LVTS TECHNICAL COMMITTEE MEETING
Wednesday, November 4, 2020 at 9:00 a.m.
LVPC Virtual Meeting Agenda

Roll Call

Courtesy of the Floor

Minutes

1. ACTION ITEM: Technical Committee approval of LVTS Joint Technical and Coordinating Committee Meeting Minutes of October 7, 2020 (see page 2)

Old Business

1. PennDOT District Transportation Bridge Status Report (SV) (see page 11)
2. PennDOT TIP Administrative Actions (JR) (see page 16)
3. FAST Act Continuing Resolution Update (CD)

New Business

1. WORK PLAN ITEM: Draft High Cube and Automated Warehouse Community Guide (SS, JS, BH, CD, BB) (see page 17)
2. Statewide Freight Forum (BB) (see page 45)
3. DCNR’s Community Conservation Partnerships Program: Jordan Creek Greenway Trail Grant Announcement (CD)

Communication + Correspondence

1. PennDOT Virtual Innovation Week (BH)
2. America Walks: Community Change Grants (CD)

Public Engagement and Participation:

1. Local Technical Assistance Program (LTAP) – Virtual Classes
   a. Registration can be found at: https://gis.penndot.gov/ltap/
      i. Introduction to Traffic Studies – November 24

Adjourn

Next Committee Meetings via Microsoft Teams
WorkshopLV: Multimodal (Multimodal Working Group), December 16, 2020 @ 3:00 PM
LVTS Technical and Coordinating, December 2, 2020 @ 9:00 AM
WorkshopLV: Freight (Freight Advisory Committee), December 2, 2020 @ 10:00 AM
Prior to the meeting being called to order, Mr. Doyle stated that the agenda and materials for this meeting were posted on the LVPC website. He provided directions on how to participate in the virtual meeting and the protocol to allow the meeting to flow smoothly. Mr. Doyle also mentioned that this meeting was advertised in the Morning Call on October 2, 2020, as well as the LVPC website and social media outlets. He explained the procedure for public participants to ask questions or make comments. Ms. Bradley reviewed the meeting agenda.

Mr. Rebert welcomed the members and the public participants. He then called the meeting to order and asked Ms. Bradley to take attendance.

**Attendees:**

LVTS Technical Committee
- City of Allentown
  - Leonard Lightner (Alt)
- City of Bethlehem
  - Darlene Heller (Alt)
- City of Easton
  - Dave Hopkins (Alt)
- LANta
  - Brendan Cotter
- LNAA
  - Ryan Meyer
- LVPC
  - Becky Bradley
- PennDOT Central Office
  - James Mosca
- PennDOT District 5
  - Chris Kufro

LVTS Coordinating Committee
- City of Allentown
  - Craig Messinger (Alt)
- City of Bethlehem
  - Michael Alkhal (Alt)
- City of Easton
  - Dave Hopkins (Alt)
- LANta
  - Owen O’Neill
- Lehigh County
  - Rick Molchany (Alt)
- LNAA
  - Tom Stoudt
- LVPC
  - Becky Bradley
- Northampton County
  - Michael Emili (Alt)
- PennDOT Central Office
  - Brian Hare
- PennDOT District 5
  - Michael Rebert

LVPC Staff Participants
- Matt Assad
- Charles Doyle
- Carol Halper
- Brian Hite
Mr. Rebert asked members of the public to state their names.

**Public Participants**
David Alas, Rick Ames, Megan Beste, Jennifer Crobak, Ralph Eberhart, Amanda Leindecker, Jeff Rai, Jen Ruth, Kim Schaffer, Scott Slingerland and Matt Szuchyt

**Courtesy of the Floor**

Mr. Rebert opened the floor to the public participants who wished to comment or ask questions about an issue not on the agenda. Hearing none, he moved on to the minutes.

**Minutes**

Mr. Kufro stated that the minutes from the September 2, 2020 LVTS Technical Committee Meeting were in the packet. Mr. Kufro asked for a motion to approve the minutes. Mr. Cotter made a motion and Mr. Meyer seconded it. Mr. Kufro asked if there were any questions or comments; hearing none, he asked Ms. Bradley for an abbreviated roll call vote. Before the roll call vote, Ms. Bradley read the results of the roll call votes from the September 2, 2020 meeting, then conducted an abbreviated roll call. The minutes were unanimously approved.

Mr. Rebert stated that the minutes from July 15, 2020 LVTS Joint Technical and Coordinating Committee Meeting were in the packet. Mr. Rebert asked for a motion to approve the minutes. Mr. Molchany made a motion to approve the minutes, with a second from Mr. O’Neill. Mr. Rebert asked if there were any questions or comments. Hearing none, he asked Ms. Bradley for an abbreviated roll call vote. Ms. Bradley read the roll call votes from the July 15, 2020 meeting, then conducted an abbreviated roll call. The minutes were unanimously approved.

**Old Business**

**PennDOT District 5 Highway Status Report**
Mr. Kufro reviewed the Highway Status Report with the Committees. He asked if there were any questions or comments from the voting members or from the public participants. No comments or questions were posed.

**PennDOT District 5-0 Transportation Improvement Program Modifications**
Ms. Ruth stated that since the July 15, 2020 Technical and Coordinating Committee Meeting, there were thirty-one District 5-0 Actions, one Statewide Administration Action and two Amendments. Ms. Rebert stated that on August 18, 2020, the members of the Technical and Coordinating Committees received an email ballot request for two TIP Amendments, the first for the 309 Tilghman Street Final Design Amendment and the second for the Hill to Hill Bridge Preliminary Engineering Amendment. These Amendments were previously voted upon and motioned for approval, with no actions required at this time.

**Traffic Counts and COVID-19 Impacts**
Mr. Hite reviewed the impacts COVID-19 and Tropical Isaias on traffic counts. The report indicated that traffic levels have steadily returned to pre-pandemic conditions, with truck traffic numbers being higher than pre-pandemic levels.
State Transportation Improvement Program Status Update
Mr. Hare reported that the State Transportation Improvement Program was adopted by the State Transportation Commission.

New Business

PennDOT Temporary Personnel Reassignments
Mr. Rebert reported that he has been temporarily reassigned as District Executive to District 6. This reassignment should last about nine months; therefore, he will have to resign as the Chair of the LVTS Coordinating Committee. The LVTS Bylaws require that the floor be open for nominations. At this point, Mr. Rebert nominated Mr. Kufro, who will serve as the acting District 5-0 Executive, for the position of Chair of the Coordinating Committee. Mr. Kufro stated that if he is selected, this would leave the chairmanship of the Technical Committee open and that he would like to nominate Mr. Cotter as Chair of the Technical Committee and Mr. Mosca to fill the opening as Vice-Chair.

Ms. Bradley reviewed the current officers of both committees. Starting with coordinating Committee, Ms. Bradley reiterated that Mr. Rebert nominated Mr. Kufro as Chair. Mr. Molchany seconded the nomination. Mr. Kufro accepted the nomination. Mr. Rebert asked if there were any other nominations; there were none. The motion passed and Mr. Kufro was named the new Chair of the Coordinating Committee.

Moving on to Technical Committee Chair vacancy, Ms. Bradley reiterated that Mr. Kufro nominated Mr. Cotter as Chair of the Technical Committee. Mr. Hopkins seconded the nominations. Mr. Cotter accepted the nomination. Mr. Rebert asked if there were any other nominations; there were none. The motion passed and Mr. Cotter was named the new Chair of the Technical Committee.

Moving on to Technical Committee Vice Chair vacancy, Ms. Bradley reiterated that Mr. Kufro nominated Mr. Mosca as Vice Chair of the Technical Committee. Mr. Hopkins seconded the nominations. Mr. Mosca accepted the nomination. Mr. Rebert asked if there were any other nominations; there were none. The motion passed and Mr. Mosca was named the new Vice Chair of the Technical Committee.

LANTA Public Transportation Agency Safety Plan
Mr. Cotter presented information on the LANTA Public Transportation Agency Safety Plan, which can be found on page 39 of the October 7 LVTS packet and on the LVPC website. The deadline for this plan is December 31, 2020. Mr. Cotter noted that the plan has to be reviewed on an annual basis. The plan was approved by the LANTA Board of Directors in September.

CARES Act Grant Awards
Mr. Meyer reported on the CARES Act Grant Awards. The Airport Authority received 6.2 million dollars in CARES Act funding back in May. To date, LVIA has received 2.3 million of the granted 6.2 million dollars.

PennDOT Multimodal Transportation Fund Open Application Period
Mr. Doyle reported that in early September, PennDOT announced an opening round for the Multimodal Transportation Fund. Grant applications will be accepted by PennDOT through November 6, 2020. Mr. Doyle explained that this grant is different from the Department of
Community and Economic Development program. Mr. Doyle also noted that while the LVPC and LVTS encourage application to these grants, as an organization the LVPC is prohibited from sponsoring or directly support grant proposals due to the staff’s affiliation with the LVTS MPO. Mr. Doyle concluded with a review of applicant requirements.

Fixing America’s Surface Transportation (FAST) Act Continuing Resolution Update
Ms. Beste, of Congresswoman’s Susan Wild’s office, presented an update on the FAST Act Continuing Resolution. The FAST Act Continuing Resolution has past and gives 13.6 billion dollars to the Highway Trust Fund for another year.

Communication + Correspondence

LANTA Comprehensive Operations Analysis
Mr. Cotter presented information on the LANTA Comprehensive Operations Analysis. As development is building along the Route 33 corridor, LANTA is taking an assessment of their services in Easton and all areas north of the Bethlehem Transportation Center. Community members can make a difference in their communities by filling out the LANTA survey at www.surveymonkey.com/r/Route33COA. The survey will be open through November 1, 2020.

Carol Halper’s Retirement Announcement
Ms. Halper announced her retirement on October 15, 2020. Ms. Halper shared her sentiments with the board members.

Adjournment

Mr. Rebert asked if there was anything for the good of order. Hearing none, he asked for a motion to adjourn. Mr. Molchany made a motion to adjourn.

Submitted by,
Becky Bradley, AICP, LVTS Secretary and
Bethany Vazquez, Program Associate
Joint Technical + Coordinating Committees

October 7, 2020 Meeting

Voice Ballot Due to COVID-19 Pandemic Restricting In-Person Interactions*

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**Joint Technical + Coordinating Committees**

**October 7, 2020 Meeting**

*Voice Ballot Due to COVID-19 Pandemic Restricting In-Person Interactions*

**ACTION 1**

**Technical Committee**

Minutes- September 2, 2020 Meeting

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**Coordinating Committee**

Minutes- July 15, 2020 Joint Meeting

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**Joint Technical + Coordinating Committees**  
**October 7, 2020 Meeting**  
Voice Ballot Due to COVID-19 Pandemic Restricting In-Person Interactions

## ACTION 2

### Technical Committee

**Election of Technical Committee Chair**

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### Coordinating Committee

**Election of Coordinating Committee Chair**

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Joint Technical + Coordinating Committees
October 7, 2020 Meeting
Voice Ballot Due to COVID-19 Pandemic Restricting In-Person Interactions

**Action 3**
Election of Technical Committee Vice-Chair

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**Totals**: 8 10 10
Joint Technical + Coordinating Committees  
October 7, 2020 Meeting  
*Voice Ballot Due to COVID-19 Pandemic Restricting In-Person Interactions*

**ACTION 3**  
Coordinating Committee  
Adjournment

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**ACTION 4**  
Technical Committee  
Adjournment

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SR 33 Bridge Over Bushkill Creek Bridge Replacement Project (I. Nathaniel)
MPMS 96431 – est. let August 18, 2022
- CEE approved April 4, 2020
- Project in final design
- DFV approved April 18, 2020
- H&H approved on September 25, 2020

SR 145 over Jordan Creek Bridge Replacement (C-C. Frey)
MPMS 110076 – est. let April 1, 2026
- Minor Wetland and Watercourse report comments being addressed by design team
- Line & Grade and structure alternatives evaluation remains ongoing

SR 329 over Lehigh River-Cementon Bridge (C-M. McGuire)
MPMS 11413 - est let April 28, 2022
- Right of Way appraisals complete, preparing offer letters
- Utility engineering is ongoing
- Continuing final design coordination including signing and pavement marking plans, traffic control plans, structure foundation designs, and railroad coordination
- Draft lighting agreement is underway

SR 378 Hill to Hill Bridge Rehabilitation over Lehigh River (C-B. Teles)
MPMS 93630 – est. let February 27, 2025
- Finalizing development and evaluation of alternates to be included in final Alternatives Analysis Report.
- Evaluating options for 2nd Street Connection
- Continuing coordination meetings with stakeholders
- Coordination with Norfolk Southern to continue once an alternative has been selected

SR 611 (N. Delaware Drive) over Oughoughton Creek (C-M. Mignella)
MPMS 12084 – est. let February 17, 2022
- Line and Grade approved January 9, 2020
- Phase 1 Environmental Site Assessment approved January 29, 2020
- Historic Resource Survey Form accepted July 2020, Richmond Village determined non-eligible
- TS&L approved May 28, 2020
- BRPA approved July 20, 2020
- SEPS report approved June 16, 2020
- H&H report approved October 2, 2020
- Safety Review submission approved October 2, 2020
- Utility coordination ongoing
- Right of Way plans development ongoing

SR 611 Culvert Replacement (C-E. Berg)
MPMS 110055 – est. let September 14, 2023
- Surveys and Inspections complete
- Line, Grade & Typical Approved May 4, 2020
- H&H and Structure Alternatives on-going
LEHIGH VALLEY TRANSPORTATION STUDY
BRIDGE STATUS REPORT
MEETING NOVEMBER 4, 2020

SR 873 over Lehigh River – Gap Bridge Repairs (C-J. Crawford)
MPMS 107552 - est. let April 1, 2025
- Determination of Effects under District CRP review
- Final Phase I ESA approved August 20, 2020
- TS&L for preventative maintenance project approved September 15, 2020
- Detour route analysis (detour SR 873 southbound traffic for bridge deck work) approved
  October 7, 2020
- Draft 4(f) documents submitted to District Environmental Unit for review October 14, 2020.
  Coordination/review by FHWA, NPS after District review

Race Street (SR 1004) over Lehigh River (C-M. Mignella)
MPMS 108134 – est. let July 28, 2022
- NOITE letters prepared and submitted, survey and environmental field work complete
- Hazardous materials investigation complete
- Deck sounding and concrete deck coring completed in June 2020, cores tested July 2020
- TS&L ongoing, to be submitted October 2020
- Traffic data collection to begin October 2020

Lower South Main St (SR 1015) over Martins Creek (C-M. Mignella)
MPMS 85930 – est. let September 16, 2021
- Hazardous materials investigation complete
- SEPS report approved November 2019
- TS&L approved December 2, 2019
- Safety Review submission approved January 24, 2020
- H&H Report approved August 31, 2020
- Design Field View submitted May 2020, approved pending completion of BRPA
- Virtual public plans display held during June 2020
- USFWS coordination ongoing. Project submittal form for Bog Turtle Programmatic
  Biological Opinion under District review, BRPA to be complete upon USWFS concurrence
- Utility coordination ongoing
- Final Right of Way plans development ongoing

Fifth Street (SR 1029) Bridge Replacement (C-C. Frey)
MPMS 94873 – est. let April 25, 2024
- This structure was removed under the 22-400 project and was originally scoped to be
  replaced under the US 22 Widening project
- Due to funding restraints and region priorities, the design agreement is being supplemented to
  create a standalone project to be completed in advance of US 22 Widening project
- Scoping for standalone project being completed now
- Line, Grade & Typical Section submission expected to be approved in early November 2020

Raubsville Road (SR 2006) over Freys Run (M-Patel)
MPMS 109914– est. let April 14, 2022
- Developed a reduced-scope conceptual alternate alignment using a minimalist approach and
  sent to the District for review, approved on July 10, 2020
- Supplement executed September 25, 2020
- Consultant working on project schedule revision so it will be a new let date
- Consultant working on Preliminary Drainage Design and Design field view submission
Mill Road (SR 2024) over Tributary to Saucon Creek (C-J. Crawford)  
MPMS 81664 - est let March 31, 2022  
- Determination of Effects under District CRP review  
- DFV approved October 1, 2020  
- H&H Pre-Application Meeting with DEP held September 21, 2020. DEP requested additional justification of box culvert alternative, submitted to DEP on October 14, 2020  
- TS&L in for signature, to be signed pending DEP comments at Pre-Application meeting  
- Core borings completed September 8, 2020; Lab testing and structure foundation report underway  
- Final Design Work Order Notice to Proceed August 10, 2020

Powder Valley Road (SR 2025) over Indian Creek (C-J. Crawford)  
MPMS 109237 - est let July 14, 2022  
- Supplement for new two-dimensional hydraulics modeling of the executed September 2020, additional H&H work underway  
- TS&L will be submitted once hydraulic modeling is complete

Indian Trail Road (SR 3016) over Hokendauqua Creek (C-M. Mignella)  
MPMS 12310 – est. let September 16, 2021  
- Hazardous materials investigation complete, Phase 1 ESA approved November 2019  
- SEPS report approved September 2020  
- TS&L approved May 28, 2020  
- H&H Report approved August 21, 2020  
- Safety Review submission approved January 29, 2020  
- Virtual public plans display held during June 2020  
- BRPA approved July 27, 2020  
- Utility coordination ongoing  
- Design Field View submission under review  
- Final Right of Way plans development ongoing

Howertown Road (SR 3017) Bridge (I. Nathaniel)  
MPMS 105371 – est. let October 20, 2022  
- CEE approved April 16, 2020  
- Project in Final Design  
- H&H approved on August 6, 2020  
- Pre-App meeting held on September 21, 2020

Old Carriage Road (SR 3018) Bridge Replacement over Catasauqua Creek (C-J. Crawford)  
MPMS 110058- est let February 16, 2023  
- H&H and TS&L design ongoing  
- Section 106 finding completed August 17, 2020  
- Safety Review study submitted for approval on October 20, 2020

Newburg Road (SR 3020) over Trib Monocacy Creek (C-E. Berg)  
MPMS 85940 - est let April 13, 2023  
- Wetlands/Phase 1 Bog Turtle completed on March 24, 2020  
- LGTS approved on April 29, 2020  
- Preliminary MPT submission approved May 14, 2020  
- SEPS Approved August 26, 2020  
- Core Boring Contract Approved October 7, 2020  
- H&H and TS&L design ongoing
LEHIGH VALLEY TRANSPORTATION STUDY
BRIDGE STATUS REPORT
MEETING NOVEMBER 4, 2020

Kernsville Road (SR 4003) Bridge over Jordan Creek (C-J. Crawford)
MPMS 89627 - est. let April 13, 2023
- Detour route analysis comments from the District Traffic Unit are being addressed
- Safety review and TS&L design ongoing
- End of review period for the impact/limit of disturbance allowed the Section 106 finding to be completed September 1, 2020
- Phase 1 Bog Turtle survey submitted September 17, 2020, to be submitted to USFWS

Meadows Road (SR 7210) Bridge (C-M. McGuire)
MPMS 12286 - est. let April 1, 2026
- A draft alternatives analysis was reviewed by the District in early October
- The designer is working to finalize the alternatives analysis now, which includes rehabilitation, replacement, and removal with cul-de-sacs
- Upon approved by the Department, the alternatives analysis report will go to FHWA, the County and other local stakeholders for their review

South Walnut Street (SR 7408) Bridge over Trout Creek (C-J. Besz)
MPMS 94680 – est. let December 7, 2023
- Contribution Agreement for transfer of the multi-modal funds to PennDOT is awaiting approval and execution
- Supplemental field survey is ongoing
- Traffic counts are complete, data processing is ongoing
- Deed research and assembly of the expanded deed mosaic is ongoing
- Conceptual Line, Grade and Typical Section approval was approved as noted, submission of the formal Line, Grade and Typical Section is pending completion of the traffic analysis to determine the need for a turning lane on the bridge
- Preparation of the Determination of Effects Report is ongoing
- A conference call was held on October 3, 2020 to discuss the progress of the Section 106 and Section 4f activities and establish the schedule moving forward
# LEHIGH VALLEY TRANSPORTATION STUDY
## BRIDGE STATUS REPORT
### MEETING NOVEMBER 4, 2020

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# LVTS Metropolitan Planning Organization

**FISCAL CONSTRAINT TABLE**

**FFY 2021-2024 TIP Highway and Bridge Element**

**Technical Committee**

MPO Coord Meeting: December 2, 2020

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**Administrative Action #2 | Fund Type | FFY 2021 | FFY 2022 | FFY 2023 | FFY 2024 | FFYs 2025-2028 and Beyond | Remarks |
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<td>512 - 04S</td>
<td>Adjust</td>
<td>CAQ</td>
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<td>(15,450)</td>
<td>(15,450)</td>
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</tr>
<tr>
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<td>STU</td>
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<td>15,450</td>
<td>15,450</td>
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<td>Before</td>
<td>CAQ</td>
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<td>15,450</td>
<td>15,450</td>
<td>15,450</td>
<td>Add STU funds to release CAQ to fully fund PE.</td>
</tr>
<tr>
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<td>Adjust</td>
<td>CAQ</td>
<td>(15,450)</td>
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<tr>
<td>Northampton County</td>
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<td>STU</td>
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<td>15,450</td>
<td></td>
</tr>
</tbody>
</table>

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**Notes:**

- Add STU funds to release CAQ to fully fund PE.
- Deobligation returned to region for reallocation.
- Phase was flipped to federal funds and obligated off the 2019 TIP.
- Flip from 581 to 185 funds. Increase to match negotiated agreement amount plus internal costs.
- Balancing source to maintain fiscal constraint.
- Actions do not affect the project delivery schedules or air quality conformity.
COMMUNITY GUIDE

High Cube and Automated Warehousing

Draft: October 26, 2020
This document serves as guidance to Lehigh and Northampton counties, the 62 municipalities of the Lehigh Valley, developers and community members, all of which have a vested interest in the impacts of high cube and automated warehousing on the health and well-being of the region. The LVPC is committed to supporting municipal governments and building collaboration between public and private partners to ensure the region’s continued sustainability and resilience.

This document has been financed in part through funding from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(f)] of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

This document is available in other formats upon request, in accordance with applicable state and federal laws. The LVPC will provide translation or interpretation services upon request. For more information, please call the LVPC at 610-264-4544.
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In July 2017, Coca-Cola opened this 19-story, fully automated cold storage warehouse in Singapore. The built-in automation moves products nearly three times faster than traditional warehouses while using half of the land area. This international trend has the potential to bring positive and negative impacts to the Lehigh Valley.
Introduction

High Cube and Automated Warehousing

As the growth of e-commerce and one-day delivery makes the Lehigh Valley one of the fastest-growing freight corridors in the nation, companies are increasingly looking for ways to move goods through the region more efficiently. High cube and automated warehouses are the latest trend that carries the potential to bring positive and negative impacts to the region. This shift in how warehouses operate will push the limits of local codes and regulations and require careful consideration by municipal governments. However, there are several steps municipalities can take to better manage the location, size and look of this emerging development trend.

What is High Cube and Automated Warehousing?

High cube and automated warehouses are differentiated from traditional warehouses because of their height, which to date, have been proposed up to 180 feet tall. They are highly automated, with newer warehouses being built for specific uses utilizing rack systems that also serve as the building’s structure. The rack system is then wrapped with a metal skin that serves as the building’s walls.

These tall structures typically integrate Automated Storage and Retrieval Systems (ASRS) to maximize storage space availability, and for the processing of goods in a more efficient manner than traditional human-manipulated storage movement systems. The intricate racking system increases the efficiency of goods moving into and out of these warehouses, with faster turnaround times for trucks, theoretically reducing the time a driver needs to stage or park.
Potential Impacts

High cube and automated warehouses enable freight and distribution businesses to build massive warehouses that are as much as eight times the height of other warehouses in the region. By allowing companies to build higher, these automated structures need less physical land to develop, with their intricate racking systems moving both products and the trucks that deliver to them through the site more quickly. Less land being developed is potentially a positive outcome, leading to reduced pressure on farmland and open space. Increased efficiency within the warehousing industry is also likely to lead to increased economic productivity.

This emerging land use also has the potential for tremendous adverse impacts on the local and surrounding communities. Their high-tech automation means fewer jobs are created at the facility. Their height means drastic changes to landscapes in communities that have no other structures higher than three or four stories. These communities often do not have the emergency management service infrastructure necessary to serve structures of this scale, posing a threat to the public health, safety and welfare. While the efficiency of these facilities likely increases freight trips in and out of the site, the real impacts on traffic, and on the road and bridge infrastructure are not fully known because examples are not yet available to accurately assess trip generation. These factors will require proactive measures by municipal governments.

### Potential Effects of High Cube and Automated Warehouses

<table>
<thead>
<tr>
<th>Possible Positive Outcomes</th>
<th>Possible Negative Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development type may need less land per facility</td>
<td>Increased emergency management needs</td>
</tr>
<tr>
<td>Reduction of energy used for operations</td>
<td>Increased freight traffic</td>
</tr>
<tr>
<td>Reduction of customer wait times for goods</td>
<td>Increased wear and tear on roads and bridges</td>
</tr>
<tr>
<td>Reduction of customer returns and damage losses</td>
<td>Fewer jobs</td>
</tr>
<tr>
<td>May be located where adequate infrastructure exists to support development</td>
<td>Potential increased demand for broadband, electric, gas, water, and stormwater and sewer services</td>
</tr>
<tr>
<td>May include green and renewable infrastructure to offset environmental impacts of development</td>
<td>Decreased air quality due to freight traffic increases and truck idling</td>
</tr>
<tr>
<td>Compatible design may improve community skyline</td>
<td>Incompatible design could substantially harm community skyline</td>
</tr>
</tbody>
</table>
Locally, these vertical structures are being proposed for refrigerated and frozen storage and computer and electronics warehousing because their height allows them to be more energy efficient, reduce labor and product damage costs, and increase order accuracy and customer service. This design is also being proposed nationally and internationally for other types of warehousing, including dry goods and retail commodities.

Simultaneously with the development of new high cube warehouse facilities, traditional existing warehouses are redeveloping and retrofitting for automation as well. In these cases, the density of goods stored increases, potential for freight vehicle trips grows and the job roles for employees shift and decline.

With this increase in high cube warehousing and deployment of automated storage and retrieval systems, the Lehigh Valley’s industrial economy has entered into its second phase of the 4th Industrial Revolution.

New construction of high cube and automated warehouses utilize the tall, intricate racking system for two purposes. The racks increase the efficiency of goods moving into and out of the warehouses, and serve as the building’s support structure, before being wrapped in a metal covering that acts as the building’s exterior walls. The racking system encompasses the entirety of the building’s height. The completed building photo below offers a glimpse of comparison to the height of a traditional warehouse. Traditional warehouses, found broadly throughout the Lehigh Valley, typically don’t exceed 50 feet, but the bottom photo shows how the 130-foot-tall building dwarfs the tractor-trailers at the first-floor bays.

The 130-foot-tall Americold Automated Storage and Retrieval System under construction in Rochelle, Illinois (above) and completed (below). Photos courtesy of Griffco Design/Build, Inc.
Local Examples

Upper Macungie (Americold) Zoning Ordinance Amendment
- Original ordinance proposal would allow for buildings up to 140 feet in height.
- Ahead of the proposed ordinance amendment, the Upper Macungie Zoning Hearing Board allowed for a height variance up to 140 feet. The Upper Macungie Board of Supervisors appealed the decision and a Lehigh County Court judge overturned the zoning hearing board decision.

Upper Mount Bethel Township Proposed Ordinance Amendments
- Ordinance proposal would allow for building heights of 100 feet by right, and 110 feet with conditional use approval.

Hanover Township (LC) Rockefeller Industrial Lot 5A Land Development Plan
- Plans propose a 50-foot-tall automated building.
Municipal Considerations

High cube and automated warehousing brings numerous implications that should be considered and planned for by local leaders in response to changing landscapes, safety and quality of life impacts. These considerations stem from the height of these development types, impacts on the workforce, reuse potential, transportation, water, sewer and stormwater system impacts and emergency services implications. Therefore, municipal considerations are wide-ranging, from traffic and transportation, to land use and zoning, to fire and police services.

As municipalities consider the most appropriate ways to address these uses between zoning, subdivision and land development or building code regulations, it's important to understand the three distinct manners in which they may emerge:

- **New construction, or greenfield development**, involves the construction of a facility at an undeveloped new location. In this situation, municipal regulatory controls are likely to have the greatest impact because zoning, land development and building codes all apply.

- **Redevelopment** is when a building or developed site is changed. Modifications are generally considered substantial when 50% or more of the building(s) and/or site are changed. This covers everything from a tower or major addition to an existing building, a large industrial use change that would markedly increase traffic but may not alter the structure of the existing building, or a complete removal of existing structures to build new. Municipal control in redevelopment will depend on the scale and extent of which a building and/or site is redeveloped. Zoning and building codes review will apply in all cases, however in major redevelopments local land development regulations should also apply.

- **Retrofit** of a facility for automated uses includes retention of the existing building and site, with interior renovations to accommodate the new use. Essentially, no volume changes to the existing building are proposed and alterations are largely, if not exclusively, internal. In these cases, municipal regulatory options are limited, with building codes likely the only management tool available, though there may be exceptions depending on the use categories defined in the zoning ordinance.

Volume is a vital consideration in high cube and automated warehousing because instead of the traditional model of storing goods on the ground floor, nearly all of the space within a high cube building is used for goods storage. While a 24-foot traditional warehouse is often shorter than a typical three-story home, a 100-foot high cube warehouse rivals the nine or ten stories found in Allentown’s Lehigh County Courthouse or Easton’s Alpha Building.

This 3D graphic illustrates the same 4.8 million cubic volume of space allocated in a high cube versus a traditional warehouse. The traditional warehouse is 200,000 square feet with a 24-foot ceiling height common in the Lehigh Valley, built over 4.6 acres of land, while the footprint of a 100-foot ceiling height high cube fits on 1.1 acre of land.
Municipal governments can be challenged in determining which rules and regulations apply as a result of the variety and scale of high cube and automated warehousing. It is easiest to think about the volume of a development as a measure of its impact on the community.

**Zoning Ordinance**

- **New construction**: Requires zoning approval for appropriately locating the land use within a community and on the property itself.

- **Redevelopment**: Standards for zoning districts must be met, although a comprehensive review of the proposal in consideration of all standards within the zoning ordinance may only be required when a substantial change to the site is proposed, such as a change to the building footprint or land use. For example, the Americold cold storage facility in Upper Macungie Township is pre-existing, therefore, increasing the height scale of that existing use above the locally allowable limit has triggered a zoning review and subsequent height variance request.

- **Retrofit**: Least likely to trigger a zoning review, unless there are significant site improvements proposed simultaneously, because the use and building footprint are not typically changing. Though substantial changes in water, sewer, stormwater, electric, gas, transportation and emergency management services needs may require other reviews and permits beyond zoning. Specifically defining High Cube and Automated Warehouses in the zoning ordinance is extremely important here. A retrofit that changes the defined use of a facility will trigger a zoning review and enable the municipality to better assess the impacts of the proposal on the community.

In any of the three potential development scenarios, the land use must be permissible in the zoning district in which it is proposed. In all cases, a project cannot exceed maximum lot or building provisions standards outlined for the applicable zoning district.

**Subdivision and Land Development Ordinance**

- **New construction**: New developments require a subdivision and land development plan, enabling a community to more comprehensively assess impacts of the proposal. The provisions of the municipal subdivision and land development ordinance are applicable for new projects, including general impact and improvements provisions. The Pennsylvania Municipalities Planning Code specifically requires that, at a minimum, development plans outline “any subdivision, all covenants relating to use, location and bulk of buildings and other structures, intensity of use or density of development, streets, ways and parking facilities, common open space and public facilities.” [Act of 1968, P.L.805, No.247 as reenacted and amended, Article 1§107. Definitions].

- **Redevelopment**: The municipal subdivision and land development ordinance typically only applies if the proposal substantially changes the site or the building. Again, the Pennsylvania Municipalities Planning Code gives broad power to the municipal government to decide whether to process a redevelopment plan as a retrofit or a development proposal. Specifically, the state law broadly outlines:

  "(1) The improvement of one lot or two or more contiguous lots, tracts or parcels of land for any purpose involving:
  
  (i) a group of two or more residential or non-residential buildings, whether proposed initially or cumulatively, or a single non-residential building on a lot or lots regardless of the number of occupants or tenure; or
  
  (ii) the division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups or other features." [Act of 1968, P.L.805, No.247 as reenacted and amended, Article 1§107. Definitions].

- **Retrofit**: May or may not require a land development plan based on the intensity, timing, character and cumulative nature of what is being proposed.
This table provides a quick reference for which municipal tools are most applicable to each development scenario:

### Local Regulatory Authority: What Tools Apply and Where

<table>
<thead>
<tr>
<th>Development Type</th>
<th>Zoning Ordinance</th>
<th>Subdivision and Land Development Ordinance</th>
<th>Building Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Construction</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Redevelopment</td>
<td>Situational</td>
<td>Situational</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>• Change of use</td>
<td>• Over 50% change to building or site</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Site improvement qualifying as land development (as defined by the MPC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retrofit</td>
<td>Situational</td>
<td>Unlikely</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>• Change of use</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Building Codes

In cases of redevelopment and retrofit where only building codes apply, municipalities should establish a process by which they can adequately determine the same use-related information that would otherwise be provided in a zoning or subdivision and land development review. The Pennsylvania Universal Construction Code is a statewide standard, applicable in all development scenarios that a municipality cannot supersede. However, the building code review process contains opportunities to implement alternative tools to help assess impacts of a development. An assessment form, for example, may provide a municipality with information relating to impacts to emergency services, transportation infrastructure, the economy and the environment.
Land Use and Zoning Implications

Municipalities and the development community should work together to identify and address the potential impacts of high cube and automated warehousing, as municipalities amend their zoning ordinances and subdivision and land development ordinances to reflect these emerging and rapidly evolving uses. High cube and automated warehousing can happen anywhere, from new construction on former agricultural fields, to redevelopment of existing retail properties, to retrofit of existing buildings. When evaluating these different development approaches, municipalities should consider the tools at their disposal in the form of zoning ordinances, subdivision and land development ordinances, and building codes, that can assist in planning for an increase in these uses, while mitigating adverse community impacts.

The following sections provide specific considerations for communities when assessing potential impacts—positive, negative or neutral—of high cube and automated warehousing:

**Permitting and Review/Approval Process**

Municipalities looking to regulate high cube and automated warehousing in their zoning ordinances should consider a number of zoning specific factors, including refining industrial use types, as high cube and automated warehousing uses require specific definitions and regulations.

**Zoning Districts**

Zoning district locations are critically important for matching the intensity of land use with locations that minimize impacts and provide the best outcomes for municipalities. Generally, locating these uses in existing industrial parks and in urban areas with proximity to major arterial roads and highways will mitigate conflicts between area residents and commercial vehicles. Municipalities must balance their needs between matching building form and scale, to matching transportation demands, to appropriate infrastructure. Locating a high cube or automated warehouse in an urban area with similar building heights may be appropriate for the landscape, but traffic generated by the use may also be detrimental to the street network. Conversely, matching the use and scale of development to appropriate infrastructure may result in an inconsistent building form if there are no existing buildings of the same scale.

**Special Exceptions and Conditional Use**

Municipalities should consider allowing these as special exceptions or conditional uses, rather than uses permitted by right, to allow thorough understanding of project specifics and resulting impacts of the proposed use.

> “Special exceptions and conditional uses are usually reserved for those land uses that will have a significant impact on the zoning district or the whole community, or for those uses that necessitate additional safeguards. Common examples of such uses include, but are not limited to, landfills, warehouse and distribution facilities, telecommunications towers, etc. These additional safeguards take the form of specific standards and criteria stated in the zoning ordinance. The applicant for a special exception or conditional use must demonstrate compliance with the specific standards and criteria stated in the zoning ordinance.”
> - Pennsylvania Department of Community and Economic Development, Planning Series 07

Municipalities should position themselves for developing the best projects in the interest of their community by periodically reviewing and amending ordinances to reflect modern or emerging development trends like high cube and automated warehouses. Subdivision and land development ordinance amendments should be made to require an impact analysis for these specific types of uses. Analyses should consider not only traffic impacts but economic impacts, such as job creation, as well as environmental impacts, including but not limited to viewed analysis and environmental impact statements. Studies of this nature allow communities to make more informed decisions on land development proposals, especially related to public safety.
Sketch Plans

One tool used to facilitate conversations between a municipality and developer is a sketch plan. A sketch plan submittal and review requirement is designed to provide developers an opportunity to informally discuss project intentions with municipalities. The plan is reviewed for general scope and layout, conformity with applicable municipal requirements and the local comprehensive plan, as well as for conditions which might affect the implementation of the development. Incorporating a sketch plan requirement in the subdivision and land development ordinance will enable public and private collaboration to ensure the project is designed to fit the fabric of a community, while also respecting property rights. Municipalities may also choose to require that the sketch plan be reviewed by the LVPC. This is recommended, as it allows for review of consistency with FutureLV: The Regional Plan, and provides an opportunity for a municipality to receive additional recommendations for improving upon the proposal.

Amending both the zoning code and subdivision and land development ordinances with these provisions allows a developer, in a site development or redevelopment scenario, or an end-user, in the case of a building retrofit, to understand community needs and vice versa. This allows communities to consider industrial sector needs related to goals outlined in the comprehensive plan, empowering communities to facilitate discussion among residents, stakeholders, appointed officials, elected representatives and developers and facility end users. Ultimately, this leads to more sustainable and resilient businesses and communities.

Height and Viewshed

In consideration of the larger region, there is a possibility of significant changes to the landscape created by tall industrial buildings, lacking architectural features, potentially visible from miles away. These projects set unique standards for warehouse height, resulting in significant visual impacts across the region. Building architecture and articulation standards should be considered to support community character.

This substantial building height could not only change the character of the municipality where it is proposed, but of neighboring communities and even the region. Permissible building heights should take into account distance to adjacent buildings and property lines to avoid impacts to emergency access and changes in neighborhood character—both critical to safety and to the tax base. Topography and tall structures nearby are also considerations for viewshed impacts. For example, a 100-foot-tall high cube warehouse may not have a negative impact in a location with other tall buildings or high hills or mountains.
On the other hand, high cube warehousing could have a sharp effect if the heights of buildings nearby or topography are out of scale with the proposed tall structure. In these cases, the high cube warehouse becomes the “landmark” or the dominate feature in the landscape. In communities and neighborhoods with lower height buildings and flatter topography, taller structures will have more of an impact.

The contrast between these two points of reference is created by the topography and character of the communities in which they are located, and underscores the importance of municipal height and viewshed consideration.

Communities should amend subdivision and land development and zoning ordinances to require viewshed information and analyses to assess the potential impacts, both positive and negative, where high cube and automated warehousing is proposed. Appropriateness of these taller structures in environments that can accommodate their impacts to the landscape, such as in existing industrial parks, with similarly tall buildings and where substantial elevation changes exist in the surrounding landscape should be considered.

**Airport-Related Height and Use Restrictions**

An important consideration municipalities must make in allowing for high cube and automated warehousing are Federal Aviation Authority (FAA) height restrictions related to airports. These regulations are reinforced through Pennsylvania Act 164 of 1984, the Airport Hazard Zoning Law.

Height restrictions exist to ensure obstructions, such as buildings and signs, are not constructed in airspace associated with airport approaches. They are mandated through both the state and federal governments and should be reflected in municipal ordinances through airport overlay zoning. The FAA identifies surface zones, which are associated with aircraft approaches to airports and have varying degrees of height restrictions depending upon the type of aircraft utilizing the airport, approach paths and topography, among other things. These height restrictions must be considered when municipalities are implementing zoning ordinance changes.

Regionally, the Lehigh-Northampton Airport Authority oversees Lehigh Valley International Airport, Queen City Municipal Airport and Braden Airpark. Half of all municipalities in the Lehigh Valley are within one or more surface zones. As many municipalities are experiencing the pressure of industrial growth, coordination with the Lehigh-Northampton Airport Authority and implementation of standards that do not allow for obstructions in airspace is vital.

Use restrictions are also a consideration for municipalities that are within surface zones. The permissibility of industrial uses is not of concern outright, but detailed assessment should be made into the proposed materials used, stored or manufactured at facilities within the surface zones to ensure no site-specific hazards are presented. Limitations or outright prohibition should be made to the extent and intensity of hazardous materials stored or utilized at high cube and automated warehouses to mitigate impacts of a disaster, should one occur.
Municipalities must also consider that they are likely at increased liability should an emergency event occur without these mandated restrictions in place. While municipalities move to adopt standards in response to the emergence of high cube and automated warehousing, they should utilize the opportunity to incorporate provisions reflective of their proximity to the Lehigh Valley’s airports and related surface zones.

**Emergency Response**

Structures of this scale and height pose a need for thorough evaluation of services provided by fire companies, police forces and emergency medical operations. These considerations are especially important for those entities that rely on volunteers, have equipment that can only serve lower height buildings, and organizations that lack specific emergency response training for larger, taller and high-powered (potential electrical, hazardous materials risks) facilities. Communities should evaluate the equipment required to mitigate emergency situations and engage service organizations in conversations about capital equipment needs, training and resources necessary to serve these facilities. Simultaneously with the development or use alteration or change, communities need to understand the fiscal impact and ultimate pressure on the tax base.

**Emergency Services Impact Statement**

Municipal subdivision and land development ordinances should be amended to reflect standards that consider the equipment and capital needs of emergency service operations. The best way to do this is to involve emergency management personnel including, police, fire and ambulance services, in the application review process. Emergency services impact statements, which could be in the form of a questionnaire included with the zoning or subdivision and land development application, should be developed and codified for high cube and automated warehousing proposals. This is especially vital to the success of service provisions to existing facilities that are retrofitted to accommodate these emerging technologies. Impacts evaluated in association with existing facilities should consider not only those on the surrounding community but also on the project site, such as reviews of parking, drive aisle, fire lane and staging adequacy.

In many ways, use changes or expansions should almost be treated like a new development proposal by the local government. This doesn't necessarily mean that a full land development application is required, though it could, depending on the extent of the proposal. In some cases, a municipality may simply require a building permit to retrofit a structure. However, if traffic could double, the types of materials stored is changing, volume of goods warehoused is substantially increasing, or amount or type of energy being used to operate a facility is changed, then emergency response needs will change.

**Public Safety Committees**

In order to facilitate communication and coordination between emergency response organizations affected by a development proposal, it is recommended that municipalities establish a ‘public safety’ or ‘emergency services’ committee. As appropriate, based on entities providing service in a particular municipality, the committee should be comprised of local police, state highway patrol, fire companies, ambulance services, municipal public works departments, and appointed municipal residents. This committee would afford an early opportunity for engagement and review of the potential impacts of a plan on the general health, safety and welfare of a community.

A committee of this sort would further allow for emergency services, such as fire departments, to coordinate anticipated emergency response and planning for future service to a proposed high cube or automated warehouse, and ensure that the most accurate data is included in the *Lehigh Valley Hazardar Mitigation Plan*. It is important for first responders to have knowledge of the internal structure of a building, any operations that may hinder or complicate emergency response and inner workings of a proposed facility, including any hazardous material situations particularly involving automation or stored goods. The location of areas accessible to employees is also important to planning for future public safety needs, especially in high cube and automated warehouses where employees are not generally located within the structure above the typical first floor height.
Economic Impacts

The LVPC recommends that municipalities incorporate requirements for the economic study and assessment of development impacts into their subdivision and land development ordinances. Proactive municipal provisions will ensure that a community is not required to bear full responsibility for costs associated with a proposed development.

Changes in development patterns and community character associated with high cube and automated warehousing pose potential impacts to property values, for example, by reducing market interest in buying a home near a facility that has high rates of ongoing daily traffic, noise generation, or a blocked viewshed. Considerations of all possible economic impacts to the region, municipality and residents compels a partnership between the public and private sectors to ensure the long-term viability and success of these facilities. The use of cost-benefit analysis in planning, development and infrastructure decisions is vital to quantify potential impacts.

In addition to considering the amount of tax revenue a community may receive, it is important to assess potential costs to ensure:

- Public safety officials have the training and equipment needed to service a facility
- Public works and engineering departments have funding to add new infrastructure and maintain existing roads and bridges affected by new traffic and changing mobility patterns
- Transit has adequate facilities and funding to support emerging and changing transit needs

Ultimately, if workers cannot get to their jobs because of poor system quality or congested infrastructure and a lack of public safety, businesses will struggle, tax revenue will decline and the potential economic benefits of a high cube or automated warehouse will decline.

Job creation and retention is a major consideration and should be integral to any negotiations between municipalities and developers or end users. Municipalities can account for economic impacts of both new and existing facilities by including high cube and automated warehouses as a special exception or conditional use in their zoning ordinances as a mechanism to allow for municipal negotiation through the development review and approval process.

Counties, school districts and municipalities should consider ways to ensure a return on investment in terms of tax revenue compared to local costs associated with service of these facilities. Monitoring industrial occupancy and vacancy is also important to maintaining jobs and the tax base, and ensuring that development is as additive to the community and region as possible. Creating a database of building and property actions allows local governments to monitor use and allows municipalities, counties and the region to get in front of major changes. This allows for incentives for redevelopment; changes in employment density, transit ridership, and emergency response needs; and other impacts to be managed in the best interests of all segments of the community.
Reusability

High cube warehousing and related industrial land uses are often built with the intent of leasing to companies based upon agreed timeframes for property rental. By leasing a property, a company does not need to commit to the additional expenses and responsibilities of long-term property ownership. At the end of a contract the leaseholder will either need to renegotiate an agreement or may be free to vacate the warehouse or industrial space. This can, in turn, create the need to redevelop or renovate such structures to attract new leaseholders.

An industrial development analysis by CBRE Group, a national commercial real estate services and investment firm, identifies the Lehigh Valley as a key region for assessment in the Interstates I-78/I-81 Corridor. Analysis from the second financial quarter in 2020 has identified several trends in the supply of industrial space for leasing that may impact the long-term viability for high cube and automated warehousing. As speculation and the supply of industrial space throughout the Lehigh Valley region has increased, the long-term usage of these structures should be considered.

The “persistent demand” for industrial space is indicative of the need to prepare for change. CBRE notes that both third-party logistics companies, e-commerce, retailers and food and beverage manufacturers are the primary sub-markets leasing industrial facilities. Space that has been vacant for several quarters was beginning to fill as a result of the stay-at-home order, which halted new construction in the spring and early summer. The Lehigh Valley, in particular, has the lowest industrial vacancy and corresponding highest contract rents in the I-78/I-81 Corridor. As the land available for industrial development declines, inventory declines and consumer demand for products and services purchased online increases, proposals for high cube and automated warehousing will only increase.

Municipalities should strive to understand the existing development trends to best plan for a healthy supply of various land use needs. Permitting too much industrial space, or any type of land use for that matter, may create an oversaturated market, and lead to high vacancy rates or a need to constantly revitalize existing structures. The technology used in high cube and automated warehouses is often built with a dual-purpose of serving as the support structure for the building frame as well as facilitating goods movement. These structures, particularly in instances of new construction, are often built to serve a specific tenant. Municipal plans and ordinances should encourage flexibility to support reusability and long-term marketability of these facilities, as the specificity of building design may reduce opportunities for reuse if the tenant vacates.

Below is a warehouse in the City of Allentown proposed for redevelopment into apartment units in 2020. The structural building frame lends itself to a variety of reuse options that would not be available for structures built to consist only of automation technology.
Workforce

Approximately 10% of the region’s workforce, 31,795 Lehigh Valley employees, is in the transportation and warehousing industry (Lehigh Valley Workforce Development Area Profile, October 2020). Highly-automated facilities are bound to have substantial impacts on the local and regional workforce, with the distinct possibility of requiring fewer employees. This could result in fewer jobs available to people with minimal education and younger workers with little work experience. It’s a concern for many communities as the potential loss of regional warehousing jobs to robotics technology occurs simultaneously with the ongoing decline of retail positions. Scott Anderson, director of Amazon Robotics Fulfillment, said in a 2019 statement that it’s possible that existing facilities will convert to high automation within the next 10 years (Gizmodo), and a 2020 report from the National Bureau of Economic Research indicates that companies are likely to move even faster towards automation investments as a result of the COVID-19 Pandemic.

As one of the largest employment sectors in the Lehigh Valley, changes in the number of warehousing jobs resulting from the trend toward automation should be closely monitored by municipalities, counties and the Lehigh Valley Workforce Investment Board. However, there is currently no data to confirm that rapidly increasing automation will result in massive layoffs in the near future. Reports by the University of California Berkeley Labor Center and Harvard Business Review suggest that automation is more so changing the day-to-day functions of existing jobs.

Assessing Employment Impacts

Communities should assess potential employment impacts related to new development, redevelopment and retrofit projects. Public and private partnerships should be formed to ensure that developers are advising municipal governments of job creation and loss, or overall change, as a measure of impact to a community. Subdivision and land development ordinances should include provisions for economic impact statements with these types of proposals that specifically address impacts to a community’s workforce. For building retrofits, where the subdivision and land development ordinance is not applicable, municipalities should consider the implementation of assessment forms with required zoning applications. These assessment forms should collect pertinent information, such as expected change in employee volume and traffic generation, so that municipalities can appropriately plan for shifts in municipal service needs.

Sustainability and Design

Incorporating sustainable building practices and design provides immense benefits to the community and developer. Utilizing renewable resources or employing sustainable design increases asset value, and decreases operational costs for the user through energy, water, maintenance and waste savings. Additionally, stormwater management benefits are generated through overall green infrastructure design.

As communities implement sustainable building practices, the benefit of reduced building footprint through increased building height should be considered. Increased ‘vertical’ impact is likely to result in the need for less land to develop these facilities and will result in reduced pressure on greenfield development, helping to sustain the Valley’s limited natural resources. Building retrofits for automated warehousing are also supportive of the environment in this way.

Geneva II Warehouse in Charlotte, NC.
Photo courtesy of Shelco LLC.
Developers should also consider the benefits of incorporating sustainability into designs, as green building has become an increasingly popular and widespread practice that can enhance business reputation in the industry. Warehousing and distribution developers such as Prologis are pushing the envelope in this area.

Although a relatively new land use, the nature of high cube and automated warehouses to be highly efficient opens them to many sustainable opportunities to reduce development pressure and lessen their carbon footprint. Developers or end-users can initiate these energy cost savings by installing solar panels or energy-efficient light fixtures.

Municipalities can incentivize the inclusion renewable energy systems and energy-conserving building design in their subdivision and land development ordinances, per the Pennsylvania Municipalities Planning Code (MPC) Section 503(6). For example, offering a density bonus when meeting sustainability thresholds can benefit the developer and the community by offsetting the associated costs of sustainable systems over the long-term, while lessening impacts of the development on the environment.

For greenfield and redevelopment sites, aesthetic features such as building form and shape, as well as minimum percentage of window area per building wall, would supplement these sustainable design recommendations and reduce the visual impact of the building’s height. Standards for building form and shape should address wall and roof scale to break up one’s line of sight. For instance, municipalities could require columns on building walls to break up the monotony of a flat wall. Minimum window requirements should ensure adequate visibility into and out of spaces accessible to employees and the creation of the appearance of windows, through building wall design, in storage areas.

Allowing high cube and automated warehouses as a special exception or conditional use supports the ability to secure minimum architectural standards. In addition to building form, architectural standards can also involve a variation of colors on building walls to reduce the perception of a ‘white box’, all of which can be negotiated through the special exception or conditional use process.
Community Collaboration

Establishing a process that enables and encourages community feedback on proposals helps build trust between local governments, residents and the private sector, educates the community on the legally applicable process, and ultimately results in better projects that are more suitable to community needs and desires.

It is in the private sector’s best interest to have an understanding of a community’s goals and objectives. For instance, a public open house allows residents to visualize what the project may look like early in the planning process. This can garner community support and understanding, and can serve to address or mitigate concerns that may not otherwise be raised until substantial investment has already been made in the project design. These community engagement opportunities provide a platform for resident voices to be heard prior to any formal review and informs developers of potential historical issues within the area, such as road flooding. It also allows resident desires, such as a walking trail or buffering beyond what the subdivision and land development ordinance requires, to be considered.

In addition to internal meetings held between a municipality and developer, pre-submission meetings can involve the other community partners, such as the LVPC, Lehigh and Northampton Transportation Authority (LANTA) and the Lehigh Valley Workforce Investment Board. Pre-submission meetings are highly encouraged because they offer parties the opportunity to provide higher-level insight into regional implications and consider a holistic approach to development, transit accessibility and sourcing workers once the project is completed.

Traffic Impacts

Changes to existing traffic patterns, especially truck traffic, is a principal concern of most communities. The LVPC encourages that any special exception or conditional use, and particularly any warehouse use, include a traffic impact study. Traffic impact studies are reports that estimate the changes that are likely to occur to the overall transportation network near the land development project based upon access needs, projected trip generation of traffic and potential effects to congestion along access roads.

Traffic Impact Studies and Trip Generation

Traffic impact study requirements are established within a municipality’s subdivision and land development ordinance. A traffic impact study is another tool used to assess the ramifications of a development, inform of future transportation constraints and enable a community to plan the best possible project outcome. Transportation impacts specifically related to high cube and automated warehousing are not fully known and are changing rapidly, therefore such scrutiny should be taken for these types of land uses.

Traditional and high cube warehouse land uses are each estimated by a separate traffic trip generation rate by the Institute of Traffic Engineers (ITE) Trip Generation Manual, 10th Edition. The ITE Manual is the engineering standard for calculating estimates of vehicle trip generated by developments. There is a relatively small volume of study information available in the high cube warehouse land use database. The database relies primarily on floor area, while there is a stronger correlation between vehicle trips and building gross square footage in regard to high cube warehousing. Gross building storage square footage is currently not available in the ITE Trip Generation manuals.

The ITE manual calculates traffic based only on gross floor area, a reflection of traditional warehouse footprints, which may not necessarily reflect the impacts of structures with storage capacity of 100 vertical feet or more. In essence, by measuring only floor area ITE treats a 24-foot-tall building with a floor area of 200,000 square feet the same as it treats a 100-foot-tall building with 200,000 square feet of floor area. In reality, the 100-foot-tall high cube or automated warehouse building is akin to stacking four traditional warehouses on top of each other.
High Cube and Automated Warehousing

Careful consideration is necessary to develop policies regarding a ‘warehouse built on top of a warehouse’. As these uses appear it may mean radical changes in trip traffic generation calculations. The goods stored and moved are available in far greater quantities when stored vertically rather than in traditional warehouses, making assumptions of transportation impacts a complicated endeavor. The limited data available for cold storage facilities produce acceptable levels of accuracy for vehicle trip estimates. However, vehicle trip generation rates based on data collected in recent years are higher than those derived from data collected at least 10 years ago. It is recommended that further investigation be made into the existing data and that additional data be collected.

In the meantime, it is anticipated that industrial developers and engineers will utilize the ITE Trip Generation Manual to calculate vehicle trips and level of service changes to the roadway system. It is critically important to note that bridge sufficiency ratings, pavement quality and maintenance, transit connections, air quality impacts, among other key questions should be addressed as part of a transportation impact statement. Some of these factors have standardized data available to assess impacts, like the ITE Manual and PennDOT traffic safety data, but other impacts are more localized, like bridge condition assessments or the ability of a road to withstand higher frequency and higher weight vehicles without falling apart. Proximity to housing, hospitals, elder care facilities and schools can have impacts as well. These may be negative, such as lowered air quality, or positive like infrastructure already built to standards that support more intense uses. Transportation Impact Statement requirements should accommodate the variety of scenarios that can arise when development is proposed.

As automation makes loading and unloading of trucks more efficient, it is likely that truck turnaround time may be faster as well, enabling a higher usage of the transportation network than traditional warehousing.

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**Trip Generation Example**

For the purposes of this example, every land use category in ITE in regard to warehousing was calculated with a base assumption of a structure of 1,000,000 square feet gross floor area.

<table>
<thead>
<tr>
<th>Land Use Category</th>
<th>Description</th>
<th>Average Daily Rate of Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Use 150: Warehousing</td>
<td>A warehouse is primarily devoted to the storage of materials</td>
<td>1,740</td>
</tr>
<tr>
<td>Land Use 154: High-Cube Transload and Short-Term Storage Warehouse</td>
<td>Buildings that have a primary function of consolidation and distribution of pallet loads (or larger) for manufacturers, wholesalers, or retailers. They typically have little storage duration, high throughput, and are high-efficient facilities</td>
<td>1,400</td>
</tr>
<tr>
<td>Land Use 155: High-Cube Fulfillment Warehouse</td>
<td>A facility characterized by a significant storage function and direct distribution of e-commerce product to end users. These facilities typically handle smaller packages and quantities than other types of HCWs and often contain multiple mezzanine levels</td>
<td>8,180</td>
</tr>
<tr>
<td>Land Use 156: High-Cube Parcel Warehouse</td>
<td>Warehouses that typically serve as regional and local freight forwarder facilities for time sensitive shipments via airfreight and ground carriers. These sites also often include truck maintenance, wash or fueling facilities</td>
<td>7,750</td>
</tr>
<tr>
<td>Land Use 157: High-Cube Cold Storage Warehouse</td>
<td>Facilities typified by temperature-controlled environments for frozen food or other perishable products</td>
<td>2,120</td>
</tr>
</tbody>
</table>

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As automation makes loading and unloading of trucks more efficient, it is likely that truck turnaround time may be faster as well, enabling a higher usage of the transportation network than traditional warehousing.
Challenges have been noted, but opportunities also exist. Higher intensity uses can be clustered to target costly infrastructure improvements to limited areas, reducing upfront and long-term maintenance costs, as one example. Also, high cube and automated warehousing, in and of itself, is a significant technological achievement. This increase in efficiency and advancement can be carried beyond the building’s interior and to the parking areas through electric charging stations for tractor-trailers and solar powering for the building’s operation, as well as supporting automated traffic signal corridors key to reducing congestion and air pollution and enhancing emergency management services delivery. Again, each development or redevelopment will have unique needs, as will the seamless integration of that facility into the community. Holistically approaching issues and needs through traffic impact assessments can support facility and community success.

This 68-foot-tall Prologis facility in Seattle features a highway-style ramp network that enables tractor-trailers to dock at two levels of bays, potentially doubling truck traffic at the building. These increased impacts are something for the Lehigh Valley region to consider. Locations with substantial industrial development near highway interchanges, near the Lehigh Valley International Airport or along major freight corridors should prepare for highly intensive facilities as industrial land becomes more limited

Photo courtesy of Prologis

Truck Routes and Access

The scoping of a traffic impact study should identify all transportation impacts, including vehicular, truck, pedestrian, multimodal and transit access. The scope of the traffic impact study should scrutinize the planned truck routes, particularly between the project location and the closest highway or interstate because the trucks utilizing these facilities will ultimately want to connect to a highway. It is critical to plan and identify the best logical and capable truck route to access these high classification roadways, to minimize tractor-trailer impacts on local roads. Improvements to potential conflict points along these routes may be negotiated between the developer, municipality and Pennsylvania Department of Transportation (PennDOT), which will ultimately make a project more accessible to tenants and users. Traffic impact studies should also consider on-site needs, including parking and insufficient infrastructure capacity.

Tractor-Trailer and Driver Amenities

Minimum truck parking and queuing requirements at facilities, along with driver amenities, should be included within the subdivision and land development ordinance. This recommendation also involves access opportunities, such as gated facilities, to ensure that trucks are not queuing along the roadway but rather internal to the site.

Municipal standards should also require or incentivize electrical hookups within truck parking areas, both for trucks and for refrigeration trailer units in which goods are transported. Electric-diesel hybrid refrigeration trailer units are becoming more common. The availability of hookups will mitigate the impacts of diesel-run units on the neighboring area and regional air quality.

Impacts to the origin and destination of goods, as well as staging and parking concerning the commodity flows to logistics of freight, are anticipated to change. Driven by continual e-commerce demand, it is likely that regulation of these uses will require ongoing evolution to maintain the service expectations of citizens. Direct attention by both PennDOT and municipal officials should focus on monitoring traffic generation and it impact on the Lehigh Valley transportation network. The true changes to both state of good repair and existing conditions present an ongoing issue, and the growing demand on the transportation network will require continued assessment on both a case-by-case and global basis.
High Cube and Automated Warehousing: Municipal Considerations for Updating Standards

Serving as a ‘to do list’ for what and how a municipality should consider making updates to local zoning codes, this chart should be used in conjunction with the detailed information provided in the High Cube and Automated Warehouse Guidance Document. Municipalities should follow a similar process when proposing updates to subdivision and land development ordinances and/or other municipal procedures and codes.

Review current zoning definitions and maps for industrial uses.

Pennsylvania Municipalities Planning Code requires that local governments accommodate possible uses in at least one zoning district.

Is the municipality participating in a multi-municipal comprehensive plan?

NO

Ensure at least two parcels can accommodate high cube and automated industrial uses.

REVISE ZONING DEFINITIONS, MAPS AND REGULATIONS. ACKNOWLEDGE THIS NEW, SPECIFIC INDUSTRIAL USE AND ESTABLISH ASSOCIATED STANDARDS THAT ASSESS IMPACTS ON THE ECONOMY, TRANSPORTATION AND UTILITY INFRASTRUCTURE, EMERGENCY MANAGEMENT SERVICES, NEIGHBORING COMMUNITIES AND BUDGETS. ESTABLISHING USES AS SPECIAL EXCEPTIONS OR CONDITIONAL USES ENABLES COMMUNITIES TO ASSESS IMPACTS.

ZONING APPLICATIONS FOR THESE USES SHOULD INCLUDE AN ADDITIONAL LIST OF QUESTIONS TO ASSESS IMPACTS TO THE COMMUNITY, EMERGENCY SERVICES AND OTHERS COMMUNITY, EMERGENCY SERVICES, ETC. ZONING APPLICATION QUESTIONS CAN BE COMBINED INTO A SINGLE FORM FOR INDUSTRIAL USES THAT COVERS KEY QUESTIONS FOR BUILDING CODES AND SUBDIVISION AND LAND DEVELOPMENT, AS WELL.

YES

Local government group should meet to review zoning definitions/maps.

At least one zoning district across all partner municipalities must accommodate this use. More than one community may choose to accommodate this use, but only one is required.
### Location
Location has a big impact on whether a land use is appropriate for that community.

**ADEQUATE ROAD, BRIDGE AND TRANSIT INFRASTRUCTURE**
Where can transportation-intensive high cube or automated uses operate without adversely affecting infrastructure?

**FREIGHT ROUTES AND CORRIDORS**
Where are there designated freight routes that can accommodate higher frequency and higher weight vehicles?

**QUALITY OF LIFE**
Where will the 24-hour operational potential of these uses have the least impact on residential, medical, educational, recreational and other uses that’s value is inherently connected to lower noise, emergency access and high air quality?

### Volume
Volume considers not only the building footprint, but the height and dimensions that allow more goods to be stored.

**COMMUNITY CHARACTER**
What impacts does the building volume have on the community’s existing character?
Consider assessing not just the front, rear and side yard setbacks, but also maximum height and size limitations.

**VIEWSHED**
What is visible to and from these facilities?
Consider impacts to residential; protected open space; historic and cultural sites; parks or recreational lands; farmland; other businesses; schools; hospitals; continuing care facilities; emergency management facilities; and other types of uses.

**PROPERTY VALUES**
Will property values decline in a specific neighborhood(s) or other land use or group affect municipal revenue and therefore make it more challenging for the delivery of governmental services, including but not limited to, road and bridge maintenance, sewer, water and stormwater infrastructure maintenance, police, fire and ambulatory needs?
Will a specific neighborhood(s) or other land use or group be directly affected? Will those specific neighborhoods(s) or other land use or group see a decline in the value of their property(ies)?

**QUALITY OF LIFE**
What impact could an individual high cube or automated warehouse, or grouping of industrial facilities, have on the quality of life of the community?
Conclusion

The true impacts of high cube and automated warehousing uses are yet to be fully determined. These emerging land uses pose both positive and adverse impacts to a community’s transportation network, economy, municipal budget, character and viewshed. Municipalities have an interest in protecting the health, safety and general welfare of their residents through regulation of these types of warehousing. The manner and approach to regulating these land uses are based upon whether the plan is for a new construction project, redevelopment of an existing lot or renovation to an existing structure.

Municipalities are encouraged to begin early in planning for this evolving land use. The most desirable outcomes benefiting communities are achievable by leveraging proper regulations in the subdivision and land development ordinance, zoning ordinance and building codes. These tools serve to assess the real impacts of a proposal, identify appropriate locations for development and ensure the prevention of additional costs to a community. Further, they serve to support the long-term success of a development.

Continually assessing the effectiveness of subdivision and land development ordinances and zoning ordinances allows a municipality to remain abreast of rapidly evolving development and industry trends, such as high cube and automated warehousing. Engaging with the private sector, relevant municipal departments, public safety organizations and residents early and often in the planning process facilitates widespread and comprehensive understanding of overall needs, resulting in the best possible outcome for all parties.

Be proactive. Install new regulations now, before they arrive.
Resources

Project Examples
https://www.westfaliausa.com/resources/case-studies/organic-valley
https://rsmowery.com/project/prologis-warehouse-park-33-building-1/

Land Use and Zoning
Lower Macungie Township Zoning Example: Specific Criteria for Warehouse, Wholesale, Storage, or Distribution uses: https://ecode360.com/34785641

Economic Impacts and Incentives
https://www.easternlandpa.com/listings/parcel-9northampton/LERTA.pdf
https://www.nber.org/papers/w27249.pdf
https://laborcenter.berkeley.edu/future-of-warehouse-work/
https://hbr.org/2015/06/robots-seem-to-be-improving-productivity-not-costing-jobs

Workforce

Reusability

Sustainability

Traffic Impacts
https://www.ite.org/pub/?id=a3e6679a%2De3a8%2Dbf38%2D7f29%2D2961becdd498
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