

APPENDIX IV

PORT TERMINAL PLANNING MODULES

Section D1 of the main report discusses the development of estimates of investment needs for the LATTs Strategic Port System. As noted therein, based on the results of the Capacity Analysis of existing facilities, the Future Facility Needs Assessment for each type of terminal was conducted. For purposes of these analyses, idealized facility modules tailored to the LATTs Region were developed. These modules were used as tools, or guidelines in comparing the current Maximum Practical Capacities (MPC's) of the existing terminals to the trade forecasts.

For purposes of the LATTs analysis, the primary focus was on the quantity of new terminals that will be needed to fulfill future requirements. Therefore, where shortfalls occur, the approximate quantities of new terminals required was determined based upon the terminal planning modules.

Key data from the 'idealized terminal modules' were used in the Future Facility Needs Assessment. The modules were 'customized' to represent cargo terminals typically associated with the LATTs Region. This recognizes the existing conditions that are unique to the size and design of cargo terminals in the Southeast and Gulf regions of the U.S. For example, the average container terminal size for this region is smaller than typical facilities found in other regions of the U.S. (i.e. West Coast). These smaller terminal modules were developed to represent the average sized terminals throughout the entire LATTs Region.

For purposes of the future facility needs assessment, the medium (baseline) cargo projection was compared to the Sustainable Practical Capacity (SPC). For practical planning purposes, sustained (SPC) throughput is often assumed to approximate 75%-80% of the terminals MPC.

Typical terminal modules were developed for Container, Neo-Bulk, Break-Bulk, Dry-Bulk and Liquid-Bulk facilities. The modules represent typical East Coast and Gulf coast maritime terminals for each cargo type. Due to the wide variety of terminal characteristics for each type of cargo, the modules were sized in comparison to average terminals found on the East and Gulf coasts.

The primary use of the modules was to provide a direct correlation between identified capacity needs (short tons/year) and the additional infrastructure required to accommodate such a need. For example, if future container cargo projections are higher than a terminal's container capacity, then there is a need for improvements. Therefore, if 3,980,000-tons/year terminal capacity is needed and each mixed storage container module has a throughput capacity of 1,592,000 Tons/Year, then approximately 2.5 mixed storage container terminal modules would be needed.

In addition to correlating the cargo tonnage projections to the needed infrastructure improvements, the modules also provided information (industry standards) for calculating throughput capacities of maritime terminals for which inadequate information was available. If the only available information about a certain terminal was the cargo type, storage mode, number of berths, berth type and terminal size (acreage), a conceptual throughput capacity was determined using industry standard data from the modules.

In the following discussions, each module summary is accompanied by a plan drawing of the module and a brief description of the module's infrastructure criteria. The characteristics shown in the following module summaries were used to develop the look-up tables in the database.

CONTAINER MODULE

The small container module shown on **Exhibit IV-1** was designed to represent the needs of a typical East and Gulf coast container terminal with wheeled, grounded or other/mixed storage to provide the maximum level of customer service. Where possible, two or more contiguous modules are recommended. The major terminal components include:

- ▶ One berth, able to accommodate container vessels of 800 to 1,150 feet in length.
- ▶ Two 100-foot-gauge container gantry cranes at a marginal wharf.
- ▶ An administration building, maintenance and repair facility and fenced parking for both longshore and administrative personnel.
- ▶ An eight-lane split terminal gate for weighing loads and documenting cargo interchange transactions.
- ▶ Approximately 25 to 30 acres of paved and striped outdoor storage with the following average per acre static capacities:

B	Wheeled	90 TEU/Acre
B	Grounded (RTG)	200-250 TEU/Acre
B	Other/Mixed	150 TEU/Acre
- ▶ Assumes an average dwell time of 6-8 days per container and 7.5 tons per TEU.

This 40-acre container module is used for the transfer of Lift On/Lift Off (Lo/Lo) and Roll On/Roll Off (Ro/Ro) containerized cargo. **Exhibit IV-2** outlines additional specifications of the module's infrastructure requirements.

NEO-BULK MODULE

This module was designed to represent the needs of an average East and Gulf coast neo-bulk terminal with moderate throughput levels for a variety of cargoes. The major terminal components include:

Exhibit IV-1: Typical Container Terminal Planning Module

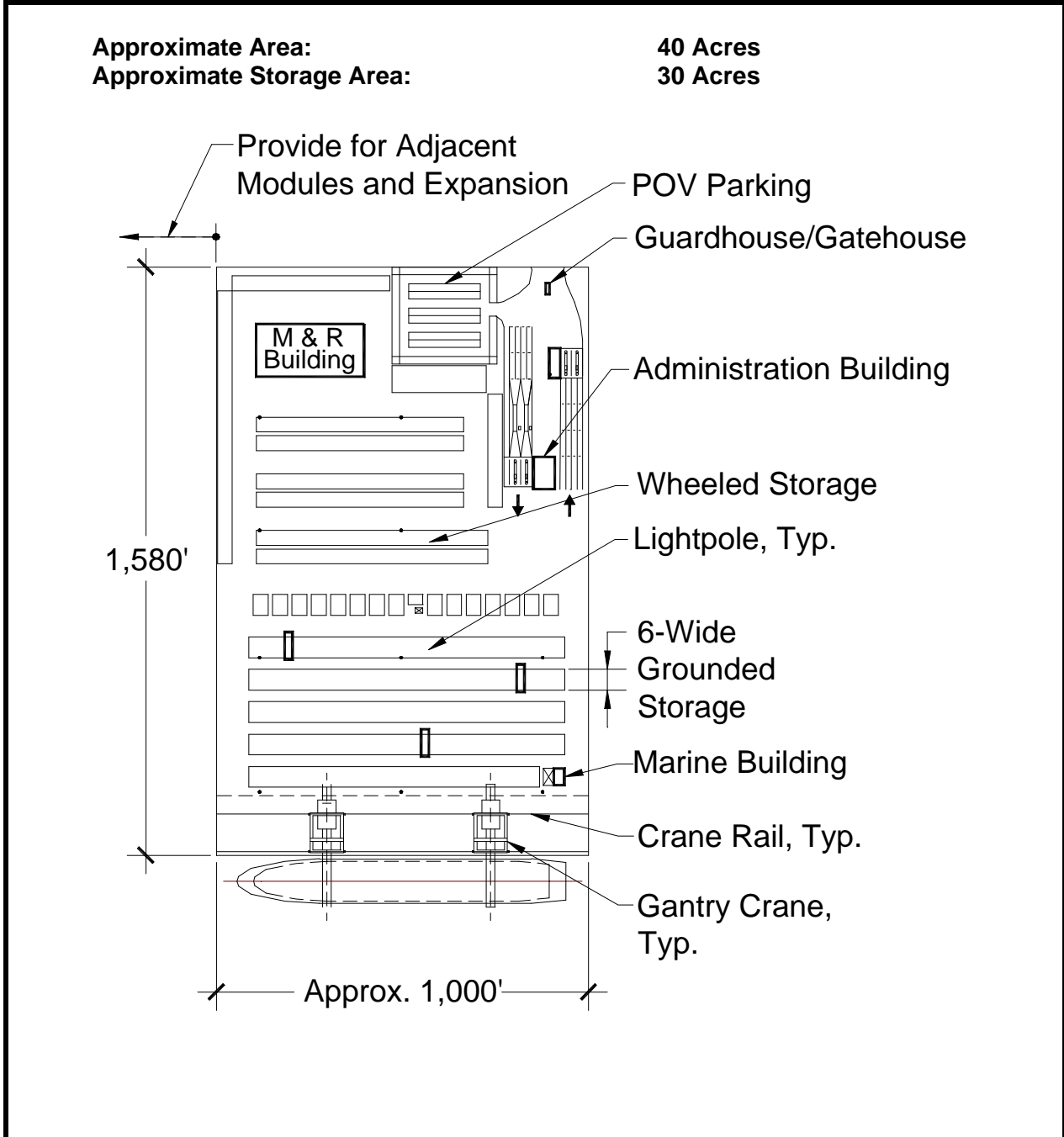


Exhibit IV-2: Container Terminal - Facility Data

Gross Terminal Area:	40 Acres
Storage Capacity Area:	30 Acres
Throughput Capacity (Short Tons/Yr.):	Wheeled = 880,000 Short Tons/Yr. Grounded = 1,739,000 Short Tons/Yr. Other/Mixed = 1,467,000 Short Tons/Yr. Average. = 1,400,000 Short Tons/Yr. (187,000 TEU/Yr.)
Wharf Apron Configuration	Length: 800' - 1,150' - Width: 160'
Storage Area/Storage Requirements	Wheeled Storage: 675 Short Tons/Acre Grounded Storage: 1,500 Short Tons/Acre Other/Mixed Storage: 1,125 Short Tons/Acre
Surge Capacity	Off-Site Storage
Crane Configuration/ Crane Capacity	2-100' Gauge Container Cranes
Building Areas	Gate Buildings: 7,500 s.f. Maintenance Building: 41,000 s.f. Administration Building: 18,000 s.f.
Gate Geometry	Four Inbound, Four Outbound Lanes

- ▶ A single berth (could be shared with another module), able to accommodate vessels up to 600 feet in length.
- ▶ A 60,000-square-foot transit shed/warehouse with a static storage capacity of approximately 3,500 short tons for cargo requiring protection from the weather. The shed includes forklift access and truck loading docks.
- ▶ 6-acres of paved outdoor storage with a storage capacity of approximately 16,200 short tons. This storage area consists of approximately 4 acres for wheeled (automobile) storage and 2 acres of open storage

Typical terminal operations data for a neo-bulk terminal were used to design this module. On average, this module can be expected to turn its storage capacity over approximately 10 to 20 times per year.

The 10-acre neo-bulk module shown on **Exhibit IV-3** is used for handling cargo such as lumber, paper, steel and autos. **Exhibit IV-4** outlines the module's facility data and infrastructure requirements.

Exhibit IV-3: Neo-Bulk Terminal Module

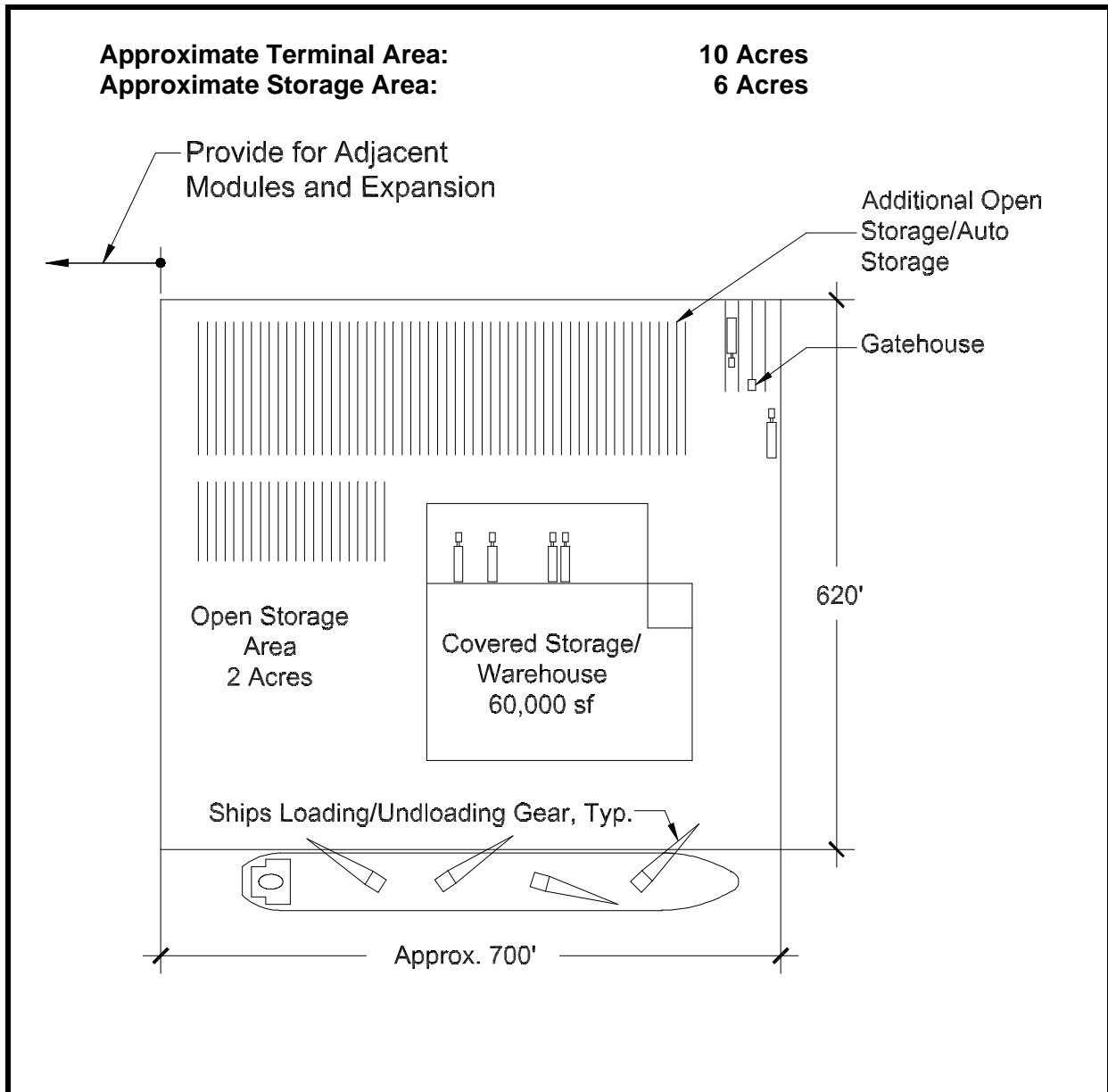


Exhibit IV-4: Neo-Bulk Terminal - Facility Data

Gross Terminal Area:	10 Acres
Storage Capacity Area:	6 Acres
Throughput Capacity (Short Tons/Year)	Outside = 202,000 Short Tons/Yr. Warehouse = 140,000 Short Tons/Yr. Mixed = 178,000 Short Tons/Yr.
Wharf Apron configuration	Length: 700', Width: 100'
Storage Area/Storage Requirements	Outside Storage: 2,700 Tons/Acre Mixed Storage: 2,600 Tons/Acre Warehouse Storage: 2,500 Tons/Acre
Surge Capacity	Included in Storage Area
Crane Configuration/ Crane Capacity	Ship's Gear or two 50-ton Mobile Cranes
Building Areas	Maintenance and Administrative Space Included Inside Transit Shed/Warehouse
Gate Geometry	Two Inbound Lanes, Two Outbound Lanes

BREAK-BULK MODULE

Typical operations for break-bulk terminals were used to design this module. On average, this module can be expected to turn its storage capacity over approximately 10 to 20 times per year.

This module was designed to represent the needs of an average East and Gulf coast break-bulk terminal with moderate throughput levels for a large variety of cargoes. The major terminal components include:

- ▶ A single berth (could be shared with another module), able to accommodate vessels up to 600 feet in length.
- ▶ A 120,000-square-foot transit shed/warehouse with a static storage capacity of approximately 7,000 short tons for cargo requiring protection from the weather. The shed includes forklift access and truck loading docks.
- ▶ 4 acres of paved, outdoor storage with a storage capacity of approximately 10,800 short tons.

The 10-acre break-bulk module shown on **Exhibit IV-5** is used for handling palletized cargo such as sacks, cartons, crates, drums and bags. **Exhibit IV-6** outlines the module's facility data and infrastructure requirements.

DRY BULK MODULE

The 20-acre dry bulk module is shown in **Exhibit IV-7** and is used for dry bulk cargoes such as feed, grain, sand & gravel, scrap metal, coal, coal/coke, clinker and fertilizer. The module is shown with the capability to accommodate outside storage, silo storage or a mix of both. The three storage modes that are considered in this module have a range of static storage capacities as noted in the diagram. **Exhibit IV-8** outlines the module's facility data and infrastructure requirements.

This module was designed to represent the needs of an average dry bulk terminal with moderate throughput levels. The major terminal components include:

- ▶ A single berth (could be shared with another module), able to accommodate vessels up to 900' in length.
- ▶ Mobile ship loaders and/or reclaimers with the capacity to (un)load 500 to 1,200 tons per hour.
- ▶ Silo or open storage areas.
- ▶ A truck transfer and parking areas.

Typical terminal operations data for a dry bulk terminal were used to prepare this module. On average, this module can be expected to turn its storage approximately 5 to 10 times per year. Throughput levels may vary significantly with this module.

Exhibit IV-5: Break-Bulk Terminal Module

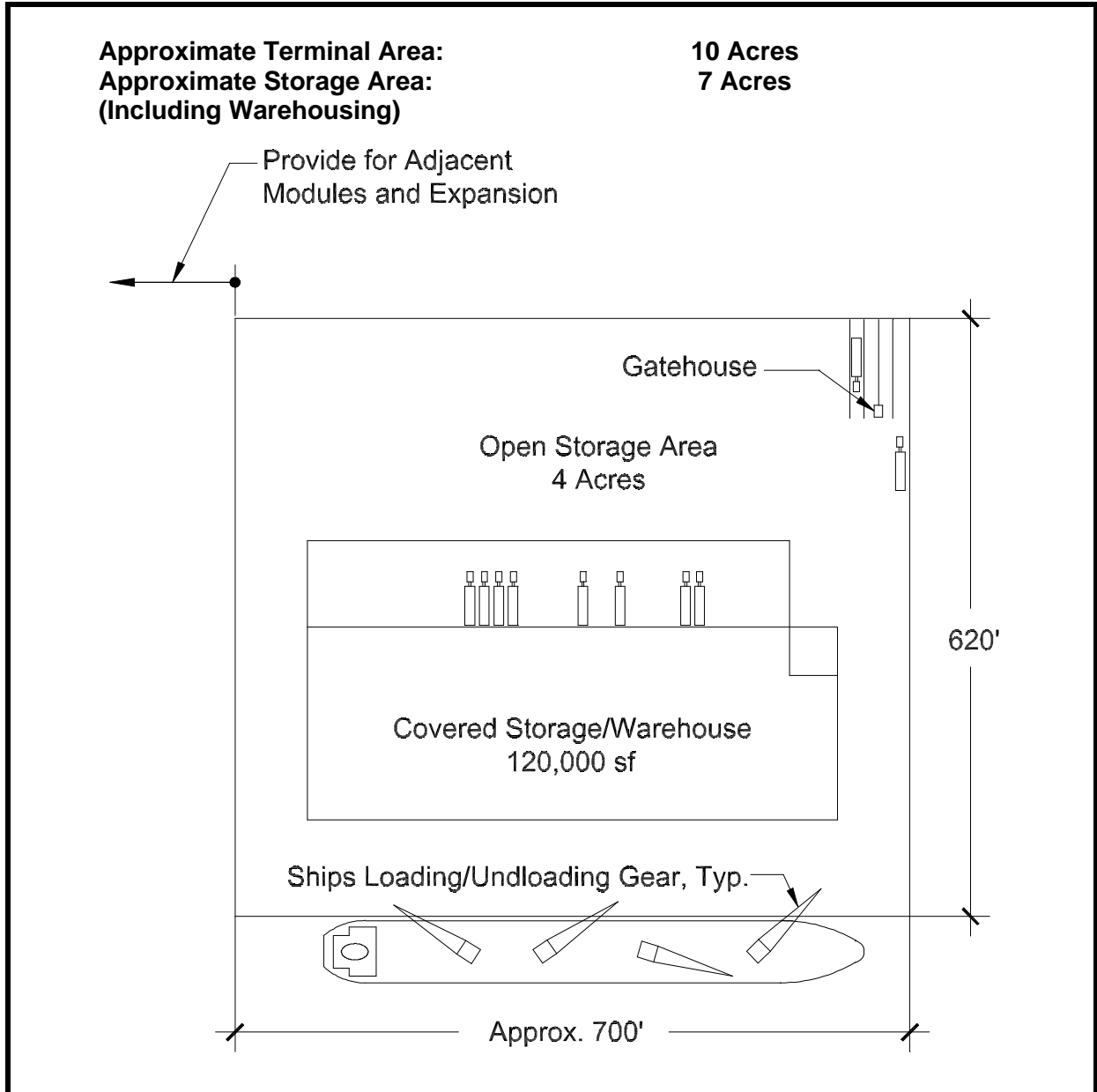


Exhibit IV-6: Break-Bulk Terminal - Facility Data

Gross Terminal Area:	10 Acres
Storage Capacity Area:	6 Acres
Throughput Capacity (Short Tons/Year)	Outside = 148,000 Short Tons/Yr. Warehouse = 187,000 Short Tons/Yr. Mixed = 142,000 Short Tons/Yr.
Wharf Apron configuration	Length: 700', Width: 100'
Storage Area/Storage Requirements	Outside Storage: 2,700 Tons/Acre Mixed Storage: 2,600 Tons/Acre Warehouse Storage: 2,700 Tons/Acre
Surge Capacity	Included in Storage Area
Crane Configuration/ Crane Capacity	Ship's Gear or two 50-ton Mobile Cranes
Building Areas	Maintenance and Administrative Space Included Inside Transit Shed/Warehouse
Gate Geometry	Two Inbound Lanes, Two Outbound Lanes

Exhibit IV-7: Dry Bulk Module

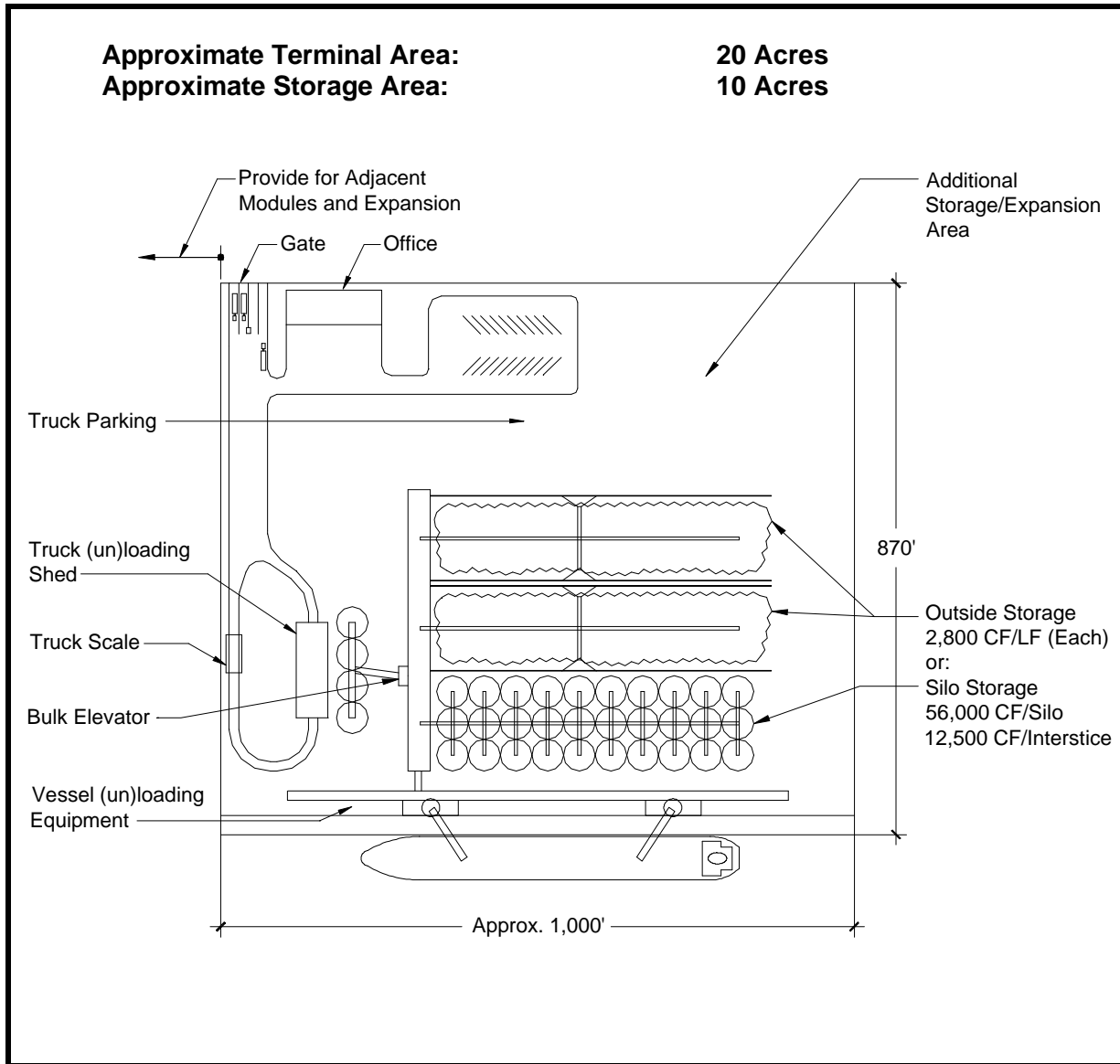


Exhibit IV-8: Dry Bulk Terminal - Facility Data

Gross Terminal Area:	20 Acres
Storage Capacity Area:	10 Acres
Throughput Capacity (Short Tons/Year)	Outside = 2,218,000 Short Tons/Yr. Silo = 2,218,000 Short Tons/Yr. Mixed = 1,684,000 Short Tons/Yr.
Wharf Apron Configuration	Length: '1000', Width: 100'
Storage Area/Storage Requirements	Outside Storage: 32,700 Tons/Acre Mixed Storage: 21,800 Tons/Acre Silo Storage: 43,600 Tons/Acre
Surge Capacity	Included in Storage Acres.
Crane Configuration/ Crane Capacity	Two ship loaders with 1,000 - 1,200 TPH rated capacity each.
Transfer Equipment	Two stacker reclaimer units (one per conveyer system) with 1,000 TPH capacity
Building Areas	Truck (un)loading Shed: 2,000 s.f. Administration and Parking: 5,000 s.f.
Gate Geometry	Two inbound Lanes, Two outbound Lanes

LIQUID BULK MODULE

The 20-acre liquid-bulk module shown on **Exhibit IV-9** could be used for handling liquid bulk cargoes such as LNG, petroleum, molasses, chemicals and vegetable oil. **Exhibit IV-10** outlines the module's facility data and infrastructure requirements.

This module was designed to accommodate the needs of an average liquid-bulk terminal on the U.S. East and Gulf coasts. The major terminal components include:

- ▶ A single berth (could be shared with another module), able to accommodate vessels up to 900 feet in length.
- ▶ A cargo manifold, which could include recessed risers or some type of permanent, articulated pipe assembly.
- ▶ Nine tanks, each having a total liquid-bulk cargo capacity of 115,000 U.S. barrels or approximately 14,500 short tons.
- ▶ A four-lane truck-loading area with an office building.

Typical terminal operations data for a petroleum liquid bulk terminal were used to prepare this module. On average, this module can be expected to turn its storage capacity over 2-5 times per year. Throughput levels may vary significantly with this module.

Exhibit IV-9: Liquid Bulk Terminal Module

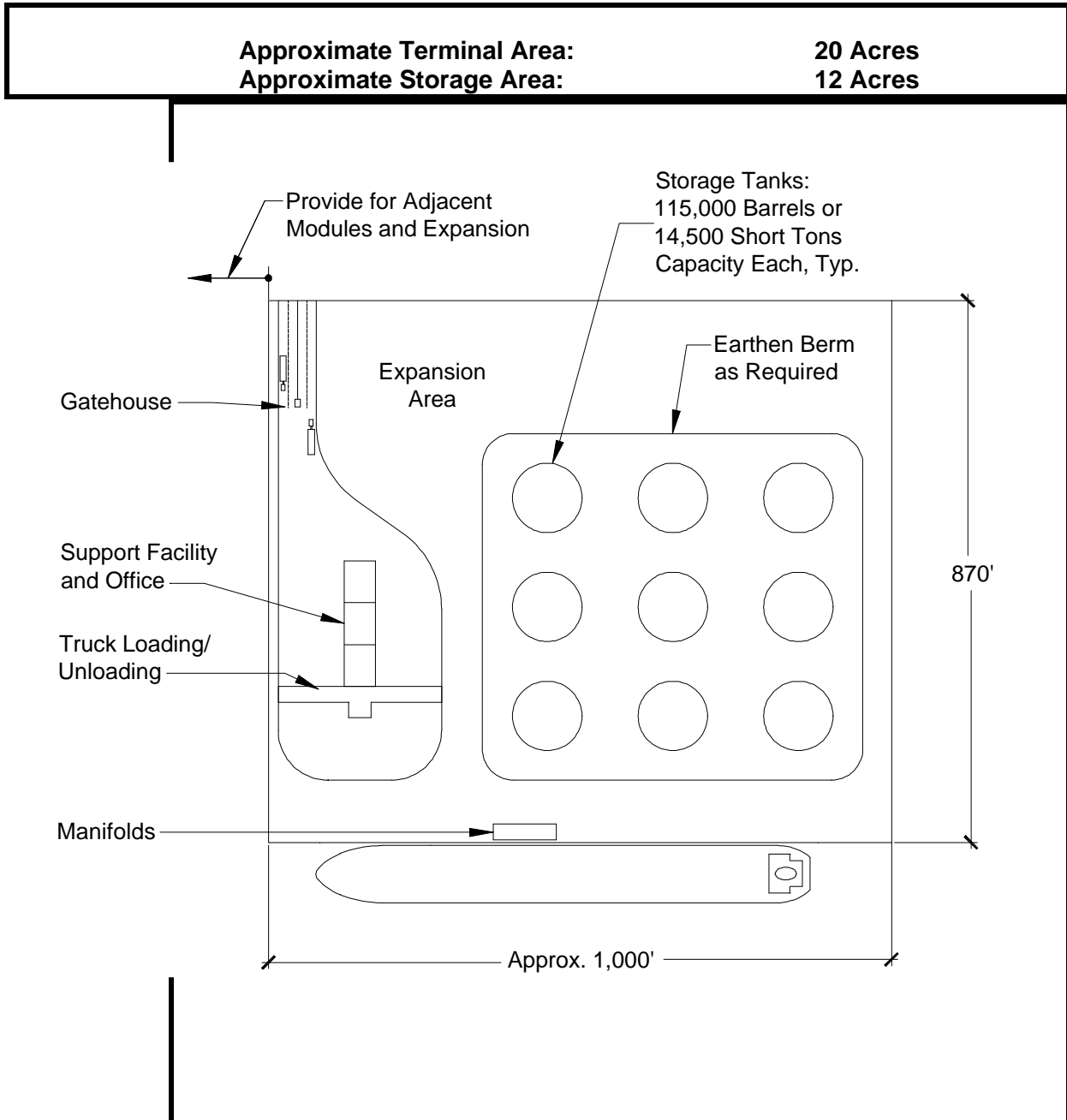


Exhibit IV-10: Liquid Bulk Terminal – Facility Data

Gross Terminal Area:	20 Acres
Storage Capacity Area:	12 Acres
Throughput Capacity (Short Tons/Year)	Tank = 2,048,000 Short Tons/Yr.
Wharf Apron configuration	Length: 1000', Width: 100'
Storage Area/Storage Requirements	Tanks (each): 115,000 Barrels (14,500 Short Tons)
Surge Capacity	Included in storage area
Transfer Equipment	Liquid Bulk Manifold
Building Areas	Support Facility and Office: 4,000 s.f.
Gate Geometry	Two Inbound Lanes, Two Outbound Lanes