

Draft Working Paper
Terminal Architecture and Engineering
Generic Terminal Design Prototype

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Designated WTA Team Reviewer: _____

Requested Review Deadline: _____ / _____ / _____

The information contained in this working paper represents work in progress. The WTA's final recommendations of ferry service expansion will reflect study in a number of different technical areas. Therefore, information in this report may change depending on the results of the interrelated technical studies.

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WATER TRANSIT AUTHORITY



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Generic Terminal Design Prototype

This report describes generic passenger terminal requirements for the Bay Area Water Transit Authority (WTA) passenger ferry system. The spaces and their requirements incorporate the WTA operations plan's policies and address the needs of both large and small terminals.

This report's goal is to describe a generic program and delineate a corresponding generic design concept for a passenger terminal prototype that can be used throughout the WTA system. This prototype will provide a level of architectural consistency that will contribute to system-wide identity, operational predictability, and maintenance efficiency.

A **modular configuration** for developing a terminal prototype will be the best approach, because individual proposed terminal locations will have different needs based on the number of routes served, volumes and growth requirements on those routes, and individual contextual aesthetic needs. The following sections describe the modules and other functional components of the terminal prototype. They are tabulated in Table 1 and illustrated in Figures 1 and 2. A cost estimate is included in Table 2.

A modular prototype will allow each terminal to have a modest beginning, and enable it to grow and be reconfigured over time as its service needs change. It will also allow individual modules to be assembled differently at specific locations in response to local contextual constraints or opportunities. The prototype will also allow each individual module to be modified without compromising the integrity of the overall prototype design.

Ticketing Process

The ticketing process is a contributing factor in determining the prototype configuration. Boarding passes or tickets will be coded by route or destination and can be purchased on site or at remote locations from ticket vending machines (TVM). Purchase will be possible with cash, a ferry pass, or a combined regional transit pass. The system will function on a "proof-of-purchase" basis, with passes or tickets randomly checked by the crew on board the boat. There will be no need to take tickets within the terminal proper before entering the waiting area or the vessel.

Passenger Waiting Area Module

After purchasing tickets or with a pass in hand, passengers will pass through turnstiles into a secured waiting area configured for up to a full boatload of 350 passengers for some routes, or for up to a full boatload of 149 passengers for lighter routes with the smaller vessel. Multiple-route terminals will have

corresponding waiting areas sized according to vessel capacity. Passengers will enter on a first-come/first-served basis. Once the vessel capacity is reached, turnstiles will lock and a full boatload will be ready to board immediately. Additional passengers will be barred from entering the waiting area until it clears for the next departure.

The Passenger Waiting Area will be covered and enclosed for protection from wind and rain, but transparent for light penetration and visual access. At typical terminal locations, it will be as close as possible to the shoreline and the transfer span to the docking float. In some unique locations where upland space is severely limited, it may be necessary to locate the Passenger Waiting Area on the water adjacent to the docking float. The connection from the Passenger Waiting Area to the transfer span and docking float will be secure from public access.

Passenger Overflow Area Module

Passengers prevented from entering the waiting area due to capacity limitations will queue for the subsequent departure in the Passenger Overflow Area. It is assumed that the Passenger Waiting Area will clear of passengers with a vessel departure before the overflow queue reaches or exceeds the next boatload capacity. This will allow the Passenger Overflow Area and queuing upstream of the turnstiles to be unstructured (no fixed queue line). Overflow Areas will accommodate approximately half a vessel's capacity.

Priorities for overflow queuing beyond the next boatload capacity that may occur are currently unresolved and left to the passengers' and crew' discretion. Given ridership projections and planned fifteen-minute headways, it is assumed that this will happen very infrequently, and likely only due to a missed headway. However, Passenger Overflow Areas will be designed so they can be expanded and retrofitted with fixed queue lines, should demand increase and overflow exceed the next boatload.

Passenger Overflow Areas will be covered but open to the air.

Passenger Services Module

Passenger Services embrace the automated services usually provided by vending machines and considered essential for passengers using the ferry system. They will initially include:

- Ticket Vending Machines (TVM)
- Change Machines
- Automatic Teller Machines (ATM)
- Pay Telephones
- Newspaper Vending Machines

Other services can be included as demand dictates and if they prove feasible.

This module will be located along the main entry route(s) to the terminal under the cover of the Passenger Overflow Area.

Concession/Vendor Module

A module will be provided to accommodate space for a food service or retail concession when this proves appropriate. On a low-volume route, this module may be initially omitted and added later as ridership increases. Additional Concession/Vendor Modules may be added over time as demand increases. This activity would be located outside the secure Passenger Waiting Area and passengers would access the Concession/Vendor Module before entering. This would allow the Concession/Vendor Module to capitalize on the greater volume of passing pedestrians along the waterfront, in addition to serving terminal users. Terminals in areas with ample surrounding retail and commercial development may forego this module entirely.

Staff Facilities Module

Although the WTA operations plan does not specify continually staffed terminals, minimal Staff Facilities will be provided at each terminal. These will include an operations staff/security personnel office and a general storage room for incidental terminal items such as tickets for the TVM, schedule and routing information, emergency equipment, first aid supplies, and miscellaneous items. The office function may vary from location to location, ranging from including an active security station with closed-circuit TV monitoring to simply providing a place for maintenance or operations staff to get out of the passenger flow when attending to business at the terminal. Size is likely to vary.

Restroom Module

Restrooms for men and women will be provided adjacent to the secure Passenger Waiting Area and sized according to code requirements for either the 350- or 149-passenger waiting capacity. Multiple-route terminals and accompanying waiting areas may require individual restroom modules for each waiting area, or a combined facility placed outside the secure waiting areas. Budgets may dictate the latter. A janitor's closet for daily cleaning of the terminal facility will be provided in the Restroom Module.

Maintenance/Operations Module

The Maintenance/Operations Module will contain the space necessary for keeping the terminal functioning. This will include:

- A room for housing mechanical and electrical equipment (including any special communications equipment)

- Space for an emergency power generator to maintain operations in a power failure
- Space for receiving and transferring trash from the vessel and the terminal
- Space for storing facility maintenance items, ship's stores, and miscellaneous nautical or vessel-related equipment
- A receiving platform for bulk deliveries to the terminal or vessel.

Information Module

This will be a kiosk-type structure at the entrance to the terminal that would display and schedule and routing information for passengers and have printed information available. This would include system-wide maps and ferry-related events. It could also display community announcements and event information for departure and destination sites.

Roof Module

The roof of a terminal facility has the potential for multiple functions. It can be designed for public access and serve as an observation deck or viewpoint for the general public. It also provides an opportunity for architectural expression, by integrating the terminal facility into the aesthetic character of each community. It can also accommodate a ferry system identifier that can be seen from surrounding locations.

Docking Float Module

The Docking Float will float at extreme low tide, allow vessels to berth on two sides, and be designed to accommodate 149- and 350-passenger vessels on either side. It will be a level platform that is ADA compliant in the public areas and will have both bow-loading and side-loading capabilities. A moveable brow will connect the Docking Float to the vessel. The Docking Float will be covered and designed to protect passengers from the elements and it will be compartmentalized and able to be ballasted so the interface with the vessels' standardized (7½' to 8½') freeboard can be optimized. Provisions will be incorporated to provide for sewage pump-out, potable water, power with an emergency generator, trash removal, and stores loading. It will be moored using vertical piles founded in competent strata. A fendering system will be deployed that allows for head-on push mooring and cushioning to the vessel side. Mooring bits will be provided as needed.

Passenger Circulation and Access Components

A secure **boarding route** from the Passenger Waiting Area to the transfer span will be required. Its length and configuration will depend on the actual site and

terminal layout. It should be as short as possible. The transfer span would preferably connect directly to the waiting area.

A **departure route** from the transfer span that bypasses the secure waiting area to access public right-of-way is also needed. This route does not have to be secure, but has to bypass and respect the secure waiting area. An electronic sensor will count passengers as they proceed into the departure route.

A **transfer span** that is ADA-compliant at all tidal levels will connect the Passenger Waiting Area (or secure boarding route) to the docking float. It will accommodate both boarding and departing passengers. Different configurations will be required, depending on whether or not two routes are served per float and whether Passenger Waiting Areas are on shore or on the water.

For efficient intermodal connections, the entrance to the terminal should be as close as possible to the **bus transit platform** and the **passenger drop-off** curb. On-site parking should be easily accessible but of secondary priority to transit access.

Service and delivery access is necessary for the Maintenance/Operations and Concession/Vendor Modules; and needs to be provided to the transfer span itself for deliveries, emergency access, and trash removal.

Staff and vendor parking will be provided adjacent to those facility modules.

Covered **bicycle storage** will be provided at the entrance to the terminal facility along the main access route to the Passenger Overflow Area.

Shoreline Access Components

A continuous, publicly accessible **pedestrian and bicycle route** will be provided around the secure areas of the terminal facility and will connect to existing and/or planned public trails and walkways along the shoreline. The connection from the Passenger Waiting Area to the transfer span and docking float will be secure from public access.

Public **viewpoint areas** will be provided at both sides of the terminal facility, as pedestrian/bicycle routes turn inland from the shoreline and proceed around the terminal.

Utility Components

The docking float will be provided with vessel sewage pump-out capability, potable water to the vessel, and shore power to vessels including connection to the emergency generator.

Table 1
Generic Terminal Program

Activity Module/Space	Quantity	Size	Area	Operational/Locational Needs
A. Passenger Waiting (1)	350 total passengers	60.0'x60.0'	3656 SF	To service 350 passenger craft. Immediately adjacent to transfer span for immediate boarding with secure access and egress. Level of Service "C".
- Standing (80%)	256 passengers	8.5 SF/passenger	2176 SF	
- Seated (20%)	64 passengers	13.0 SF/passenger	832 SF	
- Bicycles	30 passengers	20 SF/passenger	600 SF	Separate bicycle waiting and access from walk-on passengers
- Turnstiles	4	4.0'x12.0'	48 SF	In line between passenger waiting and passenger overflow.
A. Passenger Waiting (2)	149 total passengers	38.0'x40.0'	1539 SF	To service 149 passenger craft. Immediately adjacent to transfer span for immediate boarding with secure access and egress. Level of Service "C".
- Standing (80%)	112 passengers	8.5 SF/passenger	952 SF	
- Seated (20%)	27 passengers	13.0 SF/passenger	351 SF	
- Bicycles	10 passengers	20.0 SF/passenger	200 SF	Separate waiting and access from walk-on passengers
- Turnstiles	3	4.0'x9.0'	36 SF	
B. Passenger Overflow (1)	150 total passengers	25'x60'	1516 SF	For 350 passenger craft. Immediately adjacent to the passenger waiting area and upstream of secure check point. Unsecured and open to public. Level of Service "C".
- Standing (80%)	112 passengers	8.5 SF/passenger	952 SF	
- Seated (20%)	28 passengers	13.0 SF/passenger	364 SF	
- Bicycles	10 passengers	20 SF/passenger	200 SF	
B. Passenger Overflow (2)	75 total passengers	18.5'x40.0'	732 SF	For 149 passenger craft. Immediately adjacent to the passenger waiting area and upstream of secure check point. Unsecured and open to public. Level of Service "C".
- Standing (80%)	56 passengers	8.5 SF/passenger	476 SF	
- Seated (20%)	12 passengers	13.0 SF/passenger	156 SF	
- Bicycles	5 passengers	20 SF/passenger	100 SF	
C. Passenger Services				Along main access route to passenger overflow and waiting areas and adjacent to passenger overflow area. Queuing for all vending machines within the passenger overflow area.
- Ticket Vending Machines	3	9.0'x13.5'	122 SF	
- Pay Telephones	2	5.5'x7.0'	39 SF	
- Newspaper Vending Machines	2	5.5'x7.0'	39 SF	
- Change Machines	2	5.5'x7.0'	39 SF	
- ATM	1	8.0'x13.5'	108 SF	
D. Concession/Vendor	1	10'x15'	150 SF	Adjacent to and accessible from passenger overflow area.
E. Staff Facilities				
- Staff/Security Office	1	10'x15'	150 SF	Adjacent to and accessible from passenger waiting area.
- General Storage	1	10'x15'	150 SF	Adjacent to and accessible from staff/security office with exterior service access.
F. Restrooms w/Janitor's Closet	2	25.5'x22.0' inclusive	561 SF	Adjacent to and accessible from passenger waiting area.
G. Maintenance/Operations				
- Storage Room	1	12'x12'	144 SF	Accessible from the passenger waiting area with exterior service access. Adjacent to transfer span for access to and from vessel.
- Mechanical/Electrical Room	1	12'x12'	144 SF	Adjacent to and accessible from storage room with exterior service access.
- Trash/Recycling Room	1	12'x12'	144 SF	Accessible from passenger waiting room with exterior service access. Adjacent to transfer span for access from vessel.
- Emergency Generator	1	12'x12'	144 SF	Accessible from exterior with service access.
H. Information Kiosk	1	10'x10'	100 SF	At entry to terminal along main access route to passenger overflow area.
I. Docking Float	1	130'x200' overall	9300 SF	"T" Configuration. At end of transfer span from passenger waiting area.
J. Passenger Circulation & Access				
- Boarding Route	1	18.0' wide minimum	x length	From waiting area to transfer span.
- Departure Route	1	18.0' wide minimum	x length	From transfer span to public right-of-way
- Transfer Span	1	18.0'x97.0'	1795 SF	From waiting area to docking float.
- Bus Platform	Site Specific	12.0'x60.0'/std. bus	720 SF	As close to terminal entry and waiting area as possible.
- Passenger Drop-off	Site Specific	12.0'x20.0'/vehicle	240 SF	As close to terminal entry and waiting area as possible.
- Service Access	1	20.0' width	x length	Access to concession/vendor, staff facilities, maintenance/operations and transfer span.
- Vendor/Staff Parking	2	20.0'x40.0'	800 SF	Adjacent to staff facilities and concession/vendor
- Bicycle Storage	10	6.0'x30.0'	180 SF	Adjacent to and along main access route to the passenger overflow area.
K. Shoreline Access				
- Pedestrian/Bicycle Route	1	12.0' wide minimum	x length	Around secure areas of the facility connecting to continuous shoreline access. Site specific opportunity, but generally at both sides of the terminal as the shoreline access route turns inland around the terminal. Also possible as a roof deck opportunity.
- Viewpoints	2	10.0'x10.0' each	100 SF each	
L. Utilities				
- Vessel Sewage Pump Out				To truck/tanker. No onsite storage.
- Potable Water to Vessel				
- Shore Power to Vessel				Connection to emergency generator.

Figure 1
Terminal Circulation and Adjacency Diagram

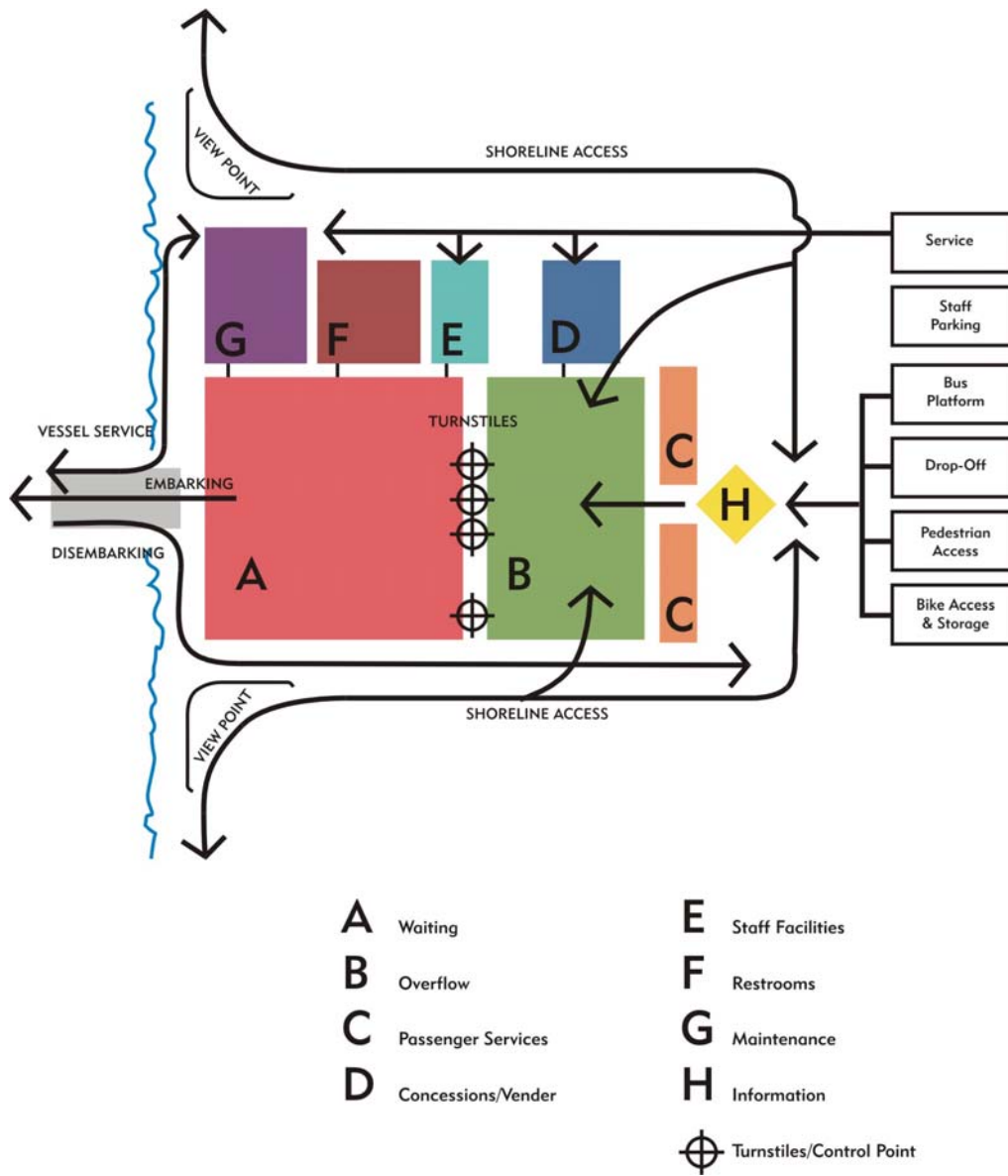


Figure 2
Modular Terminal Configuration

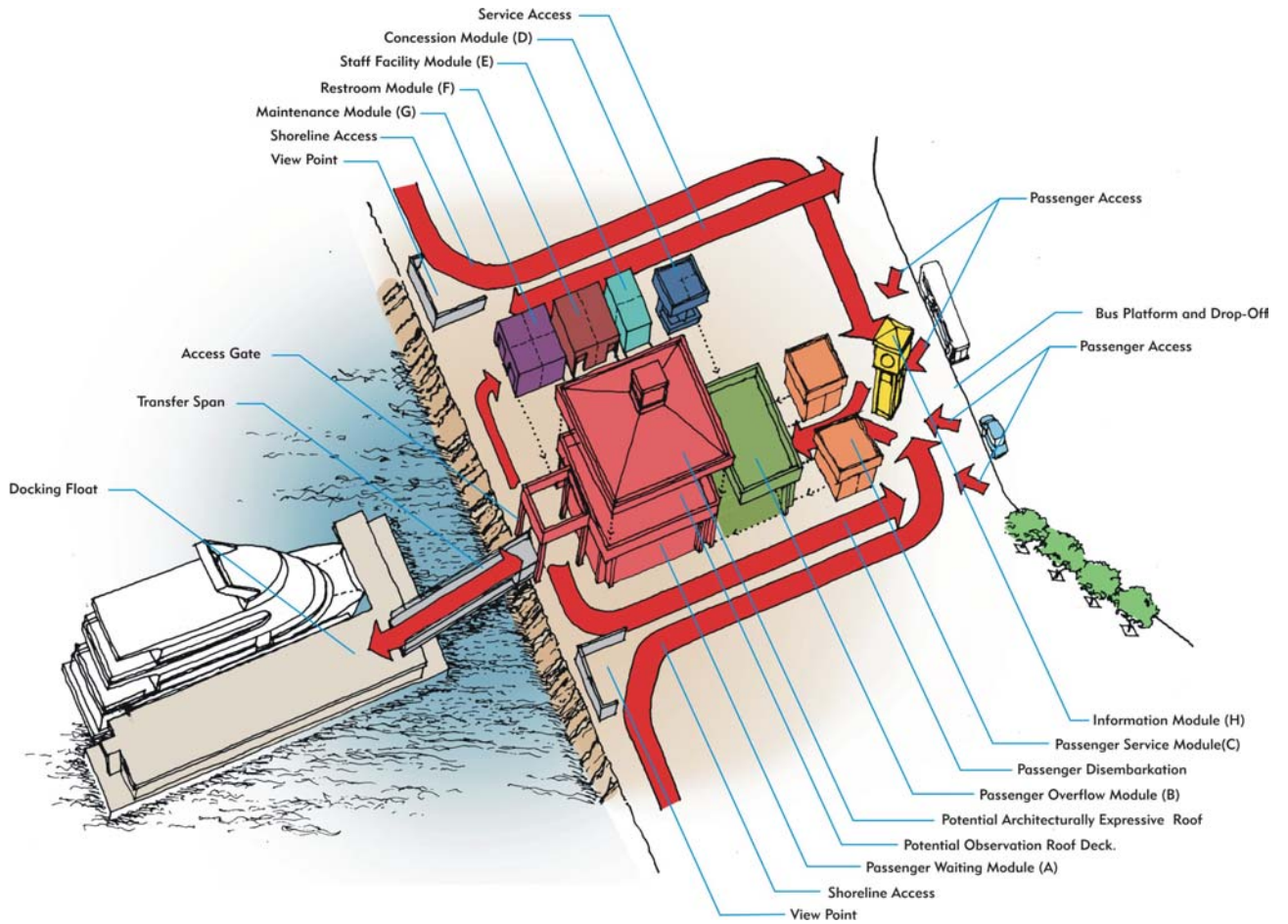


Table 2
Generic Terminal Cost Estimate

Activity Module/Space	Total Quantity	UOM	Cost/Unit	Type 1 Order of Magnitude Cost	Type 2 Order of Magnitude Cost	Notes
A. Passenger Waiting (Type 1)	3,656	SF	\$250	\$914,000		Use Similar Transit facility for Terminal
- Standing (80%)						
- Seated (20%)						
- Bicycles						
- Turnstiles	4	EA	\$500	\$2,000		Use Similar Transit facility for Terminal
A. Passenger Waiting (Type 2)	1,539	SF	\$250		\$384,750	Use Similar Transit facility for Terminal
- Standing (80%)						
- Seated (20%)						
- Bicycles						
- Turnstiles	3	EA	\$500		\$1,500	Use Similar Transit facility for Terminal
B. Passenger Overflow (Type 1)	1,516	SF	\$250	\$379,000		Use Similar Transit facility for Terminal
- Standing (80%)						
- Seated (20%)						
- Bicycles						
B. Passenger Overflow (Type 2)	732	SF	\$250		\$183,000	Use Similar Transit facility for Terminal
- Standing (80%)						
- Seated (20%)						
- Bicycles						
C. Passenger Services	347	SF	\$250	\$86,750	\$86,750	Use Similar Transit facility for Terminal
- Ticket Vending Machines	3	EA	\$10,000	\$30,000	\$30,000	Add'l cost for furnishing and equipment
- Pay Telephones	2	EA	\$1,500	\$3,000	\$3,000	Add'l cost for furnishing and equipment
- Newspaper Vending Machines	2	EA	\$750	\$1,500	\$1,500	Add'l cost for furnishing and equipment
- Change Machines	2	EA	\$5,500	\$11,000	\$11,000	Add'l cost for furnishing and equipment
- ATM	1	EA	\$2,500	\$2,500	\$2,500	Add'l cost for furnishing and equipment
D. Concession/Vendor	150	SF	\$250	\$37,500	\$37,500	Bare cost no Tenant Finish-out
E. Staff Facilities	300	SF	\$250	\$75,000	\$75,000	Use Similar Transit facility for Terminal
- Staff/Security Office	150	SF	\$100	\$15,000	\$15,000	Add'l cost for furnishing and equipment
- General Storage	150	SF	\$25	\$3,750	\$3,750	Add'l cost for furnishing and equipment
F. Restrooms w/Janitor's Closet	561	SF	\$250	\$140,250	\$140,250	Use Similar Transit facility for Terminal
G. Maintenance/Operations	576	SF	\$250	\$144,000	\$144,000	Use Similar Transit facility for Terminal
- Storage Room	1	LS	\$3,600	\$3,600	\$3,600	Add'l cost for furnishing and equipment
- Mechanical/Electrical Room	1	LS	\$10,800	\$10,800	\$10,800	Add'l cost for furnishing and equipment
- Trash/Recycling Room	1	LS	\$7,200	\$7,200	\$7,200	Add'l cost for furnishing and equipment
-Emergency Generator				\$0	\$0	Add'l cost for furnishing and equipment
H. Information Kiosk	100	SF	\$250	\$25,000	\$25,000	Use Similar Transit facility for Terminal
- Kiosk Booth	1	EA	\$5,000	\$5,000	\$5,000	Add'l cost for furnishing and equipment
I. Docking Float	9,300	SF	\$486	\$4,519,800	\$4,519,800	Cost from CH2M Hill Technical Memo 6/14/02
- Canopy	9,300	SF	\$50	\$465,000	\$465,000	Canvass Canopy
J. Passenger Circulation and Access	5,640	SF	\$250	\$1,410,000	\$1,410,000	Use Similar Transit facility for Terminal
- Boarding Route				in above	in above	
- Departure Route				in above	in above	
- Transfer Span	1795	SF	\$75	\$134,625	\$134,625	Use Cost from CH2M Hill Technical Memo 6/14/02
- Transfer Span Canopy	1795	SF	\$50	\$89,750	\$89,750	Canvass Canopy
- Bus Platform				in above	in above	
- Passenger Drop-off				in above	in above	
- Service Access				in above	in above	
- Vendor/Staff Parking				in above	in above	
- Bicycle Storage				in above	in above	

Table 2
Generic Terminal Cost Estimate (continued)

K. Shoreline Access	1400	SF	\$50	\$70,000	\$70,000	Use similar cost for site access
- Pedestrian/Bicycle Route				in above	in above	
- Viewpoints				in above	in above	
L. Utilities						
(Float, Site and Terminal)						
- Vessel Sewage Pump Out	1	EA	\$5,000	\$5,000	\$5,000	
- Potable Water to Vessel	1	EA	\$2,500	\$2,500	\$2,500	
- Emergency Generator 10 KW	1	EA	\$50,000	\$50,000	\$50,000	
- Site Utilities	1	LS	\$100,000	\$100,000	\$100,000	Includes Water, Sewage, Electrical and Partial Storm Water
- Shore Power to Vessel	1	LS	\$10,000	\$10,000	\$10,000	
			Subtotal	\$8,753,525	\$8,027,775	
			25%	\$2,188,381	\$2,006,944	
			Subtotal Construction Cost with out parking	\$10,941,906	\$10,034,719	
Additional for Parking (150 Cars, 60,000 sf lot)	1	LS	\$762,000	\$762,000	\$762,000	
			20%	\$152,400	\$152,400	
			Subtotal Construction Cost with Parking	\$11,856,306	\$10,949,119	
1. Does not include soft costs (e.g. change orders, Design, Design Services during construction, Construction Management, etc.) 2. Does not include escalation. (Costs represented in 2002 second quarter dollars) 3. Does not include new or traffic signal modification or ingress/egress roadway modifications						