

Ted Stevens Anchorage International Airport

2014 MASTER PLAN UPDATE

APPENDIX J - COST ESTIMATE

FINAL
DECEMBER 2014

RS&H

IN ASSOCIATION WITH:

HDR

DOWL HKM

RIM Architects

ATAC



Photo credit: Vanessa Bauman



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ANCHORAGE INTERNATIONAL AIRPORT
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Prepared for:
Ted Stevens Anchorage International Airport
State of Alaska Department of Transportation & Public Facilities

Prepared by:

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PREFACE

The Ted Stevens Anchorage International Airport (Airport) Master Plan Update (Master Plan Update) provides Airport management and the Alaska Department of Transportation & Public Facilities (DOT&PF) with a strategy to develop the Ted Stevens Anchorage International Airport. The intent of the Master Plan Update is to provide guidance that will enable Airport management to strategically position the Airport for the future by maximizing operational efficiency and business effectiveness, as well as by maximizing property availability for aeronautical development through efficient planning. While long-term development is considered in master planning efforts, the typical planning horizon for the Master Plan Update is 20 years.

The Federal Aviation Administration provides guidance for Master Plan development in *FAA Advisory Circular 150 / 5070-6B, Airport Master Plans*. Although not required, the Advisory Circular strongly recommends airports prepare a Master Plan. Funding for the Master Plan Update is provided primarily by the Federal Aviation Administration through an Airport Improvement Program grant.

A comprehensive Master Plan Update was last prepared in 2002 and a partial update was undertaken between 2006 and 2008. This Master Plan Update was initiated in June 2012 and concluded in December 2014. The DOT&PF entered into a contract with the firm RS&H to lead this effort. The Master Plan Update included a robust public and stakeholder involvement program.

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Appendix J – Cost Estimates

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Acronyms and Abbreviations

AC	Advisory Circular
ADAPT	Annual Delay and Activity Performance Times
ADG	Airplane Design Group
AIAS	Alaska International Airport System
Airport	Ted Stevens Anchorage International Airport
AOA	Air Operations Area
ARFF	Aircraft Rescue and Fire Fighting
ATCT	Airport Traffic Control Tower
Coastal Trail	Tony Knowles Coastal Trail
DOT&PF	Alaska Department of Transportation and Public Facilities
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulation
GRE	Ground Run-up Enclosure
ICAP	Indirect Cost Allocation Program
Master Plan Update	Ted Stevens Anchorage International Airport Master Plan Update
MOA	Municipality of Anchorage
NEPA	National Environmental Policy Act
OAIASS	Optimize AIAS Strategy
RAP	Recycled Asphalt Pavement
RON	Remain Overnight
STEP	South Terminal Expansion Project

SECTION I INTRODUCTION AND PURPOSE

The purpose of this Appendix is to document the cost estimates, prepared at a rough order of magnitude or planning level, for the recommended Ted Stevens Anchorage International Airport (Airport) Master Plan Update (Master Plan Update) projects as documented in Chapter 6, Implementation Plan. These order of magnitude cost estimates were considered in the development of the implementation plan for the recommended Master Plan Update projects and the Airport Capital Improvement Plan (or spending plan). These cost estimates are meant to help facilitate future planning, environmental documentation, design, and construction efforts and their funding.

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SECTION 2 ORDER OF MAGNITUDE TOTAL COST ESTIMATES

The recommended Airport Master Plan Update projects are listed in Table 1 by the year of their potential land acquisition, implementation, or construction year, along with their total estimated costs (in 2013 dollars). The potential acquisition / implementation / construction year presented for each project is determined based on forecast demand. The actual year each project will be implemented will be based on actual demand.

Total estimated costs account for costs potentially borne by the Airport and include advanced planning, environmental documentation, design, and construction activities. Total estimated costs also account for land acquisition, equipment, and material costs. For some of the recommended Master Plan Update projects, cost estimates were previously prepared by Airport staff. Where this was the case, the order of magnitude costs estimates, as determined by Airport staff, were used.

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Table I Recommended Master Plan Update Projects and Total Estimated Costs

The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

Potential Policy / Construction Implementation Year	Project Element	Description	Estimated Total Cost (in 2013 dollars)	Federal FAA Funds (in 2013 dollars)	Local Airport Funds (in 2013 dollars)	Funded By Others (in 2013 dollars)
Ongoing	South Terminal Expansion Project (STEP) Activity Monitoring	This project includes monitoring passenger level of service, airline needs, cargo carrier needs, and project costs to better determine when to initiate STEP.	\$50,000	\$0	\$50,000	\$0
Ongoing	Annual Delay and Activity Performance Times (ADAPT) Monitoring	This project includes monitoring aircraft delay. This analysis is necessary in order to determine the need for an additional north / south runway and / or other efficiency enhancements.	\$200,000	\$175,520	\$24,480	\$0
Ongoing	Optimize Alaska International Airport System Strategy (OAIASS)	This project includes Airport / airline coordination to develop a strategy for enhanced use of AIAS system assets (e.g., Airport and Fairbanks International Airport).	\$50,000	\$0	\$50,000	\$0
2015	Modification of the Preferential Runway Use Program (environmental documentation / policy change)	Modify the existing Airport Preferential Runway Use Program, Compendium of Operational Orders, and ATCT Standard Operating Procedures. The change would allow deviations from the preferred runway use to avoid unacceptable departure delays during daytime hours (7a.m. - 10 p.m.). The project includes potential NEPA documentation for modification of the preferential runway use program at the Airport (if considered a Federal action).	\$250,000	\$219,400	\$30,600	\$0
2015	Aircraft Rescue and Fire Fighting (ARFF) Training Facility (final site selection / environmental documentation / design / construction)	The project includes final site selection, potential NEPA documentation, design, and construction of an ARFF training facility with one burn pit located west of the South Airpark to replace the existing ARFF hydrocarbon fuel burn pit, meet applicable environmental regulations, and ensure conformance with applicable FAA AC's and FAR Part 139.	\$12,533,334	\$10,999,254	\$1,534,080	\$0
2015 - 2016	STEP (advanced planning / environmental documentation) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	STEP includes construction of a new South Terminal concourse with five new gates at the South Terminal to accommodate domestic and international operations and demolition of the North Terminal concourse. The advanced planning effort (an in-depth requirements and phasing analysis) will assess the impacts to domestic and international passenger flows, space allocations and impacts to airlines, impacts of construction activity on airport operations, impacts on apron areas and finalize phasing prior to design. Coordination between construction activity and Airport operations would also be considered during advanced planning. NEPA documentation may also be required.	\$1,070,000	\$939,032	\$130,968	\$0
2016	Hotel Site Development	The project includes development of a hotel near the North Terminal passenger processor. This project would be initiated by a private developer / tenant through an Airport issued Request for Proposal.				<i>Cost of project borne by developer/ tenant</i>

Note: The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

Table 1 Recommended Master Plan Update Projects and Total Estimated Costs (contd.)

The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

Potential Policy / Construction Implementation Year	Project Element	Description	Estimated Total Cost (in 2013 dollars)	Federal FAA Funds (in 2013 dollars)	Local Airport Funds (in 2013 dollars)	Funded By Others (in 2013 dollars)
2018	Ground Run-up Enclosure (GRE) (site selection / environmental documentation / design / construction)	The project includes site selection, potential NEPA documentation, design, and construction of a GRE to mitigate noise generated during routine aircraft maintenance, decreasing noise impacts to the surrounding community.	\$6,000,000	\$5,265,600	\$734,400	\$0
2018	"Papa" Remain Overnight (RON) Apron Expansion and Postmark Bog Development (environmental documentation / design / construction)	The project includes potential NEPA documentation, design, and construction for expanding the "Papa" RON apron by adding five additional A380-capable parking positions, extending Taxilane P, and constructing a new taxilane south of Taxilane P. The project also includes expanding the Postmark Bog area. NEPA documentation, design and construction for the Postmark Bog development would be undertaken by the developer / tenant. The cost for expanding and developing the Postmark Bog area is anticipated to be borne by the developer / tenant, and not reflected in the presented cost estimates. Earthwork costs (e.g., fill) are excluded. The cost estimates presented only reflect the cost for the "Papa" RON apron.	\$47,995,000	\$42,120,412	\$5,874,588	\$0
2018	STEP (design) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	The project includes the design for the STEP.	\$29,386,000	\$0	\$29,386,000	\$0
2018 - 2020	Runway 15-33 Widening and Decoupling, Taxiway R Extension, Taxiway Q Realignment, Taxiway Q1 Construction (environmental documentation / design / construction)	The project includes potential NEPA documentation, design, and construction for the 1) widening of Runway 15-33, 2) decoupling of Runway 33 to eliminate the intersection with Runway 7L-25R and overlapping RSAs, 3) extension of Taxiway R to the Runway 15 end, 4) realignment of Taxiway Q, and 5) construction of Taxiway Q1.	\$85,120,000	\$74,701,312	\$10,418,688	\$0
2019	East / West Parallel Taxiway and South Airpark Development (environmental documentation / design / construction) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	This project includes potential NEPA documentation, design, and construction for an extension of the East / West Parallel Taxiway (ADG-VI) to the east and west and for South Airpark development. NEPA documentation, design and construction would be undertaken by the developer / tenant. The cost for developing the existing South Airpark area (Kulis Business Park and in vacant areas along the north / south portion of Taxiway Z) is anticipated to be borne by the developer / tenant, and not reflected in the presented cost estimates.	\$15,950,000	\$13,997,720	\$1,952,280	\$0
2019	STEP Phase 1 (construction) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	The project includes construction of STEP. This includes 1) relocating R2, R3, and R4 aircraft parking positions, 2) securing any necessary permits / clearances, 3) relocating passenger operations impacted by STEP temporarily to the North Terminal, and 4) constructing a new South Terminal concourse.	\$65,269,475	\$17,566,408	\$47,703,067	\$0

Note: The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

Table I Recommended Master Plan Update Projects and Total Estimated Costs (contd.)

Potential Policy / Construction Implementation Year	Project Element	Description	Estimated Total Cost (in 2013 dollars)	Federal FAA Funds (in 2013 dollars)	Local Airport Funds (in 2013 dollars)	Funded By Others (in 2013 dollars)
2020	Land Acquisition (land acquisition) <i>The land to the west of the Airport may be acquired through purchase from or trade with the Municipality of Anchorage and other owners.</i>	The project would provide opportunity for land acquisition for the future development of the West Airpark via a land trade with the MOA or purchase from the MOA or other owners.		<i>Cost to be determined if/ when necessary.</i>		
2020	Fuel Farm Expansion (design / construction)	The project includes design and construction of a tenant initiated fuel farm expansion. Design and construction would be undertaken by the developer / tenant. The cost for expanding the fuel farm is anticipated to be borne by the developer / tenant.		<i>Cost of project borne by developer/ tenant</i>		
2020	Fairbanks International Airport Improvements (planning / environmental documentation / design / construction) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i> <i>The project would accommodate a transfer of at least 50% of the technical cargo stop operations at Anchorage International Airport.</i>	The project includes planning, potential NEPA documentation, design, and construction for necessary improvements at Fairbanks International Airport. This project would be sponsored and funded by Fairbanks International Airport.		<i>Cost of project borne by Fairbanks International Airport</i>		
2020	Master Plan Update	The Master Plan Update is anticipated to validate previous Master Plan Update findings and update the implementation timeline for Airport development, including the potential north / south runway.	\$1,000,000	\$877,600	\$122,400	\$0
2020 - 2034	Crossfield Taxiways Realignment (environmental documentation / design / construction) <i>Realignment of the crossfield taxiways would likely occur when Runway 7R-25L is reconstructed or when directed by FAA, whichever is sooner.</i>	The project includes potential NEPA documentation, design and construction to realign the crossfield taxiways perpendicular to the east-west runways in accordance with FAA standards (AC 150/5300-13A, Airport Design) and FAA coordination.	\$23,725,000	\$20,821,060	\$2,903,940	\$0
2021	STEP Phase 2 (construction) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	The project includes construction of STEP. This includes 1) relocating passenger operations to new South Terminal concourse, 2) demolishing the North Terminal concourse, and 3) upgrading the North Terminal processor.	\$37,652,966	\$3,304,424	\$34,348,542	\$0

Note: The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

Table I Recommended Master Plan Update Projects and Total Estimated Costs (contd.)

Potential Policy / Construction Implementation Year	Project Element	Description	Estimated Total Cost (in 2013 dollars)	Federal FAA Funds (in 2013 dollars)	Local Airport Funds (in 2013 dollars)	Funded By Others (in 2013 dollars)
2021	Potential North / South Runway (advanced planning / environmental documentation) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	The project includes advanced planning and potential NEPA documentation for a potential north / south runway and associated airfield improvements (e.g., taxiways, service roads, earthwork), and realignment of a contiguous Coastal Trail.	\$3,000,000	\$2,632,800	\$367,200	\$0
2021	New South Airpark Access Roadway (environmental documentation / design / construction)	The project includes potential NEPA documentation, design and construction of a roadway on the west side of the South Airpark to enable corporate and general aviation development at the west end of the existing South Airpark (near the north / south portion of Taxiway Z).	\$10,600,000	\$0	\$10,600,000	\$0
2022	STEP Phase 3 (construction) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	The project includes construction of STEP. This includes redeveloping the North Terminal apron for aircraft parking.	\$43,431,800	\$38,115,748	\$5,316,052	\$0
2024	North Airpark Roadway, Taxiway T Extension, and Eastward Expansion of the North Airpark (environmental documentation / design / construction)	This project includes potential NEPA documentation, design, and construction to include 1) construction of the North Airpark Roadway, 2) extension of Taxiway T, and 3) redevelopment / eastward expansion of the North Airpark for future development by tenants of the North Airpark. NEPA documentation and construction of the redevelopment / eastward expansion of the North Airpark would be undertaken by the developer / tenant. The cost for expanding and developing the North Airpark is anticipated to be borne by the developer / tenant, and not reflected in the presented cost estimates.	\$10,950,000	\$0	\$10,950,000	\$0
2025	North Airpark Northward Expansion	The project includes cargo development to the north of the existing North Airpark boundary and toward Point Woronzof Drive by tenants of the North Airpark. The project would be undertaken by the developer / tenant. The cost for expanding and developing the North Airpark is anticipated to be borne by the developer / tenant.		<i>Cost of project borne by developer / tenant</i>		
2025	Potential North / South Runway (design) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	The project includes design of a potential north / south runway, associated airfield improvements, and realignment of a contiguous Coastal Trail. Land acquisition costs are excluded.	\$118,512,100	\$104,006,219	\$14,505,881	\$0

Note: The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

**Table I Recommended Master Plan
Update Projects and Total
Estimated Costs (contd.)**

The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

Potential Policy / Construction Implementation Year	Project Element	Description	Estimated Total Cost (in 2013 dollars)	Federal FAA Funds (in 2013 dollars)	Local Airport Funds (in 2013 dollars)	Funded By Others (in 2013 dollars)
2027	Potential West Airpark Development (advanced planning / environmental documentation / design / construction) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	The project includes advanced planning, potential NEPA documentation, design, and construction for six A380-capable aircraft parking positions and associated taxiways in the West Airpark for the potential future development of the West Airpark. Advanced planning, NEPA documentation and construction of the West Airpark development would be undertaken by the developer / tenant. The cost for expanding and developing the West Airpark, excluding cargo parking positions, is anticipated to be borne by the developer / tenant, and not reflected in the presented cost estimates. Earthwork costs (e.g., fill) are excluded.	\$64,650,000	\$56,736,840	\$7,913,160	\$0
2027	Tunnel to West Airpark (design / construction)	The project includes design and construction of a tunnel connecting the east and west sides of the Airport. A 4-lane tunnel, providing public and secure access would be constructed from Postmark Drive and run west under Taxiway R, Runway 15-33, and Taxiway Y to the West Airpark. The public access tunnel (2 lanes) would continue under the potential north / south runway and associated taxiways. The secure access tunnel (2 lanes) would surface in the West Airpark between the existing and potential north / south runways. Potential NEPA documentation could be completed as part of the Potential North / South Runway project or Potential West Airpark Development project.	\$156,050,000	\$136,949,480	\$19,100,520	\$0
2027	Public Parking Facilities Reconfiguration (environmental documentation / design / construction)	This project includes potential NEPA documentation, design, and construction to reconfigure and expand public parking facilities.	\$2,000,000	\$0	\$2,000,000	\$0
2028	Potential North / South Runway (construction) <i>The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.</i>	The project includes construction of a potential north / south runway and associated airfield improvements. Land acquisition costs are excluded.	\$684,497,900	\$600,715,357	\$83,782,543	\$0
TBD	Deicing Chemical Collection Improvement (environmental documentation, design and construction) <i>The implementation of the deicing chemical collection improvement project is driven by the FAA and USEPA.</i>	The project includes potential NEPA documentation, design, and construction of an enhanced deicing chemical collection system based on regulatory changes.	\$30,000,000	\$26,328,000	\$3,672,000	\$0

Source: RS&H, 2014.

Note: The potential implementation year presented for each project was determined based on forecast demand. The year each project will be implemented will be based on actual demand.

Construction project costs include Alaska DOT&PF administrative costs of 3.89% of the total project costs as part of the Indirect Cost Allocation Program (ICAP).

Future tenant development costs are not presented as these costs are anticipated to be borne by the developer / tenant. These include project costs for environmental documentation, design, and construction activities.

AC = Advisory Circular, ADG = Airplane Design Group, ADAPT = Annual Delay and Activity Performance Times, AIAS = Alaska International Airport System, Airport = Ted Stevens Anchorage International Airport, ARFF = Aircraft Rescue and Fire Fighting, ATCT = Airport Traffic Control Tower, Coastal Trail = Tony Knowles Coastal Trail, FAA = Federal Aviation Administration, FAR = Federal Aviation Regulation, GRE = Ground Run-up Enclosure, Master Plan Update = Ted Stevens Anchorage International Airport Master Plan Update, MOA = Municipality of Anchorage, NEPA = National Environmental Policy Act, OAIASS = Optimize AIAS Strategy, RON = Remain Overnight, STEP = South Terminal Expansion Project, USEPA = U.S. Environmental Protection Agency

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SECTION 3 METHODOLOGY

Cost estimates are determined using rough order of magnitude or planning level techniques. In general, costs are determined for the following key areas:

- **Planning / Advanced Planning Costs** – Planning / advanced planning costs are estimated based on an anticipated level of effort.
- **Environmental Documentation Costs** – Environmental documentation costs are estimated based on an anticipated level of environmental documentation effort.
- **Design Costs** – Design costs are generally considered 10% to 15% of construction costs, depending on the complexity of the project.
- **Indirect Cost Allocation Program (ICAP) Costs** – ICAP costs are allocated for the DOT&PF to capture some Airport Improvement Program funds for administration purposes. The ICAP costs are estimated at 3.89% of the total project cost.
- **Quantified Construction Costs** – Construction costs include site preparation costs to demolish existing Airport-owned and Airport-controlled infrastructure; clear, grub, excavate, and prepare the subbase and base of the project site; and complete necessary subdrainage. Site preparation costs for any future tenant expansion areas are anticipated to be borne by a developer / tenant and are excluded.

Construction costs for airfield and roadway work also include the cost of adding new pavement sections along with necessary lighting, signage, and pavement markings or other infrastructure such as roads, trails, and fences.

Cost estimates for the terminal building also include the cost of demolition, new construction (interior and exterior), passenger boarding bridges, safety / data functions, necessary equipment, and mechanical / electrical / plumbing work.

- **Unquantified Construction Costs** – Construction costs also generally include several unquantified costs as follows:
 - **Drainage Costs** – Drainage costs are 3% of quantified construction costs (excluding subdrains).
 - **Temporary Erosion and Sedimentation Control Costs** – Temporary erosion and sedimentation control costs are 3% of quantified construction costs and drainage.
 - **Surveying Costs** – Surveying costs are 3% of quantified construction costs and drainage.

- **Contractor Furnished Items Costs** – Contractor furnished items costs are 1% of quantified construction costs and drainage.
- **Construction Traffic Control Costs** – Construction traffic control costs are 5% of quantified construction costs and drainage.
- **Mobilization and Demobilization Costs** – Mobilization and demobilization costs are 10% of quantified construction costs and all unquantified construction costs listed above.
- **Contingency Costs** – Contingency costs are 10% to 20% of all unquantified construction costs listed above.
- **Construction Administration Costs** – The quantified and unquantified construction costs sum to the construction subtotal. Construction administration is estimated to range from 7.5% to 9.5% of the construction subtotal. The sum of the construction subtotal and construction administration costs is the total construction cost.
- **Other Construction-Related Costs** – Other construction-related costs include the following:
 - **Environmental Mitigation (Permits) Costs** – Environmental mitigation (permit) costs are up to 10% of the total construction cost.
 - **Hazardous Material Mitigation Costs** – Hazardous material mitigation costs are not factored into the cost estimates. During environmental documentation efforts, these costs will need to be accounted for and added to the cost estimates. Additional information on hazardous materials at the Airport is included in **Chapter 2, Inventory of Existing Conditions**, of the Master Plan Update.
 - **Right of Way Costs** – Right of Way costs include securing access to construction sites and lands associated with a given project. Right of Way costs are estimated to range from 3% to 10% of the total construction cost when applicable.
 - **Utilities Costs** – Utility costs are 3% of the quantified construction costs plus drainage for Airport projects and 10% for roadway projects.

SECTION 4 ASSUMPTIONS AND CONSIDERATIONS

Project assumptions and considerations used to determine cost estimates are as follows:

- Estimated costs are calculated in 2013 dollars. Additional escalation costs related to the schedule and phasing of the project are excluded.
- Costs borne by the developer / tenant / non-Airport agencies or organizations are excluded.
- **Soil Conditions** (pertains particularly to the potential North / South Runway) – The area of construction consists of hilly terrain. Most of the soil in the area consists of silts with 60% to 90% passing the No. 200 Sieve. The material is adequate for construction of subgrades for the new embankment. However, the structural section must be constructed with imported material.
- **Borrow Areas** – There are no sources for borrow material containing less than 10% passing the No. 200 Sieve located in the Anchorage Bowl. Most material is brought to Anchorage via truck from Eagle River or by train from the Matanuska Valley. The cost estimates assume borrow material will be transported to Anchorage from other areas.
- **Clearing** – The area north of Taxiway K, west of Point Woronzof Drive, and east of the shoreline of Cook Inlet, is heavily wooded. The cost estimate for the potential North / South Runway considers the clearing of some of this wooded area.
- **Utilities** – Several different utilities run through project areas.
 - **Petroleum** – The Nikiski Pipeline runs through the area. It runs from Nikiski to Point Possession and then crosses the Turnagain Arm to a point southwest of Runway 7R-25L. From there, it runs north and northeast and crosses Runway 15-33, through the Airport, continuing to the Port of Anchorage. Development of some of the recommended Master Plan Update projects may require relocation of portions of the Nikiski Pipeline. These potential costs are not included.
 - **Water and Sewer** – Both water and sewer infrastructure improvements are needed to provide more water and sewer service to the South and West airparks. A loop water line extending around the Airport would help provide improved water service, while sewer service will

need to be expanded to support additional development in the South and West airpark areas.

- **Land Acquisition** – Land acquisition costs are not included within the cost estimates. Land acquisition extents and costs, if necessary, would be determined through additional planning and coordination with other agencies and owners when necessary.
- **Access** – Access to the west side of the Airport during construction would consist of two primary routes. The first would be via Point Woronzof Drive, which is an extension of Northern Lights Boulevard. Northern Lights Boulevard is restricted to vehicles of 18,000 pounds or less and local traffic. Haul would be restricted to travel via International Airport Road to Postmark Drive and then to Point Woronzof Drive. This route is outside the Air Operations Area (AOA) and requires no security provisions. The second access point would be from the vehicle service road (South Tug Road / West Perimeter Road) running around the southern perimeter of the AOA and within the AOA. There are several access points to the service road from Jewel Lake and Raspberry roads. Haul distances to the project area for both routes are similar.

Access to the sewage treatment facility would continue to be provided from Point Woronzof Drive. Public access to Point Woronzof overlook via Northern Lights Boulevard would remain.

- **Service Roads** – The construction of the potential North / South Runway requires a plan to provide vehicular access to the west side of the Airport. The first plan would be to construct a new vehicle service road around the perimeter of the potential North / South Runway and parallel taxiway and then south to connect to the West Perimeter Road. Additional service roads would be needed to cross the airfield aircraft parking / lease area at locations to be determined. The costs for the new service road are included within the overall potential North / South Runway cost estimate.
- **Tunnel System** – The construction of the potential North / South Runway and connecting taxiways would require reconfiguration of public access to the areas west of the Airport. The plan to provide vehicular access to these areas is to construct a roadway and tunnel system from Postmark Drive.

The tunnel costs are included as a separate project from the potential North / South Runway project cost.

The potential tunnel system provides a four-lane public and secure access tunnel from Postmark Drive, under Taxiway R, Runway 15-33, and Taxiway Y. From Taxiway Y, the tunnel would divide. A two-lane roadway would proceed at grade across the future potential diagonal taxiway to the west side of the Airport. Another two-lane tunnel would run under the

potential North / South Runway and parallel taxiway to provide public access to the areas west of the Airport.

- **Tony Knowles Coastal Trail (Coastal Trail)** – The Coastal Trail within the impacted area runs along the top of the bluff. The construction of the potential North / South Runway would require realignment of the Coastal Trail to maintain the connection between Point Woronzof and Kincaid Park. The ultimate alignment of the trail would be determined with public and stakeholder engagement and may include a variety of considerations and potential improvements. For the purposes of developing a cost estimate, a realignment of the trail, including a vegetated buffer around the potential runway, is considered to ensure that the cost of the Coastal Trail’s long-term preservation is accounted for.
- **Fencing** – The perimeter fence for the Airport follows Point Woronzof Drive around the north end of the Airport and then south to south of the fuel farm. It then runs west along West End Road towards the Clitheroe Center, where it turns to the south and parallels Taxiway K, and around the end of the east / west runways.

The plan would be to construct a new security fence from Point Woronzof Drive, north of the new connecting taxiway. The security fence would then run west to the new parallel taxiway, north between the rerouted Coastal Trail and service road, south and parallel to the potential North / South Runway, and finally reconnect with the existing fence at the West Perimeter Road.

Most of the fence work is outside the AOA. To ease access and remove security concerns, the security fence would be moved closer to Taxiway K during construction to assure the continued integrity of Airport security.

- **Marine Fill** – A portion of the potential North / South Runway would be constructed into the Cook Inlet west of the Asplund Wastewater Treatment Facility. The tide range for the Cook Inlet is greater than 34 feet. Material that would be used as fill should have less than 6% passing the No. 200 Sieve. Armor stone and filter stone would be placed to protect the new environment.
- **Waste Disposal** – It is estimated that approximately 10% of the excavated material would be unsuitable for use in embankments. This material would be disposed of in an existing waste disposal area located southwest of the west end of Runway 7R-25L. Access would be via the West Perimeter Road, through an existing gate in the security fence.
- **Pavement Typical Sections** – Table 2 shows the typical sections used for Master Plan Update recommended projects. Estimating factors include the total estimated volume for each unit of pavement material.
 - P-401, Hot Mixed Asphalt, Type S – 152 pounds / cubic foot

- P-401, Hot Mixed Asphalt, Type II – 152 pounds / cubic foot
- P-209, Crushed Aggregate Base Course – 148 pounds / cubic foot
- P-154, Subbase Course – 145 pounds / cubic foot

Table 2
Pavement Typical Section Details

Pavement Section	Section Details
Runway	5" – P-401, Hot Mixed Asphalt, Type S 10" – P-401, Hot Mixed Asphalt, Type II 4" – P-209, Crushed Aggregate Base Course 55" – P-154, Subbase Course
Runway Shoulder	3" – P-401, Hot Mixed Asphalt, Type II 4" – P-209, Crushed Aggregate Base Course 67" – P-154, Subbase Course
Runway Safety Area	7" –RAP 24" – P-154, Subbase Course
Taxiway	5" – P-401, Hot Mixed Asphalt, Type S 10" – P-401, Hot Mixed Asphalt, Type II 4" – P-209, Crushed Aggregate Base Course 55" – P-154, Subbase Course
Taxiway Shoulder	5" – P-401, Hot Mixed Asphalt, Type S 10" – P-401, Hot Mixed Asphalt, Type II 4" – P-209, Crushed Aggregate Base Course 67" – P-154, Subbase Course
Taxiway Safety Area	7" –RAP 24" – P-154, Subbase Course
Future Expansion Areas	4" – P-209, Crushed Aggregate Base Course 55" – P-154, Subbase Course
Service Road	4" – P-401, Hot Mixed Asphalt, Type II 7" –RAP 24" – P-154, Subbase Course
Tony Knowles Coastal Trail	2" – P-401, Hot Mixed Asphalt, Type II 2" –RAP 20" – P-154, Subbase Course

Source: HDR, 2014.
 Note: RAP = Recycled Asphalt Pavement

SECTION 5 UNIT COSTS

Unit costs were determined by the Master Plan Update team based on experience with other comparable projects. The unit costs were adjusted as necessary to account for inflation, economies of scale, access to materials, overall labor costs, accessibility of the site and project location, comparison with projects completed at other Alaska airports, complexity of construction phasing, overall complexity of the project, and the duration of the project. Unit costs were computed on a square yard or linear foot basis. Table 3 summarizes the quantified unit costs.

Table 3
Quantified Unit Costs

Cost Factor	Unit Cost
Subdrains	\$100 / linear foot
Clearing and Grubbing	\$3,000 - \$25,000 / acre
Excavation	\$8 - \$20 / cubic yard
Embankment	\$10 - \$16 / cubic yard
Subbase Course	\$18 ton
Crushed Aggregate Base Course	\$25 / ton
Recycled Asphalt Pavement	\$25 / cubic yard
Hot Mix Asphalt Type II, Class A	\$110 / ton
Asphalt Material, 52-34	\$1,200 ton
Fence Removal	\$6 - \$10 / linear foot
Temporary Fence	\$25 / linear foot
Fencing (8-foot chain-link)	\$28 - \$30 / linear foot
Access Gate (25-foot swing gate)	\$3,000 each
Pavement Removal	\$16 / square yard
Removal of Structures	Defined cost
Structural Pavement Section (runways and taxiways)	\$160 - \$162 / square yard
Blast Pad (runway)	\$72 / square yard
Shoulder Pavement Section (runways and taxiways)	\$72 - \$81 / square yard
Safety Area (runways and taxiways)	\$32 / square yard
Runway / Taxiway Painting	Defined cost
Pavement Markings	\$2 / square foot
Tack Coat, STE-1	\$900 / ton
Geotextile, Separation	\$1.50 / square yard
Geotextile, Stabilization	\$4 / square yard
Seeding	\$4,000 / acre
Runway / Taxiway Lighting	Defined cost
Relocating Navigational Equipment	Defined cost
Signage	Defined cost
Primary Armor Stone	\$150 / cubic yard
Filter Stone	\$100 / cubic yard
Marine Fill	\$20 / ton
Service Road (22 feet wide)	\$140 / linear foot
Tony Knowles Coastal Trail (12 feet wide)	\$40 / linear foot
Tunnel	\$13,000 / linear foot
Tunnel Electrical	\$5,000 / linear foot
Tunnel Mechanical	\$3,000 / linear foot

Source: HDR, 2014.