

North Carolina International Terminal Conceptual Civil Design

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General Site Description

The site covers approximately 600 acres in Brunswick County on the Cape Fear River. Currently, the parcel is zoned as Commercial Heavy Manufacturing (CO-HM). The 600-acre parcel is made up of land features including pasture/clear fields, woodlands, and wetland marshes. The topography ranges in elevation; however, the majority of the site is above 20 ft above National Geodetic Vertical Datum 1929 (NGVD). There is a bluff feature that slopes significantly from the tidal area (elevation of 0 to 5 ft NGVD) to the upland area.

Materials for Terminal Surface

Pavement sections were assumed for each operational area to derive the most cost-effective pavement option. Three pavement sections at the locations specified below were evaluated for further study:

1. **Entrance Road, Gate Area, and Parking and Maintenance Areas.** This section would consist of 7.5 inches of asphaltic concrete pavement on a 12-inch aggregate base.
2. **Container Operations Area.** This section would consist of 12 inches of asphaltic concrete on a 12-inch aggregate base.
3. **Container Stacking Area.** This would be a 12-inch gravel/stone section (similar to railroad ballast-sized stone) on a prepared sub-base.

Site Grading

The existing average elevation of the site is elevation 20.0 ft NGVD.

For purposes of this study, and to minimize the amount of earthwork required, an average site elevation of 18 ft NGVD was selected. The wharf elevation was also set at 18 ft NGVD. The grade was assumed to have a 1 percent slope extending from the land-side of the wharf towards the western boundary of the site. The gravel container areas would be a highpoint in the CY and minimum slopes would be used to direct rainfall to piping conveyance systems flowing to a stormwater treatment system.

The entrance road and gate area would be crowned and would use curb and gutter to collect stormwater and direct it to the stormwater treatment system.

Resulting excavated material would be disposed of or stockpiled for possible use in construction.

Stormwater Management

A preliminary stormwater treatment concept was established to address the relevant regulations requiring compliance. Rules in the North Carolina Administrative Code (NCAC), specifically 15A NCAC 02H .1000, provide information on the appropriate Best Management Practices (BMPs) to meet the pollutant removal efficiency design standard of 85 percent for total suspended solids (TSS). In North Carolina coastal areas, all water quality BMPs are generally designed to treat the runoff from the first 1 or 1½ inches of rainfall, depending on the classification of the water to which it drains. BMPs can be used alone or in series to achieve the required pollutant removal efficiencies and peak attenuation requirements.

For purposes of this study, some specific requirements applied to this site include:

- Direct discharge into area waters is prevented.
- Stormwater management processes are expected to be typical of high density development but would depend on the final site configuration.
- Control systems must be infiltration devices designed in accordance with 15A NCAC 02H .1008 to control runoff generated from 1½ inches of rainfall.

If the devices could retain and infiltrate or exfiltrate the runoff from 4.5 inches of rainfall, these requirements would be waived.

Preliminary calculations were performed to estimate the water quality volume. It was assumed 400 acres of the 600-acre site is covered with some form of paving and is, therefore, approximately 98 percent impervious. The other 200 acres of developed area would remain pervious.

Overall site design would be required to treat the runoff generated from 4.5 inches of rainfall. These assumptions indicated a water quality volume requirement of approximately 150 acre-ft or approximately 6.5 million cubic ft (ft³).

Three methods of treatment/storage have been assumed to store this rainfall runoff volume, and excess storage volume would be made available through design:

1. A stormwater retention area could be constructed in the northeast corner of the site. An outfall could be provided, if appropriate, which would discharge only after appropriate water treatment has been completed.
2. The perimeter of the site would be used for stormwater treatment as an infiltration trench in conjunction with perimeter safety clear space requirements (Figure 1). Isolated sections and tiers of these devices would be determined by the grading requirements. The location of the seasonal high water table would determine the type of practice. Infiltration basins require a minimum of 2 ft between the bottom of the device and the seasonal high water table and a minimum hydraulic conductivity of 0.52 inch per hour. The overflow of the system would outfall to the retention area.

3. Some of the piping systems would be routed to underground exfiltration chambers to provide additional storage. The overflow of this system would outfall to a piping system connected to the retention area.

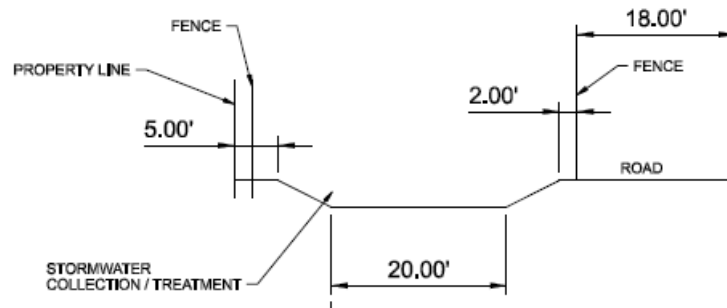


FIGURE 1
Cross Section of Infiltration Trench Incorporated into Perimeter Site Security Fencing

Grass-lined channels and other overland conveyance would not be the best alternative for conveyance due to site restrictions. Therefore, stormwater should be piped underground to collection, treatment, and storage facilities.