Federal/State/Regional Resources
Legal Limitations
Driver Issues
Technology Advances/Disrupters
Resources – All Modes

Federal – State - Region

- Freight Disruptions
- Freight Policy Studies
- Information by State
- National Statistics and Maps
- Performance Measurements
- Regional and Industry Studies
Freight Data

Network Info (Condition)
Travel Demand & Growth
Employment
Commodity Types and Movements
Forecasts
Travel Time Reliability (CMP)
PA Municipal Planning Code

Typical Land Development Process in Pennsylvania

This flowchart is based on the typical requirements but local ordinances may allow for a varied process.

Notes:
1. A Zoning Permit may be required.
2. If there is no Municipal Planning Ordinance, there may be zoning regulations at the County level.
3. Developer requests a variance of development not in compliance with zoning requirements. A Zoning Hearing Board decision is made; developer can appeal to County Court.
4. If connecting to public water and/or sewer, must receive letter to serve from authorities.
5. If sewage system is an on-site system, septic tank permit approval from Sewage Enforcement Officer is required.
6. Irrigation permit, electrical and mechanical permits may be required in addition to a building permit.
7. If not, if required by a licensed professional.
8. Sewer and water authority must receive inspections of facilities before connection to system.
9. Additional inspections may be required.

Approximate Timeline

[Diagram showing timeline with approximate dates for each step of the development process]
MPC Limitations

All Land Uses Provided For (Multi-Municipal Plans)
Consistency…Not Concurrency
Off-Site Improvements (Transportation Impact Fee/HOP)
Legislation

102’s on 4-Digit SR’s
Motor Carrier Enforcement
Driver Hours

Summary of Hours of Service Regulations

The following table summarizes the HOS regulations for property-carrying and passenger-carrying drivers.

<table>
<thead>
<tr>
<th>HOURS-OF-SERVICE RULES</th>
<th>PROPERTY-CARRYING DRIVERS</th>
<th>PASSENGER-CARRYING DRIVERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-Hour Driving Limit</td>
<td>May drive a maximum of 11 hours after 10 consecutive hours off duty.</td>
<td>May drive a maximum of 10 hours after 8 consecutive hours off duty.</td>
</tr>
<tr>
<td>14-Hour Limit</td>
<td>May not drive beyond the 14th consecutive hour after coming on duty, following 10 consecutive hours off duty. Off-duty time does not extend the 14-hour period.</td>
<td>May not drive after having been on duty for 15 hours, following 8 consecutive hours off duty. Off-duty time is not included in the 15-hour period.</td>
</tr>
<tr>
<td>Rest Breaks</td>
<td>May drive only if 8 hours or less have passed since end of driver’s last off-duty or sleeper berth period of at least 30 minutes. Does not apply to drivers using either of the short-haul exceptions in 395.1(e).[49 CFR 397.5 mandatory “in attendance” time may be included in break if no other duties performed]</td>
<td>60/70-Hour Limit May not drive after 60/70 hours on duty in 7/8 consecutive days.</td>
</tr>
<tr>
<td>60/70-Hour Limit</td>
<td>May not drive after 60/70 hours on duty in 7/8 consecutive days. A driver may restart a 7/8 consecutive day period after taking 34 or more consecutive hours off duty.</td>
<td>Sleeper Berth Provision Drivers using a sleeper berth must take at least 8 hours in the sleeper berth, and may split the sleeper berth time into two periods provided neither is less than 2 hours.</td>
</tr>
</tbody>
</table>
American Transportation Research Institute

Driver Shortage (#1)
Struggle to recruit and retain
ATA estimate shortage of 50,000 drivers
Pay, bonuses, and benefits boosted

Truck Parking (#4 and #5)(Driver #2)
Parking ELD implementation concern
Not able to preplan routes

Figure 1: Distribution of Industry Issue Prioritization Scores

<table>
<thead>
<tr>
<th>2017</th>
<th>Figure 1: Distribution of Industry Issue Prioritization Scores</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Shortage</td>
<td>Most Important</td>
<td>Second Most Important</td>
</tr>
<tr>
<td>Hours-of-Service (HOS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Truck Driving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver Retention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Retention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTHER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver Distraction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driver Health and Wellness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic Logging Device (ELD) Mandate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compliance Safety Accountability (CSA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation Infrastructure/ Congestion/ Funding</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2017

2018
Facility Design

Driver amenities, poor relationships and pay, and ELD concerns among top driver frustrations

Driver Amenities

- Require that showers, food services, sleeping areas, and entertainment and waiting areas are incorporated into facility design.
The Black Swan Theory
Main Aspects of the Theory

- Taleb believes that:
  - The more educated people are, the more likely it is that they incorrectly believe these unpredictable events are uncommon.
  - Information overflow in today's society blind us from relevant data about our life.
  - We don't interpret data accurately and create correlations that are not relevant.
AV Technology

Reduced Accidents (Distracted/Drinking)
Disabled and Elderly Mobility
Congestion
Jobs, Expense, Insurance
Moving & Producing in New Ways

Hyperloop One XP-1

Hyperloop One’s first-generation pod combines a carbon fiber shell around a custom-built levitating chassis. It was designed and built to test and validate autonomous vehicle operations in the full-system DevLoop test track.

AEROSHELL
The aeroshell is made of carbon fiber panels and is used to test a wide variety of interactions within the pod structure. Carbon fiber is lightweight and stronger than steel.

LEVITATING CHASSIS
The levitating chassis is made of structural aluminum and houses the propulsion system and magnets for levitation and guidance. It’s design is similar to a Formula 1 car, as it’s built like the shell, to be lightweight but strong.

DIMENSIONS
- 8.7 m (28.6 ft) long
- 2.7 m (8.9 ft) wide
- 2.4 m (7.9 ft) tall
Jared
LV/CPA BREAKDOWN BY SPACE

Lehigh Valley: Space Use

- Log: 56%
- eComm: 7%
- Mfr: 37%

Central PA: Space Use

- Log: 39%
- eComm: 28%
- Mfr: 33%

Log  eComm  Mfr
WHAT’S HAPPENING IN THE BOX?

- Manufacture chassis and axles for Commercial Truck Plant
- Commercial Furniture Assembly
- Manufacture HVAC components with office HQ
- On Demand Printing operation
- Manufacture corrugated packaging
- Storage/Distribution Tele/Com Equipment & assembly/repair clean room
- Manufacture pet food cans
- Manufacture residential doors
- Manufacture highway message boards
- Assemble HVAC custom filters and distribute
- Testing and packaging automobile batteries
- Admixture pharmacy
- Assemble and repair fire panels/Call Center/Admin office
- Make cleaning systems for the semiconductor industry
- Manufacture valves
- Manufacture conveyor systems
- Manufacture roofs for above ground storage tanks and separator basins
- Storage/Distribution
- E-Commerce Fulfillment
CROSS DOCK BUILDING

- Flexible, multi-tenanted building
- Fulfillment and E-Commerce uses should consider expanded PARKING area capacity
- Common in greenfield areas

<table>
<thead>
<tr>
<th>QUICK FACTS</th>
<th></th>
</tr>
</thead>
</table>
| Depth                | 360'-0" – 620'-0"
| Clear Height         | 32'-0" – 40'-0"
| Docks                | 1/5000 SF      |
| Dock Spacing         | 13'-0" – 13-6" o.c. |
| Column Spacing       | Perpendicular to Loading Wall: 52'-0" – 60'-0"
|                      | Parallel to Loading Wall: 40'-0" – 60'-0"
|                      | (60'-0" at Staging Bay) |
| Trailer Storage      | 1 Trailer per Dock Minimum |
| Office               | 3-7% of Total Building SF |
| Car Parking          | Varies; usually 0.5/1000 SF – 1/1000 SF |
| Notes                | Fulfillment centers or E-commerce Facilities require greater car parking |
SINGLE LOAD BUILDING

- Common, smaller multi-tenant building typology
- Larger office to distribution ratio
- Common in a variety of sites, including both greenfields and urban areas

<table>
<thead>
<tr>
<th>QUICK FACTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth</td>
<td>160'-0&quot; - 310'-0&quot;</td>
</tr>
<tr>
<td>Clear Height</td>
<td>28'-0&quot; - 36'-0&quot;</td>
</tr>
<tr>
<td>Docks</td>
<td>1/3500 SF - 1/6500 SF</td>
</tr>
<tr>
<td></td>
<td>°Front Load: 1/6500 SF - 1/7500 SF</td>
</tr>
<tr>
<td>Dock Spacing</td>
<td>13'-0&quot; - 13-6&quot; oc.</td>
</tr>
<tr>
<td>Column Spacing</td>
<td>Perpendicular to Loading Wall: 52'-0&quot; - 60'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>Parallel to Racking Wall: 40'-0&quot; - 60'-0&quot;</td>
</tr>
<tr>
<td></td>
<td>(60'-0&quot; at Staging Bay)</td>
</tr>
<tr>
<td>Trailer Storage</td>
<td>1 Trailer per Dock Minimum</td>
</tr>
<tr>
<td>Office</td>
<td>5-7% of Total Building SF</td>
</tr>
<tr>
<td>Car Parking</td>
<td>Varies; usually 0.5/1000 SF - 1/1000 SF</td>
</tr>
<tr>
<td>Notes</td>
<td>In Front Loading Buildings, locating the offices along the dock wall reduces dock efficiency</td>
</tr>
</tbody>
</table>
MAXIMIZING PALLETS PER TRUCK
DOMINO EFFECT OF THE PALLET DESIGN
FORM FOLLOWS FUNCTION
BUILDING CLEAR HEIGHT

32'-0" CLEAR HEIGHT

36'-0" CLEAR HEIGHT

40'-0" CLEAR HEIGHT
## SITE LAYOUT AND DIMENSIONS

### QUICK FACTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal Single Dock Apron and Trailer Storage</td>
<td>190'-0&quot; – 195'-0&quot;</td>
</tr>
<tr>
<td>Truck Court Depth</td>
<td></td>
</tr>
<tr>
<td>Optimal Entry Road Width</td>
<td>40'-0&quot;</td>
</tr>
<tr>
<td>Optimal Internal Roadways</td>
<td>30'-0&quot;</td>
</tr>
</tbody>
</table>

### Other Considerations
- Queuing
- Stacking Depths
- Guardhouses
- Dock Door Spacing
LAYOUT CONSIDERATIONS

OPTIMAL LAYOUT
COUNTER-CLOCKWISE SITE FLOW

PRCS
- Separated car and truck traffic
- Counter-clockwise site flow increases overall facility efficiency

REFER TO “OPTIMAL SITE DIMENSIONS” DIAGRAM
HAZLETON LOGISTICS PARK

1,202,320 SF AVAILABLE

EXPANDABLE TO:
1,422,500 SF
ON 90 ACRES

210,180 SF FUTURE EXPANSION

Future Trailer Storage

10,000 SF Office

100,000 SF Warehouse

133 Trailer Parking Spaces

30 Truck Access Roads

Chain Link Fence

13 Truck Access Roads
Sara
Planning for and Reacting to Warehouse Development.

Lessons Learned

Concerns, approaches and solutions from Lower Macungie Township
Master Plan approach

• 500 ± acre site approved for 6 warehouse pads on a private street.
• Sufficient turnaround at the end of a long cul-de-sac was designed.
Master Plan, Liberty II
Trucks Backing onto Township or State Roads

- Private street with loop cul-de-sac
- Emergency access required
Trucks Parking on local roads, blocking visual access for driveways and congesting the street.

- Parking areas required for truck and driver layovers
  - Feature a drivers lounge
  - Add electric hookups to prevent idling
  - Gate set back from entrance to permit sufficient stacking and prevent backing up waiting trucks on the streets
Truck parking court with door access for lounges
Mixing of delivery and loading with employee and visitor parking

- Loop road added to separate visitor and employee parking
Plan for transit or drop off at facilities

• Bus stop locations coordinated with LANTA at the design stage
• Bus stops connected to the buildings and building entrances with sidewalks
• Road frontage contains sidewalks and street trees for comfortable and safe pedestrian access.
Large buildings are unsightly and out of scale

- Work with site grading to lower the building pad
- Visual simulation of views from major roads and homes was performed
- Large berms with 3:1 slopes required to screen sensitive view sheds.
- Landscaping is layered including the top of the slope and sides
Landscaped berms to screen from nearby development
Lighting can be Intrusive

• Required downlighting/dark sky compliant fixtures
• Timing of lights to be tied to the work hours with only safety lighting overnight
• Landscaping perimeter of truck courts
• Shade trees required in employee parking areas
Look for opportunities that benefit the community and look long term

- Tie into rail siding for future use
- Locate trails for employees and benefit the community
- Landscape sustainably – native plants, naturalized areas reduce maintenance.
- Storm water can be an amenity, opportunity to reproduce natural wetlands or provide entry statement (don’t design to hide behind a fence)
1 mile trail along Little Lehigh Creek
Trucks on Local and Rural Roads

- Limit turning movements out of the facility with “pork chop” island and signage prohibiting turns and directing trucks to the appropriate route.
- Post signs in the facilities instructing drivers on the appropriate route
- Designate truck routes and prohibited streets
- Weight restrictions on bridges
- Enforcement
Directional Signage Examples
Nate
Warehouse/ Logistics & Industrial Ordinance Provisions

Lower Macungie Township
How to Enact Best Practices & Lessons Learned into Zoning Ordinance?

- ADDRESS KNOWN PROBLEMS AND ISSUES
  1. Location and process.
  2. Unwanted off-site parking, idling, resting and other affects.
  3. Minimizing on-lot traffic issues.
  4. Mitigate offsite traffic and charge impact fees accordingly.
  5. Properly screen/ buffer the use to protect abutters.
  6. Offset stormwater impacts of the use on site and design to decrease use’s footprint.
**Location and Process**

- MPC requires allowing for all uses. Define the use and designate where it is appropriate within the community.
- Limit zoning districts where use is allowed that matches adopted plan(s), or area appropriate for use.
- Establish Conditional Use process to ensure hearing and provisions/conditions may be added to a development proposal.
Establishing Amenity Area Requirements:

- Required rest area parking spaces.
  - Set a dedicated 5% of truck parking spaces for rest/ idling to provide parking for legally mandated breaks. Ensure electric hook-ups are available.

- Required lounges with restroom facilities, vending areas, etc.

- Space amenity areas proportionately to size and scale of the facility.

- Require adequate queueing/stacking lanes at entrances to avoid backups onto public streets during delivery or pick-up times.

- Separate passenger vehicle traffic from truck traffic with different entrances, lanes and parking areas. Ensure design avoids mixing traffic.

- Trails on-site to promote recreation and interconnectivity with the community.
Properly Screen and Buffer to Size and Scale of Proposal

- Require 50 foot buffer yards filled with berming, evergreen trees, deciduous and flowering trees, shrubs, bushes, ornamental grasses, etc. to fully shield view of use in close proximity ad at distance.

- Creation of a “Class C Buffer” specifically points designers to visual guide and expectation of Township within ordinance and design guidelines.

- Lighting: Site lighting shall utilize shielding and not produce glare, minimize ambient light, not shine on abutters.
Class C Buffer Standard:

Figure 3C-1 Class C Buffer Plan

NOTE:
TREES ARE SHOWN APPROX. 10 YEARS AFTER PLANTING
Class C Buffer Standard

NOTE:
TREES ARE SHOWN APPROX. 10 YEARS AFTER PLANTING

Figure 3C-2 Class C Buffer Elevation

Class C Buffer
- 1 Evergreen Per 20 Feet
- 1 Canopy Tree Per 50 Feet
- 1 Flowering Tree Per 30 Feet
- 7 Shrubs Per 30 Feet
- 22 Perennials or Tall Grass Per 30 Feet
- 1 Berm Varying 6'-8' in Height
- 3:1 Maximum Slope
Utilizing Adopted Design Guidelines to Influence Final Product

Figure 8A - ORLIC Uses and Light Industrial Uses
Utilizing Adopted Design Guidelines to Influence Final Product

Figure 8B - Warehouses
Enhanced Stormwater Management Requirements to Minimize Impact.

- Naturalization of all management features:
  - Basins with natural grass and flower plantings.
  - Irrigation areas with natural grass and flower plantings.
  - Vegetated swales with seed and tree/shrub plantings.
- Mixing of grasses/seeds as opposed to regular lawn grass:
  - Pollinator garden areas.
  - Diverse ground cover.
  - Habitat area.
Examples of Naturalization:

Photos courtesy of The Wildlands Conservancy
Examples of Naturalization:

Photo courtesy of The Wildlands Conservancy
Examples of Naturalization:

Photo courtesy of The Wildlands Conservancy
Coming Attractions

Automated and Rack Supported Warehouses
What is an automated warehouse?

- Use of robots and automated guided vehicles to retrieve and store products to maximize warehouse space.
- Reduced need for wide aisles to accommodate large pallets and pallet jacks and workers.
- Quicker retrieval and storage
- Compliments or replaces warehouse workers
Moving and storing with automation
What is a rack supported warehouse?

- Racking acts as the **structural support** for the walls and the weight of ceiling of the facility while still providing storage.

- Flexible application: installed inside or in addition to an existing warehouse or designed and built as an exterior structure.

- Combines construction and warehouse storage in one system with no need for columns that interrupt the interior space.

- Typically uses automated and semi-automated systems for inventory handling.
Ideal Applications

- Freezer or cooler exterior structures
- Maintenance shops
- Climate controlled storage warehouse
- Drive-thru building materials storage
- High-density dry storage
- Lumber storage
Planning Implications:

- **Traffic and Road Suitability:**
- High volume of materials and greater sorting speed = higher volume of truck traffic
- ITE classifications have been revised to include more than one warehouse type:
ITE classifications have been revised:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Unit of Measure</th>
<th>Trips per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>General Light Industrial</td>
<td>1,000 SQ GFA</td>
<td>0.63</td>
</tr>
<tr>
<td>130</td>
<td>Industrial Park</td>
<td>1,000 SQ GFA</td>
<td>0.40</td>
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<tr>
<td>140</td>
<td>Manufacturing</td>
<td>1,000 SQ GFA</td>
<td>0.67</td>
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<tr>
<td>150</td>
<td>Warehousing</td>
<td>1,000 SQ GFA</td>
<td>0.19</td>
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<tr>
<td>151</td>
<td>Mini-Warehouse</td>
<td>1,000 SQ GFA</td>
<td>0.17</td>
</tr>
<tr>
<td>154</td>
<td>High-Cube Transload &amp; Short-Term Storage Warehouse</td>
<td>1,000 SQ GFA</td>
<td>0.1</td>
</tr>
<tr>
<td>155</td>
<td>High-Cube Fulfillment Warehouse</td>
<td>1,000 SQ GFA</td>
<td>1.37</td>
</tr>
<tr>
<td>156</td>
<td>High-Cube Parcel Hub Warehouse</td>
<td>1,000 SQ GFA</td>
<td>0.64</td>
</tr>
<tr>
<td>157</td>
<td>High-Cube Cold Storage Warehouse</td>
<td>1,000 SQ GFA</td>
<td>0.12</td>
</tr>
</tbody>
</table>

*GFA  Ground floor area
Planning Implications

- **Economic:**
  - Use of automation can mean less employment
  - Vertical warehouse can have a smaller footprint, use a smaller site

- **Scale and Visual Impact:**
  - Racked buildings height requests may be higher than 100 feet.
  - Typical Zoning regulates building coverage, as does the ITE, not volume.
  - Bulk requirements, increased setbacks, enhanced buffering and Visual Impact Analysis are appropriate tools to mitigating potential visual impacts and scale incompatibility.
Thank you!!!

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