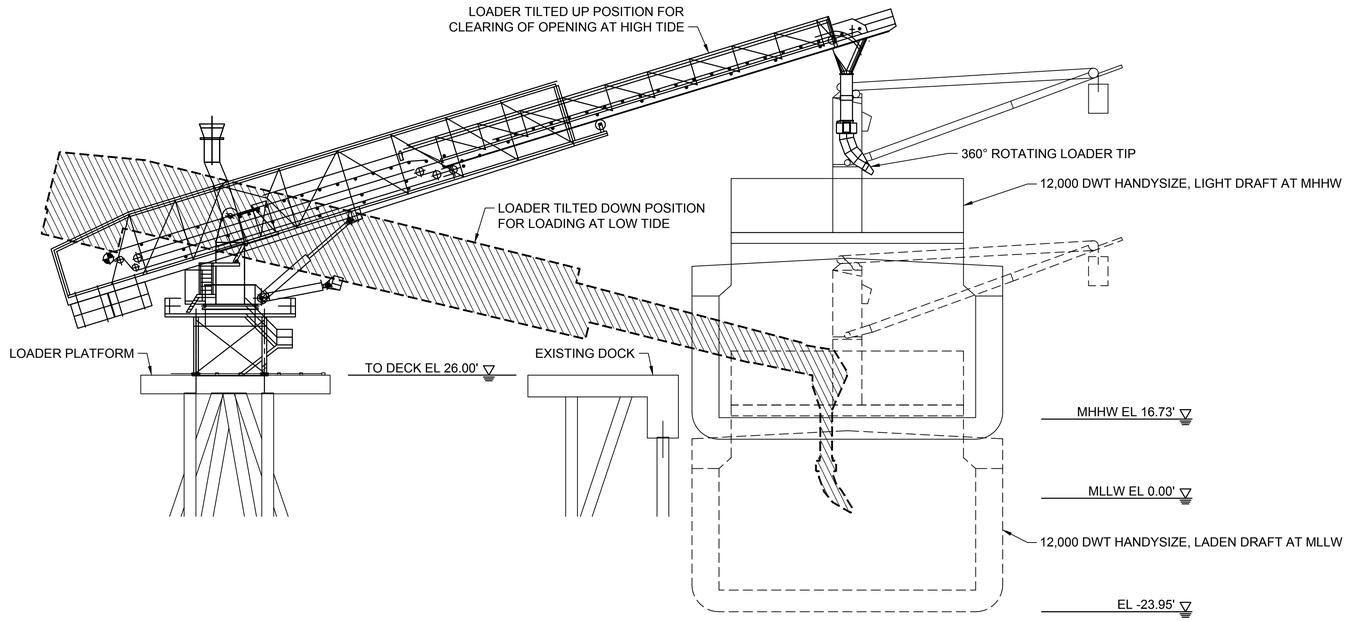
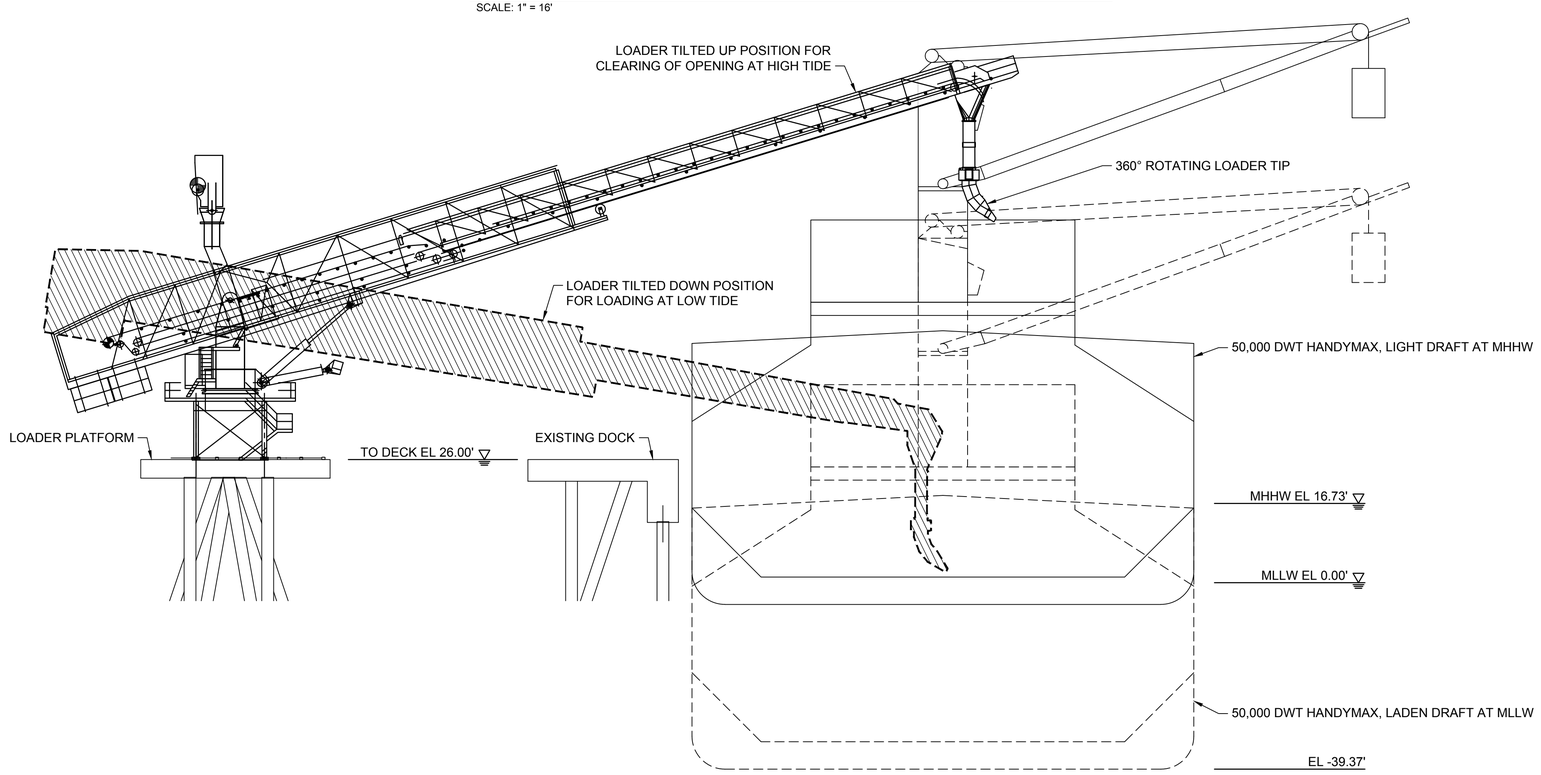


OPTION 2 - 12,000 DWT HANDYSIZE AT RADIAL SHIPLOADER SECTION

SCALE: 1" = 16'



OPTION 2 - 50,000 DWT HANDYMAX AT RADIAL SHIPLOADER SECTION

SCALE: 1" = 16'

16' 0' 16' 32'

SCALE: 1"=16'

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

OPTION 2 - SHIP LOADING SECTIONS

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Sheet Reference No.

FIG-8

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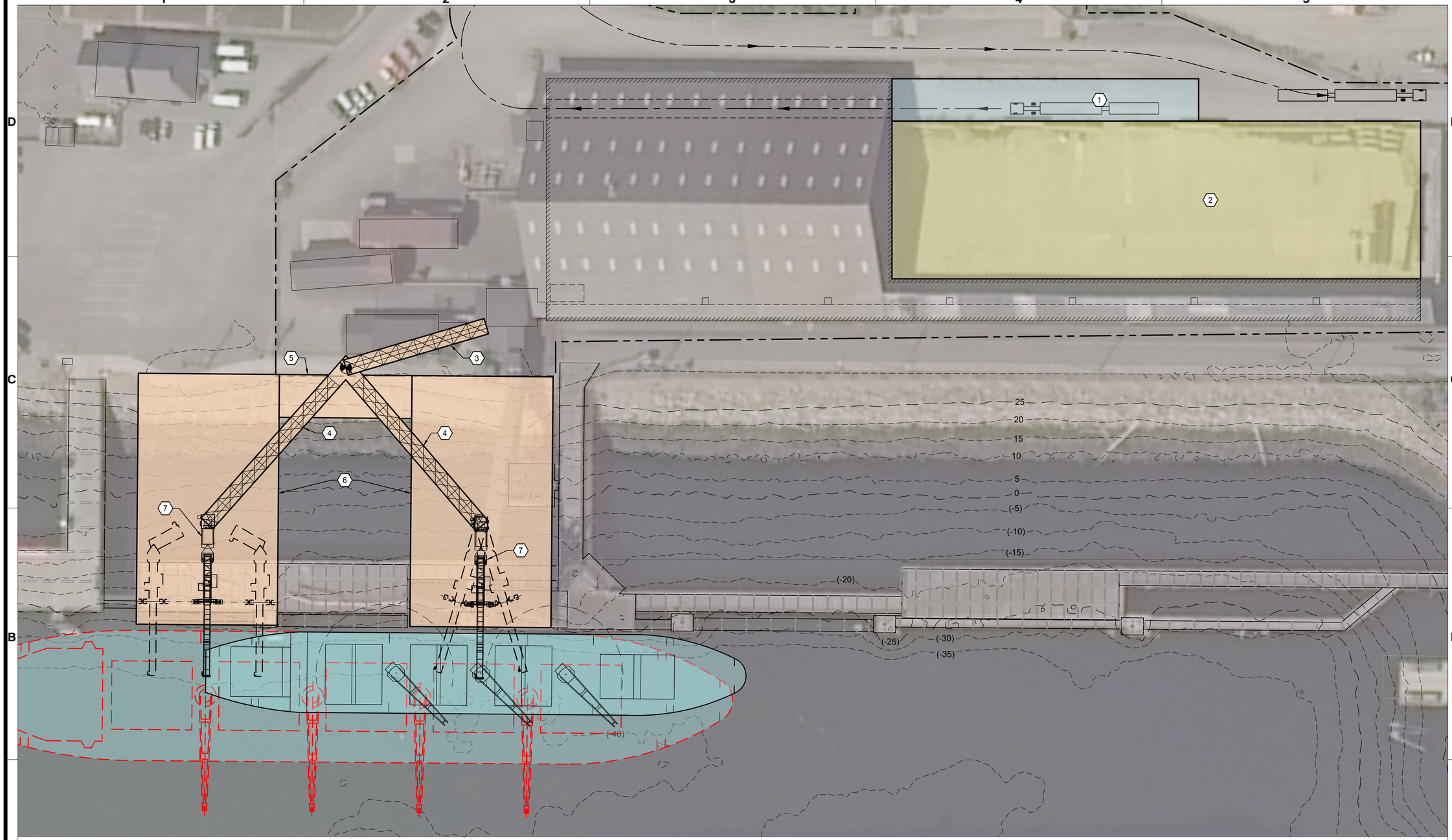
DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



OPTION 3 - MOBILE SHIPLOADER

SCALE: 1" = 40'

NOTES:

1. SEE FIG-10 FOR SHIP LOADING SECTIONS.

SITE KEYNOTES

1. 250LF ENCLOSED TRUCK UNLOADING EXTENSION
2. 70,000SF CONCENTRATE STORAGE BUILDING EXPANSION
3. TRANSFER CONVEYOR (120LF±)
4. TRANSFER CONVEYOR (170LF±)
5. 110'x35' DOCK EXPANSION
6. 115'x205' MOBILE SHIPLOADER DOCK
7. MOBILE SHIPLOADER

N

40' 0' 40' 80'

SCALE: 1"=40'

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

OPTION 3 - MOBILE SHIPLOADER

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Submitted by: SUBMITTER'S NAME MOFFATT & NICHOL	Drawing code:
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Sheet Reference No.

FIG-9

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File: Q:\AK\211077-01\20 CADD\ Active\ exhibits\211077-01_FIG-9; Plotted: 6/23/2021 1:05 PM by CUPPLES, ROB; Saved: 6/23/2021 10:58 AM by RCUPPLES

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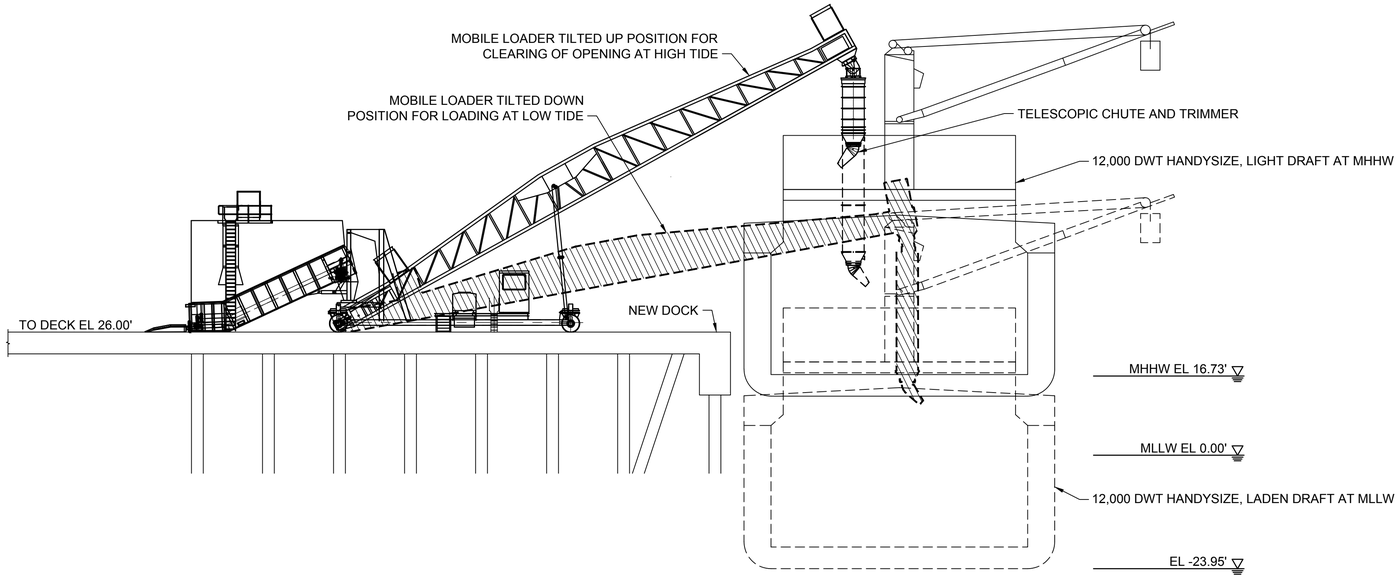
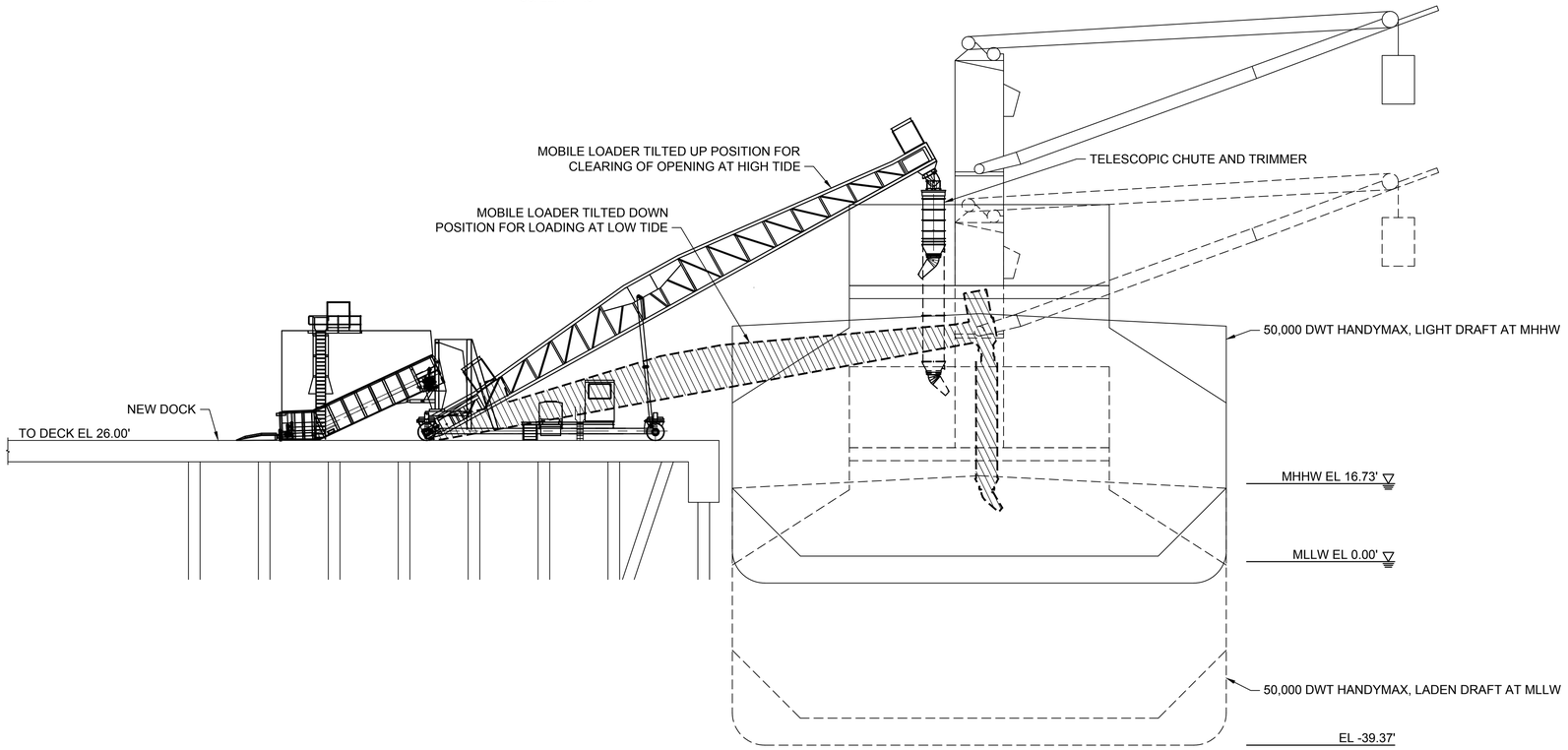


OPTION 3 - 12,000 DWT HANDYSIZE AT MOBILE SHIPLOADER SECTION

SCALE: 1" = 16'



OPTION 3 - 50,000 DWT HANDYMAX AT MOBILE SHIPLOADER SECTION

SCALE: 1" = 16'

16' 0' 16' 32'

SCALE: 1"=16'

Mark	Description	Date	Appr.

SKAGWAY ORE TERMINAL IMPROVEMENT

OPTION 3 - SHIP LOADING SECTIONS

Designed by: CB	Cad by: VS	Date: 5/21/2021	Rev. REVNO
Drawn by: RAC		M&N Project No. 211077-01	
Reviewed by: CB		Drawing code:	
Submitted by: SUBMITTER'S NAME MOFFATT & NICHOL		Drawing Scale: Plot scale: 1:1 (0 SHEET)	

880 H STREET, STE 208
ANCHORAGE, AK 99501
907-677-7500
moffatt & nichol

SEAL

Sheet Reference No.

FIG-10

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DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING