

MOVING FROM WAREHOUSE TO LOGISTICS

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Addressing the Evolution of Warehouses to Logistics Facilities

Background

In today's 24/7 economy, warehouses are no longer large buildings solely for the storage of goods. While warehouses still serve as holding centers for goods, they now serve as distribution hubs where customer orders are assembled, placed into shipping containers, and sent out to their destination. The modern logistic facility consolidates multiple phases of the consumer chain into one location, which has led to significant changes to land use within and around these developments. Unfortunately, these new facilities also bring concerns relating to noise, traffic, design, and environmental impacts. These issues are of particular importance to our local communities.

Local municipalities can leverage their zoning ordinances to successfully manage the development of this new wave of logistic facilities. The environmental group [PennFuture](#) has developed a standard model ordinance for Pennsylvania municipalities to sensibly manage the development of these facilities within their jurisdiction. Below we summarize the key points and zoning standards of their [model ordinance](#) for consideration.

Key Areas of Consideration

- Zoning Overlay and Review Process
- New and Improved Definitions
- Required Site Improvements for Large Warehouses and Truck Terminals
- Environmental Restrictions
- Access and Operations

Zoning Overlay and Review Process

A key feature of today's warehouse industry is that upwards of 70 percent of warehouse developments are built without a specific tenant in mind. This trend of "building on spec" makes it difficult to regulate these developments solely based on use. Because of this industry trend, the most effective way to manage warehouse and logistics developments is through the zoning regulations via the municipal land development process. It is recommended that municipalities employ the following elements within their zoning ordinance:

- Use clear size-based definitions to define small warehouses, large warehouses and truck terminals.
- Require conditional or special exception approval for all warehouse and logistics uses.
- Limit the new zones or overlay districts to existing industrial or related zones.
- Require an environmental and community impact statement for developments meeting the definition of large warehouse.
- Re-examine comprehensive plans and zoning districts to ensure these facilities are located near highways and interstate access points.

New Definitions

At the core of any ordinance are the definitions that define terms associated with the regulations of the ordinance. The following definitions are recommended to be added for any warehouse and logistics use:

Sensitive Receptors – Any preschools, daycares, in-home daycares, health facilities, hospitals, long term care facilities, retirements/nursing homes, community centers, places of worship, campgrounds, prisons, dormitories, residences not located on parcels within existing industrial, or commercial uses.

Warehouse Logistic Use

- *Small Warehouse* – Any warehouse less than 25,000 SF
- *Large Warehouse* – Any warehouse more than 25,000 SF

Truck Terminal

- A facility of one or more buildings containing 10 or more tractor trailer docks
- A facility with 50 tractor trailer trips per 24-hour period, per the most recent *Trip Generation Manual* by the [Institute of Transportation Engineers \(ITE\)](#)
- 100 car trips per 24-hour period, per ITE

It should be noted that not every warehouse will meet the definition of a truck terminal. The warehouse type is primarily defined by the size of the warehouse building. A warehouse could then qualify as a truck terminal depending upon the number of docks and/or trip generation characteristics. This layer of flexibility helps establish the distinction between traditional warehouses and warehouses used for modern logistics.

Required Site Improvements for Large Warehouses and Truck Terminals

The following site requirements/improvements are recommended for all warehouse types:

- Maximum building height of 35 feet for all warehouse and logistics uses
- *Small warehouse* – minimum lot area of 2 acres
- *Large warehouse* – minimum lot area of 5 acres
- *Large warehouse* over 100,000 SF – minimum lot area of 10 acres

Typically, the larger the facility is, the more intense issues related to traffic, light, and sound become. To help mitigate these effects, the following site improvements are recommended for Large Warehouses and Truck Terminals:

Large Warehouses Buffer Requirements

- Warehouses of 25,000 to 99,999 SF: 100-foot buffer adjacent to residential, institutional, parks and open space uses and zoning districts
- Warehouses of 100,000 to 250,000 SF: 150-foot buffer adjacent to residential, institutional, parks and open space uses and zoning districts
- Warehouse of 250,000+ SF: 300-foot buffer adjacent to residential, institutional, parks and open space uses and zoning districts
- 50-foot buffer for all other uses

- Buffer yard requirement of one large evergreen (8-10' height) per 25 linear feet, one canopy tree (2.5 – 3" caliper) per 75 linear feet, one flowering tree (8-10' height) per every 50 linear feet, 5 shrubs (2-3' height) per every 25 linear feet
- All evergreen and deciduous trees will be at least 8 feet in height
- Landscape buffers will be located on the outer edge of the buffer yard

Large Warehouse Additional Requirements

- A berm of varying heights will be built around all parking areas visible from and within 250 feet of exterior lot lines, regardless of the adjacent property use or zoning classification.
- All berm buffer plantings shall be planted on the top and outward facing, upper third of the berm.
- Roofs shall be solar ready.
- Non-solar areas will be reflective.
- Warehouses over 400,000 SF shall include roof mounted solar panels to power all non-refrigerated business operations.
- Ensure requirements are provided for street trees, parking lot trees, and stormwater facility landscaping.
- Parking lot islands shall be planted with native groundcovers or shrubs in lieu of turf grass.
- Provide for naturalized areas, as appropriate, including no-mow areas to promote species habitat. This includes stormwater basins designed as rain gardens.
- Where possible, the use of green roofs and green roof technology should be encouraged.

Truck Terminals

- Shall be within 0.5 miles of an entrance and exit to a highway/expressway
- Loading areas, storage areas for trucks, entrances, and truck parking shall be a minimum of 250 feet from any dwelling and property line of any residential zone
- Required traffic impact statement containing the following elements:
 - Proposed development description
 - Daily and peak traffic volumes
 - Locations of all accidents reported to the state police within the study area over the last two years
 - Expected traffic generation, including tractor trailer volume
 - Anticipated levels of service for key traffic movements
 - Recommended improvements
 - Truck Routing
- Signage pertaining to anti-idling, directions to truck routes, internal circulation, and contact information for facility representatives
- One truck parking space per every two loading docks
- Five percent of truck parking spaces shall be reserved for outbound trucks in the required layover
- Trucks will not be allowed to idle and charging spaces will be provided
- Truck terminals shall have appropriate amenities for drivers seating, tables, restroom, sinks, stalls, and dispensing machines

Environmental Restrictions

The size and scale of new warehouse development can have profound impacts on the local environment. To mitigate these impacts the following environmental restrictions are recommended:

Woodlands

- No more than 50 percent of trees measuring 6 inches at diameter at breast height (DBH), shall be removed.
- No trees, measuring 6 inches DBH shall be removed, unless clearly necessary to effectuate the proposed development.
- Tree replacement or fee in lieu provisions shall be provided.

Endangered Species

Pennsylvania Natural Diversity Inventory (PNDI) environmental review shall have been completed within two years of the submission of land development.

Riparian and Forest Buffer Areas

- Subject to riparian buffer requirements if within 150 feet of perennial/intermittent river, stream, creek, lake, pond, or reservoir, be they natural or manmade.
- Preserved riparian buffer shall be a minimum of 100 feet on each side of the body of water, subject to more stringent requirements as the slope increases.
- 25 additional feet should be added to the riparian buffer if a nontidal wetland or vernal pond is within the riparian buffer area.

Access and Operations

Logistics uses have a significant impact on adjoining roads and neighboring properties. To contain warehouse operations on the site, the following additions to the zoning ordinance are recommended:

Street Considerations

- Shall be located along an arterial road with a right-of-way of 50 feet and ADT of 5,000 or more.
- Queuing spaces shall be provided internal to the site to prevent stacking into public streets.
- Ten percent of passenger vehicle parking spaces shall be electric vehicle (EV) ready with 5 percent installed with charging facilities.
- Separate access points for passenger vehicles and trucks shall be provided.
- Parking for passenger vehicles and trucks shall comply with existing municipal parking requirements. The BCPC recommends a parking standard based on the number of employees on the largest shift.

Off Street Loading

- One 12-foot by 80-foot off-street loading space for each trucking dock shall be provided.
- Maneuvering for each loading spot shall be completely contained within the site.

Lighting

- Illumination onto residences shall not exceed 0.1 footcandles at the subject property line.
- Illumination onto any other neighboring property shall not exceed 1.0 footcandle.
- Vegetation should not be the primary means to control glare. Glare shall be controlled through baffles, shields and appropriate mountings.
- Luminaries shall not be mounted above 20 feet.

Sensitive Receptors

Regulations for developments adjacent to sensitive receptors include:

- Drive aisles shall be oriented away from sensitive receptors.
- Loading docks, truck entries, and truck aisles shall, whenever feasible, not face sensitive receptors
- For warehouses over 100,000 SF, the loading docks shall be located at a minimum of 300 feet from the sensitive receptor's property line.

Sound

- Sound at property line of a sensitive receptor shall not exceed 60dBA.
- Sound at property line for boundary of any developed property not containing a sensitive receptor shall not exceed 70 dBA.
- Within 30 Days of the start of site operations, the owner/operator of the site shall provide the municipality with an affidavit that includes the following information pertaining to site sound levels:
 - The contact information of the person conducting the test and date, time, duration and weather conditions of when sound measurements occurred.
 - The equipment was used to measure the sound, including documentation of when the equipment was last calibrated.
 - A site map depicting the test locations of sound measurements.
 - Decibel levels measured at each test location.
 - A statement attesting to the accuracy of the information provided.
- The municipality shall reserve the right to require independent verification of sound measurements or request additional measurements on the owners property, including within the property line.

Stormwater Management

The model ordinance gives extensive consideration to using pervious pavement for warehouse and logistics facilities to manage the site's stormwater and promote infiltration. The BCPC recommends adherence to the design and maintenance standards found within the [Pennsylvania Department of Environmental Protection BMP Manual](#), as amended or replaced.