• Introduction and Background
• Operating Scenarios
• Vessel Selection
• Acquisition
• Summary and Recommendations
“The overall purpose of the project is to procure a vessel which will provide passenger and vehicle transportation to and from Ketchikan, AK and Prince Rupert, BC. The intent of this study is to determine mission requirements, possible vessel types ...”
(from AMHS Contract Statement of Services)

- Home port in Ketchikan with service to Prince Rupert
- Dock conditions and restrictions to be considered
- Capacity per round trip: approximately 60 vehicles, 350 people, and 100 LT of commercial vans (5 semis).
- Minimize operational costs
- Reasonable acquisition cost
- Excellent passenger comfort and seakeeping qualities
**International Voyage Regulatory Environment**

**SOLAS** - International Maritime Organization (IMO), **Safety Of Life At Sea Convention** (treaty)

SOLAS related expenditures (1994-2004) $40 Million

Projected expenditures to meet SOLAS 2010 mandate (in millions)

<table>
<thead>
<tr>
<th>Name</th>
<th>Expenditure ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aurora</td>
<td>2.0</td>
</tr>
<tr>
<td>Le Conte</td>
<td>2.2</td>
</tr>
<tr>
<td>Matanuska</td>
<td>13.0</td>
</tr>
<tr>
<td>Taku</td>
<td>7.0</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>$24.2</strong></td>
</tr>
<tr>
<td>Kennicott</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>$25.1</strong></td>
</tr>
</tbody>
</table>
The Future Belongs to Dayboats

PAST
- Few roads
- Long distances between ports
- Long-haul, continuously manned vessels calling at multiple ports

FUTURE
- More roads
- Short crossings between road ends
- Dayboats making the connections at these short crossings

TRANSITION
- Dayboats such as the *Fairweather*, *Chenega* and *Lituya*
- Southern Gateway vessel could join these transition vessels to serve today and into the future
Ketchikan to Prince Rupert

92.5 nautical miles
Projected Demand

Potential to reduce service days during off-peak times in order to realize additional reductions to operating cost.
## Operational Scenarios Studied

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>![Ship Icon]</td>
<td>One full-capacity vessel making one round trip per day, 12 hours or less, single crew on board, no living quarters</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>![24-Hour Icon]</td>
<td>24-hour operation, one full-capacity vessel, multiple crews on board, with living quarters</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>![2-Trip Icon]</td>
<td>One half-capacity vessel making two round trips per day as needed to meet capacity</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>![2-Vessel Icon]</td>
<td>Two half-capacity vessels (in peak months), together meeting the capacity</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>![1/2-Trip Icon]</td>
<td>Two full-capacity vessels making one round trip every two days, crews stay overnight in Prince Rupert</td>
</tr>
</tbody>
</table>

All systems studied have a peak one-way capacity of 59 cars and 350 passengers.
Vessel Concepts Considered

- Conventional displacement monohull < 20 kts
- Hi-speed (IMO HSC Code) monohulls > 28 kts
- Hi-speed (IMO HSC Code) catamarans > 28 kts
- Conventional (SOLAS) monohull 20 to 28 kts
- Conventional (SOLAS) catamaran 20 to 28 kts
- Existing AMHS vessels

152 Vessel-Operating Scenario Combinations considered
Lifecycle Cost Calculations

Alaska Lifecycle Cost (in 2005 dollars) =
10% of Acquisition Cost +
Present Value of 20 years of Annual Operating Costs
• Assumes Federal Government underwrites 90% of acquisition cost

Total Lifecycle Cost (in 2005 dollars) =
Acquisition Cost +
Present Value of 20 years of Annual Operating Costs
Alaska Lifecycle Cost Rankings
Key Findings

- One vessel on route is optimum
- One round trip per day is optimum
- 12-hour service day is optimum

Costs are driven by crew costs first and second by fuel consumption
# Possible Schedule for 21.1 Knot Dayboat

<table>
<thead>
<tr>
<th>Location</th>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ketchikan</td>
<td>Start up</td>
<td>6:00 am</td>
</tr>
<tr>
<td></td>
<td>Cast off from Ketchikan</td>
<td>6:30 am</td>
</tr>
<tr>
<td>Prince Rupert</td>
<td>Arrive in Prince Rupert</td>
<td>11:42 am</td>
</tr>
<tr>
<td></td>
<td>Cast off from Prince Rupert</td>
<td>12:11 pm</td>
</tr>
<tr>
<td>Ketchikan</td>
<td>Arrive in Ketchikan</td>
<td>5:25 pm</td>
</tr>
<tr>
<td></td>
<td>Secure for the night</td>
<td>5:52 pm</td>
</tr>
</tbody>
</table>

**Length of Service Day Less than 12 hours**

Port time in Prince Rupert could be increased by 45 minutes with a service speed of 23.3 knots.
Dixon Entrance is more exposed to ocean waves and swell than most other AMHS routes; seakeeping is especially important.

Widely adopted motion sickness criterion (10% MSI)
- Less than 10% of passengers sick at least 90% of the time
- Motions in excess of 10% MSI tend to produce passenger complaints

Top-ranked monohulls meet seakeeping criteria
Catamarans do not meet seakeeping criteria, even when active ride control systems are added.
Southern Gateway Design Concept

KENNICOTT

GATEWAY MONOHULL

KENNICOTT

GATEWAY MONOHULL
Recommended Monohull Design

Length Overall: 377’ – 0”
Breadth: 52’ – 0”
Depth Molded to Main Deck: 21’ – 6”
Propulsion Power: 11,500 BHP
Vehicle Deck Arrangements

Showing all car and light truck arrangement

Showing arrangement of 5 trailers and 48 cars
Passenger Deck Arrangement

**Red** - Food Service

**Cyan** - Heads

**Blue** - Lifesaving Equipment

**Orange** - Work Desks

**Green** - Elevator
Interface with Ketchikan Berths

Main Dock

Maintenance Dock (port side door required)
Interface with Prince Rupert Terminal
Bow Door and Notional Terminal
## Acquisition Cost

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (2005 $million)</th>
<th>Cost (adj. 9/07 start)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel contract (shipyard cost)</td>
<td>36.7</td>
<td>38.6</td>
</tr>
<tr>
<td>Contingency for increased speed and bow door</td>
<td>3.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Program costs (15%)*</td>
<td>6.0</td>
<td>6.3</td>
</tr>
<tr>
<td>ICAP (5%)†</td>
<td>2.0</td>
<td>2.1</td>
</tr>
<tr>
<td>Total acquisition cost</td>
<td>48.2</td>
<td>50.7</td>
</tr>
</tbody>
</table>

* Program costs include owner’s representation, design engineering and construction management and an allowance for change orders during vessel construction.

† ICAP is an accounting procedure required for all programs that receive funds from the FHWA or the U.S. DOT, ranging from 3.5 to 5% of acquisition cost.
Ketchikan to Port Simpson

68 nautical miles
### Proposed Schedule

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td>1</td>
<td>Develop Contract Design</td>
<td>Q4</td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
</tr>
<tr>
<td>2</td>
<td>Bid &amp; Award</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>Design Verification</td>
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</tr>
<tr>
<td>4</td>
<td>Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Delivery Voyage/Crew Familiarization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Early Service/Shakedown</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Develop Contract Design (16 months)**: Start by 11/1/05
- **Bid and Award (6 months)**: Shipyard begins 9/1/07
- **Design Verification (6 months)**
- **Construction (22 months)**: Construction complete 1/1/10
- **Delivery Voyage/Crew Familiarization (2 months)**: In service 3/1/10
- **Early Service/Shakedown (3 months before the peak season)**
Summary and Recommendations

- Lowest Alaska life cycle cost
  - One 59-car dayboat
  - Making one round trip per day
  - Nominal service day < 12 hours
  - Requires service speed between 21.1 and 23.3 knots

- Monohull meets all AMHS seakeeping requirements

- $50 M budget is adequate

- Contract design should begin no later than November 2005