CHARLESTON NAVAL COMPLEX REUSE PLAN

MARINE TERMINAL AND ACCESS PLANNING

Prepared for:	Trident's BEST Committee
Subject:	Marine Terminal and Access Planning
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Port of Charleston Container Terminals

Future Container Demand

VZM has reviewed the most recent Port of Charleston container forecasts through the year 2010 from World Sea Trade Service (WSTS, 1993) and projected year 2015 container volumes by:

1. Determining the Compound Annual Growth Rate (CAGR) for the total of import and export volumes anticipated for the period 1993 through 2010.

2. Projecting the continuation of this CAGR through the year 2015. The year 2015 was selected because it represents a 20-year planning horizon, which is appropriate for terminal development projects requiring long lead times for planning and construction. Based on an overview of current regional and national trends and on its professional judgment, VZM feels it is reasonable to assume that a CAGR in the range of 5% per year is sustainable through the year 2015.

3. Applying the CAGR to actual current container volumes, a practice consistent with South Carolina State Ports Authority (SCSPA) methods. In fiscal year 1993, the Port of Charleston handled 804,373 TEUs (20-foot equivalent units) of containerized cargo.

Using this method, traffic of more than 2,400,000 TEUs is projected for the Port of Charleston in the year 2015--roughly three times current levels. This is consistent with anticipated growth at the national level.

Three other forecasts are available: 1) a 1990 WSTS forecast presented in a Frederic R. Harris report for SCSPA entitled, "Terminal X Conceptual Planning Study" (1991), 2) a Frederic R. Harris modification of the 1990 WSTS forecast in the same study and 3) a 1993 SCSPA forecast based on 1992 WSTS growth rates applied to actual FY 1993 volumes. The four forecasts are compared in the table below. The Terminal X Study forecasts have been converted from short tons to TEUs using 7.7 tons per TEU (the factor assumed in the study).

Port of Charleston
Import and Export Container Volume Forecasts (in TEUs/year)

Forecast and CAGR	1990 WSTS 4.5% to '95 4.3% to '15	1991 Harris 4.5% to '95 5.5% to '15	1993 SCSPA 4.9% to 2015	1994 VZM 5.1% to 2015
1995	1,032,522	1,032,522	885,133	888,452
2000	1,265,892	1,349,464	1,124,310	1,139,134
2005	1,569,998	1,763,696	1,428,116	1,460,548
2010	1,947,159	2,305,080	1,814,015	1,872,651
2015	2,403,384	3,012,648	2,304,190	2,401,031

Except for the 1991 Frederic R. Harris forecast, these numbers are fairly consistent. The Harris forecast included an adjustment for increased "reverse flow" (from South Asia to North America) through the Suez Canal in 1995. While reverse flow is expected to support growth in Atlantic container traffic, VZM believes it is not necessary to apply an additional adjustment. The VZM year 2015 forecast of 2,400,000 TEUs is strongly supported by the 1990 WSTS and 1993 SCSPA data.

One other important factor in the container forecasts is the ratio of exports to imports. In FY 1992, 65% of Port of Charleston tonnage was export vs. 35% import (a 2:1 ratio). The latest WSTS figures suggest that by 2010, 74% of containers will be export and 26% import (a 3:1 ratio).

Anticipated Container Capacity

The Terminal X study presents estimates for the capacity of existing and future Port of Charleston container terminals. By 1995, after completion of the Wando Terminal, capacity is estimated at 8,707,000 short tons (1,130,779 TEUs).

VZM reviewed this capacity assumption. Capacity is a function of the interaction of many factors, such as number of ship berths, acres of container storage, type of storage (on chassis or in stacks), stacking equipment (top loaders, straddle carriers, mobile yard cranes), number and type of cranes, container "dwell time" in the yard,

gate size, operating hours, rail service, etc. VZM typically uses a proprietary computer model to account for these factors and accurately determine capacity. For the present analysis, a general estimate was made using the following method:

1. Determine the amount of gross terminal acreage that is devoted to container handling.

2. Identify future improvements that will increase the amount of this acreage. Completion of an ongoing expansion of Wando Terminal by 1995 and an additional 15-acre Wando expansion (which is possible but not yet planned) have been assumed.

3. Determine the number of acres devoted to stacked storage and multiply by the average throughput per storage acre for comparable operations elsewhere in the U.S.

4. Determine the remaining number of non-stacked acres and multiply by the average throughput per gross terminal acre for comparable operations elsewhere in the U.S.

Port of Charleston
Capacity Estimates for Existing Container Terminals (in TEUs/year)

Terminal Name	Container Acres Total	Stacked Acreage	Other Acreage	Capacity Estimate
Columbus Street	71	11 @ 5800 TEUs/year; yard crane	60 @ 2300 TEUs/year	201,800
Wando Terminal	215	32 @ 5800 TEUs/year; yard crane	183 @ 2300 TEUs/year	606,500
North Charleston	131	30 @ 4650 TEUs/year; top loader	101 @ 2300 TEUs/year	371,800
Total	417	73	344	1,180,100

This figure is very close to the capacity estimate from the Terminal X study and tends to confirm it. However, it should be remembered that the estimate is based only on terminal acres and storage system; and consideration of other critical throughput factors might indicate greater or lesser capacity. Also, the amount of stacked storage is an SCSPA estimate and can change quickly based on terminal operating decisions.

Container Terminal Development Program

By comparing future demand and expected capacity, possible capacity shortfalls can be identified. This suggests that the Port of Charleston will need to double its container-handling capacity by the year 2015.

Port of Charleston
Annual Container Demand vs. Capacity through 2015 (in TEUs/year)

Year	Container Demand	Container Capacity	Capacity Shortfall	Shortfall as % of Existing Capacity
1995	888,452	1,180,100	0	0 %
2000	1,139,134	1,180,100	0	0 %
2005	1,460,548	1,180,100	280,448	24 %
2010	1,872,651	1,180,100	692,551	59 %
2015	2,401,031	1,180,100	1,220,931	103%

Capacity shortfalls can be translated into a development program in two ways. Improvements to existing terminals--for example, more berths or storage area, a switch from chassis to stacked storage or an on-dock railyard--can sometimes expand capacity. However, in many cases these types of improvements are not adequate to meet a growing port's expansion needs. Absent a detailed investigation of current operations, it is assumed that Port of Charleston container capacity shortfalls will be preferentially met by new construction, which will create highly marketable state-of-the-art terminals.

VZM has developed a series of idealized cargo terminal design plans, or "modules," based on computer modeling and actual experience. The modules provide maximum throughput for the least amount of space by balancing the number of berths, amount of storage and other design parameters. Because the throughput levels for each type

of container terminal module have been determined, a potential Port of Charleston container terminal development program can be expressed in terms of the number of modules needed to meet their capacity shortfall.

New container terminals are likely to be primarily chassis operations with some use of stacking systems. Based on existing usage patterns plus a reasonable increase in the use of stacked storage, VZM anticipates that: 1) approximately 30% of the terminal area (27 acres) will be stacked storage with an average throughput of 5,800 TEUs per acre and 2) approximately 70% of the terminal area (63 acres) will be devoted to chassis storage and other functions with an annual throughput of 2,300 TEUs per acre. The average throughput for the entire facility would be 3,330 TEUs per acre (300,000 TEUs per year). This is higher than existing terminal capacities (around 2,850 TEUs per year) and significantly higher than 1,900 TEUs per acre actually achieved in FY 1993.

Under these assumptions, a phased development program to add four container terminal modules (eight berths total) is suggested for the Port of Charleston. Actual phasing and construction timing will need to be based on market demand, funding availability, engineering and construction constraints and permitting requirements.

Port of Charleston
Container Terminal Modules Needed through 2015 (in TEUs/year)

Year	Demand	Meet by Intensifying Existing Operations	Meet by New Terminal Construction	Number of Two Berth Modules Needed
1995	888,452	888,452	0	0
2000	1,139,134	889,134	300,000	1
2005	1,460,548	860,548	600,000	2
2010	1,872,651	972,651	900,000	3
2015	2,401,031	1,180,100	1,200,000	4

Port of Charleston Auto Terminals

Future Auto Demand

Automobile cargo volumes at the Port of Charleston have fluctuated somewhat over the past few years. In FY 1990, vehicles accounted for 32,769 tons; in FY 1991, the level was 32,917 tons; and in FY 1992, the level jumped to 65,897 tons. SCSPA does not have an auto cargo forecast available. A reasonable estimate can be generated as follows:

1. Start with the average Port of Charleston auto volume between FY 1990 and FY 1992 (43,861 tons). The equivalent number of individual units is estimated at 1 ton per unit.

2. Add vehicle cargo associated with the new BMW plant in Greer, South Carolina. BMW indicates that it expects to move between 25,000 and 30,000 units per year through the Port of Charleston beginning in 1995. This could increase to between 70,000 and 80,000 units if BMW chooses to consolidate its ship movements in Charleston; such a decision would depend in part on the availability of a suitable facility. The working assumption is to plan for a low of 30,000 and a high of 80,000 BMW units.

3. Grow the total units from steps 1 and 2 at the average regional rate to year 2015. Further studies should be performed to validate the application of this rate to specific conditions at the Port of Charleston.

This yields a projected throughput of between 170,000 and 288,000 units per year, with a midpoint of 229,000 units per year.

Anticipated Auto Capacity

The Port of Charleston primarily handles its autos at the Union Pier Terminal. In light of plans announced by the Port of Charleston to redevelop Union Pier, the existing ro-ro facility may be reconfigured in its present location; or it may be relocated to another site. Therefore, this facility has not been considered for purposes of determining existing capacity. The working assumption is that a single Port of Charleston ro-ro terminal should meet the anticipated demand, regardless of its location. It should accommodate the midpoint estimate (229,000 units per year), with the potential for expansion if warranted.

Auto Terminal Development Program

One VZM auto terminal module (65 acres, two ship berths) would provide a throughput capacity of 225,000 tons, which meets the midpoint forecast.

Port of Charleston Neo Bulk and Break-Bulk Terminals

Future Neo Bulk and Break-Bulk Demand

Neo bulk is a type of non-containerized cargo shipped in large units, such as iron, steel or lumber. Break-bulk is a type of non-containerized cargo that is usually moved in smaller units on pallets, such as fruit, bagged grain and other food products. Major neo bulk and break-bulk cargoes at the Port of Charleston include wood pulp, lumber, paper, machinery, metals and bagged chemicals. SCSPA does not have neo bulk or break-bulk forecasts available. A reasonable estimate can be generated for each commodity type by taking a three-year average volume and growing it at the average regional rate to year 2015. Again, further studies should be performed to validate the application of such rates to specific conditions at the Port of Charleston.

Port of Charleston
Neo Bulk and Break-Bulk Commodity Volumes (in Tons/year)

Commodity	FY 1990	FY 1991	FY 1992	3-Year Average	Year 2015 Estimate
Wood Pulp	176,267	169,310	172,533	172,703	924,045
Lumber	130,705	97,922	68,955	99,194	255,259
Paper	101,083	135,761	100,125	112,323	181,296
Machinery	90,373	129,255	96,149	105,259	202,983
Iron/Steel	28,498	27,049	16,380	23,976	12,549
Other Metals	16,612	20,961	27,771	21,781	23,214
Chemicals	7,034	9,800	20,253	12,362	17,491
Miscellaneous	24,004	59,006	31,301	38,104	76,357
Total	695,233	725,708	614,292	678,411	1,693,173

Under these assumptions, neo bulk and break-bulk volumes are anticipated to more than double by year 2015, with most of the increase attributable to wood pulp, lumber and paper.

Anticipated Neo Bulk and Break-Bulk Capacity

The Port of Charleston handles its neo bulk and break-bulk cargoes at its Union Pier and Columbus Street facilities. Because of the potential redevelopment of Union Pier, its future neo bulk and break-bulk cargo handling capacity is assumed to be zero for planning purposes. At Columbus Street, approximately 16 acres directly adjacent to the wharf are devoted to neo bulk and break-bulk handling. However, in the long term it will probably be desirable to convert this Columbus Street space to container use; and its neo bulk/break-bulk capacity is also assumed to be zero.

Neo Bulk and Break-Bulk Terminal Development Program

Two VZM neo bulk/break-bulk terminal modules (each with 53 acres and two ship berths) would provide a throughput capacity of 1,974,000 tons per year, which is adequate to meet the demand forecast. However, VZM recommends a development program of only one module (a 65 acre combined neo bulk and break-bulk facility) in light of the following:

- The wood pulp and lumber growth rates are very aggressive and need further verification to support a development program.
- Future operations at Union Pier and Columbus Street could continue to accommodate neo bulk and break-bulk operations if necessary.
- Other SCSPA ports at Georgetown and Port Royal specialize in bulk and break-bulk commodities and could potentially accommodate overflow volume from the Port of Charleston.

Port of Charleston Liquid and Dry Bulk Terminals

The Port of Charleston handles some commodities in liquid and dry bulk form, but this is not a large share of its business. It is assumed that future growth in liquid and dry bulk cargoes would be accommodated at either Georgetown or Port Royal.

Port of Charleston Passenger Cruise Terminal

Based on VZM and Mercer Management studies for East and West Coast ports, we believe expansion of Port of Charleston cruise operations is feasible, except on the Navy Base site. Issues to be considered include:

- Demand: The Port of Charleston cannot compete with large international cruise ports like Miami, but could be competitive in three specialty markets: the Canadian maritime provinces, Bermuda and the Caribbean Islands. Seasonal repositioning of cruise ships along the Atlantic coast offers another opportunity: calls at Charleston could be part of the itinerary of seasonal movements.

- Facility Location: As a general rule, the closer a cruise terminal is to landside attractions, the more likely it is that people will spend money in the community. Landside benefits of cruise operations would probably be maximized by keeping them in their current Union Street Pier location, at the foot of Market Street in downtown Charleston. North Charleston has less of the landside uses of interest to cruise passengers.

- Benefits for Naval Base South: The site could directly benefit from expanded cruise operations by providing cruise ship overhaul, repair and maintenance facilities.

Port of Charleston Industrial Park

Hamilton, Rabinovitz and Alschuler have determined that there is a market for a master planned, Class A industrial park with rail service in the Charleston area. This market would be made even stronger by physical proximity to the Port, where it could take advantage of the need for commercial and industrial space generated by cargo handling activities.

Intermodal Rail Service

The site is served by two Class One railroads--Norfolk Southern and CSX Intermodal. Currently, both Norfolk Southern and CSXI operate intermodal yards in the North Charleston Area. These handle both international (to and from the Port of Charleston) and domestic (to and from locations within the U.S.) cargo.

Intermodal rail service is seen as a key component of the long-range success of container terminal development at the Navy base for the following reasons:

- For long-haul cargo (more than 500 to 700 miles), rail can be a cost-effective alternative to truck traffic.
- Increasingly, terminals and shipping lines are demanding intermodal rail service as a condition of calling at a port. This gives ports with rail service a competitive advantage in attracting business.
- A fully loaded double-stack train can carry up to 560 TEUs (20-foot-equivalent units) in lieu of trucks, reducing congestion on area streets and highways.
- The closer a railyard is to the terminal, the greater the benefits in terms of reducing a terminal's operating cost (thereby making it more attractive to potential users), reducing vehicle miles traveled (by eliminating the need to haul containers to an off-site facility) and reducing neighborhood impacts (by consolidating rail operations in industrial Port areas). Ideally, the facility is located right next to the terminal--that is, it is "on dock."
- To the extent that intermodal rail is utilized, the terminal itself can be smaller; since containers are quickly moved out of the yard and onto rail, rather than remaining in storage within the terminal. A 90-acre container terminal with on-dock rail can provide the same level of cargo throughput as a 110-acre terminal.

Intermodal Demand

SCSPA estimates its current "intermodal split" (the percent of international containers carried over long hauls by rail instead of by truck) at approximately 20%. Nationally, it is expected that up to 40% of all international container movements will involve an intermodal linkage between ship and rail. In the absence of detailed forecasts, a plausible scenario for future SCSPA intermodal operations is that:

- Intermodal traffic at Columbus Street continues to be handled by on-dock facilities in place at the terminal.

- Intermodal traffic at the North Charleston and Wando Terminals continues to be drayed (moved by truck) directly to CSXI and/or Norfolk Southern intermodal yards.

- Intermodal traffic associated with the potential SCSPA development program discussed earlier (four container terminal modules) is accommodated by an on-dock intermodal railyard adjacent to the new terminals.

- The intermodal split at the new terminals is as much as 40% of all container movements (up to 480,000 TEUs per year in year 2015).

If a new intermodal yard is constructed at the Navy base, it could also accommodate domestic intermodal movements. Federal policy initiatives and funding guidelines (most recently, the Intermodal Surface Transportation Efficiency Act of 1991 ["ISTEA"]) have increasingly favored intermodal initiatives. As a result, truckers and rail companies are entering into partnerships; and it is reasonable to anticipate a substantial and sustainable increase in the intermodal transportation of domestic cargo. This could translate into increased traffic for North Charleston intermodal railyards, independent of SCSPA operations.

Intermodal Rail Development Program

The intermodal railyard should accommodate up to 480,000 TEUs per year associated with the four container terminals on the Navy Base. Additional capacity should be provided to allow for drayage from other SCSPA terminals and domestic cargo operations. A design capacity of 720,000 TEUs is recommended for planning purposes. This figure should be verified by more detailed demand studies.

Private Maritime Uses

While SCSPA is seen as the predominant user of the waterfront, other potential users have also been considered.

- There have been many requests for use of the Naval Shipyard lands and facilities. Therefore, the retention of as much of this area as possible, consistent with SCSPA expansion requirements, is a central element of the reuse program.

- There have also been requests for non-shipyard waterfront land from import/export and bulk material processing companies. Because this plan has been developed only to the concept stage, the definite identification and accommodation of specific users will need to be accomplished as part of the plan implementation process.

- There has been some discussion of the possibility of "private ports" (that is, non-SCSPA operations). North Charleston already has several private terminals, including Texaco and Hess, to the north of the Navy base. However, no proposals emerged during the planning process.

Program Summary

The proposed Port of Charleston development program and funding strategy can be summarized as follows:

- Four container terminals and one neo bulk/break-bulk terminal, with an option for one auto terminal in lieu of one of these terminals.

- An on-dock intermodal railyard.

- Construction of an adjacent Maritime Industrial Park.

- Construction of related transportation access improvements and mitigation.

- Other capital expenses or maintenance contributions as mutually agreed upon by SCSPA and the relevant parties.

DESIGN AND INFRASTRUCTURE DATA

Terminal Design Plans

VZM design plans begin with idealized terminal "modules" that reflect optimal dimensions, space allocations and functional relationships among terminal components. The modules have been used successfully in designing terminals for numerous East, West and Gulf Coast ports. As such, they represent a valuable starting point for an overall design plan. However, the design process must also take into account the amount and condition of available land, access routes, utilities, need for dredging or landfill, soil stability, market or tenant or shipper needs, environmental impacts and other factors; and the terminal modules may need to be modified to meet such conditions.

Container Terminals

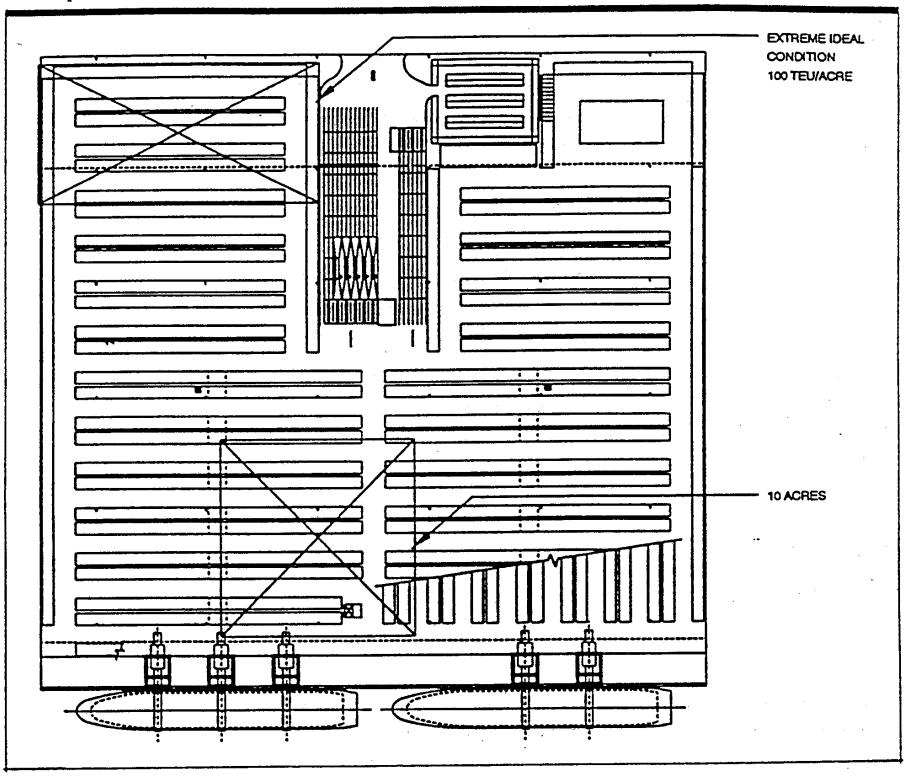
The container modules are based on a multiple grid overlay system, or "MGOS," in which the basic layout accommodates a variety of container storage systems (chassis vs. on-ground) and stacking equipment (top loader, straddle carrier or mobile yard crane). This allows modifications to storage methods and equipment over time without requiring physical changes to the terminal itself.

Container Module: Design Data

	Chassis Storage	Top Loader	Straddle Carrier	Mobile Yard Crane
Terminal Area	90 to 110 acres			
Wharf and Berthing	2,000 to 2,280 feet minimum for two berths			
Channel Criteria	Depth = 50 feet; Width = 500-700 feet			
Crane Requirements	Number = 5-6; Gauge = 100 feet			
Buildings	Gate Building = 10,000 square feet Maintenance/Repair = 36,000 square feet Warehouse = 76,000 square feet (optional)			
Access Requirements	Gate: 12 Inbound Lanes, 12 Outbound Lanes Rail: Intermodal Rail Service			

Container Terminals--Chassis Module

Conceptual Plan

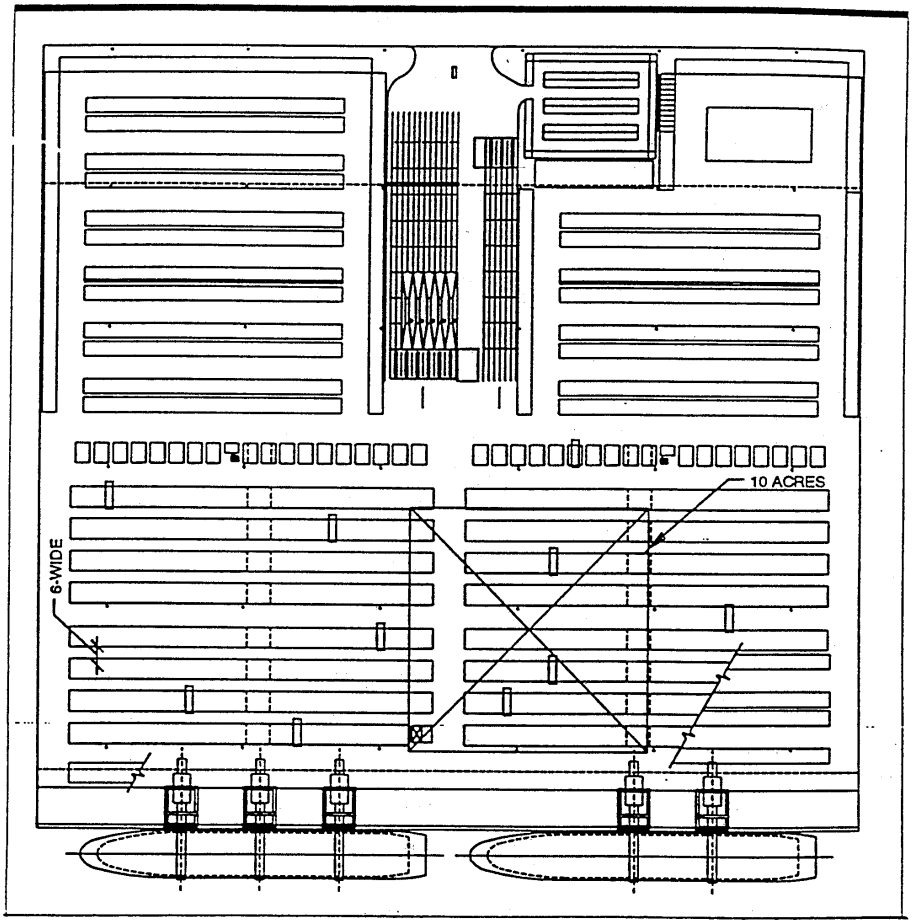


Infrastructure Requirements--Chassis Module

% of Traffic That Is Truck	83%
Number of Unit Trains per Day (Round Trip Counts as Two)	2-4
Parking Spaces Required	120
Electrical Power	12,000-15,000 KVA
Crane 1000 KVA x 6	6,000 KVA
Reefers	2,000 KVA
Lighting	1,000 KVA
Buildings	2,000 KVA
Misc.	1,000 KVA
Natural Gas	2,500 CFH
Potable Water	320 GPM
Fire Water	30 Hydrants 2,500 GPM
Telephone/Communications	6 Lines
Sanitary Sewer	10" Line
Storm Sewer	Three 48" Outfalls
Special Utilities	Paging and Computer
Special Right-of-Way	ICTF Rail Access

Container Terminals--Mobile Yard Crane Module

Conceptual Plan



Infrastructure Requirements--Mobile Yard Crane Module

% of Traffic That Is Truck	90%
Number of Unit Trains per Day (Round Trip Counts as Two)	2-4
Parking Spaces Required	120
Electrical Power	12,000-15,000 KVA
Crane 1000 KVA x 6	6,000 KVA
Reefers	2,000 KVA
Lighting	1,000 KVA
Buildings	2,000 KVA
Misc.	1,000 KVA
Natural Gas	2,500 CFH
Potable Water	320 GPM
Fire Water	30 Hydrants 2,500 GPM
Telephone/Communications	6 Lines
Sanitary Sewer	10" Line
Storm Sewer	Three 48" Outfalls
Special Utilities	Paging and Computer
Special Right-of-Way	ICTF Rail Access

Auto Terminals

The auto module is designed to accommodate two "Pure Car Carrier" (PCC) vessels. These are basically large floating parking structures. Vehicles are driven on and off the ship. Within the terminal, there are areas for vehicle storage, processing and administrative functions.

Auto Module: Design Data

Terminal Area	65 acres
Wharf and Berthing	1,450 feet minimum for two berths
Channel Criteria	Depth = 45 feet; Width = 500-700 feet
Buildings	Gate Building = 1,000 square feet Vehicle Prep/Wash Area = 150,000 square feet Administration = 40,000 square feet
Access Requirements	Gate: 3 Inbound Lanes, 3 Outbound Lanes Rail: Service to terminal

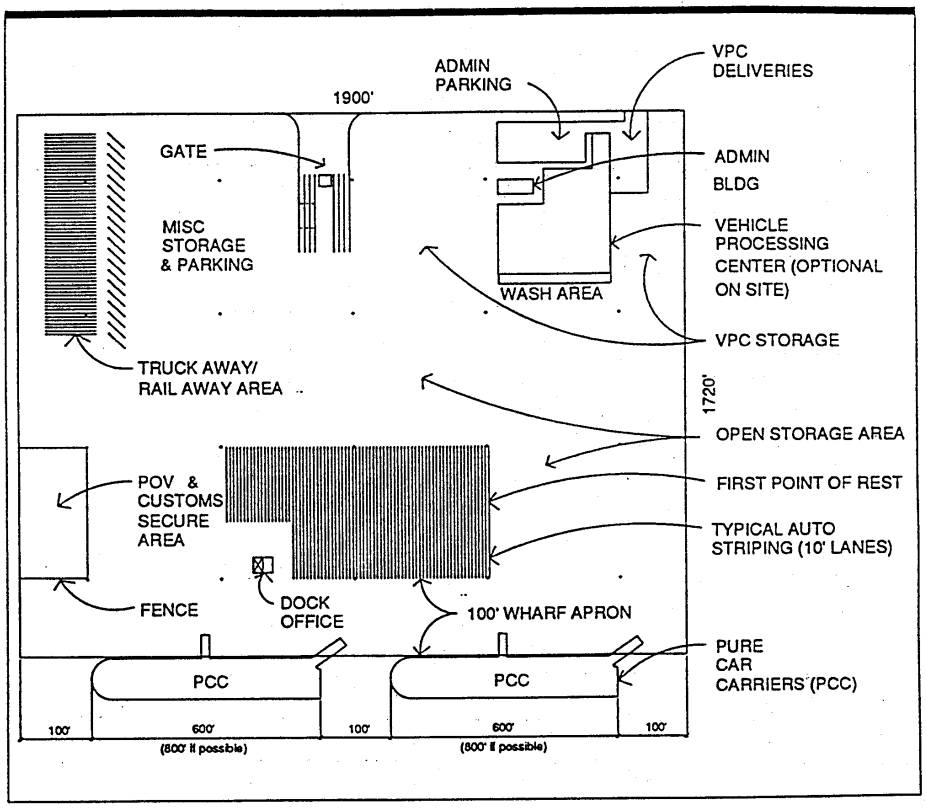
Neo Bulk and Break-Bulk Terminals

These modules are designed for maximum flexibility to accommodate a variety of neo bulk (steel, lumber, pulp, large machinery, etc.) and break-bulk (bagged fruit or grain, etc.) cargos. The break-bulk module is designed to be incorporated into a larger neo bulk or container module.

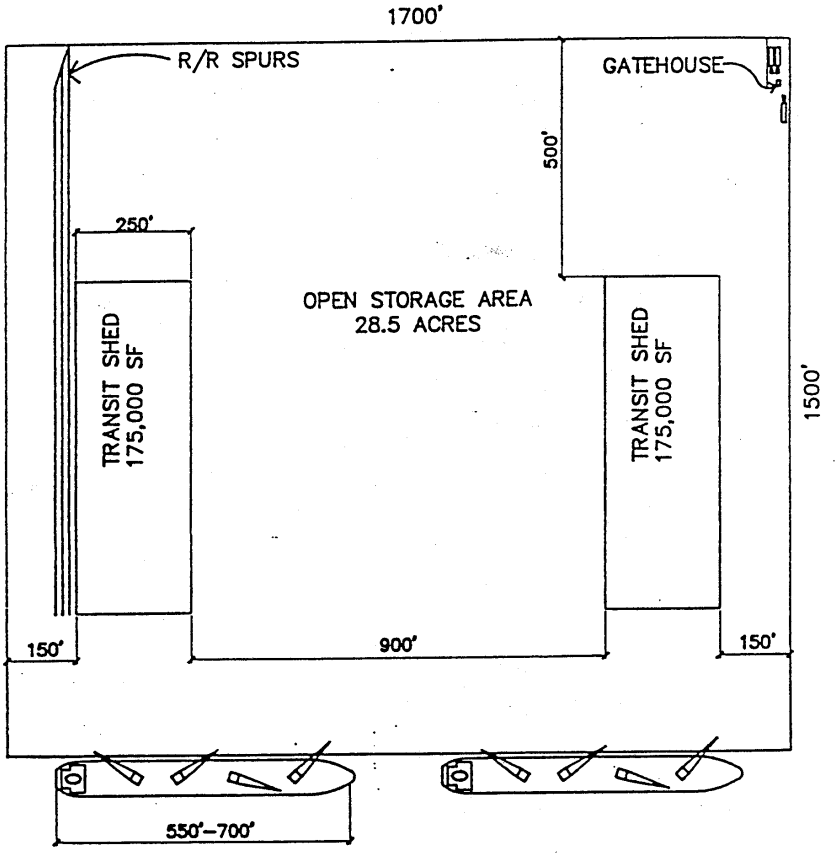
Neo Bulk Module: Design Data

Terminal Area	53 acres
Wharf and Berthing	1,700 feet minimum for two berths
Channel Criteria	Depth = 45 feet
Buildings	Transit Sheds: 2 at 175,000 square feet each
Access Requirements	Gate: 1 Inbound Lane, 1 Outbound Lane Rail: Service to terminal

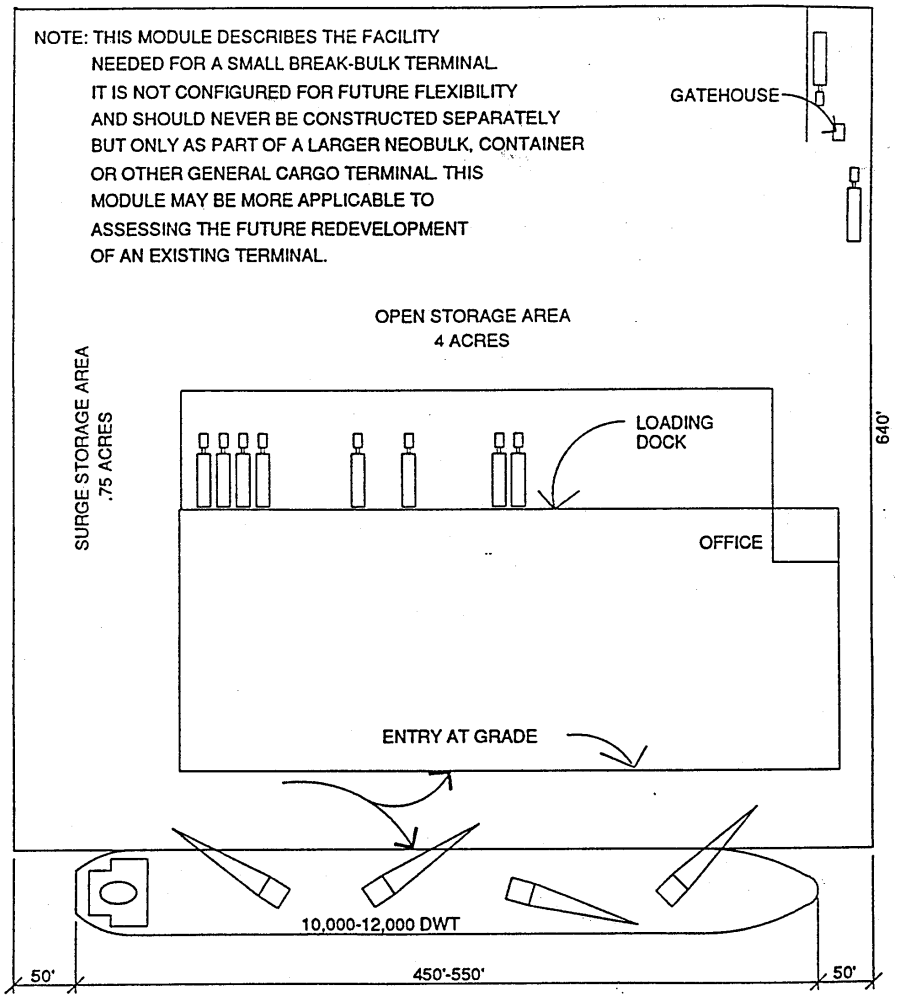
Auto Terminal Module



Neo Bulk Terminal Module



Break-Bulk Terminal Module



Break-Bulk Module: Design Data

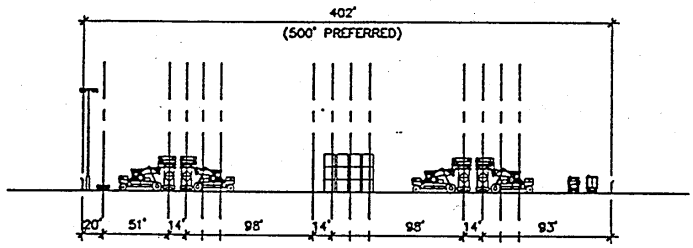
Terminal Area	10 acres
Wharf and Berthing	650 feet
Channel Criteria	Depth = 40 feet
Buildings	Transit Sheds: 1 at 100,000 square feet
Access Requirements	Gate: 1 Inbound Lane, 1 Outbound Lane Rail: Service to terminal

Intermodal Railyard

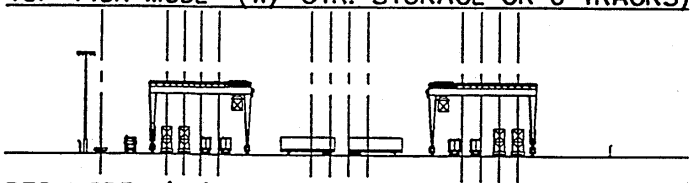
Railyards can vary substantially in terms of length, number of working tracks and amount of storage. VZM has designed railyards as small as 24 acres and as large as 650 acres. For this project, a railyard of 8,000 feet by 500 feet has been proposed. This provides six working tracks for loading/unloading double-stack trains of approximately 6,400 feet in length, with two additional tracks for other operations.

Operating in a very efficient manner, such a facility could provide capacity on the order of 735,000 TEUs per year. This assumes: 1) there are six working days per week; 2) there are 6 working tracks; 3) each working track handles a maximum of one train in and out per day, but less on average (reflecting down time and other factors); and 4) each train has a maximum capacity of 440 TEUs in double-stack operation, but generally operates at 67% loaded because of the use of trailer-on-flatcar and container-on-flatcar operations. This facility could accommodate the target level of throughput (720,000 TEUs), but a larger facility would be desirable.

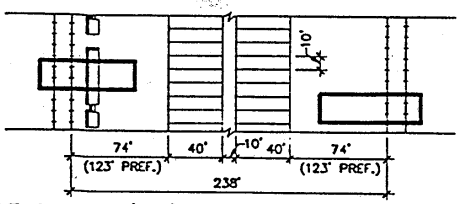
Intermodal Railyard Design Options



TOP-PICK MODE (W/ CTR. STORAGE OR 6 TRACKS)



RTG MODE (W/ CTR. STORAGE OR 6-12 TRACKS)



RTG MODE PLAN (W/ CENTER STORAGE)

MASTER PLAN ALTERNATIVES

To accommodate the Port development program in the context of other programmatic requirements that emerged during the study, numerous design plans were examined. This section describes the final alternative plans for Port development, from which the preferred plan was created.

Design Considerations

Multiple factors were considered in developing alternative plans for land use by the Port of Charleston, including:

- Availability of relatively undeveloped waterfront land: A large area at the south end of the site (suitable for container terminal development) and a smaller area at the north end (suitable for neo bulk/break-bulk terminal development) were targeted for further study.

- Potential for alternative uses: To the extent possible, lands with potential non-Port uses were to be retained. This included the shipyard facilities, State Department buildings and the industrial park site. Other lands, buildings and facilities were considered available for development. It should be noted that there were requests for some of these lands, buildings and facilities under the screening process, but planning proceeded under the assumption that such requests could be accommodated elsewhere to the satisfaction of the involved parties.

- Preservation of "buffer" zones: Port development was precluded from adjoining North Charleston residential areas to allow for the creation of buffer zones through open space or other neighborhood-compatible uses.

- Potential for effective transportation connections that would minimize impacts on surrounding neighborhoods.

- Accommodation of the full development program with minimum costs for demolition and landfill.

- Some degree of soil stabilization and environmental remediation will be required to make certain areas of the site suitable for development. Available data is insufficient to allow for a detailed assessment of the required work, but these issues are acknowledged as concerns that will need to be addressed through follow-up studies.

Transportation Access Alternatives

The north end of the site is likely to enjoy good road access for trucks if Virginia Avenue is improved as proposed in the region's Transportation Improvements Plan. Trains accessing the north end of the site must cross Virginia Avenue at grade, but this is not likely to be a problem unless uses that generate high numbers of train trips (container terminals and intermodal railyards) are located there.

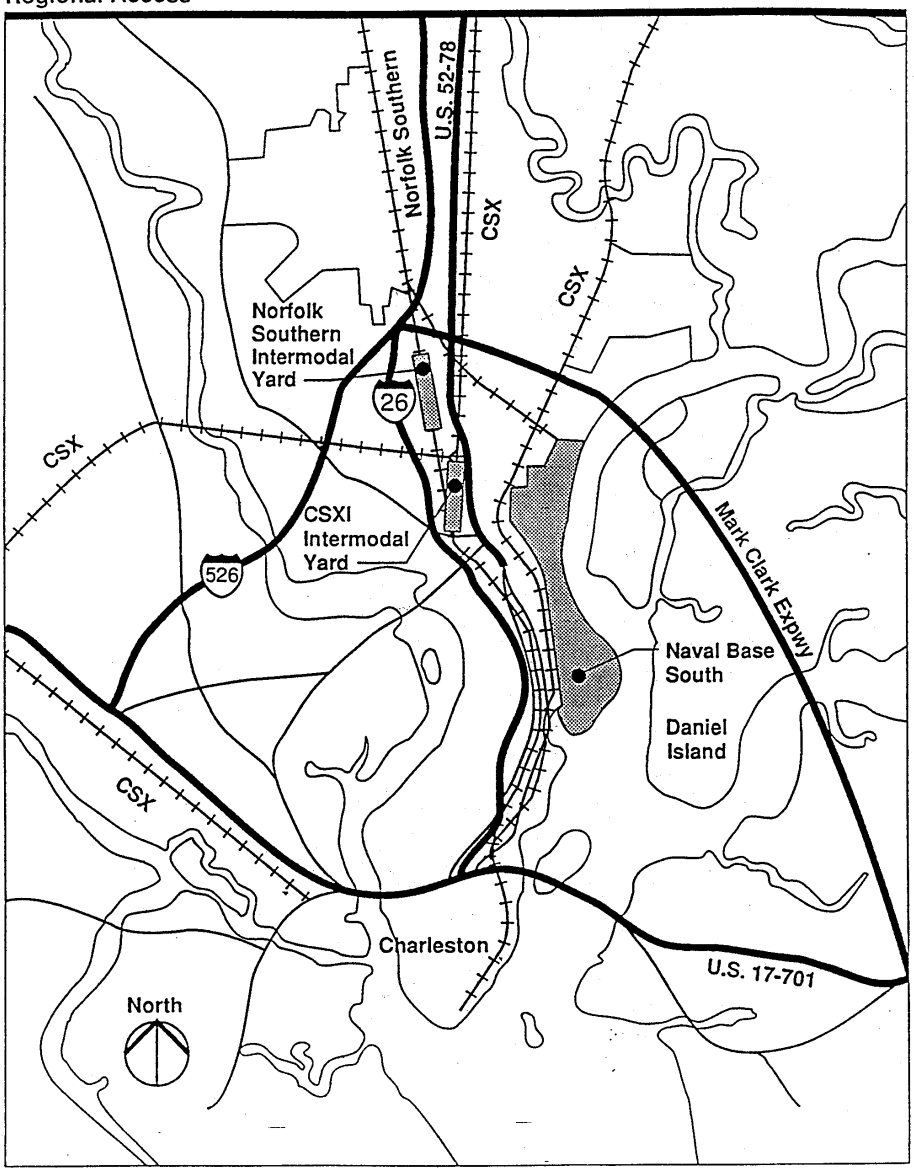
Looking at potential container terminal and intermodal railyard development on the south end of the site, the landside access problems are more significant. The existing rail infrastructure is inadequate to serve a state-of-the-art railyard, and the existing roadway network could not absorb large increases in container terminal truck trips. To minimize neighborhood impacts and travel times to and from the Port facilities, the recommended solution is to:

- Create a direct roadway link from I-26 to the container terminals and railyard by reconstructing the freeway interchange and building fly-over ramps. This link could also serve the maritime industrial park and marina (which is planned to remain). The link would be fully grade-separated; that is, after leaving I-26, there would be no cross traffic until reaching the site.

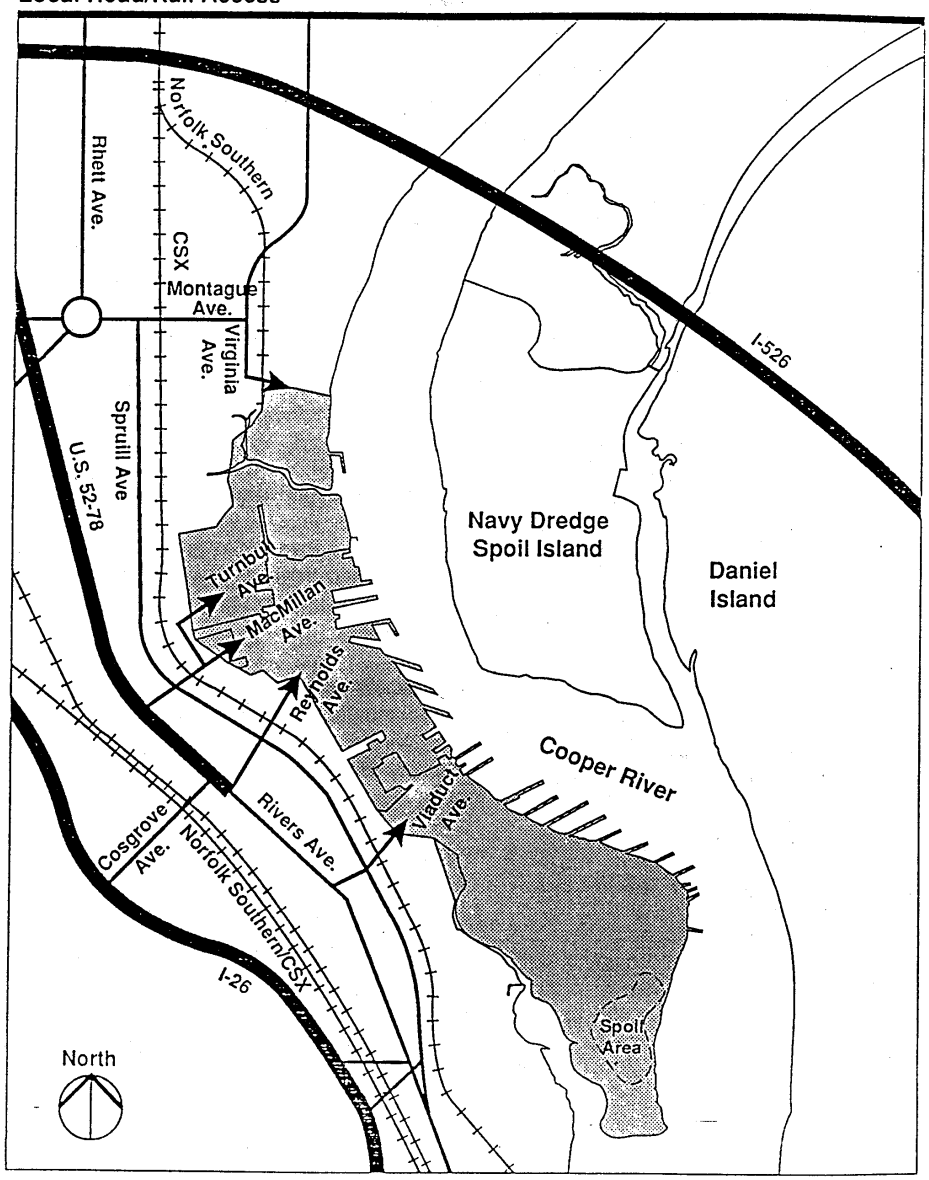
- Create a direct connection from the Norfolk Southern and CSX main lines to the railyard. Roads crossing this connection would be elevated to eliminate delays at grade crossings. This connection would run parallel with the roadway connection.

- Elevate or reconfigure selected intersections in the city of North Charleston that would be adversely impacted by additional rail trips. A grade separation at Montague Avenue, where it crosses the CSXI main line at grade, should be considered. Dorchester Avenue also crosses the CSXI main line at grade, but construction of a grade separation could require demolition of a number of houses in the area; dead-ending the street at the grade crossing and re-routing through traffic should be considered.

Regional Access



Local Road/Rail Access



- Abandon existing rail facilities that would be replaced by the new railyard. One concept under discussion would have CSXI abandon its intermodal yard in the city of North Charleston and a track running through residential areas adjacent to Spruill Avenue; in exchange, CSXI would have use of the new railyard for international and domestic intermodal cargo and would enter into a cooperative agreement to provide access and service by Norfolk Southern.

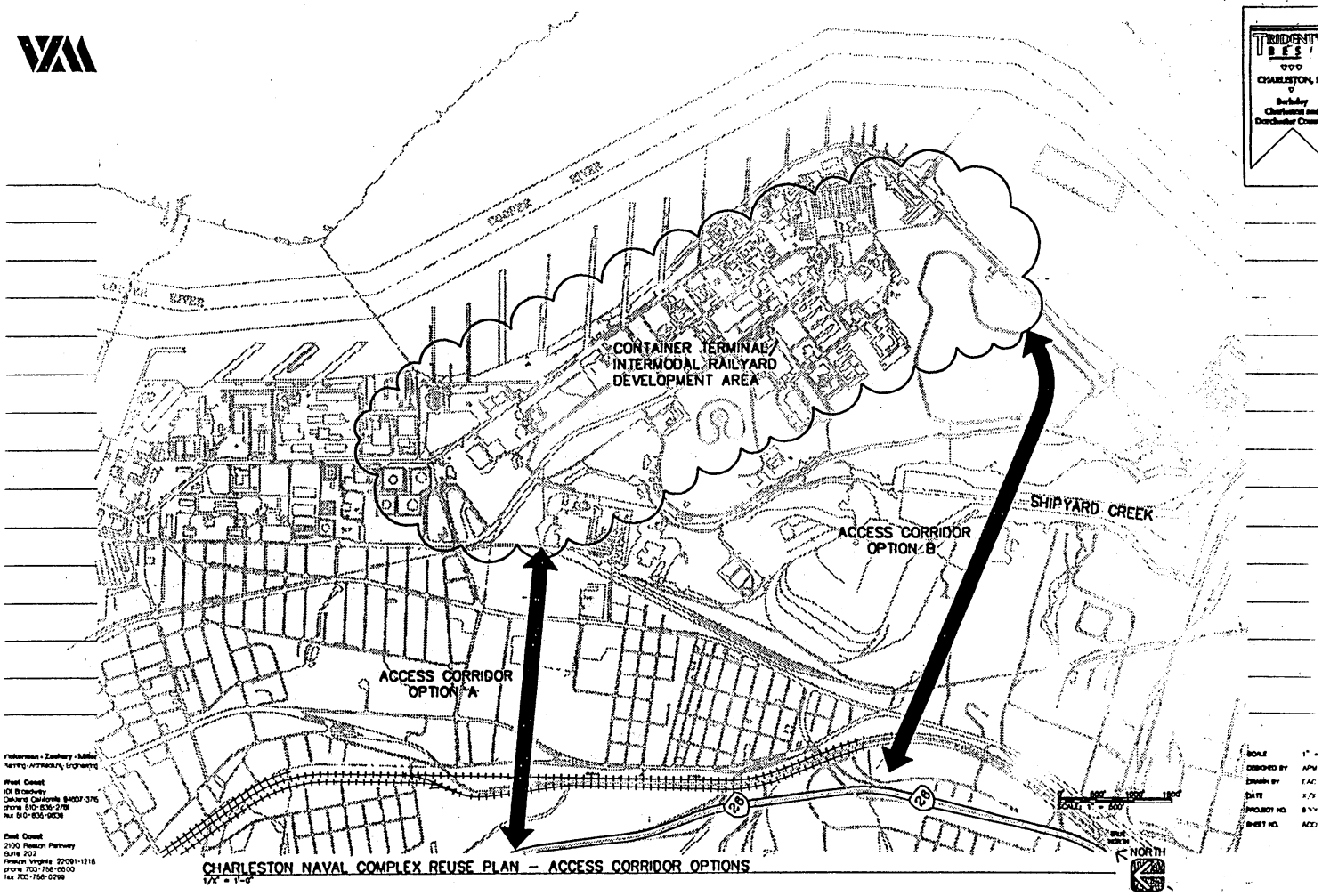
Two options for locating the road/rail access corridor are illustrated in the figure on the following page.

- Option A is to run the corridor generally south of Jacksonville Road. Disadvantages of this option include: 1) the elimination of neighborhood businesses, 2) possible removal of residences (depending on the design), 3) the need for bridges at Garner and Spruill avenues and 4) the fact that the rail connection would enter the railyard at the middle rather than the end, making railyard operation more difficult.

- Option B is to run the corridor generally between Pittsburgh and Cherry Hill Avenues. This would provide an optimal rail connection at the end of the railyard and could probably be designed to avoid the demolition of existing residences, but would have the following disadvantages: 1) the elimination of neighborhood businesses, 2) the need for a bridge at Spruill Avenue and 3) the need for a bridge across Shipyard Creek.

From a design standpoint, Option B is superior. However, the Shipyard Creek crossing is a major concern due to its impacts on wetlands, navigation and existing businesses (see discussion under Transportation/Environmental Impacts). In the belief that these issues can be resolved, it is recommended that Option B be considered as the preferred access corridor location.

Aside from the access corridor, there are a number of ways that circulation within the site can be organized. The general rule is to avoid crossing the road and rail tracks to the extent possible. One elegant solution is a one-way loop road running from I-26 to the marina, then to the railyard's truck gate, then to the container terminals, then to the industrial park and finally, back to I-26, with no rail crossings at grade. A queuing lane (or lanes) for trucks would be provided outside of the normal traffic lanes. When trains are not pulling into or out of the yard (which would be most of the time), there



CHARLESTON NAVAL COMPLEX REUSE PLAN – ACCESS CORRIDOR OPTIONS
1/4" = 1'-0"

would be a "short cut" road across the tracks and into the industrial park, opposite from the marina access road. This concept is illustrated in the figures on the following pages. Many variations on this concept are feasible.

Land Use Alternatives

At the north end of the site, an area adjacent to private liquid bulk terminals in the city of North Charleston has been targeted for development as a neo bulk/break-bulk terminal. The site is currently used primarily for warehousing. Access would be via Virginia Avenue.

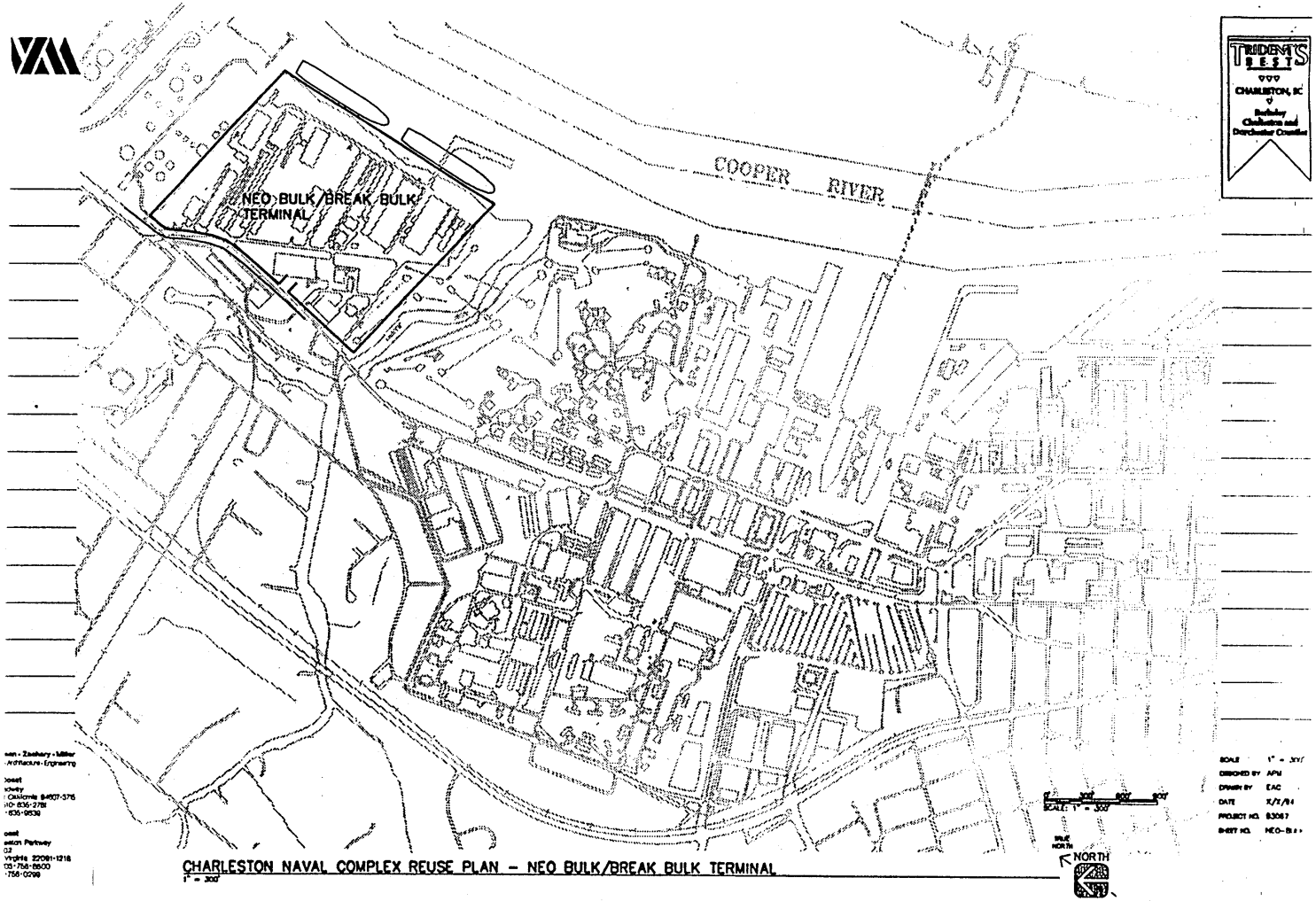
Numerous alternatives were explored to accommodate container terminal and intermodal railyard development on the south end of the site. Most of these represent variations on six basic alternatives, as illustrated in the figures on the following pages.

- Alternative 1 was presented as an interim design concept. It shows four container terminals of approximately 110 acres and 2,280 linear feet of berthing each. There is a "bend" in the wharf to accommodate the fourth container terminal and extensive landfill and/or decking. A generously sized marine industrial park is located between the container terminals and the railyard. This allows for a very simple circulation pattern, but makes it more difficult for the terminals to utilize the railyard.

- Alternative 2 is a variation of Alternative 1. The positions of the railyard and industrial park are reversed, requiring a more complicated circulation system (a one-way loop system is illustrated), but providing more direct access between the terminals and the railyard. Trucks would leave the terminal through the main gate, cross the road and enter the intermodal yard through secondary gates.

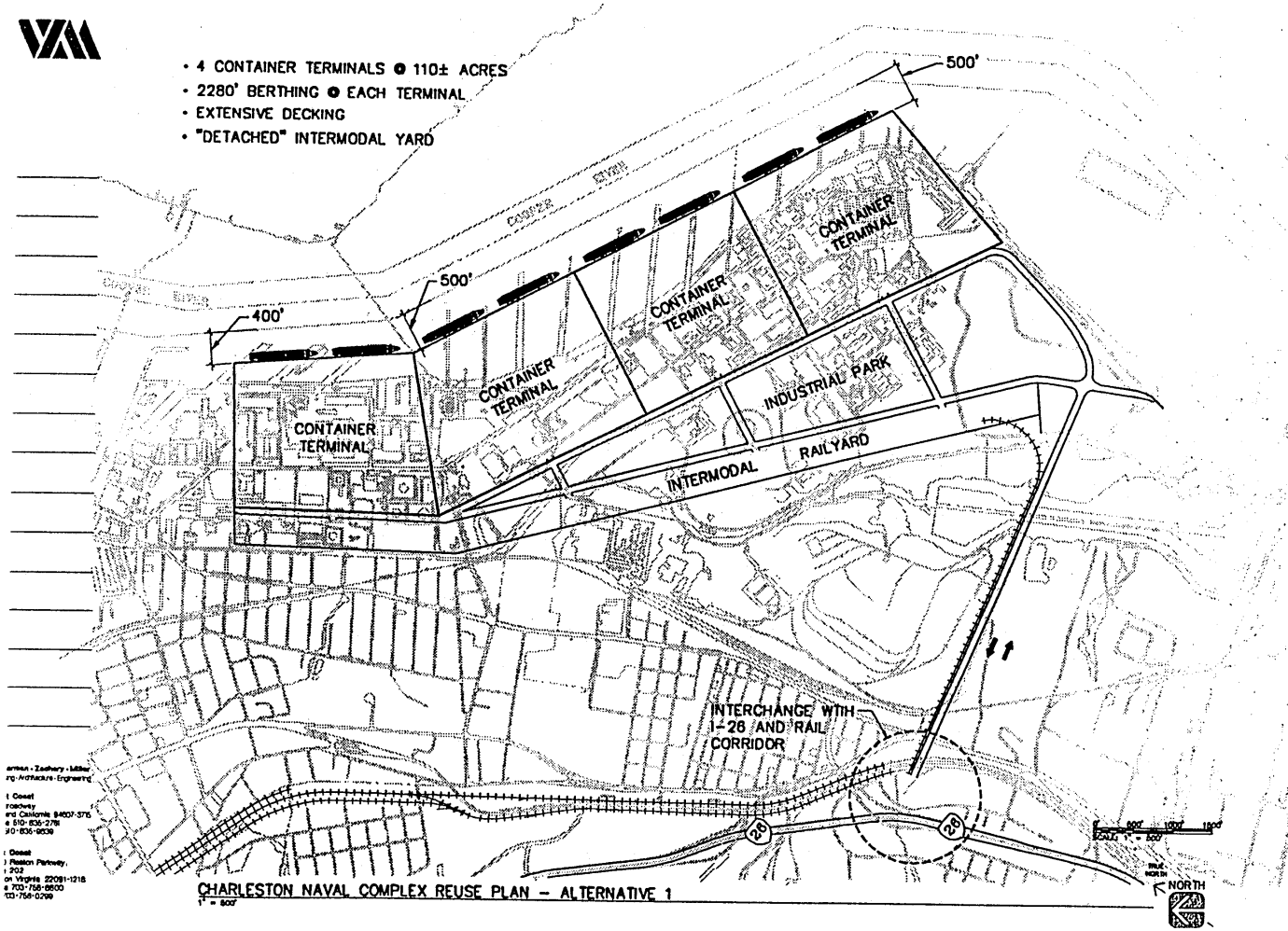
- Alternative 3 is a variation of Alternative 2 in which the amount of landfill is reduced. By adjusting the alignment of the wharf, the number of acres of fill is generally offset by the acres of cut. The disadvantage of this "balanced cut/fill" approach is that it leaves very little room for the industrial park.

- Alternative 4 is a variation of Alternative 3 in which the terminals are slightly smaller--90 acres with 2,000 linear feet of berthing each. The smaller terminals are made possible by the use of intermodal rail. There is much less cut/fill and more land for the industrial park.



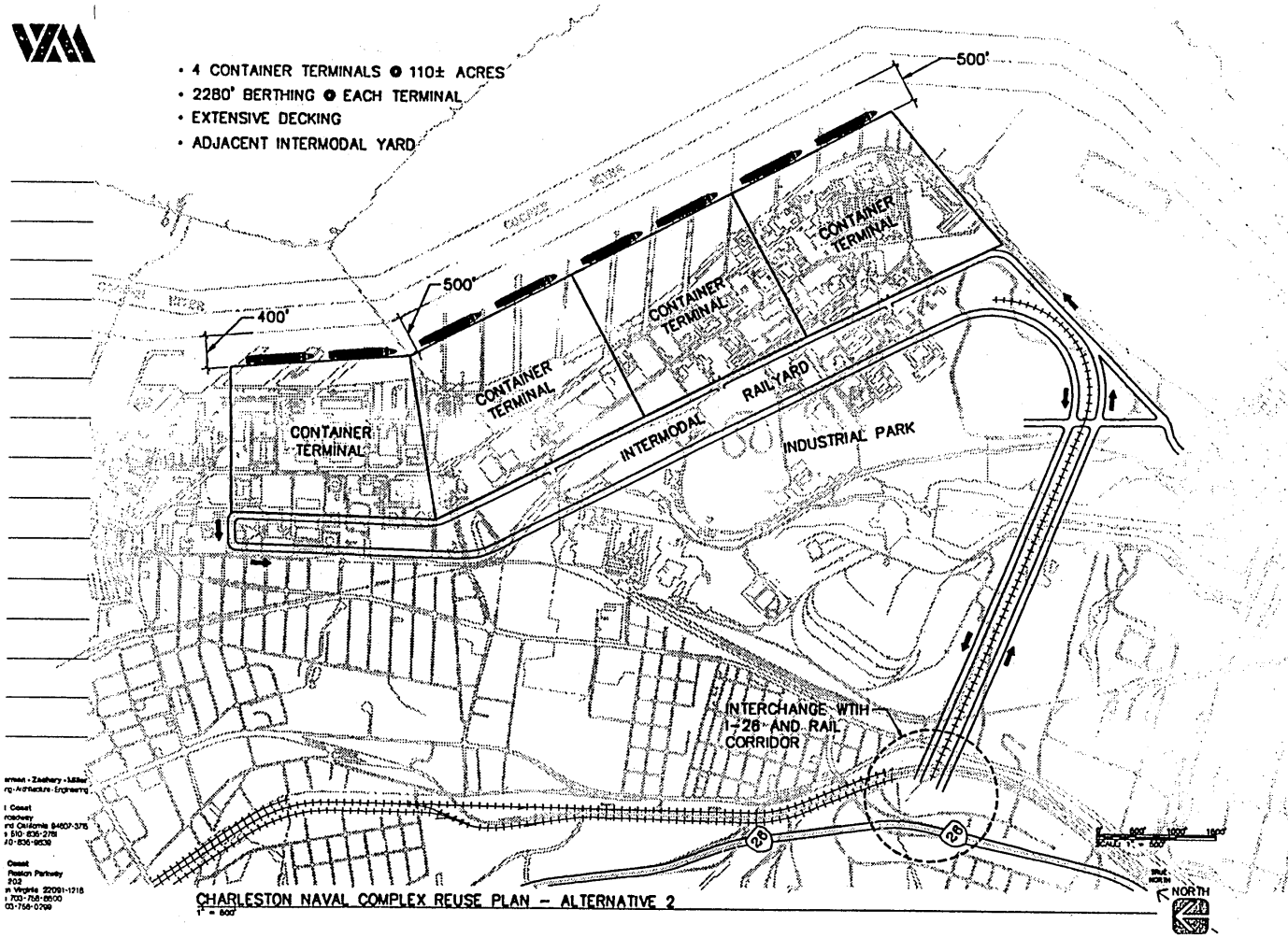
CHARLESTON NAVAL COMPLEX REUSE PLAN – NEO BULK/BREAK BULK TERMINAL

1" = 300'



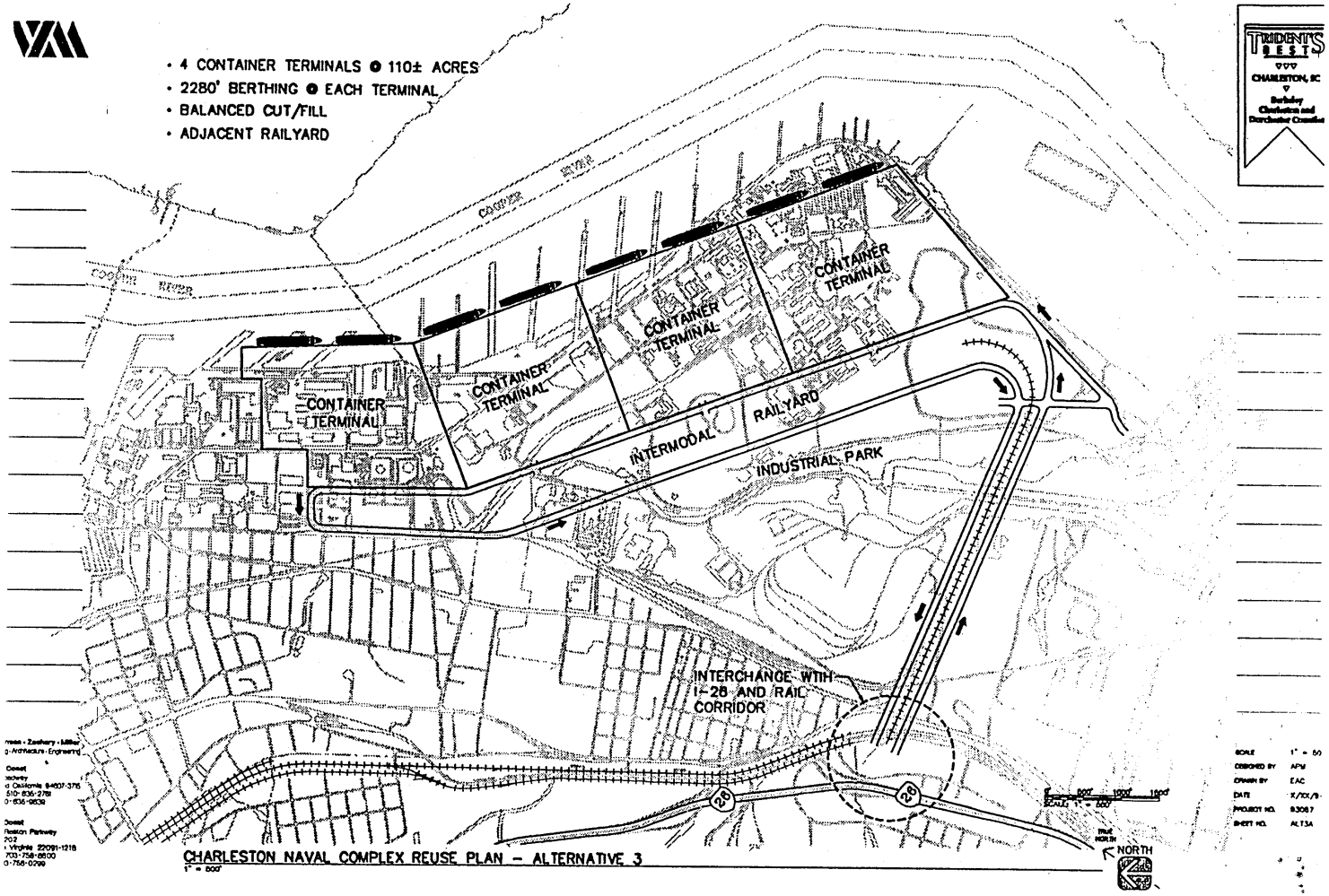
CHARLESTON NAVAL COMPLEX REUSE PLAN – ALTERNATIVE 1

1" = 800'



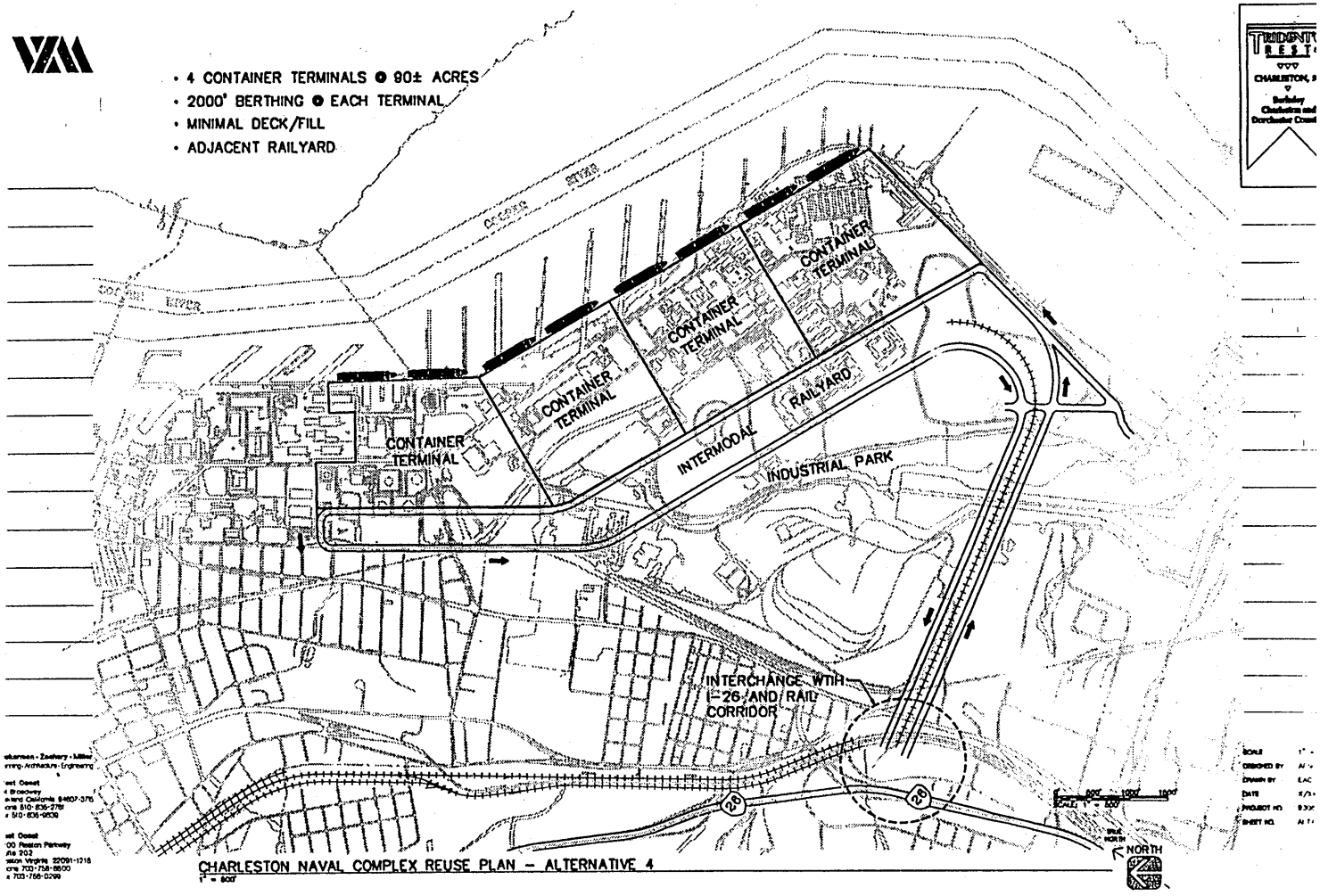
CHARLESTON NAVAL COMPLEX REUSE PLAN – ALTERNATIVE 2

1" = 800'



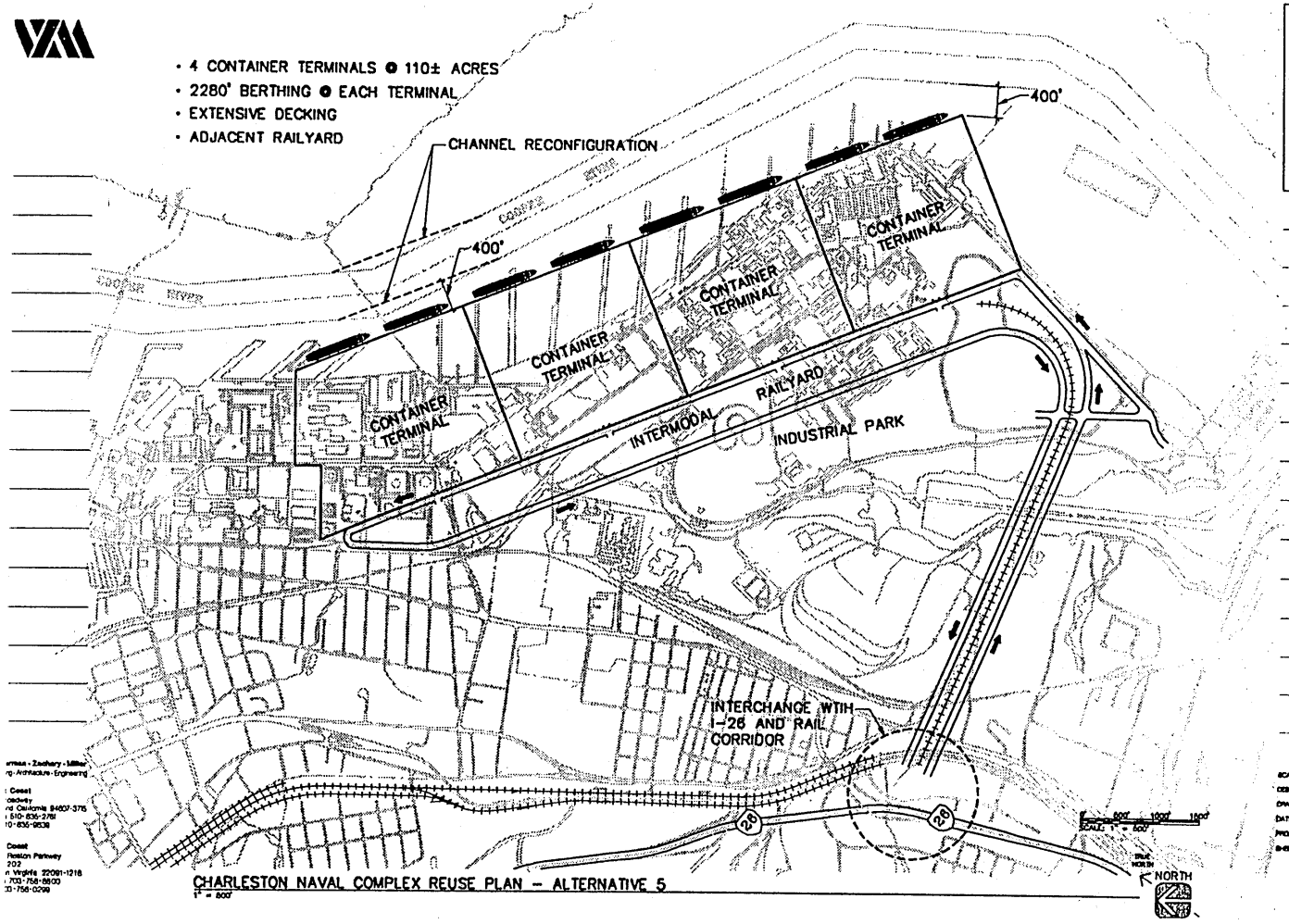
CHARLESTON NAVAL COMPLEX REUSE PLAN – ALTERNATIVE 3

1" = 600'



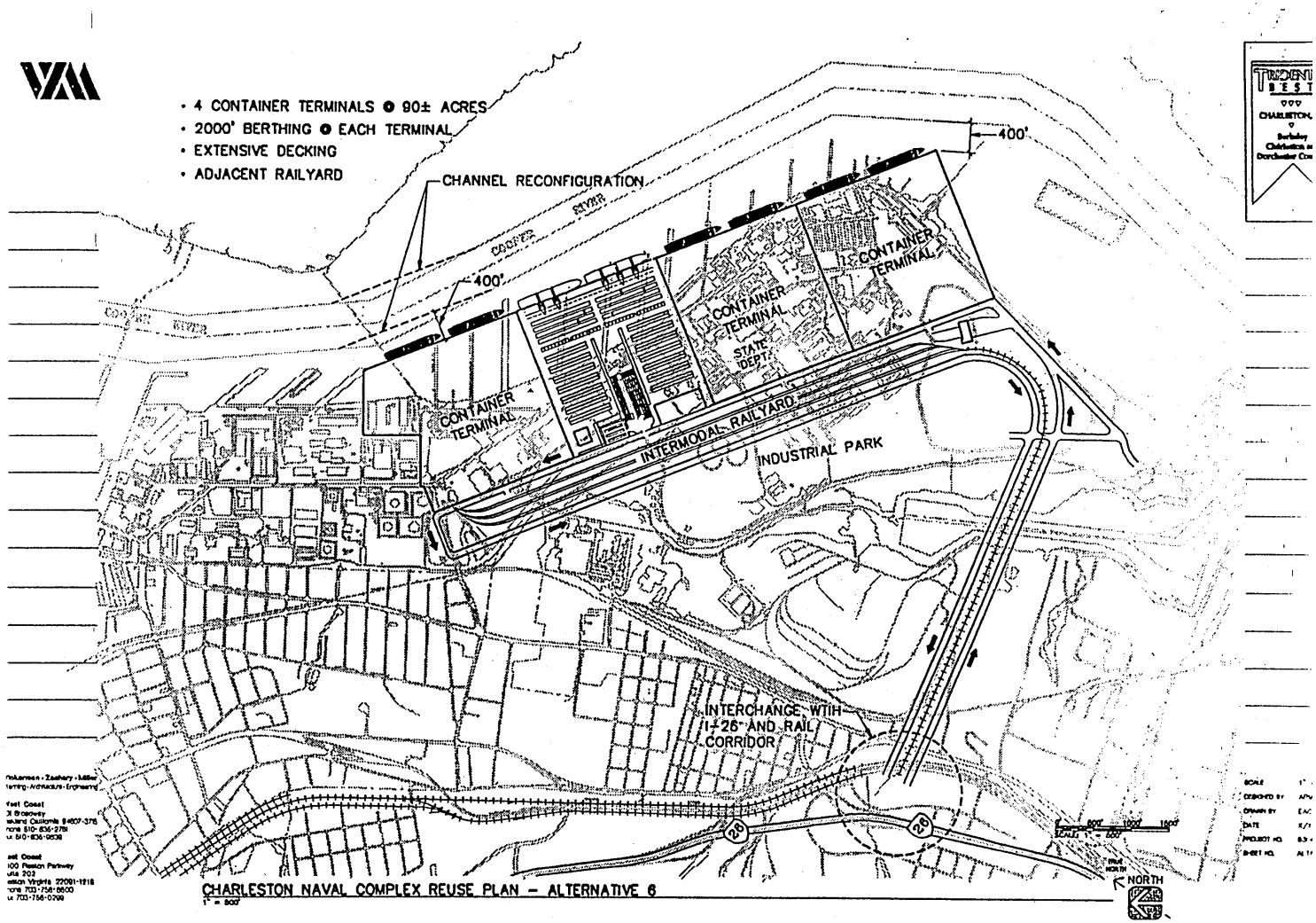
CHARLESTON NAVAL COMPLEX REUSE PLAN – ALTERNATIVE 4

1" = 800'



CHARLESTON NAVAL COMPLEX REUSE PLAN – ALTERNATIVE 5

1" = 800'



CHARLESTON NAVAL COMPLEX REUSE PLAN – ALTERNATIVE 6

1" = 800'

- Alternative 5 shows four 110-acre terminals placed in a straight line, eliminating the "elbow" in Alternatives 1 through 4. Like Alternative 2, it requires extensive landfill/decking and provides a generous industrial park.

- Alternative 6 is a variation of Alternative 5 using 90-acre terminals. Of the six alternatives, this is VZM's preferred alternative, since: 1) the linear wharf configuration and railyard adjacency are highly desirable from a terminal operating standpoint; 2) the terminals, the railyard and the industrial park are acceptably sized; and 3) the amount of landfill/decking required is not excessive, although Alternatives 3 and 4 are superior in this respect. Conceptual layouts for one container terminal and the intermodal railyard are illustrated on the figure for this alternative.

The consultant team's recommended land use plan (not illustrated) incorporates a minor variation of Alternative 6 in which an area owned by the State Department (in an area indicated on the Alternative 6 figure) is preserved. The consultant team's recommended land use plan also utilizes a slightly different wharf alignment.

Preliminary Phasing Strategy

As noted earlier, phasing and construction timing depends on a variety of factors beyond the scope of this study. Based on experience at other ports, VZM suggests the following preliminary phasing strategy:

- Phase I (zero to five years) is proposed to consist of construction of a 65-acre neo bulk/break-bulk terminal, a 90-acre container terminal, a 45-acre auto terminal (as an interim use on the site containing the State Department), a 70-acre intermodal railyard and all off-site access improvements

- Phase II (five to 10 years) is proposed to consist of construction of a 90-acre container terminal and conversion of the 45-acre auto terminal to a 90-acre container terminal.

- Phase III (10 to 15 years) is proposed to consist of construction of a 90-acre container terminal and a 23-acre intermodal railyard expansion.

TRANSPORTATION/ENVIRONMENTAL IMPACTS

Definition of the Project

For purposes of this analysis, the project consists of: 1) development of four container terminals, a neo bulk/break-bulk terminal and an industrial park on the Navy base; 2) development of an intermodal railyard on the Navy base with abandonment of the existing CSXI intermodal yard in the city of North Charleston and an existing CSXI track adjacent to Spruill Avenue; 3) construction of new road and rail interchanges with I-26 and the CSXI and Norfolk Southern main lines and grade-separated links from the new interchanges directly to the site; and 4) a grade separation at Montague Avenue and roadway reconfiguration at Dorchester Avenue in the city of North Charleston to mitigate train impacts.

Impacts under a "No Project" Alternative

Without the proposed project, the South Carolina State Ports Authority will develop four container terminals on property it owns on Daniel Island. It is unlikely that rail access can be cost-effectively provided to this site, which will result in: 1) the need for larger terminals, 2) the need to haul intermodal containers by truck from Daniel Island to the existing CSXI and Norfolk Southern railyards in the city of North Charleston and 3) the continued hauling of intermodal containers from SCSPA's Wando Terminal to these railyards. The overall impact will be to increase truck and train traffic through North Charleston.

Train Traffic With Project

Current CSXI Operations

CSX switching occurs at Bennett Yard, which is oriented east/west and located south of I-526 and west of I-26. CSX Intermodal (CSXI) operates an intermodal yard oriented north/south and located east of I-26 just above Dorchester Street in North Charleston. CSXI reports that switching capacity is adequate but that the intermodal yard has operated at capacity since 1989.

Approximately 30% of CSXI's intermodal traffic is double-stack containers. Vertical clearance through to inland destinations is restricted to 19 feet, 2 inches, which allows for stacking a "regular cube" (8 feet, 6 inches in height) and a "high cube" (9 feet, 6 inches in height). Of the remaining 70%, approximately 75% of the traffic is container-

on-flatcar (COFC) and 25% is trailer-on-flatcar (TOFC or "piggy back"). Approximately 50% to 60% of CSXI's traffic is international cargo, with 20% to 35% domestic cargo and 15% to 20% empty containers.

The CSXI Intermodal Yard handles two trains in and out five days a week and one train in and out on Saturday. The trains vary in length and composition and typically have a mix of 90-foot flatcars and dedicated double-stack cars. The bulk of the traffic is sent north and west, away from Charleston. However, there is scheduled service to the south of the yard five days a week, with departures generally at 8 a.m. and returns around 11 p.m. A mix of flatcars and double-stack cars is sent south along the main line, which runs generally between I-26 and Rivers Avenue as it passes the Navy base. Many of these cars are bound for Cooper Yard (a storage yard adjacent to Shipyard Creek) and serve various bulk industries in the area (coal, ore, etc.). An average of four or five cars are sent further south to the Port of Charleston along the main line, although this varies from day to day.

CSX also owns a secondary line running just east of Spruill Avenue which runs through Cooper Yard. CSXI reports that the line is in poor condition and is not used either north or south of Cooper Yard; service to and from Cooper Yard is via a main line connecting spur south of the yard.

Current Norfolk Southern Operations

Norfolk Southern switching occurs at Seven Mile Yard, which is oriented north/south and located south of I-526 and east of I-26, just north of the CSX Intermodal Yard. Seven Mile Yard also accommodates intermodal transfers. Norfolk Southern reports that Seven Mile Yard has been recently expanded and that there are no constraints on switching activity or intermodal transfers.

Approximately 50% of Norfolk Southern's intermodal traffic is double-stack containers. Vertical clearance to inland destinations is restricted to 20 feet 3 inches, which allows for stacking two "high cubes" (9 feet 6 inches in height). Of the remaining 50%, approximately 70% of the traffic is COFC and 30% is TOFC. Approximately 90% of Norfolk Southern's intermodal business is international, with only 10% domestic.

Seven Mile Yard handles one intermodal train in/out five days per week and one mixed freight train in/out seven days per week. As with CSXI, the trains vary in length and composition, with a mix of 90-foot flatcars and dedicated double-stack cars; and most are sent north out of the Charleston peninsula.

There is scheduled service to the south of the yard five days a week, with departures at approximately 1:30 p.m. and returns at approximately 5:30 p.m. Typically, approximately 35 to 40 cars (of which 10 to 15 are double-stack and the rest flatcars) are sent south along the main line, which parallels and eventually joins with the CSXI main line. Approximately 30 of these cars serve the Port of Charleston's Columbus Street Intermodal Terminal, with the rest serving bulk industries along the line.

Impacts of Proposed Project

At full build-out, the intermodal railyard could handle as many as 720,000 TEUs of international and domestic cargo per year. With six working tracks and assuming a maximum of one train in and out per track per day, up to six round trips could be generated on a peak day. The proposed rail transportation improvements will confine these trips to established rail corridors, bypassing residential neighborhoods. Trains could be scheduled to minimize impacts.

The new facility would allow the existing CSXI yard--a source of noise and traffic problems for the city of North Charleston--to be eliminated, along with a rail line running through residential areas adjacent to Spruill Avenue. Two grade crossings of the main CSXI line (at Montague and Dorchester Avenues) would be eliminated.

Furthermore, by diverting up to 480,000 TEUs from truck to rail, approximately 400,000 truck moves per year--moves that would otherwise go to and from the existing Norfolk Southern and CSXI yards--would be eliminated from the region's roadway network. Overall, these represent substantial congestion relief and air quality benefits.

Truck Traffic With Project

Trip generation assumptions for the container terminals and the intermodal railyard are summarized in the tables on the following page. During the peak hour of a peak day, each of the four container terminals could generate 315 one-way vehicle trips (assuming a 40% intermodal split); the railyard could generate 97 such trips.

Different assumptions concerning the intermodal split would produce different trip generation estimates. For example, using a 20% split, there would be 370 one-way peak hour/peak day trips from each container terminal. The railyard would handle 480,000 TEUs per year (rather than 720,000) and generate 89 one-way peak hour/peak day trips. Over the course of a year, the difference between a 40% and a 20% split is approximately 175,000 one-way vehicle trips.

Container Terminal Trip Generation Methodology

Step	Task	Calculation
1	Identify terminal yearly throughput.	300,000 TEUs
2	Divide by working days per year to determine throughput on average day. VZM assumes a five-day work week.	300,000/260 = 1,154 TEUs per avg. day
3	Convert TEUs to units (throughput lifts). This factor is approximately 1.7 TEUs per unit. This indicates the number of unit-carrying one-way truck trips.	1,154/1.7 = 679 one-way unit-carrying truck trips per avg. day
4	Account for "single moves": Unit in/bobtail or bare chassis out (U/B) and vice versa (B/U). Generally, approximately 40% of round-trips are unit in/unit out (U/U), with 30% U/B and 30% B/U. On average, 70% of all one-way trips are unit-carrying and 30% are not; to account for these, divide by 0.70.	679/0.70 = 970 one-way throughput-related truck trips per avg. day
5	Account for "extra" trips unrelated to terminal throughput (trips to and from container freight stations and maintenance areas, empties to and from customers, etc.). An additional factor of 40% is typical.	970 x 1.4 = 1,358 one-way truck trips per avg. day
6	Account for non-truck trips, which are usually 10% of all trips.	1,358/0.90 = 1,509 one-way vehicle trips, avg. day
7	Account for intermodal split. Up to 40% of the throughput related truck trips will be to and from the intermodal yard, rather than on the roadway network.	1,509-(970x0.4) = 1,121 one-way vehicle trips per avg. day
8	(Optional) Determine peak hour and peak day trips. Divide by terminal operating hours (usually 8), multiply by the peak hour and peak day factors (usually near 1.5).	1,121/8x1.5x 1.5 = 315 one-way trips, peak hour and peak day on roads

Intermodal Railyard Trip Generation Methodology

Step	Task	Calculation
1	Identify facility yearly throughput.	720,000 TEUs
2	Divide by working days per year to determine throughput on average day. VZM assumes a six-day work week.	1,000,000/312 = 2,308 TEUs per avg. day
3	Convert TEUs to units (throughput lifts). This factor is approximately 1.7 TEUs per unit. This indicates the number of unit-carrying one-way truck trips.	2,308/1.7 = 1,358 one-way unit-carrying truck trips per avg. day
4	Account for "single moves": unit in/bobtail or bare chassis out (U/B) and vice versa (B/U). We assume that 40% of round-trips are unit in/unit out (U/U), with 30% U/B and 30% B/U, so that 70% of all one-way trips are unit-carrying and 30% are not.	1,358/0.70 = 1,940 one-way throughput-related truck trips per avg. day
5	Account for "extra" trips unrelated to terminal throughput. There are fewer "extra" trips than for a container terminal; a factor of 1.2 is used.	1,940 x 1.2 = 2,328 one-way truck trips per avg. day
6	Account for non-truck trips, which are usually 10% of all trips.	2,328/0.90 = 2,587 one-way vehicle trips per avg. day
7	Account for intermodal split with adjacent container terminals. These truck trips will not be on the roadway network.	2,587-(970x0.4x4) = 1,035 one-way vehicle trips per avg. day
8	(Optional) Determine peak hour and peak day trips. Divide by facility operating hours (usually 24) and multiply by the peak hour and peak day factors (usually near 1.5).	1,035/24x1.5x1.5 = 97 one-way trips, peak hour and peak day

Peaking factors vary considerably by facility and location and need to be verified for Port of Charleston operations. Of particular importance is the fact that the peak period for port traffic does not necessarily coincide with the commuter peak. For example, in Los Angeles, the morning peak is 9-10 a.m.; and the afternoon peak is 2-3 p.m.

Vehicle trips associated with the industrial park have not been estimated. The neo bulk/break-bulk terminal would generate approximately 155 vehicle trips per day, which represents a relatively small number per hour.

The project would confine the great majority of new vehicle trips to the interstate highway system and a grade-separated access road, with minimal intrusion into the surrounding area. The interstate system (I-26 and I-526) would experience additional traffic. Locally bound trips to areas south of the Navy base would probably use Spruill or River Avenues, but these would represent a very small percentage of the overall traffic.

Navigation Impacts With Project

Port terminals must be served by marine channels with adequate depth, width and turning basin geometry and must not be subject to unreasonable surge or other hydrodynamic conditions. Further study will be needed to determine whether the wharf alignment, channel clear distances and turning basins provided in the consultant team's preferred plan are sufficient. Maintenance dredging to maintain adequate depths will be needed.

As discussed earlier, navigation of Shipyard Creek could be impacted under the preferred transportation corridor alignment. Generally, the Shipyard Creek bridge would need to run at-grade, since trains cannot negotiate steep grades. If designed as a fixed-span structure, it would cut off access to the upper reaches of the creek, with the following impacts: 1) a berth owned by Macalloy Inc. (currently leased to Metal Trades, Inc.) would become inaccessible; 2) the berth owner would have recourse to contest the project; 3) closure of this berth would result in the Army Corps of Engineers ceasing to provide maintenance dredging of the creek for commercial navigation, which would impact viable businesses that own or lease land on the creek (principally Detyens Shipyard, Metal Trades and Salmons Dredging); and 4) potential recreational boating areas would no longer be accessible.

The businesses potentially affected by the Shipyard Creek crossing have indicated their general support for the overall development concept and a desire to reach a

mutually acceptable solution. Concepts that have been discussed include: 1) providing substitute berthing and facilities either on Shipyard Creek or elsewhere on the base, 2) designing a moveable-span bridge and/or 3) entering into suitable cargo-handling agreements with SCSPA.

Other Issues With Project

Marine cargo terminals represent a clean, safe land use, and their presence should not be seen as a potential constraint on residential or commercial uses. Container terminals are simply large cargo parking lots. They have relatively small noise and air impacts when their access is properly managed, and they can be aesthetically pleasing when carefully designed and landscaped. Their cranes, while visible for some distance, are objects of interest in most communities.

The required interchange(s) and bridges have not been designed. Additional work will be needed to determine the movements to be accommodated by the interchange(s), the dimensions and alignments of the fly-overs and supporting piers and the rail alignment. Once these are at the preliminary design stage, it will be possible to determine noise and vibration impacts, visual impacts and the need for property acquisition/relocation.

The proposed Shipyard Creek crossing would impact a wetlands area. Existing wetlands would also be impacted by 70 acres of landfill shown in the consultant team's preferred plan. This could be constructed as a 100% pier and deck structure or as landfill behind a new bulkhead with a marginal wharf structure. Most of the fill would occur in wetlands with fairly low habitat value, but would need to be mitigated to the satisfaction of regulatory agencies with jurisdiction (South Carolina Coastal Council, Federal EPA, Army Corps of Engineers, etc.).

The disposal of spoils from maintenance dredging to maintain required channel depths will be a major concern. The Navy Spoil Island has unused capacity and should be able to accommodate near-term disposal of spoils.

A substantial portion of the site is a former landfill. Soil stability in this area has been a problem in the past, requiring pier supports for buildings. High-load uses are planned for the site, and the soil will need to be stabilized. The alternative--pier supports--is likely to be prohibitively expensive and would also puncture caps that might be required on contaminated areas. A Navy study of the contaminated sites is currently underway.

PRELIMINARY COST ESTIMATE

A cost estimate has been prepared for developing the marine cargo terminals and the intermodal railyard, as well as for related access improvements. This estimate is provided for reference only and represents a professional opinion. It is based on a preliminary concept design sketch of the consultant team's recommended plan, plus other available information. Actual construction costs could significantly vary from this estimate, depending on future engineering and environmental investigations, ultimate design of improvements, construction timing, availability of labor and materials and other factors beyond the control of the author. This estimate is not a guaranteed maximum figure. In preparing the estimate, these assumptions have been made:

- The estimate is based on 1994 dollars.
- A contingency factor of 10% is included.
- Only costs associated with the following program have been considered: 1) four container terminals, a neo bulk/break-bulk terminal and an intermodal railyard on the Navy base; 2) new road and rail interchanges with I-26 and the CSXI and Norfolk Southern main lines and grade-separated links from the new interchanges directly to the site; and 3) a grade separation at Montague Avenue and a roadway reconfiguration at Dorchester Avenue in the city of North Charleston.
- Costs for architectural, engineering, planning, legal and other professional consulting fees are not included.
- Costs for governmental/permitting fees are not included. These could include: building permit fees, street fees, plan check/design review fees, grading fees, development impact fees, utility connection fees, mitigation fees, special district fees, fees for preparation of traffic studies and fees for EIR/EIS or other required studies.
- Contractor's overhead and profit are included.
- Costs for construction management, construction administration, staking and surveying, materials lab and testing fees and other construction consulting fees are not included.

- Owner's administrative and insurance costs during construction and costs associated with move-in and start-up are not included.
- Maintenance fees and cost for owner's special warranties and bonds are not included.
- Costs for off-site construction and utilities other than road, rail and bridge infrastructure are not included.
- Property acquisition and relocation costs are not included.
- Tenant improvement costs, including the cost of fixed operating equipment such as container cranes, are not included.
- Hazardous material and asbestos abatement and disposal costs are not included (except as noted below).
- An allowance of between $150,000 and $250,000 per developed acre (existing land plus landfill and decking) has been added to cover mitigation of landfill, soil remediation and soil stabilization. Depending on the results of engineering and environmental studies that have not yet been conducted and the results of permitting requirements that have not yet been established, this figure could be substantially different.
- Demolition of existing buildings is not included.
- Costs for pier demolition, cut/fill, dredging and wharf construction have been estimated by another consultant and are presented here for information only. VZM makes no representations concerning them.

Summary of Development Costs

Development Phase	Program	Cost (rounded to half-million)
Phase I	90-acre container terminal 45-acre interim auto terminal 65-acre neo/break-bulk terminal 70-acre intermodal railyard All road/rail improvements 36 acres of landfill/decking required	$370,500,000 to $397,500,000
Phase II	90-acre container terminal Convert 45-acre auto terminal to 90-acre container terminal 12 acres of landfill/decking required	$129,000,000 to $142,500,000
Phase III	90-acre container terminal 23-acre railyard expansion 23 acres of landfill/decking required	$100,500,000 $112,000,000
Total	Terminals and Railyard: 518 acres	$600,000,000 to $652,000,000

Summary of Phase I Development Costs

Item	Notes	Cost
Pier Demolition, Cut/Fill, Dredging, Wharf Construction	Assumes landfill with marginal wharf.	$ 68,717,956
Backlands Fill	1,132,560 CY @ $4.50 ea	$ 5,096,520
Site Development	200 terminal acres @ $350,000 ea. plus 70-acre railyard @ $300,000 ea.	$ 91,000,000
Terminal Buildings	135,000 s.f. @ $100 ea. plus 60,000 s.f. @ $75 ea.	$ 18,000,000
Infrastructure	Shipyard Creek fixed-span bridge ($23,400,000), I-26 interchange and flyovers ($43,560,000), Spruill Ave. Bridge ($14,000,000), Montague Ave. bridge ($14,000,000), Dorchester Ave. work ($14,000,000), road/rail connectors ($8,200,000)	$117,160,000
Subtotal		$299,974,476
Plus Contingency		$ 29,997,447
Plus Mitigation, Remediation and Stabilization	$150,000 to $250,000 per acre over 270 acres	$ 40,500,000 to $ 67,500,000
Total		$370,472,447 to $397,472,447

Summary of Phase II Development Costs

Item	Notes	Cost
Pier Demolition, Cut/Fill, Dredging, Wharf Construction	Assumes landfill with marginal wharf.	$ 33,027,981
Backlands Fill	595,320 CY @ $4.50 ea	$ 2,678,940
Site Development	135 terminal acres @ $350,000 ea.	$ 47,250,000
Terminal Buildings	160,000 s.f. @ $100 ea.	$ 16,000,000
Infrastructure		$ 0
Subtotal		$ 98,956,921
Plus Contingency		$ 9,895,692
Plus Mitigation, Remediation and Stabilization	$150,000 to $250,000 per acre over 135 acres	$ 20,250,000 to $ 33,750,000
Total		$129,102,613 to $142,602,613