PRELIMINARY REPORT:

# Hybrid Electric Ferries: Design-Build Contracting and Procurement

## LEGISLATIVE AUDITOR'S CONCLUSION:

The Legislature should consider revising state law to allow alternatives that increase ferry acquisition speed and value to the state.
WSF should improve cost estimation, payment, and other practices.

*February 2023*

## Executive Summary

The 2022 Supplemental Transportation Budget directed JLARC to evaluate Washington State Ferries' design-build contracting approach for hybrid electric ferries. The review must include a comparison to best practices and opportunities for both cost and operational efficiencies. JLARC staff consulted with VARD Marine, Inc. (VARD), a firm with expertise in marine engineering and procurement to assist with the review. VARD's final report is available in Appendix A.

## Washington State Ferries is using design-build contract approaches to acquire hybrid electric ferries

Washington State Ferries (WSF) is a division of the Washington State Department of Transportation (WSDOT). WSF's Long Range Plan calls for increasing the state's ferry fleet to 26 vessels and shifting to plug-in hybrid vessels by 2040. Chapter 47.60 RCW requires WSF to use a design-build approach to acquire new ferries. Design-build means that WSF executes a single contract with one shipbuilder to design and construct the vessel. The approach transfers most of the project risk[1] to the shipbuilder. However, the approach can increase the vessel price as the shipbuilder accounts for the risk.

WSF plans to issue a Request for Proposal (RFP) for the first hybrid electric vessels during the first quarter of 2023. These will be the first vessels acquired under the laws adopted in 2015.

[1]Risks include schedule delays, technical problems, and cost overruns.

## Exhibit: Hybrid electric Olympic class vessels will be the first acquired under the 2015 laws

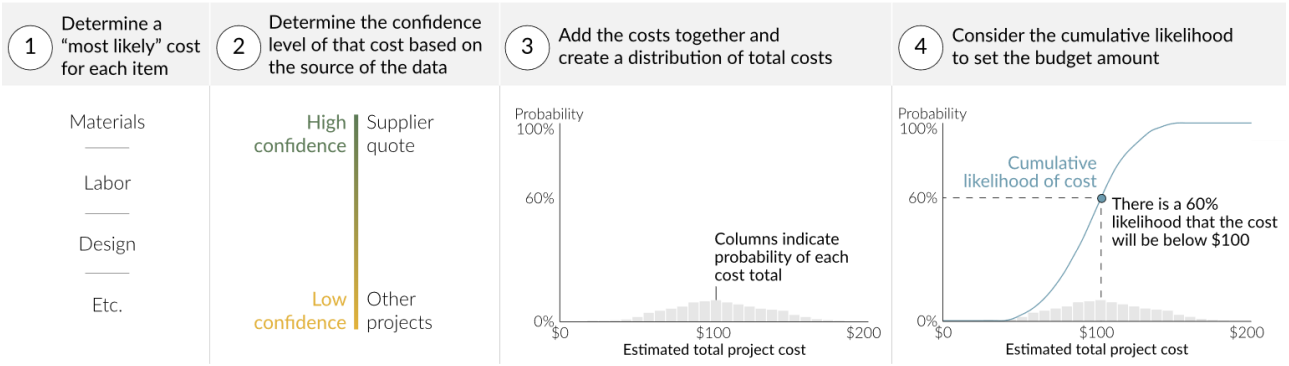

**Source: JLARC staff analysis of WSF documentation.**

# WSF uses standard cost estimating practices. Current estimates do not convey key assumptions and uncertainty.

Different cost estimation methods are used at different stages of a project. In shipbuilding, it is typical for early cost estimates to vary significantly as more is learned and vessel designs are refined. WSF follows industry practice in starting with top-down cost estimates (e.g., based on previous work) and moving to more detailed bottom-up estimates (e.g., based on actual data). However, WSF does not clearly explain assumptions, data sources, methods, or uncertainty in the estimates that accompany its budget requests. This has reportedly led to confusion for legislators and legislative staff about why estimates change and whether the estimates are comparable.

WSF's cost estimating practices produce single value estimates (e.g., a ferry will cost $220 million). Best practice is to provide a range of possible costs and the likelihood that the actual cost will be at or below a certain amount along the range. This is called a probabilistic approach. WSDOT uses a probabilistic approach for civil engineering projects valued over $100 million. WSF intends to use this process in 2023 for the first hybrid electric ferry acquisition.

## Exhibit: A probabilistic approach shows the range of costs. Decision makers can set budgets based on the likelihood that costs will be at or below a certain amount.




**Source: JLARC staff depiction based on WSDOT CEVP and notional drawings from the Government Accountability Office and JLARC's project consultant.**

## Statute does not allow WSF to consider non-price factors when awarding contracts

State law requires WSF to award a vessel contract using a low bid approach that awards the contract to the shipbuilder offering a technically acceptable proposal at the lowest price. A common alternative is a best value approach, in which a bid is selected based on the relative importance of price and other factors. This approach is appropriate for projects like a ferry acquisition where project requirements are less clear, more design work is needed, or risks are high. It can encourage shipbuilders to offer designs that lower life cycle costs or reduce project risks.

## Statute does not allow WSF to use faster procurement approaches that still encourage in-state construction

State law also requires WSF to conduct an in-state procurement first, starting with a Request for Proposal (RFP) that is limited to Washington shipbuilders. WSF may only seek out-of-state bids if the fixed prices from all Washington shipbuilders are more than 5% above WSF's engineer's estimates. This approach compares the estimated cost to the shipbuilder's price, which also considers labor, profits, and other proprietary factors. The second RFP process, if necessary, will add time to the procurement and may increase cost.

JLARC staff and its consultant found that at least 12 states offer in-state preferences by applying the preference during the selection process. These approaches allow the state to run a single procurement process and still provide incentives for in-state shipbuilders.

### Exhibit: State law requires planning and a three-phase design-build contracting approach

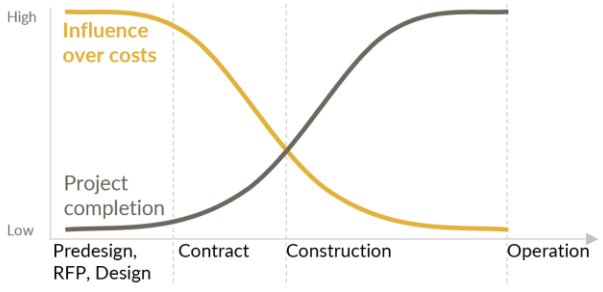
| PLANNING | PHASE 1 (RFP) | PHASE 2 (Technical proposals) | PHASE 3 (Bids) |
|---|---|---|---|
| WSF completes predesign studies.<br>Legislature authorizes acquisition.<br>WSF develops Request for Proposal (RFP).<br>• Includes estimated contract price.<br>• Requires vessel to be built in Washington. | WSF issues RFP.<br>Shipbuilders respond to qualification questions.<br>WSF selects shipbuilders for Phase 2. | WSF periodically reviews each shipbuilder's design, drawings, and specifications.<br>Each shipbuilder submits its proposal.<br>WSF accepts or rejects each proposal. | Each shipbuilder submits a firm, fixed price.<br>WSF awards design-build contract based on lowest price.<br>***OR**, if all responses are more than 5% above engineer's estimates:*<br>WSF rejects all bids and issues new RFP nationally. |

**Source: JLARC staff depiction of RCWs 47.60.385, 47.60.386, 47.60.814, 47.60.815, 47.60.816, 47.60.818, and 47.60.820.**

## WSF can address cost concerns by using predesign studies to analyze life cycle costs

The Government Accountability Office (GAO) estimates that 70% of a vessel's life cycle costs occur after construction. Some of the best opportunities to control costs occur during the predesign phase, before an RFP is issued. Predesign studies explore different ways to address a vessel's requirements. While WSF's predesign studies addressed life cycle costs related to fuel efficiency and preservation, they did not evaluate long-term staffing costs

### Influence over life cycle cost is greatest in early project phases




**Source: Adapted from report prepared by consultant to JLARC staff.**

as required by statute. Also, WSF's approach to selecting predesign study topics may unintentionally exclude topics that have a significant effect on life cycle cost.

Although predesign studies can help ensure that requirements are clear and thorough, changes after the contract is signed are typical in any shipbuilding project. Best practice is to ensure that changes are monitored and managed from the time they are raised, through the approval process, and to their resolution. WSF's change management system appears to be aligned with best practices.

## WSF should tie payments to measurable project progress

WSF has limited cost and schedule reporting requirements in its contracts and pays shipbuilders through monthly payments. During construction, the payments reflect an estimate of progress since the last billing. While this is administratively simple, it is inconsistent with best practice. Best practice is to link payments to significant project milestones (e.g., final design review, steel cutting, or trials) or measurable project progress. A progress-based approach that is commonly used is Earned Value Management, which considers cost, work completed, and schedule.

## WSF does not have documented policies reflecting current laws and best practices for acquisition, cost estimation, or risk management

Although there is room for improvement, WSF has used valid approaches to defining project requirements, managing risk and change, and controlling cost and schedule. WSF's contracting approach for previous vessel acquisitions complied with the statutory requirements in place at the time.

However, WSF has little formal documentation of its policies or practices. Its primary vessel policy document does not reflect statutory changes made in 2015 or best practices (e.g., cost estimation, predesign studies, or lessons learned reviews). Absent documentation, WSF relies heavily on staff expertise and consulting firms.

## Legislative Auditor's recommendations

### Recommendations to the WSDOT Ferries Division (WSF)

1. WSF should ensure that cost estimates provided to OFM, legislative staff, and the Legislature are clear and well documented.
2. WSF should apply probabilistic approaches to its cost estimates and clearly indicate the likelihood of the cost falling at or below the funding level requested.

3. WSF should ensure predesign studies evaluate long-term costs as directed by statute and that the suite of studies for each acquisition project addresses the most significant potential life cycle cost drivers.
4. WSF should tie shipbuilder payments to significant milestones or measurable project progress.
5. WSF should update its ferry acquisition policies and procedures to reflect current laws and best practices.

### Recommendations to the Legislature

6. The Legislature should consider amending state law to allow WSF to use a best value selection process for ferry acquisition.
7. The Legislature should consider amending state law to allow WSF to offer a single nationwide RFP that increases competition, offers in-state preference, and protects against the risk of a longer procurement process.

You can find additional information in Recommendations.

# 1. WSF using design-build to acquire plug-in hybrid electric ferries

## Washington State Ferries is using design-build contract approaches to acquire plug-in hybrid electric ferries

The 2022 Supplemental Transportation Budget directed JLARC to evaluate Washington State Ferries' design-build contracting approach for hybrid electric ferries. The review must include a comparison to best practices and opportunities for both cost and operational efficiencies. JLARC staff consulted with experts in marine engineering and procurement (VARD Marine, Inc. or VARD) to assist with the review. The consultant's final report is available in Appendix A.

## WSF is electrifying its fleet, consistent with direction from the Governor and Legislature

Washington State Ferries (WSF) is a division of the Washington State Department of Transportation (WSDOT).

WSF currently manages a fleet of 21 ferries and 20 ferry terminals. Each vessel has an expected operating life of 50 to 60 years. The 2017 Legislature[2] directed WSF to update its Long Range

[2]2017-19 Transportation Budget, Section 309(6).

Plan to address service needs, characteristics for replacement vessels, and funding. One year later, the Governor issued Executive Order 18-01, which directed WSF to transition to a zero-carbon emission ferry fleet. In response, WSF produced the following plans:

- Long Range Plan update (2019). The plan recommends increasing the ferry fleet to 26 vessels and shifting from diesel-powered vessels to plug-in hybrid electric vessels by 2040. To do this, WSF plans to add three vessels, replace fifteen[3] as they reach the end of their service life, and modify most of the remaining vessels.
- System Electrification Plan (2020). The plan documents how WSF will shift to plug-in hybrid electric vessels. It offers a high-level assessment of feasibility, requirements for vessels and terminals, schedules, anticipated capital investments, training and workforce needs, and future studies.

The 2022 Legislature stated that it intends to fund the electrification program as described in the Long Range Plan (RCW 47.60.838).

## WSF must use a design-build contract approach specified in law

Chapter 47.60 RCW specifies how WSF acquires new ferries.

- Beginning in 2001, the law *allowed* WSF to use a design-build approach for new ferries.
    - In design-build, the buyer executes a single contract with one entity for design and construction services. WSF may pay an honorarium to unsuccessful shipbuilders to reimburse them for some of the preparation costs.
    - Design-build can include an "owner's model" approach. This means the buyer develops a concept design that shows one possible approach to meeting the requirements (e.g., ship speed, propulsion, capacity). Shipbuilders are not required to follow the design and the buyer does not guarantee its performance.
- In 2015, the Legislature amended the law and *required* WSF to use a design-build approach. Other changes included requiring a fixed-price contract, hiring an independent owner's representative for each project, and starting a new RFP process if the bids from in-state shipbuilders exceed WSF's engineer's estimates. These changes are discussed further in other sections of this report.

[3]The plan calls for replacing 13 vessels. Another two went out of service shortly after the plan was published.

## Exhibit 1.1: Sections of Chapter 47.60 RCW specify WSF's acquisition approach

| PLANNING | PHASE 1 | PHASE 2 (Technical proposals) | PHASE 3 (Bids) |
|---|---|---|---|
| WSF completes predesign studies and receives Legislative Authorization.<br><br>WSF develops Request for Proposal (RFP).<br>• Includes estimated contract price.<br>• Requires vessel to be built in Washington. | WSF issues RFP.<br><br>Shipbuilders respond to qualification questions.<br><br>WSF selects shipbuilders for Phase 2. | WSF periodically reviews each shipbuilder's design, drawings, and specifications.<br><br>Each shipbuilder submits its proposal.<br><br>WSF accepts or rejects each proposal. | Each shipbuilder submits a firm, fixed price.<br><br>WSF awards design-build contract based on lowest price.<br><br>***OR**, if all responses are more than 5% above engineer's estimates:*<br><br>WSF rejects all bids and issues new RFP nationally. |

**Source: JLARC staff depiction of RCWs 47.60.385, 47.60.386, 47.60.814, 47.60.815, 47.60.816, 47.60.818, and 47.60.820.**

## Design-build contracts transfer most risk to the shipbuilder

Ferry acquisition projects can involve schedule, technical, and cost risks.

- Schedule: Shipyard capacity constraints, design changes, or late equipment deliveries can delay a project.
- Technical: Shortfalls in how the vessel or its systems perform can keep it from meeting service needs.
- Cost: General inflation or increases in specific equipment or materials can raise costs above the estimated budget.

Regardless of the contracting approach, risk can be reduced by transferring or sharing it with others, or by addressing it in project requirements. Risk can also be accepted. The state attempts to transfer most risk by using a design-build fixed price contract.

- A design-build contract transfers most risk to the shipbuilder because the shipbuilder is responsible for meeting the schedule and technical requirements.
- A fixed price transfers most cost risk to the shipbuilder because the shipbuilder agrees to provide the vessel at the stated price, even if there are cost overruns.

Shipbuilders are likely to increase the price to account for these risks. Consistent with best practice, WSF tries to mitigate this increase through contract provisions that share risk. For example, WSF includes materials escalation clauses that share the risk of cost fluctuations for steel and copper-based materials.

### Design-build less common among other U.S. ferry owners and optional for WSDOT civil engineering

Although design-build is often used for ferry projects internationally, in the US, it is much less common than design-bid-build. Design-bid-build is a more traditional contracting approach in which shipbuilders bid based on the design offered by the ferry owner. VARD notes that design-bid-build tends to be used for projects with new technology and design-build tends to be used for more conventional projects. A design-bid-build approach has advantages (e.g., increased control and flexibility) and disadvantages (e.g., increased risk and time). Other public ferry owners in the U.S. (e.g., North Carolina, New York City, Alaska, Massachusetts) have used design-bid-build for their vessel acquisitions.

WSDOT can choose to use design build or other contracting approaches (e.g., design-bid-build) for civil engineering projects based on the project's needs and benefit to the state.

## WSF is acquiring five plug-in hybrid electric Olympic class ferries

WSF's Long Range Plan and System Electrification Plan call for using plug-in hybrid electric vessels. Vessels will be powered by batteries, which will be charged at the terminal. Each will also have at least two diesel generators on board.

### WSF attempted to purchase hybrid electric ferries under an existing contract

In 2007, WSF signed a contract with Todd Pacific Shipyards[4] for diesel-powered Olympic class[5] vessels. Between 2012 and 2018, the shipbuilder delivered four Olympic class ferries and discussed providing more.

[4]Purchased by Vigor Industrial in 2011.
[5]Olympic class ferries carry 144 cars.

As noted above, the 2015 Legislature passed new requirements for ferry acquisitions. It exempted ferries purchased under existing contracts from these requirements.

In 2019, the Legislature approved an extension of the existing contract to build five new hybrid electric Olympic class vessels. This exempted the new vessels from the 2015 requirements. The intent was to save time and money by not rebidding the contract. The contract negotiations ended in 2022 after WSF and the shipbuilder (now known as Vigor Shipyards) were unable reach agreement.

## WSF plans to issue a new Request for Proposal (RFP) in 2023

WSF plans to issue the RFP for the hybrid electric Olympic class vessels in the first quarter of 2023. These vessels will be the first to be acquired under the 2015 laws.

In July 2022, WSF issued a Request for Information (RFI) that included an overview of its acquisition strategy for the hybrid electric Olympic class vessels. The RFI noted that WSF intended to purchase five vessels, with an average price of $220 million, to be delivered between June 2027 and December 2031 (one vessel every 13 months). It asked interested shipbuilders to provide feedback about the stated price target and delivery schedule, as well as the time allowed for proposal development and other financial considerations. The RFI also stated that the contract would include enforceable small business enterprise goals, as required by state law.

In October 2022, WSF held an industry day event for interested companies. Attendees included shipbuilders, materials suppliers, and consulting firms. At the event, WSF noted that it would offer Vigor's design as an owner's model that shipbuilders could use as the basis for their own designs and proposals. WSF stated that in response to industry feedback, it was reviewing the price target, delivery schedule, and request for fixed prices on all five vessels.

### Exhibit 1.2: Hybrid electric Olympic class vessels will be the first to be acquired under the 2015 laws


**Source: JLARC staff analysis of WSF documentation.**

WSF also has begun early planning work to acquire a different class of plug-in hybrid electric vessels that will carry 124 vehicles. The RFP process is currently estimated to occur in the 2025-27 biennium, with the first vessel to be delivered in 2031.

# 2. Cost estimates could better convey potential change

## WSF uses standard cost estimating practices. Current estimates do not convey key assumptions and uncertainty.

### WSF requests funding for new ferries through the state transportation budget

Washington State Ferries (WSF) requests vessel funding from the Legislature as part of the Washington State Department of Transportation's (WSDOT) budget request. As required, the budget request and supporting documentation include high-level cost estimates for the current and ten future biennia. The Legislature must authorize funding before WSF issues a Request for Proposal for any ferry. In general, WSF begins estimating the cost of a vessel during conceptual design (see Exhibit 2.1). WSF provides updated estimates in its regular and supplemental budget requests.

### WSF funding requests do not clearly explain assumptions, data sources, methods, or uncertainty

Between September 2018 and December 2022, estimates for the first hybrid electric Olympic class vessel increased from $188 million to $249 million. Although WSF has supporting documentation, the estimates it shares with the Office of Financial Management (OFM) and legislative staff exclude the information. For example, they do not clearly show:

- How much cost change is due to inflation or other factors (e.g., design changes, updated information).
- Whether the estimate includes materials for future vessels.
- Whether the estimate includes design costs.
- The method used to create the estimate.

The lack of documentation has reportedly led to confusion for legislators and legislative staff about why estimates change and whether the estimates are comparable. According to the Government Accountability Office (GAO), best practice is to clearly and thoroughly document cost estimates. Well-documented estimates show the data source and the data's reliability. Documentation also should describe how the estimate was developed so that it can be understood and replicated. Documentation may help explain differences between the cost estimate and the budget request (e.g., to reflect sensitivity around contract negotiations), or if the estimate is likely to change.

## Cost estimates should change and become more refined over time

Best practices, such as those published by GAO, and industry practice call for refining cost estimates throughout a project.

Estimates should account for both risk and uncertainty. As a result, early estimates may vary significantly from each other and the final price.

- Risk factors can be identified, quantified, and mitigated. These include schedule delays, material costs, and technical changes. See Section 3 for more detail.

- Uncertainty factors are unknown and cannot be quantified. These include the difference between the estimated vessel cost and the shipbuilder's price. Price includes factors such as productivity, overhead, labor rates, and profit expectations. This information often is confidential and dependent on both market conditions and competition. Uncertainty should largely disappear once bids are available, since state law requires fixed price contracts.

## WSF uses standard estimating methods that produce single value estimates of vessel costs

In addition to using better information as the project advances, best practice is to also use different cost estimation methods. WSF follows normal industry practice in moving from top-down cost estimates to more detailed bottom-up estimates as a project advances and design becomes more refined. These approaches produce estimates that are a single value (e.g., $220 million).

### Top-down estimates use known data from similar vessels to predict costs for the planned vessel

**Top-down estimates** are created early in a project when there is less detailed information available. WSF uses a common top-down method called parametric estimating. A parametric estimate uses historical data about cost drivers from other vessels to estimate the cost of a new vessel. Cost drivers can include dimensions, weight, operating speed, and vehicle/passenger capacity. In the planning phase, most of the estimates that WSF provided to OFM and the Legislature were top-down estimates. This is consistent with industry practices.

### Bottom-up methods are more detailed ways of estimating construction costs

**Bottom-up estimates** add individual line items to create an estimate of the total cost of the new vessel. For the estimate to be accurate, most of the vessel design must be complete. WSF hires expert consulting firms to create bottom-up estimates called the engineer's estimate.

WSF hired a consulting firm[6] to complete the engineer's estimate for the hybrid electric Olympic class ferry, as designed by Vigor[7]. An independent review by JLARC's contracted consultant found the estimate to be thorough, well-researched, and compliant with the requirement to identify cost drivers (RCW 47.60.815).

## Exhibit 2.1: Estimates are refined as the project advances and more accurate information becomes available

| PROJECT PHASE | PLANNING | | RFP (PHASES 1-3) | DESIGN-BUILD IMPLEMENTATION (after contract is awarded) | |
|---|---|---|---|---|---|
| DESIGN STAGE | **1. Concept** Dimensions, initial powering levels, and approximate weight. | **2. Preliminary** Adds key performance parameters. | **3. Basic/Class** Drawings and analysis demonstrate the ship meets the regulations and criteria. | **4. Functional** All equipment selected, drawings and calculations reflect equipment size, weight, and performance parameters. | **5. Detailed** Drawings provide all information on locations and relationships of equipment and systems. |
| ESTIMATING METHOD | **Top-Down** | **Top-Down and/or Bottom-Up** | **Bottom-Up** | **Estimate replaced by fixed price bid + post-contract contingency** | |

**Source: JLARC staff summary of information in VARD report.**

[6]Glosten.
[7]Shipbuilder previously in negotiations with WSF for hybrid electric ferries.

## Applying a probabilistic approach, like the one used for WSDOT civil engineering projects, would help to convey the level of uncertainty involved

The Government Accountability Office (GAO) publishes a cost estimating guide. It notes that a single value estimate "by itself provides no information about the underlying uncertainty of the estimate and is insufficient for making good decisions about the program."

Industry standards and GAO best practice guidance recommend using a probabilistic approach with any top-down or bottom-up estimate. Probabilistic approaches determine a "most likely" cost for each line item in the project and a level of confidence based on the source of information. The result is a cost range that allows decision makers to set a budget based on the likelihood that the actual cost will be at or below a certain amount.

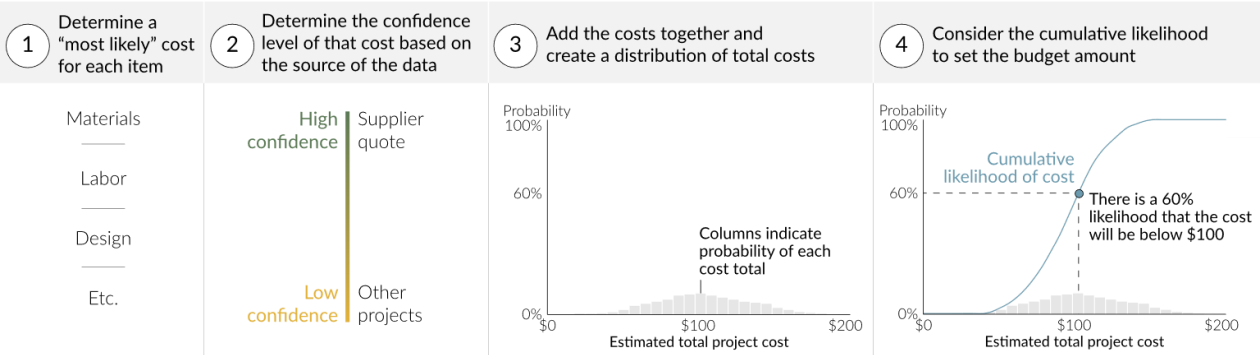
### WSDOT uses a probabilistic approach for civil engineering projects

WSDOT uses a probabilistic approach called the Cost Estimate Validation Process (CEVP) for all civil engineering projects valued over $100 million. The CEVP provides a biennial budget estimate based on the 60th percentile of the project's total cost. It also provides data about the range of costs and risks so the Legislature can make informed budget decisions.

### WSF intends to use WSDOT's approach for the hybrid electric Olympic class ferry acquisition

WSF intends to use the CEVP and expects to complete the process for the plug-in hybrid electric Olympic class ferry during the first quarter of 2023. However, it plans for this to be a one-time event for this acquisition. Best practice is to periodically refine the estimates as more accurate information becomes available, and apply the probabilistic approach each time.

## Exhibit 2.2: A probabilistic approach shows the range of costs. Decision makers can set budgets based on the likelihood that costs will be at or below a certain amount.




**Source: JLARC staff depiction of probabilistic approach based on WSDOT CEVP and notional drawings from both the Government Accountability Office and JLARC staff's project consultant.**

## Legislative Auditor's recommendations to WSF

- WSF should ensure that cost estimates provided to OFM, legislative staff, and the Legislature are clear and well documented.
- WSF should apply probabilistic approaches to its cost estimates and clearly indicate the likelihood of the cost falling at or below the funding level requested.

# 3. Acquisition could consider best value & different approach to in-state preference

## Statute does not allow WSF to use non-price factors to select shipbuilders or use faster acquisition approaches that still encourage in-state construction

## Low bid and best value are common ways to award competitive contracts

Regardless of how the contract is structured (e.g., design-build or other), buyers have options for how they award a competitive contract.

- **One option is a low bid selection.** The agency awards the contract to the firm offering the lowest price, technically acceptable proposal. Technically acceptable means that it meets the requirements in the Request for Proposal (RFP). This selection method is appropriate when projects have clear requirements and low risk.
- **Another option is a best value selection.** The agency awards the contract to the firm based on the relative importance of price and other factors (e.g., technical capability, past performance, use of small businesses). According to the Government Accountability Office (GAO), this selection method is appropriate when requirements are less clear, more design work is needed, or risks are high.

### Exhibit 3.1: Selection of the winning proposal may consider price and other factors to varying degrees


**Source: Adapted from GAO report 19-691.**

## Statute requires WSF to use a low bid selection. This may discourage shipbuilders from suggesting features that lower life cycle costs.

By law, Washington State Ferries (WSF) must award the contract to the shipbuilder that offers the lowest bid for a technically acceptable proposal (RCW 47.60.820).

WSF intends to allow shipbuilders who bid on the hybrid electric Olympic class ferry acquisition to offer technical proposals that differ from the owner's model[8]. However, there is no incentive to propose improvements that reduce life cycle cost if doing so increases the shipbuilder's bid price.

## A best value selection would allow WSF to choose a shipbuilder that meets criteria in addition to upfront price

In a best value selection, bids are evaluated based on both price and non-price criteria. If the Request for Proposal (RFP) clearly states the criteria and their relative priority, bidders can focus their responses on the elements that offer the greatest overall value.

For ferry acquisition, selection criteria could:

- Encourage shipbuilders to offer designs that lower life cycle costs or reduce project risks.
- Reflect current legislative priorities to have vessels built in Washington and encourage the use of small or minority-owned businesses.
- Evaluate the shipbuilder's facilities, workload, expertise, capability, and ability to meet the schedule as part of the overall award criteria. By law, these factors are currently used only to select the shipbuilders that are eligible to submit a bid (see Phase 1 in the graphic below).

The best value selection is commonly used in federal procurements and in Washington State Department of Transportation (WSDOT) civil engineering projects. The 2021 Legislature approved it for use by any county that purchases electric ferries (RCW 36.32.234).

[8]Design produced under previous contract.

## By law, a WSF ferry RFP is restricted to in-state bids. If it is unsuccessful, a second round begins, which adds time to the procurement process.

As noted in Exhibit 3.2, state law requires WSF to use a phased approach to design-build contracting for ferries.

The current approach provides an initial preference for shipbuilders in Washington. WSF may only seek out-of-state bids if the fixed prices from all Washington shipbuilders are more than 5% above the engineer's estimates. These estimates are unique to each bid and are based on detailed information and developed designs. The law was passed in 2015 and has not been applied to a ferry acquisition. JLARC staff's consultant identified potential challenges for implementation:

- It may be difficult for in-state bids to be within 5% of the engineer's estimate because the estimate focuses on cost. Estimators try to account for other factors, such as risk tolerance, profit, and productivity, that the shipbuilder incorporates into its price. However, there is a great deal of uncertainty about these proprietary charges.
- In this design-build approach, each shipbuilder's design must be compared to an engineer's estimate that reflects that specific design. For example, the engineer's estimate created in 2021 is based on Vigor's[9] design of the hybrid electric Olympic class ferry. It cannot be reused as-is because other shipbuilders are likely to have different designs. The development of multiple estimates adds time, cost, and complexity.
- Limiting the potential shipbuilders to those in-state means the production capacity and existing workload of the shipyards may constrain the project schedule.
    - Statute does not provide guidance if WSF identifies no qualified shipbuilders in Phase 1 based on factors including workload, expertise, and ability to meet the schedule.
- WSF estimates that a second RFP process would add more than a year to the project schedule.
- Some federal funding is available only if the competition for the ferry construction contract is open to all shipbuilders in the U.S.

[9]Shipbuilder previously in negotiations with WSF for hybrid electric ferries.

### Exhibit 3.2: State law requires a three-phase design-build contracting approach

| PHASE 1 (RFP) | PHASE 2 (Technical proposals) | PHASE 3 (Bids) |
|---|---|---|
| WSF issues a Request for Proposal (RFP) to in-state shipbuilders.<br><br>Washington shipbuilders respond to qualification questions.<br><br>WSF selects shipbuilders for Phase 2. | WSF periodically reviews each shipbuilder's design, drawings, and specifications.<br><br>Each shipbuilder submits its proposal.<br><br>WSF accepts or rejects each proposal.<br><br>WSF completes an engineer's estimate for each shipbuilder's proposed design. | Each shipbuilder submits a firm, fixed price.<br><br>WSF awards design-build contract to a Washington shipbuilder based on lowest price.<br><br>***OR**, if all responses are more than 5% above engineer's estimates:*<br><br>WSF rejects all bids and issues new RFP nationally. |

**Source: JLARC staff depiction of RCWs 47.60.814, 47.60.815, 47.60.816, 47.60.818, and 47.60.820.**

## Other states offer in-state preferences in initial RFP

While other states offer in-state preferences for shipbuilding and other construction activities, none initially limit bids to in-state firms. Rather, they structure the initial RFP to include preferences or selection criteria that benefit in-state businesses. For example:

- Alaska has provided a 5% preference to the bid price for in-state firms. It also awards in-state bidders an additional 10% overall evaluation point preference in the scoring criteria.
- At least ten states have a "percentage preference." This preference is applied when an out-of-state bidder offers the lowest price. It allows agencies to select an in-state bidder if they are within a specified percentage of the lowest bid.
- States including Florida, Maine, and Texas use a "tie-bid preferences" approach that allows procurement officials to select an in-state bidder if materials are of the same price and quality.
- Other states, including Louisiana and Rhode Island, offer preferences for out-of-state proposals that include a partnership with in-state firms.

## Legislative Auditor's recommendations to the Legislature

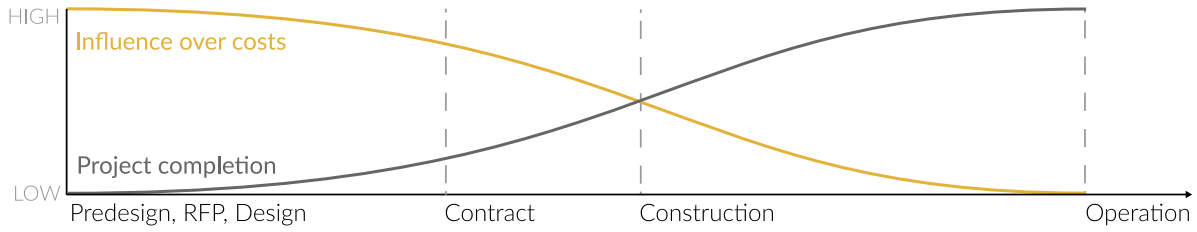
- The Legislature should consider amending state law to allow WSF to use a best value selection process for ferry acquisition.
- The Legislature should consider amending state law to allow WSF to offer a single nationwide RFP that increases competition, offers in-state preference, and protects against the risk of a longer procurement process.

# 4. Additional predesign studies and a different payment strategy can address cost concerns

## WSF can address cost concerns by using predesign studies to analyze life cycle costs and managing change. It also should tie payments to measurable project progress.

A vessel's life cycle costs include acquisition (e.g., design, construction), operations, maintenance, and disposal. The U.S. Government Accountability Office (GAO) estimates that 70% of a vessel's life cycle costs are experienced after construction. An even higher percentage may be experienced for vessels that have a relatively long (50 to 60 year) life expectancy, such as Washington's state ferries. The best opportunities to control these costs are early in a project, during the project's predesign and design phases when the technical and contractual requirements are set.

### Exhibit 4.1: Influence over a vessel's life cycle cost is greatest during early project phases




**Source: Adapted from report prepared by JLARC staff's consultant (Appendix A).**

## WSF uses predesign studies to inform a vessel's technical requirements but could do more to assess life cycle costs

Predesign studies explore ways to address a vessel's requirements. For example, Washington State Ferries' (WSF) completed predesign studies for the hybrid electric Olympic class ferries explored how to minimize vessel wake, convert vessels to plug-in hybrid electric propulsion, and

appropriately size battery banks. The results of the studies guide the technical requirements in the Request for Proposal and the vessel design.

Statute requires predesign studies to include certain information, including an evaluation of long-term operating costs related to fuel efficiency, preservation, and staffing (RCWs 47.60.385–.386). WSF's completed predesign studies for the diesel and hybrid electric Olympic class vessels that addressed life cycle costs related to fuel efficiency and preservation but did not evaluate long-term staffing costs.

WSF reports that it selects the topics for predesign studies based on stakeholder input and industry trends. VARD Marine Inc. (VARD), JLARC staff's consultant, found that the topics are valid. However, WSF's approach may unintentionally exclude topics that have a significant effect on life cycle costs, such as the potential impact of new technology on crew size and training. A systematic approach could also incorporate information about cost drivers based on WSF's experience with vessels already in operation.

## WSF's change management system is consistent with best practices

Changes are typical in a shipbuilding contract and can occur during the design or construction phases. Some may be driven by changes in regulations. When this occurs, the shipbuilder is contractually required to comply. Other changes may be proposed by the owner or shipbuilder based on changing needs, new information, or technology improvements. Best practice is to ensure that non-regulatory changes are managed appropriately and tracked from the time they are raised, through the approval process, and to their resolution.

VARD noted that WSF's change management system is well-organized, detailed, and aligned with best practices. For example, documentation includes official forms from WSF and the shipbuilder showing who made the change request, the justification, and the decision about whether to proceed. VARD observed the following:

- **Diesel Olympic class vessels**: WSF and the shipbuilder (Vigor) had few changes throughout the process. The project had refined and well-formulated requirements, WSF was disciplined in avoiding change, and the change order process was robust. The total value of changes was 1.4% of the contract price.
- **2019 hybrid electric Olympic class vessels**: The design phase did not follow normal practices as detailed in statute because the contract was an extension of a previous agreement. The requirements were not fully developed and there was more technical uncertainty (e.g., the effect of the propulsion system on other design requirements). Design changes included passenger elevators, use of non-metallic piping, and battery

room access. This led to multiple increases to the scope of work, schedule, and cost before the contract's termination in 2022.

### Contingency is used to pay for a limited set of change orders after the contract is awarded

Although WSF must use a fixed-price contract, state law allows it to approve change orders on a limited basis. In its budget, WSF can ask the Legislature to appropriate up to 5% of the contract price as contingency to pay for change orders. The Office of Financial Management (OFM) must approve contingency expenditures (RCW 47.60.820).

## WSF pays shipbuilders in monthly payments

WSF has few cost and schedule reporting requirements in its contracts. In previous acquisition projects, it made monthly payments to the shipbuilder.

- For the functional design (see Section 2), WSF paid the shipbuilder in uniform monthly payments. These payments reflect the total price for the work spread equally over the time needed to complete it.
- For detailed design and construction, WSF paid the shipbuilder in monthly progress payments. These payments are based on the shipbuilder's estimate of progress since the last payment cycle. However, the contract notes that these estimates are tentative and should be used only for determining payments. They are not considered evidence of progress or acceptability.

WSF states that it prefers this payment method because it is administratively simple and costs less to manage. WSF believes these payments can help the primary contractor make timely payments to small businesses employed as subcontractors and suppliers. However, WSF acknowledges it has limited recourse when the shipbuilder does not deliver the expected results during the design phase.

## Best practice links payments to significant milestones or measurable progress

Federal and private shipbuilding contracts typically use payment approaches that are based on the completion of milestones or measurable progress. These approaches can reduce project risk and improve the shipbuilder's performance.

- Milestone-based approaches link payments to certain major events such as final design review, steel cutting, or trials. The nature and value of these payments can be negotiated based on the shipbuilder's construction plan.

- Earned value approaches consider cost, work scope, and schedule. For each time period in a project schedule, the planned value of the work is compared to the actual value of the work completed. The shipbuilder is paid only for measurable progress. This is commonly called Earned Value Management (EVM). EVM is well-suited for complex projects with long production periods, high risk, and high costs.

### Governments and industry consider EVM a worldwide best practice management tool

At the federal level, EVM became a standard required practice for government contractors in the 1990s.

The shipbuilding industry also recognizes EVM as a best practice for ensuring cost and schedule control. For example, the intended shipbuilder for the hybrid electric Olympic class ferry (Vigor) required its contractors to adhere to EVM by allowing them to report and invoice only for physical progress on scheduled deliverables.

WSF's parent agency, the Washington State Department of Transportation (WSDOT), has used EVM to measure performance and progress for some capital projects since 2009. Its guidance document notes that EVM can help WSDOT determine the health of the project in terms of cost and schedule, and use the data to forecast project trends.

## Legislative Auditor's recommendations to WSF

- WSF should ensure predesign studies evaluate long-term costs as directed by statute and that the suite of studies for each acquisition project addresses the most significant potential life cycle cost drivers.
- WSF should tie shipbuilder payments to significant milestones or measurable progress.

# 5. WSF lacks documented policies reflecting current law and best practices

## WSF does not have documented policies reflecting current laws and best practices for vessel acquisition, cost estimation, or risk management

Chapter 47.60 RCW details the approach that Washington State Ferries (WSF) must use to acquire new ferries. The law was adopted in 2001 and has been modified multiple times, including significant changes in 2015. Materials reviewed by VARD Marine Inc. (VARD), JLARC staff's consultant, indicate that WSF complied with the laws in place at the time for its recent

vessel acquisitions. For example, its Requests for Information or Proposal packages have included relevant statutory references.

## WSF's primary vessel policy document does not reflect statutory changes made in 2015

WSF's policies and procedures for vessel acquisition and preservation are documented in the Vessel Engineering Manual (Manual). The last substantive update was in 2002. A minor update in 2012 reflected agency reorganization. There have been no changes since then. As such, it is inconsistent with current law, including the statutory changes made to WSF's vessel acquisition process in 2015, such as:

- Requiring a design-build process and fixed-price contracts.
- Limiting contingency to 5% of the contract price and requiring OFM approval of contingency spending.
- Requiring WSF to hire an independent owner's representative to manage or oversee project elements, including change orders.
- Stipulating that if none of the bids from the initial in-state Request for Proposal (RFP) are within 5% of the engineer's estimates, WSF must reject all bids and issue a nationwide RFP.

### Exhibit 5.1: Content in the WSF policy manual was last updated in 2002


**Source: JLARC staff analysis of WSF's Vessel Engineering Manual and statutory changes.**

## WSF policies do not address best practices for key steps of the acquisition process

As noted in other sections of this report, WSF follows many best practices for vessel acquisition. However, it has not updated its policies and procedure documents to reflect these practices. This may result in inefficiencies or increased project risk. For example, the Manual does not provide current guidance for the following key elements:

- **Predesign studies**. The Manual does not document how predesign studies will be selected or what content is required.
- **Cost estimates.** The Manual requires estimates, but provides limited guidance for developing and documenting the work. In particular, it does not define the process for estimates developed by WSF staff.
- **Risk management.** The Washington State Department of Transportation (WSDOT) requires active risk management of large capital projects, including ferries, and its Project Risk Management Guide aligns with best practices. However, the guide has a civil engineering focus. WSF does not have a similar set of policies for risk management in ferry projects. This would include a risk management process, organizational risk profile, and risk assessments with a shipbuilder.

### WSF does not require or conduct formal "lessons learned" reviews

Best practice is to conduct a formal "lessons learned" review at the end of each project or after the delivery of each vessel on a multi-vessel project. The review can inform and refine the approach to key steps in future procurements. The Manual directs staff to conduct such reviews when contracts close and to use the information in future procurements. This guidance appears insufficient, since WSF staff reported that the process is informal, not timely, and may not inform other projects.

### WSDOT policy documents are tailored to civil engineering work

WSDOT has published many guidance documents such as its Cost Estimating Manual for Projects and Project Risk Management Guide. However, the materials are written for civil engineering work and little of it is directly applicable to ferry acquisition.

## Absent policy documentation, WSF relies heavily on staff expertise and independent consultants

In the absence of documented policies, WSF relies on staff expertise to determine how it will manage each vessel acquisition and ensure statutory compliance. It currently has four staff

members dedicated to vessel acquisitions. The equivalent of seven shared staff members assist with contracts, legal review, inspections, and other work. WSF supplements its in-house expertise with consultants (e.g., engineering analysis).

A heavy reliance on staff knowledge and expertise, without documented policies and clear succession planning, could leave WSF vulnerable if it experiences turnover or retirements. For example, a less experienced in-house team may have difficulty defining its support needs (e.g., expert consultants). This increases project risk.

Effective documentation that is updated as statute and best practices evolve helps retain organizational knowledge and mitigate the risk of having that knowledge limited to a few personnel. Effective documentation would also provide a consistent means for communicating information and knowledge to external parties, including the Legislature and the consultants that work on ferry projects.

### WSF hired an Independent Owner's Representative as required by statute

In 2015, the Legislature required that WSF hire an independent owner's representative (IOR). The IOR serves as an intermediary between WSF and the shipbuilders during development and construction of the first vessel in each new class of ferries (RCW 47.60.810). The IOR must be the primary advocate and communicate with shipbuilders, perform quality oversight, manage change order requests, and ensure contract adherence.

WSF hired an IOR for the plug-in hybrid electric Olympic class acquisition. However, the IOR's contracted scope is narrower than the role directed by statute. WSF states that the scope reflects available funding. According to VARD, the narrow scope is more consistent with industry practice. This is the first time WSF has used the position.

## Legislative Auditor's recommendation to WSF

- WSF should update its ferry acquisition policies and procedures to reflect current laws and best practices.

# Appendix A: Consultant report

## JLARC staff consulted with experts in marine engineering and procurement to help evaluate WSF's approach to vessel acquisition

JLARC staff engaged VARD Marine, Inc. to identify best practices in vessel acquisition and assess the Washington State Ferries' approach to design-build procurement for hybrid electric vessels.

VARD's methods including analyzing documents provided by WSF, interviewing WSF staff, conducting a literature review, examining similar ferry procurements in the U.S. and internationally, reviewing state and federal law, and applying professional judgment based on the team's experience and expertise.

VARD identified numerous opportunities for improvement, many of which are captured in JLARC's report.

### Report and executive summary available for download

A full copy of the consultant report can be downloaded here.

The executive summary of the consultant report can be downloaded here.

# Appendix B: Applicable statutes

### Chapter 47.60 RCW details the approach that WSF must use to procure new ferries

47.60.385: Vessel acquisition project funding requests and predesign studies

47.60.386: Additional requirements for vessel acquisition funding requests.

47.60.810: Independent owner's representative, acquisition phases

47.60.814: Request for proposal requirements, Build in Washington provision

47.60.815: Engineer's estimate, nationwide RFP

47.60.816: Acquisition phase one (selecting proposers for phase two)

47.60.818: Acquisition phase two (development of technical proposals, fixed price bid)

47.60.820: Acquisition phase three (low-bid award requirement, honorarium, contingency limit)

47.60.838: Vessel and terminal electrification program

### Terminal improvement, vessel improvement, and vessel acquisition project funding requests — Predesign study—Prioritization

RCW 47.60.385

(1) Terminal improvement, vessel improvement, and vessel acquisition project funding requests must adhere to the capital plan, include route-based planning, and be submitted with a predesign study that:

a. Includes all elements required by the office of financial management;

b. Separately identifies basic terminal and vessel elements essential for operation and their costs;

c. Separately identifies additional elements to provide ancillary revenue and customer comfort and their costs;

d. Includes construction phasing options that are consistent with forecasted ridership increases;

e. Separately identifies additional elements requested by local governments and the cost and proposed funding source of those elements;

f. Separately identifies multimodal elements and the cost and proposed funding source of those elements;

g. Identifies all contingency amounts;

h. Identifies any terminal, vessel, or other capital modifications that would be required as a result of the proposed capital project;

i. Includes planned service modifications as a result of the proposed capital project, and the consistency of those service modifications with the capital plan; and

j. Demonstrates the evaluation of long-term operating costs including fuel efficiency, staffing, and preservation.

(2) The department shall prioritize vessel preservation and acquisition funding requests over vessel improvement funding requests.

## Additional requirements for vessel improvement and vessel acquisition funding requests

### RCW 47.60.386

(1) In addition to the requirements of RCW 47.60.385(1), initial requests for, and substantial modification requests to, vessel acquisition funding must be submitted with a predesign study that:

a. Includes a business decision case on vessel sizing;

b. Includes an updated vessel deployment plan demonstrating maximum use of existing vessels, and an updated systemwide vessel rebuild and replacement plan;

c. Includes an analysis that demonstrates that acquiring a new vessel or improving an existing vessel is more cost-effective than other alternatives considered. At a minimum, alternatives explored must include:

    i. Alternatives to new vessel construction that increase capacity of existing vessels;

    ii. Service level changes in lieu of adding vessel capacity; and

    iii. Acquiring existing vessels or existing vessel plans rather than wholly new vessels or vessel plans; and

d. Demonstrates that the vessel proposed for improvement, construction, or purchase, if intended to replace an existing vessel or to place an existing vessel into inactive or reserve status, is consistent with the scheduled replacements in the rebuild and replacement plan.

(2) In addition to the requirements of RCW 47.60.385(1), initial requests for, and substantial modification requests to, vessel improvement funding must be submitted with a predesign study that includes:

a. An explanation of any regulatory changes necessitating the improvement;

b. The requirements under subsection (1) of this section, if the improvement modifies the capacity of a vessel;

c. A cost-benefit analysis of any modifications designed to improve fuel efficiency, including potential impacts on vessel maintenance and repair; and

d. An assessment of out-of-service time associated with making the improvement and ongoing preservation of the improvement.

## Design-build ferries—Independent owner's representative—Phases defined—Department may modify certain existing option contracts

RCW 47.60.810

1. The department shall use a modified request for proposals process when purchasing new auto ferries, except for new 144-auto ferries purchased through an option on a contract executed before July 6, 2015, whereby the prevailing shipbuilder and the department engage in a design and build partnership for the design and construction of the auto ferries. The process consists of the three phases described in subsection (3) of this section.

2. Throughout the three phases described in subsection (3) of this section, the department shall employ an independent owner's representative to serve as a third-party intermediary between the department and the proposers, and subsequently the successful proposer. However, this representative shall serve only during the development and construction of the first vessel constructed as part of a new class of vessels developed after July 6, 2015. The independent owner's representative shall:
    a. Serve as the department's primary advocate and communicator with the proposers and successful proposer;
    b. Perform project quality oversight;
    c. Manage any change order requests;
    d. Ensure that the contract is adhered to and the department's best interests are considered in all decisions; and
    e. Possess knowledge of and experience with inland waterways, Puget Sound vessel operations, the propulsion system of the new vessels, and Washington state ferries operations.
3. The definitions in this subsection apply throughout RCW 47.60.812 through 47.60.822.
    a. "Phase one" means the evaluation and selection of proposers to participate in development of technical proposals in phase two.
    b. "Phase two" means the preparation of technical proposals by the selected proposers in consultation with the department.
    c. "Phase three" means the submittal and evaluation of bids, the award of the contract to the successful proposer, and the design and construction of the auto ferries.
4. The department may modify an existing option contract executed prior to July 6, 2015, to allow for the purchase of up to five additional 144-auto ferries, for a total of nine 144-auto ferries. The department must execute a new modification to an existing option contract for each of the additional five ferries.

## Design-build ferries—Issuance of request for proposals

RCW 47.60.814

1. Subject to legislative appropriation for the procurement of vessels, the department shall issue a request for proposals to interested parties that must include, at least, the following:

    a. Solicitation of a proposal to participate in a design and build partnership with the department to design and construct the auto ferries;

    b. Instructions on the prequalification process and procedures;

    c. A description of the modified request for proposals process. Under this process, the department may modify any component of the request for proposals, including the outline specifications, by addendum at any time before the submittal of bids in phase three;

    d. A description of the design and build partnership process to be used for procurement of the vessels;

    e. Outline specifications that provide the requirements for the vessels including, but not limited to, items such as length, beam, displacement, speed, propulsion requirements, capacities for autos and passengers, passenger space characteristics, and crew size. The department will produce notional line drawings depicting hull geometry that will interface with Washington state ferries terminal facilities. Notional lines may be modified in phase two, subject to approval by the department;

    f. Instructions for the development of technical proposals in phase two, and information regarding confidentiality of technical proposals;

    g. The vessel delivery schedule, identification of the port on Puget Sound where delivery must take place, and the location where acceptance trials must be held;

    h. The estimated price range for the contract;

    i. Notification that the contract will be a fixed price contract;

    j. The form and amount of the required bid deposit and contract security;

    k. A copy of the contract that will be signed by the successful proposer;

    l. The date by which proposals in phase one must be received by the department in order to be considered;

    m. A description of information to be submitted in the proposals in phase one concerning each proposer's qualifications, capabilities, and experience;

n. A statement of the maximum number of proposers that may be selected in phase one for development of technical proposals in phase two;

o. Criteria that will be used for the phase one selection of proposers to participate in the phase two development of technical proposals;

p. A description of the process that will be used for the phase three submittal and evaluation of bids, award of the contract, and postaward administrative activities;

q. A requirement that the contractor comply with all applicable laws, rules, and regulations including but not limited to those pertaining to the environment, worker health and safety, and prevailing wages;

r. A requirement that the vessels be constructed within the boundaries of the state of Washington except that equipment furnished by the state and components, products, and systems that are standard manufactured items are not subject to the in-state requirement under this subsection (1)(r). For the purposes of this subsection (1)(r), "constructed" means the fabrication, by the joining together by welding or fastening of all steel parts from which the total vessel is constructed, including, but not limited to, all shell frames, longitudinals, bulkheads, webs, piping runs, wire ways, and ducting. "Constructed" also means the installation of all components and systems, including, but not limited to, equipment and machinery, castings, electrical, electronics, deck covering, lining, paint, and joiner work required by the contract. "Constructed" also means the interconnection of all equipment, machinery, and services, such as piping, wiring, and ducting;

s. A requirement that all vessel design specifications and drawings must be complete and, when applicable, meet United States coast guard standards before vessel construction begins; and

t. A requirement that all warranty work on the vessel must be performed within the boundaries of the state of Washington, insofar as practical.

2. The department shall not issue a request for proposals for the procurement of vessels, except on a contract executed before July 6, 2015, without specific authorization to do so from the legislature. After receiving such specific authorization, any request for proposals issued by the department must comply with RCW 47.60.815.

## Design-build ferries—Cost-benefit analysis—Engineer's estimate—Subsequent request for proposals, when required.

RCW 47.60.815

1. The Washington state institute for public policy must conduct a cost-benefit analysis of the state's ferry vessel procurement practices. This analysis must (a) compare in-state construction to construction at shipyards across the United States, (b) identify barriers to receiving three or more in-state bids to a request for proposals, and (c) recommend policies to encourage three or more in-state bidders to respond to a request for proposals. This analysis must be provided to the governor, the transportation committees of the legislature, and the department by December 1, 2016.
2. In developing its engineer's estimate to procure a ferry vessel, the department must identify significant project cost drivers, including materials, labor, overhead, delivery, and profit.
3. After July 1, 2017, if all responses to the initial request for proposals under RCW 47.60.814 are greater than five percent above the department's engineer's estimate for the project, the department must reject all proposals and issue a subsequent request for proposal that is not subject to RCW 47.60.814(1)(r).

## Design-build ferries—Phase one

### RCW 47.60.816

Phase one of the request for proposals process consists of evaluation and selection of prequalified proposers to participate in subsequent development of technical proposals in phase two, as follows:

1. The department shall issue a request for proposals to interested parties.
2. The request for proposals must require that each proposer prequalify for the contract under chapter 468-310 WAC, except that the department may adopt rules for the financial prequalification of proposers for this specific contract only. The department shall modify the financial prequalification rules in chapter 468-310 WAC in order to maximize competition among financially capable and otherwise qualified proposers. In adopting these rules, the department shall consider factors including, without limitation: (a) Shipyard resources in Washington state; (b) the cost to design and construct multiple vessels under a single contract without options; and (c) the sequenced delivery schedule for the vessels.
3. The department may use some, or all, of the nonfinancial prequalification factors as part of the evaluation factors in phase one to enable the department to select a limited number of best qualified proposers to participate in development of technical proposals in phase two.

4. The department shall evaluate submitted proposals in accordance with the selection criteria established in the request for proposals. Selection criteria may include, but are not limited to, the following:
    a. Shipyard facilities;
    b. Organization components;
    c. Design capability;
    d. Build strategy;
    e. Experience and past performance;
    f. Ability to meet vessel delivery dates;
    g. Projected workload; and
    h. Expertise of project team and other key personnel.
5. Upon concluding its evaluation of proposals, the department shall select the best qualified proposers in accordance with the request for proposals. The selected proposers must participate in development of technical proposals. Selection must be made in accordance with the selection criteria stated in the request for proposals. All proposers must be ranked in order of preference as derived from the same selection criteria.

## Design-build ferries—Phase two.

### RCW 47.60.818

Phase two of the request for proposals process consists of preparation of technical proposals in consultation with the department, as follows:

1. The development of technical proposals in compliance with the detailed instructions provided in the request for proposals, including the outline specifications, and any addenda to them. Technical proposals must include the following:
    a. Design and specifications sufficient to fully depict the ferries' characteristics and identify installed equipment;
    b. Drawings showing arrangements of equipment and details necessary for the proposer to develop a firm, fixed price bid;
    c. Project schedule including vessel delivery dates; and
    d. Other appropriate items.

2. The department shall conduct periodic reviews with each of the selected proposers to consider and critique their designs, drawings, and specifications. These reviews must be held to ensure that technical proposals meet the department's requirements and are responsive to the critiques conducted by the department during the development of technical proposals.
3. If, as a result of the periodic technical reviews or otherwise, the department determines that it is in the best interests of the department to modify any element of the request for proposals, including the outline specifications, it shall do so by written addenda to the request for proposals.
4. Proposers must submit final technical proposals for approval that include design, drawings, and specifications at a sufficient level of detail to fully depict the ferries' characteristics and identify installed equipment, and to enable a proposer to deliver a firm, fixed price bid to the department. The department shall reject final technical proposals that modify, fail to conform to, or are not fully responsive to and in compliance with the requirements of the request for proposals, including the outline specifications, as amended by addenda.

## Design-build ferries—Phase three

### RCW 47.60.820

Phase three consists of the submittal and evaluation of bids and the award of the contract to the successful proposer for the final design and construction of the auto ferries, as follows:

1. The department shall request bids for detailed design and construction of the vessels after completion of the review of technical proposals in phase two. The department will review detailed design drawings in phase three for conformity with the technical proposals submitted in phase two. In no case may the department's review replace the builder's responsibility to deliver a product meeting the phase two technical proposal. The department may only consider bids from selected proposers that have qualified to bid by submitting technical proposals that have been approved by the department.
2. Each qualified proposer must submit its total bid price for all vessels, including certification that the bid is based upon its approved technical proposal and the request for proposals.
3. Bids constitute an offer and remain open for ninety days from the date of the bid opening. A deposit in cash, certified check, cashier's check, or surety bond in an amount

specified in the request for proposals must accompany each bid and no bid may be considered unless the deposit is enclosed.

4. The department shall evaluate the submitted bids. Upon completing the bid evaluation, the department may select the responsive and responsible proposer that offers the lowest total fixed price bid for all vessels.
5. The department may waive informalities in the proposal and bid process, accept a bid from the lowest responsive and responsible proposer, reject any or all bids, republish, and revise or cancel the request for proposals to serve the best interests of the department.
6. The department may:
    a. Award the contract to the proposer that has been selected as the responsive and responsible proposer that has submitted the lowest total fixed price bid;
    b. If a contract cannot be signed with the apparent successful proposer, award the contract to the next lowest responsive and responsible proposer; or
    c. If necessary, repeat this procedure with each responsive and responsible proposer in order of rank until the list of those proposers has been exhausted.
7. If the department awards a contract to a proposer under this section, and the proposer fails to enter into the contract and furnish satisfactory contract security as required by chapter 39.08 RCW within twenty days from the date of award, its deposit is forfeited to the state and will be deposited by the state treasurer to the credit of the Puget Sound capital construction account. Upon the execution of a ferry design and construction contract all proposal deposits will be returned.
8. The department may provide an honorarium to reimburse each unsuccessful phase three proposer for a portion of its technical proposal preparation costs at a preset, fixed amount to be specified in the request for proposals. If the department rejects all bids, the department may provide the honoraria to all phase three proposers that submitted bids.
9. 
    a. To accommodate change orders on a fixed price contract, the department shall request that the legislative appropriation for any auto ferry construction project include a contingency in the following amounts:
        i. For the first vessel in any class of vessels designed to be powered by liquefied natural gas, the contingency may be no more than ten percent of the contract price;

ii. For all other vessels, the contingency may be no more than five percent of the contract price.

b. The contingency required by this subsection (9) must be identified in the funding request to the legislature and held in reserve until the office of financial management approves the expenditure.

## Vessel and terminal electrification program

### RCW 47.60.838

It is the intent of the legislature to fully fund the vessel and terminal electrification program in accordance with the Washington state ferries 2040 long range plan. The legislature finds that to attain the 2040 target fleet size of 26 vessels, a biennial replacement schedule is necessary to ensure the level of ferry service and reliability expected by the public. Therefore, by June 30, 2025, the legislature will secure funding options, including but not limited to a vessel surcharge, to devote the resources necessary to fulfill the vessel and terminal needs outlined in the 2040 long range plan.

# RECOMMENDATIONS & RESPONSES

## Legislative Auditor Recommendations

**The Legislative Auditor makes five recommendations to WSDOT Ferries Division (WSF) and two recommendations to the Legislature to improve vessel acquisitions.**

### Recommendations to WSDOT Ferries Division (WSF)

#### Recommendation #1: WSF should ensure that cost estimates provided to OFM, legislative staff, and the Legislature are clear and well documented.

Best practice is to clearly and thoroughly document cost estimates so that decision makers can understand and use the information.

Well documented estimates show the data source and the data's reliability. Documentation also should describe how the estimate was developed so that it can be understood and replicated. Documentation also should include the assumptions and explain if and why the estimate is likely to change.

| | |
|---|---|
| Legislation Required: | None |
| Fiscal Impact: | JLARC staff assume this can be completed within existing resources. If WSF believes additional resources are needed, it should include that information in its future budget requests. |
| Implementation Date: | October 2023; Estimates for the 2024 Supplemental Budget should be clear and well documented |
| Agency Response: | To be included with Proposed Final Report |

## Recommendation #2: WSF should apply probabilistic approaches to its cost estimates and clearly indicate the likelihood of the cost falling at or below the funding level requested.

WSF has stated that it intends to use WSDOT's CEVP process for the plug-in hybrid electric Olympic class procurement. This is a one-time action that is occurring late in the acquisition process. WSF should apply probabilistic approaches to all estimates to ensure decision makers have the best information available at all project stages.

| | |
|---|---|
| Legislation Required: | None |
| Fiscal Impact: | JLARC staff assume this can be completed within existing resources. If WSF believes additional resources are needed, it should include that information in its future budget requests. |
| Implementation Date: | October 2023; Estimates for the 2024 Supplemental Budget should include probabilistic approaches |
| Agency Response: | To be included with Proposed Final Report |

## Recommendation #3: WSF should ensure predesign studies evaluate long-term costs as directed by statute and that the suite of studies for each acquisition project addresses the most significant potential life cycle cost drivers.

RCWs 47.60.385 and 47.60.386 require predesign studies to include an evaluation of long-term operating costs related to fuel efficiency, preservation, and staffing. WSF should ensure that studies address all these factors.

Predesign is intended to help ensure that requirements are complete before the RFP process, reducing the chances of unexpected, expensive change orders later in the process.

| | |
|---|---|
| Legislation required: | None |
| Fiscal impact: | JLARC staff assume that developing a plan to ensure predesign studies address life cycle costs can be completed within existing resources. Conducting more predesign studies may require additional resources. |
| Implementation date: | December 2023 |
| Agency response: | To be completed with Proposed Final Report |

## Recommendation #4: WSF should tie shipbuilder payments to significant milestones or measurable project progress.

While WSF's current approach is administratively simple, it does not give WSF sufficient recourse if the shipbuilder does not deliver expected results. WSF should ensure the contracted shipbuilder is undertaking effective schedule and cost control using tools such as earned value management (EVM). This would provide WSF with visibility into project performance and give it a basis to tie payments to measurable progress or milestones.

| | |
|---|---|
| Legislation required: | None |
| Fiscal impact: | JLARC staff assume there may be minimal fiscal impact. WSF could determine whether additional resources are needed by evaluating those needed by WSDOT to implement similar EVM or payment approaches. |
| Implementation date: | June 2024 |
| Agency response: | To be completed with Proposed Final Report |

## Recommendation #5: WSF should update its ferry acquisition policies and procedures to reflect current laws and best practices.

WSF should document its policies and procedures to reflect current law, best practices, and its own established procedures. WSF can use the report by VARD Marine, Inc. as a guide because it details the discrepancies with state law and best practice.

Moving forward, WSF also should establish a process for ensuring timely revisions to reflect legislative changes or lessons learned during acquisition processes.

| | |
|---|---|
| Legislation required: | None |
| Fiscal impact: | JLARC staff assume that this can be completed within existing resources. If WSF believes additional resources are needed, it should include that information in its future budget requests. |
| Implementation date: | December 2023 |
| Agency response: | To be completed with Proposed Final Report |

## Recommendations to the Legislature

### Recommendation #6: The Legislature should consider amending state law to allow WSF to use a best value selection process for ferry acquisition.

RCW 47.60.820 requires WSF to award the contract based on the lowest total fixed price bid. A best value selection process would allow WSF to select a shipbuilder based on additional factors such as use of small businesses, life cycle costs, build location, and risk. Best value selection is considered a best practice for acquisition projects in which requirements are less clear, more design work is needed, or risks are high.

| | |
|---|---|
| Legislation required: | RCW 47.60.820 would need to be amended to allow a different selection process |
| Fiscal impact: | Uncertain, depending on how WSF structures the tradeoff between price and other factors |
| Implementation date: | June 2024 |
| Agency response: | To be completed with Proposed Final Report |

### Recommendation #7: The Legislature should consider amending state law to allow WSF to offer a single nationwide RFP that increases competition, offers in-state preference, and protects against the risk of a longer procurement process.

RCW 47.60.815 requires WSF to encourage in-state ferry construction by conducting an in-state procurement first. If the fixed prices from all Washington shipbuilders are more than 5% above WSF's engineer's estimates, it must issue a new RFP nationally. Other states have adopted single RFP processes that offer in-state preferences.

| | |
|---|---|
| Legislation required: | RCW 47.60.815 would need to be amended to allow a different procurement process. |
| Fiscal impact: | Uncertain |
| Implementation date: | June 2024 |
| Agency response: | To be completed with Proposed Final Report |

## Agency Response

Agency response(s) will be included in the proposed final report, planned for May 2023.

## Current Recommendation Status

JLARC staff follow up on the status of Legislative Auditor recommendations to agencies and the Legislature for four years. The most recent responses from agencies and status of the recommendations in this report can be viewed on our Legislative Auditor Recommendations page.

# MORE ABOUT THIS REVIEW

## Audit Authority

The Joint Legislative Audit and Review Committee (JLARC) works to make state government operations more efficient and effective. The Committee is comprised of an equal number of House members and Senators, Democrats and Republicans.

JLARC's nonpartisan staff auditors, under the direction of the Legislative Auditor, conduct performance audits, program evaluations, sunset reviews, and other analyses assigned by the Legislature and the Committee.

The statutory authority for JLARC, established in Chapter 44.28 RCW, requires the Legislative Auditor to ensure that JLARC studies are conducted in accordance with Generally Accepted Government Auditing Standards, as applicable to the scope of the audit. This study was conducted in accordance with those applicable standards. Those standards require auditors to plan and perform audits to obtain sufficient, appropriate evidence to provide a reasonable basis for findings and conclusions based on the audit objectives. The evidence obtained for this JLARC report provides a reasonable basis for the enclosed findings and conclusions, and any exceptions to the application of audit standards have been explicitly disclosed in the body of this report.

# Study Questions

**Click image to view PDF of proposed study questions.**

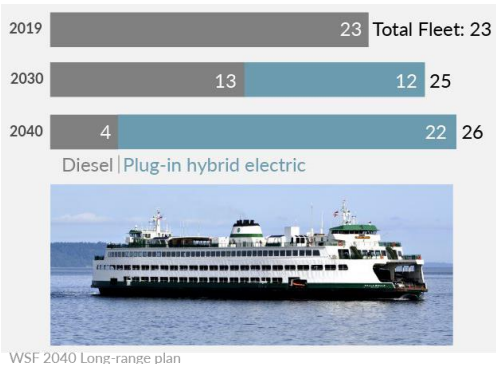
Washington JLARC

## PROPOSED STUDY QUESTIONS
## Hybrid Electric Ferries: Design-Build Contracting and Procurement

State of Washington Joint Legislative Audit and Review Committee — Updated May 2022

### Washington State Ferries' long-range plan includes plug-in hybrid electric vessels

Washington State Ferries (WSF) is a division of the State Department of Transportation. WSF's 2040 long-range plan is to increase the fleet from 23 to 26 vessels and shift most of the fleet to plug-in hybrid electric vessels. Statute requires WSF to use design-build contracting methods for new ferries.



WSF 2040 Long-range plan

### 2022 Supplemental Transportation Budget changed focus of JLARC's review

The 2021 Transportation Budget included a JLARC study of WSF's contract and cost estimates used for the first Olympic-class hybrid electric vessel. That procurement has since been delayed. As a result, the 2022 Supplemental Transportation Budget changed the study to focus on the design-build contracting approach for all classes of hybrid electric ferries, best practices, and opportunities for cost and operational efficiencies.

### This study will evaluate WSF's design-build contracting practices and policies

JLARC staff are working with consultants who have relevant expertise to answer the following questions:

1. What are WSF's policies and practices for procuring new hybrid-electric ferries through design-build contracts?
    a. Are WSF's policies and practices consistent with state and federal statutes and regulations?
2. How do WSF's policies and practices for design-build contracts for hybrid-electric ferries compare to domestic and international best practices?
    a. Are there best practices for addressing other related requirements or interests, such as build local requirements or use of small, minority-owned, or women-owned businesses?
    b. What are the advantages and disadvantages of these best practices, including potential costs or savings?
3. What design-build contracting best practices or industry standards can be used to decrease vessel construction costs or ensure operational efficiencies?
    a. Do WSF's cost management practices align with industry best practices, domestically and internationally, or other appropriate standards?

### Study Timeframe

**Preliminary Report:** June 2023 — **Proposed Final Report:** September 2023

### Study Team

| | | | |
|---|---|---|---|
| **Team Lead** | Rebecca Connolly | (360) 786-5175 | rebecca.connolly@leg.wa.gov |
| **Research Analyst** | Eric Whitaker | (360) 786-5618 | eric.whitaker@leg.wa.gov |
| **Project Coordinator** | Valerie Whitener | (360) 786-5191 | valerie.whitener@leg.wa.gov |
| **Legislative Auditor** | Keenan Konopaski | (360) 786-5187 | keenan.konopaski@leg.wa.gov |

JLARC Study Process

Study Mandate (Budget, legislation, committee direction) → **Proposed Study Questions** → Legislative Auditor's Preliminary Report → Legislative Auditor's Proposed Final Report (Agency response included) → Final Report (Option to append committee comment) → *Committee votes to distribute completed audit*

**JOINT LEGISLATIVE AUDIT & REVIEW COMMITTEE**
106 11th Ave SW, Olympia, WA 98501
**Email:** JLARC@leg.wa.gov | **Phone:** (360) 786-5171

# Methodology

The methodology JLARC staff use when conducting analyses is tailored to the scope of each study, but generally includes the following:

- **Interviews** with stakeholders, agency representatives, and other relevant organizations or individuals.
- **Site visits** to entities that are under review.
- **Document reviews**, including applicable laws and regulations, agency policies and procedures pertaining to study objectives, and published reports, audits or studies on relevant topics.
- **Data analysis**, which may include data collected by agencies and/or data compiled by JLARC staff. Data collection sometimes involves surveys or focus groups.
- **Consultation with experts** when warranted. JLARC staff consult with technical experts when necessary to plan our work, to obtain specialized analysis from experts in the field, and to verify results.

The methods used in this study were conducted in accordance with Generally Accepted Government Auditing Standards.

More details about specific methods related to individual study objectives are described in the body of the report under the report details tab or in technical appendices.

# CONTACT
# JLARC Authors

**Rebecca Connolly, Research Analyst,** 360-786-5175

**Eric Whitaker, Research Analyst,** 360-786-5618

**Valerie Whitener, Audit Coordinator**

**Eric Thomas, Legislative Auditor**

**Graphics:**

**Liz Thomas, Committee Technology and Administrative Assistant,** 360-786-5123

**Geneva Johnston, Data Reporting and Visual Communications Analyst,** 360-786-5286

# JLARC Members

## Senators

Bob Hasegawa
Liz Lovelett
Mark Mullet, Assistant Secretary
Ann Rivers
Rebecca Saldaña
Shelly Short
Lynda Wilson, Vice Chair
Keith Wagoner

## Representatives

April Berg
Jake Fey
Keith Goehner
Ed Orcutt, Secretary
Gerry Pollet, Chair
Drew Stokesbary

**Washington Joint Legislative Audit and Review Committee**
106 11th Ave SW, Suite 2500
PO Box 40910
Olympia, WA 98504-0910

Phone: 360-786-5171
Email: JLARC@leg.wa.gov