Notes on this Revised Draft of the Mobility Plan

This revised draft of the Mobility Plan element will be presented to the Planning Board for endorsement at its meeting on October 8, 2025. Comments will be considered by the MPC and appropriate changes made before presentation to the Planning Board for final adoption.

The MPC decided that to avoid future confusion when elements may be updated, any goal for a particular topic will appear in only one element in the Master Plan. Reference to overlapping topics will be included in the background text of the secondary element (s), to confirm that the topic has been considered, and the Plan element with the associated goals will be identified.

For the Mobility Plan element, the following duplication issues were identified:

1. GBESE 1: Electric Vehicle Charging: Strategies for installing Level 1 and 2 charging in buildings and small developments will be in the GBESE. Commercial Level 2 and 3 charging installations at strategic locations in the Borough will be covered in the Mobility Plan element.
2. GBESE 2: All mobility issues for large vehicles such as cars, trucks and buses, and personal mobility such as walking, bicycling, scooters and skateboards, including battery-powered, and the roads, sidewalks and other routes in the Borough will be found in the Mobility Plan element. Only driveway mobility issues will be in the GBESE.
3. Economic Development Plan 1: Parking issues related to businesses and commercial facilities were addressed in the Economic Development Plan rather than in the Mobility Plan. Associated goals remain in the Economic Development plan and are referenced in this Mobility Plan.
4. Economic Development Plan 2: The Economic Development Commission is concerned about the limited ways for pedestrians, hikers, and cyclists to move between the Town Center and Route 31. A summary of these concerns is included in Section 3 of this Mobility Plan.

During the revision, comments from the public received after the conditionally adopted elements were published on the website have been considered and changes made where appropriate.

[These notes are for information only and will not appear in the final version of the element.]

MASTER PLAN

BOROUGH OF PENNINGTON
NEW JERSEY

4. Mobility Plan Element (Revised)

The final draft of the Mobility Plan from the element writing team was conditionally adopted by the Planning Board on March 12, 2025, and posted on the Borough website for public comment.

This revised version includes updates based on public comments and changes based on comparison of all elements to ensure consistency. These are highlighted in yellow. It will be presented to the Planning Board for endorsement at its meeting on October 8, 2025, prior to final adoption at a public meeting later in 2025.

Contents

Mobility Plan Element Writing Team

Thanks go to the following people who helped create this draft of the Mobility Plan element: Roger Demareski, Meredith Moore, Allison Neary, Natalie Shivers, Kristin Tunkel, Rick Smith, Doug Pinelli, with Andy Jackson as chair.

1. Introduction

The Municipal Land Use Law (MLUL) includes a Circulation Plan as a permitted Master Plan element. N.J.S.A. 40:55D-28(4) describes the element as follows:

"A circulation plan element showing the location and types of facilities for all modes of transportation required for the efficient movement of people and goods into, about, and through the municipality, taking into account the functional highway classification system of the Federal Highway Administration and the types, locations, conditions and availability of existing and proposed transportation facilities, including air, water, road and rail."

Following the lead of Mercer County, we have chosen to name this the **Mobility Plan** element since this implies a broader range of users than the name circulation. The Plan should not only accommodate large vehicles such as cars, trucks and buses on the roads, but also personal mobility such as walking, bicycling and using personal vehicles such as scooters and skateboards, including those that are battery powered. Because of its relatively small size and its location, the Borough is also concerned with regional mobility conditions and proposals. Since the Borough is essentially a fully developed community, opportunities for major mobility infrastructure improvements are limited. With the wide variety of potential users, the system of roadways, sidewalks, bikeways and other pathways needs to be designed and regulated to maximize safety while ensuring efficient traffic movement.

There are seven categories in the FHA functional highway classification system. The roads in Pennington Borough are shown below under these classifications:

1. Interstates
   None
2. Other Freeway/Expressway
   None
3. Other Principal Arterial
   State Route 31
4. Minor Arterial
   County Route 640 – Pennington Road, South and North Main Street
   County Route 546 – South Main Street to Lawrenceville-Pennington Road
5. Major Collector
   County Route 631 – Ingleside Avenue
   County Route 624 – Pennington Titusville Road, West and East Delaware Avenue
6. Minor Collector
   County Route 623 – Pennington-Harbourton Road
   Broemel Place and Green Street south of Broemel Place
7. Local
   All other Borough roads

The Delaware Valley Regional Planning Commission (DVRPC, see Section 8a below) presents traffic counts on its website https://www.dvrpc.org/webmaps/trafficcounts/. It can be searched by municipality or Zip Code. Traffic counts for roads in and around Pennington have been extracted from data for Zip Code 08534 and presented in Appendix A, Table A1. Most of the counts are

between March 2022 and March 2024. The counts have been added to a schematic map of Pennington in Figure A1 to give a general picture of traffic flow in and around Pennington. From 9,000 to 9,500 vehicles per day join Route 31 northbound from Pennington Circle. Of these, around 8,400 travel as far as the North Main Street intersection, meaning around 800 leave Route 31 for destinations likely on the west side of Pennington. About 900 vehicles join Route 31 from North Main Street. Around 3,000 vehicles per day enter Pennington via Pennington Road from Pennington Circle and most of these travel as far as the Main Street traffic lights at Delaware Avenue. About 3,300 vehicles per day pass in each direction on East Delaware Avenue and onwards to Pennington-Rocky Hill Road. About 3,200 vehicles leave or join Route 31 on Pennington-Hopewell Road, representing traffic passing through Pennington on Route 31 on the way to Hopewell. The DVRPC count does not differentiate between automobiles and trucks. Such data would be useful.

The DVRPC daily count is generated from hourly counts which allows the visualization of how traffic is distributed during the day. Figure A2 shows three examples: southbound Route 31, north of Pennington-Harbourton Road; westbound East Delaware Avenue, east of Main Street; and northbound South Main Street, north of Curlis Avenue. All show morning and afternoon peaks with lesser peaks around lunchtime. Peaks for Route 31 are just under 700 vehicles per hour, Delaware Avenue 300 per hour and northbound Main Street 250 cars per hour. We will explore with DVRPC the opportunity to gather additional data in and around Pennington.

In preparing this Mobility Plan element, we benchmarked the Circulation Plans in the Master Plans of nearby communities: Hopewell Township, Hopewell Borough, Princeton, Bordentown, Lambertville, Stockton, Rocky Hill, and Hightstown. We also reviewed the Circulation and Sidewalk Plan of the 1998 Pennington Borough Master Plan and the circulation sections in the 2005, 2013 and 2023 Master Plan Reexamination reports (Appendix B). We also considered the findings and recommendations of the 2002 Route 31 Design Study that applied to the Borough.

The vision and goals for the Mobility Plan element are a subset of the overall Master Plan 2025 vision and goals developed by the Master Plan Committee (MPC) and the Citizens Advisory Committee (CAC). The CAC is composed of 15 resident volunteers appointed by the Mayor on October 4, 2023. The role of the CAC is to assist the Planning Board in any area assigned to it, as detailed in NJ MLUL 40:55D-27a. In this case, the CAC is assigned to help the Planning Board develop Master Plan 2025 Their role is to work with the MPC and with the Committees and Commissions developing draft elements for the Master Plan. CAC members serve as community contacts, obtaining feedback and buy-in as the Plan elements develop.

In the fall of 2023, the MPC and CAC worked together to develop the vision and goals for the updated Master Plan. Their report was reviewed, modified and endorsed by the Planning Board in a public meeting on January 10, 2024. The modified vision and goals were presented to the public at an Open House at Borough Hall on April 10, 2024. Minor revisions were made based on feedback from Borough residents. The resulting list of draft goals was distributed to the teams developing the Master Plan elements as a guide for their discussions. The Mobility goals in that report were the starting point for the Mobility Plan element writing team.

2. Mobility Plan Vision, Goals and Strategies

Pennington Borough's visions for mobility are:

- To have transportation policies that reduce automobile use in the Borough.
- To provide safe sidewalks for pedestrians of all ages and abilities, and safe routes for bicycles and other low speed personal vehicles, and link them to schools, businesses and adjacent open space and recreation areas.
- To ensure that proposed mobility enhancements respect the preservation of Pennington's historic character and, also, do not impede the passage of emergency response vehicles.
- To provide adequate parking for customers of businesses in the town center while meeting the parking needs of business employees and residents.
- To continually improve highway access and crossing management for Route 31.
- To minimize the impacts of transportation on the environment, including greenhouse gas emissions, and air and noise pollution.
- To implement Complete & Green Streets, and Vision Zero policies.
- To promote public and other transit alternatives to reduce traffic congestion and provide services to young and old residents and to people with disabilities.

The Mobility Plan goals and strategies are blended from five sources;

- The MPC/CAC Master Plan report approved by the Planning Board in a public meeting on January 10, 2024, and presented to the public at an Open House on April 10, 2024.
- The 2023 Master Plan Reexamination report adopted by the Planning Board on May 10, 2023, which reviewed progress on the circulation goals of the 1998 Master Plan, and the reexaminations of 2005 and 2013. See Appendix B.
- The Open Space and Recreation Plan (OSRP) conditionally adopted by the Planning Board in a public meeting on June 12, 2024.
- The Green Buildings and Environmental Sustainability (GBESE) Plan conditionally adopted by the Planning Board in a public meeting on November 13, 2024.
- Recommendations pertaining to Pennington in the 2002 Route 31 Design Study.

Background to the topics addressed by the goals will be found in Sections 3-8.

The goals are numbered below, and the associated strategies are listed below each goal.

1. Focus on the safety of vulnerable road users who are not in cars.
    a. Develop a robust network of well-lit sidewalks, personal vehicle lanes, sharrows and shared-use paths. Reinforce speed limits with more and better signs and reminders. Reduce the width of the marked car and truck lanes to the minimum possible to meet regulations in order to reduce pedestrian crossing distances and maximize the roadway availability for personal vehicles. Personal vehicle lanes should be kept like roadways and not be a repository for plowed snow, leaf piles, trash cans, etc.
    b. Create infrastructure for pedestrians, bicycles and personal mobility vehicles, including battery-electric powered, while ensuring that new facilities respect the

district's historic aesthetic. Explore options for providing 110V charging for small electric vehicles and be open to e-scooter and e-bike ride-share proposals.

c. Follow New Jersey Complete & Green Streets design policies, adopted by Council in 2014 and modified in 2016, when designing and updating Borough roads, and prioritize personal transportation over cars and truck traffic: https://www.nj.gov/transportation/eng/completestreets/pdf/CS_Model_Policy_2020.pdf
d. The design of modifications to Borough roads should be coordinated with first responders to ensure that all lanes are wide enough and are free of obstructions such as chokers and speed bumps that would delay emergency response.
e. Follow the principles of Vision Zero, adopted by Council in 2022, which encourages municipalities to adopt achievable goals to prevent traffic-related severe injuries and fatalities: https://www.visionzero4nj.org
f. Install bicycle route signs and pavement marking on those streets best suited and safest for bicycles such as the Great Western Bikeway and other connections to bicycle routes outside the Borough – see the Proposed Bike Route map in the 2024 Open Space and Recreation Plan element (OSRP).
g. Make cycling to Toll Gate school safer by constructing a bike path on the south side of East Curlis Avenue. The width of the current sidewalk is inadequate for bicycle use, pedestrian use, and car drop-off.
h. Ensure the safety of pedestrians by requiring homeowners and businesses to keep their sidewalks in good condition and free of shrubbery and tree overhangs and by enforcing the ordinances to that effect. The snow removal ordinance should also be enforced.
i. Reduce the hazard to pedestrians and bicyclists from the lack of dedicated side lanes on the sharply curved North Main Street bridge over the railroad tracks. In the near term, consider lowering the speed limit on the bridge and/or speed bumps and add flashing pedestrian warning signs at both ends of the bridge. A more permanent solution would be to use the piers from the previous bridge to support a new pedestrian/bike bridge connecting the Baldwin Lake Preserve and the Borough Public Works property. The bridge would be in Hopewell township but both Borough and Township residents would benefit from this infrastructure improvement.

2. Increase the number of ways to move around our area without getting in a car.
   a. Enhance pedestrian, bicycle and personal mobility vehicle linkages to Borough parks and trails into Mercer County.
   b. Improve access to safe trails outside the Borough with a "Stony Brook-Presidential Hill Connector" to link the LHT with neighborhoods south of East Delaware Avenue.
   c. Extend bike-friendly linkages to the south, taking advantage of the Great Western Bikeway (GWB) route. Bike lanes along South Main Street could connect to the GWB for rides towards Lawrenceville and to enable cyclists on the GWB to easily divert to visit Pennington's Town Center and/or pass through Pennington as a connection to the Lawrence-Hopewell Trail.
   d. Ask Hopewell Township to add personal vehicle lanes on Wellington Drive to allow Borough residents to ride safely to shopping and dining opportunities on Denow Road while avoiding the safety risks of riding along Route 31.

e. Encourage property owners in the Route 31 commercial corridor, whose properties can be safely reached by bicycle from the Borough, to provide bike racks.

3. Manage increased traffic passing though the Borough to and from Hopewell Township's new industrial developments, such as BeOne Medicines (BeiGene) and tenants of the Princeton West Innovation Campus on Pennington-Rocky Hill Road, and new housing developments being constructed on Washington Crossing Road and Scotch Road, and proposed on Nursery Road.
    a. Work with the County to ensure good traffic flow at the intersection of Main and Delaware to minimize traffic bypassing the light by using residential streets.
    b. When addressing the potential impacts of increased traffic from regional developments, ensure that the historic district remains accessible without compromising its charm or safety.
    c. Introduce new signage at the gateways to Pennington to reinforce the speed limit and educate drivers on the need to respect and protect other road users. Follow models used in the UK, as described in Section 4a.

4. Reduce congestion on Route 31 and increase safety for non-car users along the route.
    a. Develop and implement creative ways to reduce traffic jams at the traffic signal at Route 31 and West Delaware Avenue, including the possibility of an overpass.
    b. Improve the safety of pedestrians, bicyclists and other low-speed personal vehicles users crossing Route 31 at West Delaware Avenue.
    c. Work with Hopewell Township, Mercer County and the State to increase the number of guarded pedestrian/bicycle crossings of Route 31. Currently there are none for 2.2 miles between West Delaware Avenue and Denow Road. There will be one after the Ingleside Avenue traffic light is installed, but the remaining gaps will be over a mile.
    d. Request that the County and CSX railroad build a safer bridge on West Delaware Avenue with less steep slopes and clearer sightlines to traffic stopped at the Route 31 traffic light. The bridge should be designed to be safer for pedestrians, bicyclists, and personal mobility users. Currently there is an exposed gas line on top of the bridge that should be better concealed and protected from the elements.
    e. Replacement of the aging CSX bridge over Broemel Place should be prioritized and should include a solution to frequent flooding that occurs under the bridge.
    f. Suggest that DVRPC consider the possibility of a roll-on, roll-off truck-train service between I-295 in Ewing and I-287 in Bridgewater using the current CSX route.

5. Address various parking concerns in the Borough.
    a. Work with the Economic Development Commission to find innovative ways to increase the available parking for customers of businesses in the town center while meeting the parking needs of business employees and residents. See the Economic Development Plan recommendation 3. Mobility, Access and Parking, goal b. for further details.
    b. Parking solutions proposed within the historic district should prioritize compatibility with its historic setting.

c. Work with the County to equitably resolve the conflict between the need for residential and commercial on-street parking and the desire for dedicated bike and micro-mobility lanes on Main Street and on Delaware Avenue.
d. Control the temporary placement of contractor vehicles to minimize the impact on traffic, particularly vulnerable low speed vehicles that may need to move into the main traffic flow to avoid them.
e. Look for opportunities to replace impervious parking coverage with pervious cover to improve groundwater replenishment and reduce flooding.

6. Eliminate flooding on all roads in Pennington Borough.
    a. Eliminate flooding on Route 31, West Delaware Avenue, Broemel Street, North Main Street, Eglantine Avenue, and East Franklin, which impedes the passage of emergency vehicles to many parts of the Borough.
    b. Increase awareness of flooding hazards to road users and pedestrians to save lives.
    c. Flooding-related infrastructure improvements for mobility should respect the goals of the Municipal Stormwater Management Plan (MSWMP). Improvements close to waterways or wetlands, such as bridge or culvert replacements, should include restoration of the natural systems in the scope of work, where appropriate.

7. Promote the use of electric vehicles (EVs) and other zero-GHG emissions vehicles.
    a. Work with PSE&G to ensure that enough power will be available in Pennington to support electric vehicle charging and the electrification of residences aimed at reducing CO_2 emissions.
    b. Facilitate the installation of Level 2 (220V, 45-amp) or Level 3 (440V, 150+ amp) electric vehicle charging stations at central locations for residents without a suitable private location, such as a garage or driveway, for charging. The placement of EV charging stations must balance modern mobility needs with the preservation of historical integrity. All EV chargers, including residential, must have an electrical disconnect within 25 feet of the charger easily accessible to first responders.
    c. Encourage all new developments to install Level 2 (220V, 45-amp) electric vehicle chargers.
    d. Ease the permitting for the installation of Level 2 electric vehicle charging in existing homes while ensuring they are installed correctly for safety.
    e. Support commercial Level 3 charging along Route 31 and in the Borough center to incentivize visitors driving EVs to use local businesses.
    f. Replace the Borough operational vehicle fleet with electric or hydrogen-powered vehicles when practical.
    g. Advocate with PSE&G to allow vehicle-to-grid and vehicle-to-home bidirectional charging to improve the economics of EV ownership, replace fossil fuel home backup generators and help meet grid demand in peak periods.
    h. Ensure that emergency service personnel are trained in EV accident response and have the right equipment to respond to an EV fire. Provide guidance to residents on how to help when an EV is involved to avoid an electric shock.

8. Enhance public transportation and other alternative transportation options

a. The Borough should conduct regular surveys to determine where Borough residents travel and under what circumstances they would choose public transport, and what type of services they would use.
b. Based on needs identified from the surveys, collaborate on regional transportation initiatives with the County and the State.
c. Encourage the further development of various transit services for the elderly, disabled, and other transportation-dependent people such as those too young to drive and people who do not own a car.
d. Explore the integration of public and private school transportation services with other transportation services to better serve the needs of the students and the community.
e. Encourage the expansion or development of private transportation services such as taxis, shuttles, carpools and app-based car services to reduce private car use.
f. Make information available to the public on transit services using print and electronic media.
g. Work with neighboring communities in Mercer and Somerset counties to encourage DVRPC's long-term goal to reestablish passenger train service between West Trenton and Bound Brook, with a station in Pennington if the landfill is removed.

9. The Borough should arrange for regular traffic and parking studies in and around Pennington and monitor changes to gauge the effectiveness of actions taken in response to the Mobility Plan.
    a. When the industrial and residential developments in the Township are completed, a comprehensive traffic study should be undertaken to provide recommendations for managing traffic in Pennington. This may be possible by comparing historical and ongoing traffic counts by the Delaware Valley Regional Planning Commission.
    b. Route 31 traffic studies by DVRPC, the State or the County should be designed to generate data of use to Pennington Borough. Long-distance tractor trailer trucks should be counted separately from cars and local delivery trucks.
    c. The Hopewell Valley Regional School District should prepare traffic projections based on student intake from surrounding areas. Items to address would be parking for student drop-off/pick-up at Toll Gate Elementary School, the impact of the Middle and High Schools on Route 31 and West Delaware intersection congestion, and the impact of the reduced availability of school buses in the Borough, and the effect of the cost to residents on bus use.
    d. The Borough should institute a monitoring program to measure the success of the strategies applied in traffic reduction and safety improvement.
    e. The Economic Development Commission should conduct regular studies of business parking needs as businesses and conditions change.

3. Route 31 and its Issues

The section of Route 31 from Pennington Circle to North Main Street was originally constructed as a bypass around Pennington. Like many bypasses, it became a location for shopping centers and other commercial buildings with large, paved parking lots separating the buildings from the roadside. Traffic conflicts are common; vehicles turning into shops and commercial buildings,

and pedestrians and vehicles crossing Route 31 at West Delaware Avenue must contend with heavy traffic driving north and south on Route 31. This becomes acute when the Middle and High Schools are starting and ending a school day. This intersection has also been subjected to flooding in recent storms.

As summarized in the introduction and reported in Appendix A, the Delaware Valley Regional Planning Commission (DVRPC) conducts regular traffic counts around the region, see website https://www.dvrpc.org/webmaps/trafficcounts/. Traffic counts for roads in and around Pennington are presented in Table A1 and on a schematic map of Pennington in Figure A1. From 9,000 to 9,500 vehicles per day join Route 31 northbound from Pennington Circle. Of these, around 8,400 travel as far as the North Main Street intersection, meaning around 800 leave Route 31 for destinations likely on the west side of Pennington. About 900 vehicles join Route 31 from North Main Street. About 3,200 vehicles leave or join Route 31 on Pennington-Hopewell Road, representing traffic passing on Route 31 through Pennington on the way to Hopewell Borough. The DVRPC database does not differentiate between cars and trucks and gives no information on seasonal or weekday-weekend differences. Such data would be useful. Figure A2 shows an hourly vehicle count for Route 31 and shows peaks of about 700 vehicles per hour in each direction in the morning and again in the afternoon.

Only about a half a mile of Route 31 passes though Pennington Borough, from just south of the West Delaware Avenue intersection to the northwest corner of the Heritage development, plus two small triangular sections, one of which includes part of the CSX Railroad bridge and one just south of that bridge. However, Route 31 has a major impact on Pennington Borough from Denow Road to the North Main Street intersection, which includes six gateways to the Borough; Pennington Road, Ingleside Avenue, West Delaware Avenue, Broemel Place, West Franklin Avenue, and North Main Street. Route 31 is the main route out of the Borough to the south and the north. It is of vital interest to the well-being of the many Borough residents who frequent businesses at the Pennington Circle and at the Hopewell Crossing Shopping Center on Denow Road. Pennington Borough must work with Hopewell Township, Mercer County, NJDOT and DVRPC to protect the interest and safety of Borough residents who use this stretch of Route 31.

Truck traffic on Route 31 is a major concern to Pennington Borough and Hopewell Township, and to Flemington Borough, Raritan and Somerville. Routes 31 and 202 provide the most convenient route from I-95/I-295 to I-287/I-87 between the Atlantic states to the south and northern New Jersey, eastern New York, western New England and eastern Canada. Until 1979, through truck traffic was intended to be carried on interstate extension I-95/I-695 to be constructed from a junction north of Route 31 on I-95 (now I-295) to Route I-287. This project was de-designated in 1980 due to local opposition and one result is the current heavy truck traffic on Route 31. See: www.nycroads.com/roads/I-695_NJ/

The Mercer County Mobility Plan uses this de-designation as a cautionary example regarding the need to preserve rights-of-way for transportation: “Preserving the possibility of future connections is one of the most important functions of this mobility plan. Several connections in this plan are almost inconceivable today, either because of current environmental regulations or stakeholder opposition. Conditions of the moment, however, should not forever preclude the possibility of a sensible project. For a cautionary example, the de-designation of an interstate link

between I-95 in Hopewell Township and I-287 in Somerset County was hailed as a victory for preservationists in the 1970s. Today, the same groups rue the heavy truck traffic on US 206 and NJ 31 that the interstate link would have carried, and development has come anyway, filling in the proposed right of way. Seeking to avoid that fate, this plan identifies projects that may be highly desirable if conditions change."

As input to this Mobility Plan, the 2002 Route 31 Design Study Report was reviewed to identify problems and recommend solutions that are still relevant to mobility today. The Report was prepared for Pennington and Hopewell Township by Dodson Associates with the aid of a Smart Growth Planning Grant and was released after three public meetings. See: https://www.penningtonboro.org/sites/g/files/vyhlif5426/f/uploads/2002_route_31_design_study_1.pdf .

Proposals to widen Route 31 to speed up the flow of traffic from I-95 (now I-295) to Route 202 were discussed in the 2002 Study report and are a continuing concern. The existing Route 31 right of way can accommodate four lanes of traffic and widening has been discussed by NJ-DOT in the past. The 2024-2033 NJ-DOT Statewide Transportation Improvement Program (STIP) shows no proposals for Route 31, https://www.nj.gov/transportation/capital/stip2433/sec3.shtm. As voiced by the community at large during the public meetings held by Dodson Associates in 2002, an undivided four (4) lane highway is not acceptable to Pennington Borough and the surrounding community and will be opposed by Pennington Borough and Hopewell Township. However, it is classed by NJ-DOT as a desirable typical section of 4 lanes on the project plan Planned Projects Quadrant Map 5 in Appendix B of the Mercer County Master Plan.

The DVRPC conducts a Congestion Management Program in accordance with Federal guidelines. Its latest report was in 2023, https://www.dvrpc.org/reports/24135.pdf. It explains what is meant by congestion, how it is measured, and how congested sites are ranked so that transportation funds can be most effectively used. It gives congestion data separately for Pennsylvania and New Jersey. Table 7 of the report shows 4 sections of Route 31 being classed as Focus Roadway Corridor Facilities out of 130 such sections in the five NJ counties in the DRVPC region. The section from CR 623 (Pennington Titusville Rd.) to CR 518 (Lambertville Hopewell Rd. is shown as somewhat congested. However, when other criteria are factored in, it gets a low ranking in the allocation of Transportation Improvement Program (TIP) resources compared with other congested sites in the region. An interactive map of the results is found at https://dvrpcgis.maps.arcgis.com/apps/MapSeries/index.html?appid=b2b9f9a42dd84f36a4059db56c89b19e. Clicking on the Focus Roadway Corridors tab and zooming to Pennington shows the section of Route 31 from I-295 to Pennington Titusville Rd. as somewhat congested. Clicking on 8C Pennington Borough on the CMP Corridor and Sub-corridor Areas tab brings up a link to a table of strategies that can be tried to reduce congestion without TIP funding. This data has been copied into Appendix A, following the traffic data. The most promising statement is that it is in the top 20% of NJ sub-corridors for anticipated volume to capacity ratio (V/C) which suggests that it may be in line for funding in the long term. However. It also notes that given the levels of anticipated congestion, adding capacity to existing roads (e.g. 4 lanes for Route 31) and transit capacity-adding strategies are appropriate in this sub-corridor if strategies further up the list cannot adequately address problems without also mixing in new capacity.

Pennington Borough, Hopewell Township and Mercer County should bring their concerns about the Route 31 and West Delaware Avenue intersection to the attention of the DVRPC. As discussed in Section 8a, the DVRPC is currently updating the strategies in its long-range plan, Connections 2050, and is seeking public input on projects to be included in the Transportation Improvement Program (TIP). DVRPC has developed a performance-based Benefit Criteria Evaluation process for new project candidates. Seven benefit criteria are assigned weightings and are used to determine how candidate projects support federal Transportation Performance Measures and align with the vision and goals of the DVRPC plan. Of the seven, this intersection meets three; safety [27%], facility asset condition and maintenance (the frequent flooding) [22%] and reliability and congestion [11%] for an encouraging total weighting of 60%.

DVRPC's long range plan, Connections 2050, presents a table and map of major regional transportation projects in the next 25 years. As discussed in Section 7c below, it includes the re-establishment of passenger service from West Trenton Station to Bridgewater, and on to Newark and New York. An innovative way to reduce truck traffic on Route 31 and Route 202 would be to upgrade this project to accommodate roll-on, roll-off "truck-trains" in addition to the passenger trains. The concept would be to rebuild the line as an electrified double track (it used to be double track until the 1980's, so the track bed is wide enough) and build trains of roll-on, roll-off flat cars. The trains would need to run frequently to be an attractive alternative to driving Route 31/202 for truckers. The rail distance is 25 miles, which would take 30 minutes at 50 mph. The driving trip on Route 31 and Route 202 is 35 miles and takes 55 minutes off-peak. Reduction in fuel cost, driving time and driver stress may make it attractive to truckers and economically viable as an investment. The terminals at each end could be equipped with truck-rated chargers and hydrogen supply, overnight truck parking and food service. Trucks that use Route 206, Route 1 to Route 18, and other routes to and from the northeast may also find it attractive. This potential upgrade to their listed passenger train service re-establishment project should also be discussed with DVRPC.

Returning to the 2002 Route 31 Design Study, specific problems identified in the report that are still relevant today are as follows:

1. Rt. 31 divides the schools and library area to the west from the compact "walking village" of Pennington Borough to the east. Crossing Route 31 can be difficult and dangerous for pedestrians and cyclists, A safer crossing is needed for all and especially for students.
2. Delays of several cycles of the traffic lights on both Route 31 and West Delaware Avenue are experienced at peak hours - encouraging vehicles to seek alternate routes on local streets or County roads.
3. There is an opportunity to locate a new Pennington train station with parking on the east side of the landfill site, integrated with other developments on the site. Recent proposals called for a stop at the Merrill Lynch complex. If the landfill is reclaimed, it would be a good site.
4. Bicycles must compete for space with vehicles while waiting for signals and while riding across Route 31 on West Delaware.

The executive summary of the 2002 Route 31 Design Study report contained 19 general recommendations. The 5 that are still relevant to Pennington Borough today are summarized and edited here:

1. The priority should be to keep traffic on Route 31 rather than displacing it onto local or County roads.
2. Route 31 should not be a high-speed conduit for through traffic that cuts the community apart and requires screening and separation from the surrounding neighborhoods.
3. Prioritize improvement or elimination of dangerous conflicts in turning movements.
4. It is imperative to create a safe crossing at the Route 31 and West Delaware intersection for pedestrians, bicycles, scooters, skateboards, etc. In 2002, there was much interest in the community in exploring either an aesthetically designed overpass or an underpass if it could be well lit, safe and deal with drainage problems at this low point intersection.
5. The Borough should link the Lawrence Hopewell Trail to Main Street. Facilities for safe and convenient bicycle parking should be provided to enhance commercial vitality in Pennington. Continuing the link along West Delaware Avenue and across Route 31 would help emphasize a unified center stretching to the schools.

It should be noted that 5 recommendations from the 2002 Route 31 Design Study report have been acted on, including those in Hopewell Township that have an impact on Borough residents:

1. The intersection of Route 31 and West Delaware Avenue now has left turn lanes in all four directions and left turn traffic lights. The lights also allow pedestrian crossings, although there is still a risk of pedestrian conflict with cars turning left or right on a green light.
2. The speed limit in the Pennington Borough section of Route 31 is 35 mph.
3. The intersection of North Main Street and Route 31 now has pedestrian crossings controlled by traffic lights.
4. A concrete sidewalk now runs along the east side of Route 31 from the Pennington Golf Center north to West Franklin Avenue. There is no sidewalk on the west side of Route 31.
5. A full traffic light will be installed at the intersection of Ingleside Avenue and Route 31. The Great Western Bike Trail proposed recently by Mercer County makes a safe crossing of Route 31 at Ingleside Avenue essential.

The 2002 Route 31 Design Study report suggested that Hopewell Township and Pennington Borough should consider commissioning their own study of future transportation/land use growth for the New Jersey Route 31 corridor. This idea may be worth reviving in view of current congestion and safety concerns.

The Economic Development Commission is concerned that the only current avenues for pedestrians, hikers, and cyclists to move between Town Center and Route 31 are the West Delaware Avenue bridge and the underpass on Broemel. Neither of these routes currently are pedestrian friendly, much less pleasant or encouraging. Residents also report it is difficult crossing West Delaware once one is west of Burd Street. These dis-incentives to non-vehicular movement are compounded for the large number of people (and potential business customers) seeking to cross Route 31 to travel to and from the HVRSD Campus. The Economic Development Plan offers possible solutions to this concern:

i. The West Delaware and Broemel railroad crossings need to be improved, making them more welcoming to pedestrians and better lit.

ii. Redevelopment of the former "Landfill" area, as well as the former Senior Center property at the north end of Reading Avenue, should facilitate and encourage the creation of coordinated streetscapes and new, green, encouraging means for pedestrians and cyclists to move between the Town Center and residential areas, and the Route 31 Corridor, coordinating with the Pennington School and freight railroad as necessary.
iii. Plans to redevelop the Landfill and potentially rezone and redevelop properties at the intersection of Rt. 31 and West Delaware Avenue, and to enhance storm water management proximate to that intersection, should be leveraged to create improved means for pedestrians to cross Route 31. This improvement would be a significant boost to businesses along Route 31, West Delaware Avenue, in the Landfill property, and even in Town Center, by connecting them to the large high school and middle school constituencies.

4. Complete & Green Streets and Vision Zero

Pennington Borough adopted a customized version of the NJDOT Complete & Green Streets policy in 2016. New Jersey has been recognized as a national leader for advancing Complete Streets, which promote safety for pedestrians, bicyclists and other users of New Jersey roadways. NJDOT adoption of a Complete Streets policy in December 2009 made New Jersey one of the first ten states in the nation to make Complete Streets an official internal policy. Mercer County adopted a Complete Streets policy in 2012 and incorporated it into its Mobility Plan Element as revised in 2016 (see Section 8c).

The NJDOT policy requires that future roadway improvement projects include safe accommodation for all users, including bicyclists, pedestrians, transit riders and the mobility impaired. Roads should be built to safely accommodate a variety of transportation modes and users of all ages and abilities. Complete & Green Streets are planned, designed, and constructed to blend with the local community, while meeting transportation needs.

Complete & Green Streets improve safety by providing pedestrians, bicyclists, and drivers with adequate facilities and by reducing travel speeds so that all users can safely use the streets together. Complete Streets improve mobility and accessibility by enhancing the quality and availability of the connections between residences, schools, parks, public transportation, offices, and retail destinations. A walkable community improves overall quality of life by creating an environment where people are encouraged to interact and develop a sense of community.

A review of safety research by the Federal Highway Administration (FHWA) found that a variety of facilities commonly found in Complete & Green Streets design (e.g., marked crosswalks, raised medians, pedestrian refuge islands, traffic control devices, careful bus stop placement, safe routes to school, traffic-calming measures, continuous sidewalks, and walkways, etc.) can serve as efficient countermeasures to pedestrian accidents. Bicyclists and other low-speed vehicle users also benefit from Complete & Green Streets due to slower traffic speeds and the provision of low-speed vehicle-friendly facilities. The benefits of Green Streets also come from the use of green infrastructure (e.g., street trees, rain gardens, permeable pavement, etc.) to manage stormwater and reduce flooding.

The NJDOT Complete & Green Streets program falls under the NJFIT (NJ Future in Transportation) initiative. A complete description of the Complete & Green Streets model policy, along with model resolutions and model ordinances can be found in: https://www.nj.gov/transportation/eng/completestreets/pdf/CS_Model_Policy_2020.pdf .

A Complete & Green Streets policy includes several elements; traffic calming, streetscaping, sidewalk plan and pedestrian mobility, and bicycle and other low-speed vehicle paths:

a. Traffic Calming and Streetscaping

Traffic calming strategies and techniques are important for enhancing the safety of pedestrians and users of bicycles and other low-speed vehicles by controlling traffic speed and increasing awareness of other road users. They help to maintain the residential character of Borough streets and can provide clearly marked pedestrian access routes between residential neighborhoods and local facilities, including schools, shops, recreational facilities, and open space outside the Borough. The Borough has initiated the use of roadway modifications such as "chokers" that reduce the width of the cartway at pedestrian crossings. Other modifications such as raised crosswalks and speed bumps should be considered.

Street trees, especially with branches that overhang the street, can have a calming effect on traffic. The Shade Tree Committee should continue its work to maintain and replace trees lining Borough streets and should continue to work with the County to maintain and replace trees on County roads in the Borough. All streets in the Borough would benefit from a consistent tree maintenance policy. However, accommodating the road, parking spaces, sidewalks, and future bikeways within the right-of-way of Main Street and Delaware Avenue is a challenge that is made difficult by the location of the large trunks of older trees. The root systems of these trees can cause the sidewalk to become uneven and dangerous. In some cases, the trunks are so large that the sidewalk needs to be narrowed. As these large trees die or are removed, the location and eventual size of replacements should be considered as part of the design plan for mobility.

Street lighting, landscaping and furniture (streetscape) play a role in calming traffic and enhancing the pedestrian environment in the downtown area. New sidewalks, decorative streetlights, signs, and benches have been added in the past and this program of beautification should be continued. Enhanced lighting and walkability will support both residents and visitors, encouraging appreciation of the district's historical assets.

Speed limits play a major role in traffic calming, especially when enforced as the police try to do in Pennington. The speed limit in the Borough is 25 mph with one exception, Green Street, which is 30 mph. It is the only street in town with a higher speed limit, even though it is bounded by a Pennington School playing field used recreationally by children of all ages. The start of the 25-mph limit on South Main Street northbound is marked but the sign is partially hidden by a tree branch. The location of the change from 25 to 35 mph going south on South Main Street towards the Circle is unclear as there is no sign on the opposite side of the road from the northbound 25 mph sign. The Borough boundary is just south of Vannoy Avenue, so that is where the 25 mph to 35 mph likely takes place. This should be clearly marked.

The Borough should consider adopting a uniform 25 mph zone with clear zone markings at every gateway. The signage could be modeled on the growing number of "20 mph zones" in the UK, but in Pennington's case would be 25 mph. These often have colored markings and symbols on the roadway in addition to clear signs on both sides of the road. UK regulations can be found in : https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/2733/setting-local-speed-limits.pdf .

The Borough should work with Hopewell Township to extend the zone markings and signs to all Township streets that can only be accessed through the Borough.

b. Pedestrian, Bicycle, and other Low-Speed Personal Mobility Routes

The Master Plans of several benchmarked communities cover sidewalks and bikeways separately but given the limited right-of-way space on local streets and County roads in the Borough, an integrated approach is needed. In some cases, the roadway itself will need to be shared. Bicycles are not for everyone so both sidewalks and bikeways need to accommodate a growing range of low-speed personal vehicles, including skateboards, scooters, e-bicycles, e-scooters, and e-skateboards (one, two or four wheels). These are frequently used by young people who are below driving age. Prioritizing pedestrian and low-speed vehicle mobility does not mean other vehicles are not important or considered; it means the Borough desires to be a place where safety, comfort, and livability for all ages and abilities is the utmost concern. Facilitating travel to and through the Borough by means other than conventional cars and trucks will contribute to the feeling of community.

To promote and encourage personal mobility, the Borough should:

- Design and develop a safe, convenient Borough-wide network of pathways and trails for pedestrians, bicycles, wheelchairs and other low-speed personal vehicles. Eliminate gaps in the current network that prevent a continuous route to destinations such as schools, businesses, churches, recreational facilities, parks, and open space outside the Borough.
- Indicate clearly which roads are part of the share-the-road programs in the above network through highly visible signage and road surface markers. However, the use of "sharrows" marking has become controversial due to the lack of understanding by drivers of the concept. See: https://www.bicycling.com/news/a20044419/what-are-sharrows-used-for/ for more information.
- Designate safe walking, bicycling and low-speed personal vehicle routes to schools, which will benefit children and their parents alike by inculcating healthy habits and independence for the students and reducing the need for parents to chauffeur their children to and from the school and other destinations around town.
- Ensure that the network of pathways is well-maintained and kept clear of brush leaves, and snow and that overhanging shrubbery and trees are trimmed and maintained for the safety of users.
- Provide safe and ADA-compliant crosswalks crossings at roadway intersections or intermediary points where appropriate, especially on routes to schools. Crosswalks should incorporate contemporary best practices, e.g., warning lights, Rectangular Rapid Flashing Beacons [RRFB] to maximize safety for pedestrian and bike/personal mobility.

- Encourage walking and alternate vehicle use for local trips to mitigate roadway congestion and parking demand issues in the downtown core.
- Educate pedestrians, bicyclists, motorists, and other users about the rights and responsibilities of those using Borough roads and other pathways safely. Promote mutual respect among all roadway users through education, enforcement, and encouragement.
- Provide street furniture appropriate to pedestrian and bicyclist needs.
- Develop a downtown bicycle parking plan with appropriate zoning standards.

It is the policy of the previous Borough Master Plan that high volume streets have sidewalks on both sides and that low volume streets, such as cul-de-sacs, loop, and other non-through streets have sidewalks on at least one side, where consistent with potential usage, available right-of-way, environmental concerns, and engineering constraints. This policy is continued in this Plan.

The Circulation/Sidewalk Plan map in the 1998 Master Plan shows the location of all existing and proposed sidewalks and bikeways in the Borough as of 1998. This map should be updated and should show where sidewalks/bikeways and crosswalks could be constructed as funding permits. Priority should be given to the completion of missing links in existing sidewalks and to connecting sidewalks to existing or planned open space pathways.

Ideally the sidewalk on the north side of East Delaware Avenue should be extended to connect to the Lawrence Hopewell Trail extension at the Stony Brook bridge, giving access to Rosedale Park, Mercer Meadows, the Watershed Institute and the Mount Rose Preserve. However, the high bank on the northwest side of East Delaware Avenue leading to the bridge makes this difficult. An alternative proposal from the Open Space and Recreation Plan element is the "Stony Brook-Presidential Hill Connector." This connector would link the LHT Pennington Connector with the Pennington neighborhoods south and west of East Delaware Ave. It would consist of:

- A crosswalk across East Delaware Avenue at its intersection with King George Road.
- A new bicycle-capable trail along the southeast side of East Delaware Avenue from Stony Brook to the intersection of East Delaware Avenue and Federal City Road. This can be an off-road trail because the land is owned by the County.
- A crosswalk across Federal City Road at that intersection to the fire road access to Presidential Hill.
- Surfacing the fire road up to Madison Avenue, from which cyclists and pedestrians can safely use neighborhood streets to the southeast quadrant of Pennington.
- Extending the sidewalk on the south side of East Delaware Avenue to the Federal City Road crosswalk to give access to the LHT from the center of Pennington.

The recently replaced railroad bridge on North Main Street does not have a protected path for pedestrians, bicyclists and other users. It is narrow and entering the bridge from either direction has blind corners due to the sharp curve. The Borough and Hopewell Township should consider installing a footbridge over the railroad at the side of the road bridge using the existing piers from the previous road bridge. This should be tied into sidewalks leading to the Route 31 pedestrian crossing at the traffic light.

The Greater Mercer Transportation Management Association (GMTMA) published its Greater Mercer Trails Plan in November 2019, see: https://gmtma.org/wp-

content/uploads/2020/02/gmtn_report_final_updated_print-v2-1.pdf . This report is a valuable resource on existing trails and future trail plans. Chapter One summarizes engagement and collaboration efforts to understand and evaluate vision, goals, and priorities. Chapter Two establishes the region's baseline conditions and context, and defines mobility and safety needs, existing barriers and constraints, and opportunities for improvement. Chapter Three presents the Framework Plan with hundreds of proposed individual actions to improve multimodal mobility and safety. Chapter Four documents the prioritization methodology and Implementation Matrix of proposed improvements.

A recent addition to the Mercer County Master Plan is the 2020 Bicycle Master Plan https://www.mercercounty.org/home/showpublisheddocument/19206/637352618600000000 .

The New Jersey Bicycle and Pedestrian Master Plan describes initiatives to promote walking and bicycling by providing technical and financial aid. The Borough should consult this plan as it designs and implements its network of pathways. See: https://www.nj.gov/transportation/commuter/bike/pdf/bikepedmasterplanexecsumm2016.pdf#:~:text=The%20New%20Jersey%20Bicycle%20and%20Pedestrian%20Master%20Plan,are%20routine%2C%20convenient%2C%20and%20secure%20throughout%20the%20state .
It recommends that sidewalk and bikeway improvements should be implemented when:

- Roads are due for resurfacing or other routine maintenance
- Grants or other funding is available
- Programs are developed that support a walking and bicycle friendly community and encourage more people to walk or bicycle as a means of daily transportation.

c. Borough Roadway Improvements

In addition to recommendations specific to Route 31 detailed in Section 3, there are improvements that should be considered for Borough streets and County roads:

- The recent realignment and traffic signal timing at the intersection of Main Street and Delaware Avenue has created multi-light-change delays for traffic on Main Street in peak periods. The delays are due to traffic turning left onto East or West Delaware Avenue being prevented from turning by oncoming traffic on both South and North Main Street. The consequence is that many drivers bypass the intersection using Abey Drive and Eglantine Avenue. One fix is to create divided light timing for Main Street traffic as is done for Delaware Avenue traffic. Another is to create a left turn lane on northbound Main Street so that straight ahead and right-turn traffic can proceed without waiting for left-turning cars. This problem is acute for northbound traffic on South Main Street at peak periods and is exacerbated by the (necessary) traffic light hold for pedestrians to cross.
- The bridge replacement planned by Mercer County over Stony Brook on Pennington to Rocky Hill Road should be designed and built to accommodate safe bicyclist and pedestrian crossing of Stony Brook on both sides of the road. It is the sole connector between Pennington Borough and the Lawrence Hopewell Trail (LHT).
- The flooding experienced during tropical storm Ida in 2021 and Debby in 2024 on Abey Drive, Broemel Place, Knowles Street, Eglantine Avenue and North Main Street should be investigated and corrected.

5. Parking

Anecdotally, it is thought that parking in the Town Center is insufficient to meet the needs of local businesses. The Economic Development Commission should survey local businesses to quantify the issue. How many more spaces are needed and what is the range of parking times that are needed? There are all-day needs for employees, and shorter stays for customers. There are also the long-term needs of residents who live above businesses, or in nearby residences. The EDC should also determine if lack of parking is an impediment to businesses starting up in the Town Center and if so, how much more public or on-street parking is needed to satisfy them. Parking solutions proposed within the district should prioritize compatibility with its historic setting.

Once this data is available, the Borough can look for creative ways to increase the available parking, if it is needed. Options include allowing owners of parking areas with spare capacity, such as businesses, churches, and schools to charge for parking using an app-based phone system. It would likely be necessary for a single app-system to be selected for ease of use by residents. The app can be programmed so that owners can restrict parking when their own users need it. Would Pennington School allow the creation of a pervious gravel parking area on part of the field behind Borough Hall? Another option is to convert the back lots of properties on the west side of South Main Street between Sumo Sushi and the Methodist Church to a Borough parking lot. Most of these buildings are commercial and access from parking at the rear would be a benefit. The land could be purchased or leased for a tax break on the land portion used for parking. From Google Earth, the area is estimated to be 70 x 250 feet, which is sufficient for about 50 cars in two rows. (Thanks to Zoning Officer John Flemming for this suggestion).

On Main Street and Delaware Avenue, there are traffic conflicts caused by residential parking when bicycles and other personal vehicles need to move out into the main traffic lanes to pass the parked vehicles. It is easy to just say the personal vehicle users should use streets that are not as busy, but most choose to take the shortest route, which often is these two roads. Given the limited space in the right-of-way, few options are available. One would be the use of sharrows markings together with enforcement of the speed limit. Other options should be sought. A similar concern for bicyclists and personal vehicle users arises when contractors or delivery vehicles park on these main roads. Perhaps sharrows marking should be considered for the full length of both roads where dedicated small vehicle lanes are not possible.

6. Zero-GHG-Emission Vehicles

An essential contribution to mitigating the effects of climate change is to limit the emission of greenhouse gases from human activity. Recognizing that cities and states throughout the U.S. are adopting greenhouse gas emission reduction targets and strategies, Pennington Borough Council resolved in Resolution 2021-3.4 that:

1. The Environmental Commission will be responsible for reporting to Council on an annual basis the amount of carbon released by the Borough and the amount of carbon offset.

2. The Environmental Commission will assist the Borough in developing strategies to migrate away from carbon energy sources.
3. Pennington Borough will become Carbon Neutral in all of its operations by 2035.
4. The Environmental Commission will use the Borough's efforts to become carbon neutral as a way to educate and encourage Borough residents and businesses to become carbon neutral.

In response to item 4, the Environmental Commission, with Council approval, will develop a Community Energy Plan following a template developed by Sustainable Jersey under a grant from the New Jersey Clean Energy Program (NJCEP). The template lists seven strategies, the first of which is to reduce energy consumption and emissions from the transportation sector. The transportation strategy contains the following elements:

1. Adopt supportive zoning and regulations for EV infrastructure.
2. Install public chargers and encourage workplace EV charging infrastructure.
3. Improve municipal fleet efficiency and purchase alternative fuel vehicles.
4. Train first responders and non-emergency staff on EVs and charging equipment.

If Borough residents converted to EVs, it is possible to reduce the Borough's annual CO_2e (carbon dioxide equivalent) emissions by over 7,000 metric tons per year, 2.5 tons per year per resident. This is 25 times larger than the reduction of 276 tons that can be achieved by making all municipal operations carbon neutral. See Appendix C for details.

It should be noted that there are two other zero-GHG emissions technologies that are competing with battery-electric vehicles. Both are based on green hydrogen, which can be produced by electrolysis of water using solar or wind electric power generated in excess of grid demand. The first hydrogen technology is the fuel cell, which uses electrochemistry to combine hydrogen with oxygen from the atmosphere to generate electricity and water. The electricity produced will charge a battery and drive an electric motor. The second technology uses hydrogen directly in an internal combustion engine, which could be either a piston engine or a gas turbine. Hydrogen is under test for use in buses, trucks, and rail. These contribute about 25% of the CO2e emissions, or about 10 MMT CO2e in New Jersey. Whilst Pennington is not home to many trucks or buses, hydrogen filling stations should be considered along with EV battery charging on Route 31.

Two issues being addressed by the EV industry are increasing the energy storage density of batteries to increase range, and battery recharging time. To compare EV to gasoline charging times, the 10 gallons needed for a range of 300 miles with the 30-mpg car takes about a minute to pump at a gas station. For the EV average 2.9 kWh/mile, a charge of 103 (300/2.9) kWh is needed. Appendix C calculates the time needed to deliver 103 kWh for each of the three classes of EV charger:

- Home Level 1 Charger: 120V 20A = 43 hours per 300 miles range
- Home Level 2 Charger: 240V 40A = 11 hours per 300 miles range
- Commercial Level 3, NJ: 480V 310A = 40 minutes per 300 miles range
- Commercial Level 3, max: 480V 730A = 18 minutes per 300 miles range

The actual charging time depends on the EV's battery control system, so times may be longer. Also, the total number of Level 3 charges during the lifetime of an EV battery may be limited

due to the high electric current. The analysis tells us that a 120 V Level home charger would only give a range of about 80 miles after an overnight 12-hour charge. This may be sufficient if all car use is local and infrequent, but for many users, a Level 2 charger is needed.

There are currently some financial incentives for Level 1 and Level 2 charger installations in New Jersey. Details can be found on the DEP website https://dep.nj.gov/drivegreen . PSE&G, which serves Pennington Borough, has an Electric Vehicle (EV) Charging Program to support the deployment of residential, mixed-use (commercial), and public Direct Current Fast Charging (DCFC) electric vehicle chargers for a broad range of customers.

A development that is gaining traction is the concept of bidirectional charging. This comes in various forms, vehicle to grid (V2G), vehicle to home (V2H), vehicle to load (V2L), vehicle to vehicle (V2V) and vehicle to everything (VTX). V2G allows utility companies to use EV batteries as a supplemental storage capacity for the grid. Electronic control and smart meters can balance energy withdrawals from car batteries to meet high demand, while charging to meet the anticipated needs of drivers. Avoiding charging in periods of high demand and high cost and promoting off-peak charging at a reduced cost provide economic incentives to V2G EV owners. V2H allows a car battery to be used in place of a fossil-fueled generator to provide power to a home during power outages. It can also be used to replace high-cost, peak demand electricity for powering a home with power from the EV battery and recharging the EV when the grid cost drops. This too will need a smart meter and support from the utility. Pennington Borough should canvas PSE&G for this capability for its residents. V2L allows camping and outdoors equipment to be powered from the EV battery and could be of value to contractors working in remote locations. In both cases it could replace gasoline-powered generators. V2V allows the transfer of charge from one vehicle to another and could help those who run out of charge on the road. V2X does not yet exist but is proposed.

Amendments to the Municipal Land Use Law adopted in August of 2021 included many provisions specific to the installation of electric vehicle supply equipment. The details can be found in the 2023 Pennington Borough Master Plan Reexamination report, Section C8, Electric Vehicles.

The landscape for personal EVs is changing dramatically. All major domestic and foreign automobile manufacturers have EVs in their portfolio and there is significant growth in the industry. Tariffs have been imposed and proposed to protect domestic manufacturers in many countries, including the US. There is tremendous academic and commercial innovation on EV drive train design and batteries, and the market is continually changing. Competition is fierce and prices are dropping, while quality, reliability and vehicle capabilities are improving. Some states are introducing regulations to limit or eliminate the sale of new fossil fueled cars by a certain date. New Jersey has set 2035 as the last year for the sale of new fossil fueled cars and light trucks, which necessitates the installation of charging stations in homes and public places soon.

Commercial charging stations in the country are becoming profitable as the number of EVs increases, and private investment is taking the place of state-led initiatives. Energy companies such as BP (BP Pulse) and Shell (Shell Recharge) are dedicating forecourt space at gas stations to Level 3 fast chargers, as well as installing standalone charging locations. ExxonMobil has not

yet shown signs of interest, but the Exxon gas station at Route 31 and West Delaware may be an option for fast chargers in Pennington. There is a move to harmonize the charging infrastructure so that EVs from different manufacturers will be able to recharge at any charging station.

There is also a need to increase the capacity and robustness of the grid to supply the electricity needed for the growing EV fleet, both personal and commercial, and for the switch to electricity for many domestic and commercial applications. Pennington Borough can only advocate in support of this. Without it, the grid is in danger of becoming unstable in periods of high demand.

A final area to consider is safety. It is generally considered to be safe to charge an EV in an attached garage at home if the charger is installed correctly, used correctly, and maintained periodically. Installation is covered by the NJ Uniform Construction code. The Borough should ensure that EMS and Fire Department volunteers and professionals receive training and the correct equipment to deal with EVs involved in accidents. Guidance should be offered to Public Works staff in case they have problems with the Borough's EV fleet or are the first to arrive at an accident scene and offer help. Similar guidance could also be offered to residents.

The Borough needs to be flexible and nimble with regulations to keep up with rapid developments in the EV field. We should consider allowing EV repair and maintenance facilities to locate in the Borough as these would have minimal impact on the environment and would be good business opportunities. We should educate our residents that as the EV fleet grows, it will be necessary for the state to charge EV owners annually to pay for roads as revenue from the gas tax declines.

7. Public Transit

The Greater Mercer Transportation Management Association (GMTMA) was established in 1984, and consists of large and small employers, local governments, authorities and state agencies who share a commitment to providing transportation choices that are good for commuters, good for business and good for the environment. Their website https://gmtma.org has links to a variety of publications, and lists the following services:

- Employers; Programs and Services, NJ Smart Workplaces, Rideshare
- Property Managers; Transportation, Good Moves, Biking
- Seniors Senior Programs; RideProvide, Travel Training
- Schools; Safe Routes to School, Walking School Bus, School Pool
- Commuters; Bus and Train Services, Commuter Tax Benefit, Biking
- Community; Educational Programs, Street Smart, Mobility Guide

Pennington Borough should ensure that residents and businesses are aware of GMTMA services and take advantage of them.

GMTMA annually publishes a Mobility Guide for Mercer County. The 2024 edition includes the following topics; How to ride an NJ Transit bus and the NJ Transit Access Link; How to ride the train (NJ Transit, SEPTA and Amtrak); Taking bikes on transit; Biking and Walking in Mercer County; and how to get to popular destinations in Mercer County by public transit. It gives links to timetables, transportation company websites and apps. Under community transportation, it

covers the following options available to Pennington residents, Mercer County T.R.A.D.E., Hopewell Valley Rides, RideProvide, and Medicaid transportation provided by Modivcare.

Services provided by GMTMA to communities include education programs; Clean Air Out There (air quality education program), Bike Safety, Pedestrian Safety, Walking for Health and Happiness (senior mobility and safety), and Travel Training (instruction for inexperienced transit users on how to use public transit in Mercer County. Community services include setting up Walking School Bus routes under the Safe Routes to School program, and Walkability Audits to identify concerns for pedestrians related to the safety, access, comfort and convenience of the walking environment and to help identify potential solutions such as engineering treatments, policy changes or education and enforcement measures. Pennington Borough should take advantage of these services. GMTMA will also set up a table covering transportation options at a community fair and we should consider this for Pennington Day.

Public transit works well in dense urban locations but less so in suburban and rural communities. It is successful when buses or subways are frequent enough that a timetable does not need to be consulted, which is only cost-effective in urban locations. From Pennington, personal cars are the common choice for short and medium length trips. For longer trips by train or plane, driving to a station or airport is preferred. Public transit may be chosen when the cost of parking is sufficiently high (e.g. Newark Airport). Alternatively, ride services such as Uber, Lyft, taxi or limousine may be used.

The Borough should conduct a survey to determine where people travel and under what circumstances they would choose public transport and what type of services they would use. With this data, collaboration on regional transportation initiatives with the Delaware Valley Regional Planning Commission, Hopewell Township, Mercer County and the State will be possible. Below is a summary of current public transit options serving Pennington.

a. Bus Route

The Borough is currently served by NJ Transit Bus route 624, which runs between Pennington and Plum St. at Enterprise Avenue in East Trenton via the Trenton Transit Center. There are 17 services on weekdays running hourly from Pennington from 5:20 am to 8:20 pm with a late bus at 9:50 pm, and 6 services on Saturdays, every two hours between 8:00 am to 6:00 pm. Holiday services are as for Saturdays with the addition of a 6:00 am bus. There is no service on Sundays. Buses circulate with return service from Trenton to Pennington after a waiting time of about 15 minutes at Plum Street. The waiting time at Broemel Place in Pennington is about 40 minutes.

At the Trenton Transit Center, about a 40-minute ride from Pennington, passengers can connect to the train services of Amtrak, NJ Transit, SEPTA and the River Line. It would probably be used more often to connect with trains if services were more frequent, such as every half hour, and extended to later hours and if services on Saturday and Sunday were the same as for weekdays. Parking at Trenton station is $20 per day, and the bus would be an economical and convenient option. It would also be more practical if some of the 40-minute waiting time in Pennington was instead used to pick up passengers in the northern section of Pennington, with a route such as Broemel Place, Green Street, Franklin Avenue, Eglantine Avenue, King George

Road, East Delaware Avenue then turning left on South Main Street to join the current route. When people see the regular bus service, they may be more inclined to use it. There are multiple bus stops in town that do not have shelters, which does not promote usage of the bus. NJ Transit will arrange for, and bear the cost of, installing bus shelters at bus stops established by municipal resolution provided that a local sponsor, public or private, will agree to accept responsibility for maintenance and liability.

b. Mercer County T.R.A.D.E.

Mercer County T.R.A.D.E. (Transportation Resources to Aid the Disadvantaged and Elderly) provides transportation services to Mercer County residents who are senior citizens (60+) or people with disabilities or are economically disadvantaged. Trips are either by subscription or on demand as needed and reservations must be made in advance by phone. Trips are free but there is a $1.00 suggested donation. This service should be promoted within the Borough. https://www.mercercounty.org/departments/transportation-and-infrastructure/t-r-a-d-e

c. Hopewell Valley Rides

Hopewell Valley Rides is a transportation service offered by Hopewell Township. It is available to residents aged 60+ and adults with disabilities within Hopewell Valley (Pennington, Hopewell Borough, Hopewell Twp.) Wheelchair accessible service is available. Rides are provided by car through the RideProvide program. After registering, eligible residents can purchase vouchers for $5 per one-way trip. Rides can be requested by calling RideProvide 48 hours in advance to ensure availability. Rides are available from 8:00 am to 5:00 pm Monday through Friday. Free trips are provided to and from Princeton Healthcare System facilities and RWJ Hospital and other select facilities. A brochure on the service can be found at: https://www.hopewelltwp.org/DocumentCenter/View/129/Hopewell-Valley-Rides-Brochure-PDF

d. Passenger Rail

Train services are not available from Pennington. Services to Philadelphia and beyond can be accessed via train stations at Trenton and West Trenton, and to Newark and beyond from Trenton and Hamilton. Long-distance services are provided by Amtrak, local services by NJ Transit and SEPTA.

The re-establishment of passenger service on the CSX line from West Trenton to Bridgewater (and on to Newark) is listed on the Delaware Valley Regional Planning Commission's Table of Major Regional Projects (https://www.dvrpc.org/webmaps/mrp2050/#page2) . It is shown as an illustrative project under Transit Expansion that needs to occur in the next 25 years but has not yet been moved into the Transportation Improvement Program (TIP). It is also shown on the DVRPC map of projects https://www.dvrpc.org/webmaps/mrp2050/#map. Since DVRPC only covers Mercer County, it only mentions future stations near I-295 in Hopewell Township and in Hopewell Borough, but it is likely to include one or more stations in Somerset County. The table shows a cost estimate of ~$700 million. If the Pennington landfill is reclaimed, it could be a

preferred site for a station over the Merrill Lynch site near I-295. This idea should be communicated to the DVRPC for consideration along with the truck-train idea in Section 3.

An interesting discussion on the history and issues of the West Trenton to Bound Brook and Bridgewater rail line can be found online in https://railroad.net/reviving-passenger-service-between-west-trenton-bound-brook-t8100-270.html . Passenger trains last ran on this line in 1981 and there was no stop in Pennington. One downside to consider would be the negative reaction to the noise of additional trains from those living close to the line. CSX may also resist this change because the overhead electric catenary does not provide enough clearance for their double-decker freight trains. The SEPTA and CSX tracks south from West Trenton were separated recently for this reason. However, two-way scheduling should be easier for CSX with a return to double track and CSX could run the truck trains for profit.

In 2001, a Transportation Subcommittee of the Hopewell Borough Planning Board conducted a Hopewell Borough-wide survey to determine if the community was in favor of this reactivation. The survey results were presented in the 2007 Hopewell Borough Master Plan. The results of the 272 surveys returned showed that the Borough was almost evenly divided on the question (49% want no rail stop in the Borough and 46% are in favor of a rail stop in the Borough). The number one reason given by those opposing the stop was increased traffic congestion while the top reason provided by those in favor of a stop was convenience. A new survey, including residents of Pennington and Hopewell Township, and in Somerset County, should be conducted, possibly through the GMTMA or DVRPC.

8. Relationship with Regional Transportation Plans

a. Delaware Valley Regional Planning Commission (DVRPC)

DVRPC is the federally designated Metropolitan Planning Organization (MPO) for the Greater Philadelphia region, established by an Interstate Compact between the Commonwealth of Pennsylvania and the State of New Jersey. Pennsylvania members are Bucks, Chester, Delaware, Montgomery, and Philadelphia counties, plus the City of Chester. New Jersey members are Burlington, Camden, Gloucester, and Mercer counties, plus the cities of Camden and Trenton. DVRPC serves strictly as an advisory agency. Any planning or design concepts as prepared by DVRPC are conceptual and will require engineering design and feasibility analysis. Actual authority for carrying out any planning proposals rests solely with the governing bodies of the states, local governments or authorities that have the primary responsibility to own, manage or maintain any transportation facility.

DVRPC's vision for the Greater Philadelphia Region is a prosperous, innovative, equitable, resilient, and sustainable region that increases mobility choices by investing in a safe and modern transportation system; that protects and preserves our natural resources while creating healthy communities; and that fosters greater opportunities for all. DVRPC's mission is to achieve this vision by convening the widest array of partners to inform and facilitate data-driven decision-making. They are engaged across the region, and strive to be leaders and innovators, exploring new ideas and creating best practices. DVRPC provides services to member governments and

others through planning analysis, data collection, and mapping services. Aerial photographs, maps and a variety of DVRPC publications are available to the public. The DVRPC traffic count data was used in the analysis in Appendix A, as discussed in Sections 1 and 3 above and the DVRPC emissions report results are mentioned in Section 6.

As an MPO, DVRPC conducts the regional Congestion Management Program in accordance with Federal guidelines. Its latest report was in 2023, https://www.dvrpc.org/reports/24135.pdf and the current recommendations for Pennington Borough are discussed in Section 3 above. DVRPC's current strategic plan, Connections 2050, was approved in 2021 and is currently being updated. Details of the process can be found on https://www.dvrpc.org/plan/. Public input is being sought to update the strategic plan, and proposed projects will be considered under their weighted Benefits Criteria process for inclusion in the Transportation Improvement Program (TIP). An informative slide show on developing and implementing the TIP can be found on: https://dvrpcgis.maps.arcgis.com/apps/Cascade/index.html?appid=725da42575294635b4deb8fd2eee953d .

As a member of the DVRPC, Pennington is also a member of the Central Jersey Transportation Forum (CJTF) formed in 1999, https://www.dvrpc.org/centraljerseytf/, https://centraljerseytf.org. CJTF strives to integrate land use and transportation among municipal and county leaders at the border of two Metropolitan Planning Organizations in the Central Jersey area. Facilitated by the Delaware Valley Regional Planning Commission in coordination with the North Jersey Transportation Planning Authority and New Jersey Department of Transportation, this partnership has maintained progress toward coordinated land use and transportation planning and development, information sharing and collaboration, and the exchange of information and resources. continue this participation to gain technical assistance and influence regional transportation issues.

b. Hopewell Township Master Plan

Since all traffic entering and leaving Pennington Borough does so through Hopewell Township, the Circulation Plan element of the Township's Master Plan and this Mobility element should be largely in agreement on traffic management issues. In addition, since a much larger stretch of Route 31 is in Hopewell Township, any proposals for Route 31 will impact Pennington. The current version of the Township's Master Plan was adopted in May 2002. It can be found at https://www.hopewelltwp.org/DocumentCenter/View/856/Master-Plan-2002-PDF. The Master Plan did not include a circulation plan element, but 12 transportation goals were presented, the first which was to develop a circulation plan. A Circulation Plan was adopted in March 2006: https://www.hopewelltwp.org/DocumentCenter/View/8613/Circulation-Plan-Element---Adopted-March-9-2006 . The Route 31 aspects of the Plan build off the recommendations in the 2002 Route 31 Design Study, discussed in Section 3 above. There was also a positive discussion on the merits of reestablishing passenger trains on the West Trenton line. At the time it was shown as an NJ Transit candidate project. A Master Plan reexamination report was adopted in December 2021: https://www.hopewelltwp.org/DocumentCenter/View/8410/2021-Periodic-Reexamination-of-the-Master-Plan-and-Development-Regulations-PDF . The only additions to circulation in the reexamination report were related to the Lawrence Hopewell Trail.

c. Mercer County Master Plan

The Mercer County Master Plan was adopted in September 2010 and amended in May 2016. The Master Plan and associated plan elements were developed after three public meetings held in 2006/7, resulting in a Regional Action Plan (RAP). The framework document can be found at: https://www.mercercounty.org/home/showpublisheddocument/1242/636058423221200000

Mercer County's vision for balanced growth throughout the county focuses on four outcomes, two of which concern transportation:

- Adequate level of housing choice and affordability that makes it possible for residents to live in the county throughout their lives.
- Adequate transportation and housing choice to maintain an educated workforce and a stable economy.
- Enhanced core transportation corridors through the implementation of access management, connectivity, and wise land use decisions.
- Continued strategic investment in open space and recreational facilities so that residents and employees enjoy enhanced quality of life in the county.

The Master Plan is divided into three sections; economy, transportation and environment. Under transportation, the key findings from the RAP meetings were

1. Commute times continue to increase.
2. People live further from their jobs or are commuting on congested roads.
3. The automobile continues to dominate personal transportation while public transit usage remains limited.
4. Land use patterns contribute to roadway congestion, auto dependency, and demand for public transit.

Key goals identified were

1. Enhance travel options.
2. Encourage land uses to support transit.
3. Improve social equity in access and mobility.
4. Manage congestion.

The following introduction to Transportation Policies and Strategies is taken directly from the Master Plan Framework document:

"Mercer County is closely linked to a growing global economy through its transportation network. The variety of existing transportation options in the county contribute to residents' quality of life. The county will continue to invest and maintain investments in existing roads, bridges, and airports, and strategically invest in future public transportation projects in order to move people efficiently to and from destinations within the county and beyond to support regional economies.

With aging infrastructure and the increasing costs associated with construction of new roads and bridges, there is an increasing opportunity to improve roadway capacity on existing roads

especially where they service redevelopment and new development resulting in centralized land use patterns.

The availability and accessibility of a variety of transportation options for residents and workers in the county, including site conditions that encourage pedestrian activity, is a critical element to successful, sustainable mixed-income housing development. Planning for denser housing near transit service not only reduces roadway congestion but also addresses social equity objectives by providing mobility and access for population segments with no access or limited access to automobiles and for those populations who have no desire for an auto-dependent lifestyle.

Recognizing that not all workers will live where they work, transportation policy encourages expansion of existing public transportation capacity and roadway improvements that support commuters and appropriately direct freight movement through the county to surrounding metropolitan areas. County input on the effect of state and federal road improvements, especially those directly connecting the surrounding metropolitan areas of Philadelphia and New York City, on county travel patterns will continue to be needed as capital investments are made in the future to support economic growth statewide."

Policies developed for transportation are as follows.

1. Direct growth to transit corridors and centers.
2. Promote compact design, walkable and mixed-use centers, that support transit.
3. Match jobs to housing to reduce long auto commutes to work.
4. Promote strategic capacity expansion to support compact development and multimodal options.
5. Promote county road access management to enhance safety and capacity.

Strategies associated with these policies may be found in the online Framework document.

The County Mobility Plan was also adopted in September 2010 and amended in May 2016: https://www.mercercounty.org/home/showpublisheddocument/1250/636058423231670000
The County is working on an update to the Plan.

Section 4 of the Mobility Plan details policies and associated strategies. The policies are

1. Preserve existing transportation facilities.
2. Improve safety for all travelers.
3. Promote choice of travel mode.
4. Promote land uses that reduce reliance on automobiles.
5. Link transportation improvements to economic and environmental goals.

Strategies associated with these policies may be found in the online Mobility Plan document.

Observations from the County Mobility Plan of relevance to Pennington are as follows:

1. "Preserving the possibility of future connections is one of the most important functions of this mobility plan. Several connections in this plan are almost inconceivable today, either because of current environmental regulations or stakeholder opposition. Conditions of the moment, however, should not forever preclude the possibility of a sensible project. For a cautionary example, the de-designation of an interstate link between I-95 in Hopewell

Township and I-287 in Somerset County was hailed as a victory for preservationists in the 1970s. Today, the same groups rue the heavy truck traffic on US 206 and NJ 31 that the interstate link would have carried, and development has come anyway, filling in the proposed right of way. Seeking to avoid that fate, this plan identifies projects that may be highly desirable if conditions change."

2. Route 31 is classed by NJ-DOT as a desirable typical section of 4 lanes on the Planned Projects Quadrant Map 5 in Appendix B. No proposed projects are shown for Route 31.
3. Under Policy 3, Promote choice of travel mode, Freight: Work with NJDOT, DVRPC, and municipalities to develop standard routes for freight vehicles, both through the county and to destinations within the county, including retail and commercial and industrial sites, distribution centers, and intermodal facilities.

d. New Jersey Department of Transportation (NJDOT) Long Range Transportation Plan

The current New Jersey mobility plan is the State Long-Range Transportation Plan (SLRTP), published in October 2008 with the title "Transportation Choices 2030". It can be found at https://www.nj.gov/transportation/works/njchoices/pdf/2030plan.pdf. The goals of the plan are given in Section 5 and are reproduced here with the associated policies. Strategies for each policy can be found in Section 5 of the plan.

1) Maintain and renew transportation infrastructure
   - Fix it first
   - Fix it efficiently
   - Back to basics
2) Integrate transportation and land use planning
   - Champion smart growth
   - Create better "tools"
3) Increase safety and security
   - Make travel safer
   - Reduce risk
4) Improve mobility, accessibility, and reliability
   - Counter congestion with multimodal solutions
   - Improve connections
5) Operate efficiently
   - Reduce delay
   - Give customers choices
6) Respect the environment
   - Promote environmental stewardship
   - Enhance quality of life
7) Optimize freight movement
   - Increase freight system capacity and efficiency
   - Integrate freight into transportation and land use planning
   - Target investments in key freight hubs and corridors
8) Continue to improve agency effectiveness
   - Enhance interagency coordination
   - Improve customer satisfaction

- Deliver projects and services on time and within budget

The State is currently working on an updated plan "Keep It Moving NJ!" aimed at 2050. No release date for the plan has been given. NJDOT describes the plan as "a forward-thinking initiative to consider current challenges and anticipate future needs, ensuring that our transportation infrastructure remains robust and resilient. By developing this plan, we aim to create a sustainable and adaptable transportation network that promotes safety, reduces congestion, supports economic growth, and improves the overall well-being of our citizens for decades to come." They are currently obtaining input from the public and the themes under consideration can be found in the first question of their online survey:

"NJDOT and NJ transit have proposed the following goals for New Jersey. Which three are most important to you?:

1) Maintenance
   - Keep our transportation infrastructure (roads, bridges and public transportation), facilities and equipment in good condition.
2) Eco-friendly
   - Promote a more environmentally friendly transportation system.
3) Effectiveness
   - Improve the effectiveness of transportation agencies.
4) Accessibility
   - Expand equitable access to jobs and services through transportation, especially in areas that do not have as many resources.
5) Resilience
   - Ensure that the transportation system can withstand climate change, extreme weather conditions and emergencies.
6) Partnership
   - Integrate transportation and land use planning
7) Safety
   - Enhance safety and reduce traffic deaths
8) Mobility
   - Make travel more accessible, easier, and reliable
9) Goods movement
   - Identify opportunities to move freight more efficiently
10) Efficiency
   - Operate the transportation system efficiently."

In its Mobility Plan, Mercer County describes its relationship with NJDOT as follows: "NJDOT is a primary partner with Mercer County for local project implementation through its local aid formula funding (state funds) for bridge and highway maintenance. NJDOT is also a very active participant in developing DVRPC's TIP, since most federal funding goes to projects on state-maintained interstates and federal highways. County participation and support for these projects is vital because federal and state highways are the primary links in the county's transportation network. This relationship is key to projects on State Route 31 in Pennington and Hopewell Township.

9. Relationship with Other Plan Elements in Master Plan 2025

The Mobility Plan impacts and is impacted by other Master Plan elements as follows:

Land Use Plan Element. This plan relates to the Borough's zoning and potential redevelopment areas. Mobility needs will be impacted by the Borough's development and redevelopment plans. Land required for suggested improvements in roads, sidewalks and trails will need to be incorporated in the Land Use Plan.

Housing Plan Element. The borough has identified areas of redevelopment which have the opportunity for high density housing, including affordable. The impact of these developments on highway access and increased traffic volume needs to be considered in the Mobility Plan. The Plan also should keep abreast of development in areas surrounding the Borough, which may have an impact on Borough traffic and require remediation.

Utilities Plan Element. The implementation and maintenance of many goals and strategies of the Mobility Plan will be the responsibility of the Department of Public Works. We need to be mindful of the capacity of the Department to do this work and build it into the Utilities Plan. The impact of Mobility projects on local taxes needs to be kept under control so we may retain the diverse age of population we have now instead of people moving away once their children are gone. The Municipal Stormwater Management Plan (MSWMP) is not part of the Master Plan but is referenced in the Utilities Plan. The goals of the MSWMP must be respected when considering mobility infrastructure changes. Improvements close to waterways or wetlands, such as bridge or culvert replacements, should include restoration of the natural systems in the scope of work, where appropriate. Heavy rainfall and flooding, damage from severe storms, and pollutant infiltration from road runoff may impact the operation of Borough utilities.

Economic Development Plan Element. This Plan considers all aspects of commerce and economic development in the Borough. Effective and diverse mobility options are an important piece of economic activity. Parking is critical and a balance of the needs of residents, employees and customers will need to be found. There is also an opportunity to reduce the amount of impervious coverage for parking by replacing it with pervious cover to improve groundwater replenishment and reduce flooding. Many such opportunities exist with business parking.

Open Space and Recreation Plan Element. This Plan makes recommendations on improving access to local recreation facilities and open spaces. These are mostly for cyclists and pedestrians and often require dedicated trails or road lanes. The Mobility Plan and the Open Space and Recreation Plan need to be consistent.

Conservation Plan Element. Conflicts between the Mobility Plan recommendations and the Conservation Plan need to be avoided. The Conservation Plan incorporates the Borough's Community Forestry Management Plan by reference and many of the Borough's trees grow on the rights-of-way of Borough and County Roads. The desire for shade trees and Mobility Plan

strategies for space for pedestrians, bicyclists and other personal vehicle users should be consistent.

Green Buildings and Environmental Sustainability Plan Element (GBESE). Several goals and strategies in the GBESE are aimed at reducing the Borough's contributions to climate change. Section D of the GBESE is Land Use and Mobility. The goals in this section and in the Mobility Plan should be consistent. The GBESE includes the Community Energy Plan under development and a significant part of that plan is focused on transportation energy use and greenhouse gas emissions. The goals of the Mobility Plan and the Community Energy plan must be consistent.

Historic Preservation Plan Element. The Pennington Historic Commission supports the aim to enhance mobility but underscores the need to integrate mobility enhancements with the preservation of the Borough's historic character. Improvements in pedestrian and bicycle infrastructure within and around the Historic District should align with Complete Streets policies, ensuring that new facilities respect the district's aesthetic while improving safety and connectivity. Parking solutions within the district should prioritize compatibility with its historic setting. Measures such as strategically placed EV charging stations must balance modern mobility needs with the preservation of historical integrity. Additionally, careful planning is required to address the potential impacts of increased traffic from regional developments, ensuring the Historic District remains accessible without compromising its charm or safety.

Appendix A. Traffic data in and around Pennington

The Delaware Valley Regional Planning Commission (DVRPC - https://www.dvrpc.org) presents traffic counts on its website. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia region, established by an Interstate Compact between the Commonwealth of Pennsylvania and the State of New Jersey. It includes Mercer County.

Regional traffic count data is available on https://www.dvrpc.org/webmaps/trafficcounts/. It can be searched by municipality or Zip Code. Traffic counts are reported as Annual Average Daily Traffic (AADT), which represents an estimate of all traffic during a 24-hour period at the location indicated for the year in which it was collected. AADT counts for roads in and around Pennington have been extracted from data for Zip Code 08534 and presented in Table A1. Traffic counts are a daily average based on counts taken over three to five days, depending on location. All counts were taken midweek. Counts are given in both directions for each road. The DVRPC count does not differentiate between cars and trucks. Such data would be useful. The month each count was taken is shown on the table. Most are between March 2022 and March 2024, which are post-Covid, but two sets were from March 2021 (North Main St. and Ingleside Ave. west of Van Noy) and one from June 2020 (West Delaware Avenue), which would be affected by Covid restrictions. The West Delaware Avenue count was taken June 16-18. The last day of school was June 17, so it only partially included school traffic.

The counts have been added to a schematic map of Pennington in Figure A1. Counts in and out of each junction do not sum exactly as they were done on different dates for different roads. However, a general picture of traffic flow in Pennington can be discerned. From 9,000 to 9,500 vehicles per day join Route 31 northbound from Pennington Circle. Of these, around 8,400 travel as far as the North Main Street intersection, meaning around 800 leave Route 31 for destinations likely on the west side of Pennington. About 900 vehicles join Route 31 from North Main Street. About 3,200 vehicles leave or join Route 31 on Pennington-Hopewell Road, representing traffic passing through Pennington on the way to Hopewell. Around 3,000 vehicles per day enter Pennington via Pennington Road from Pennington Circle. Most of these travel as far as the Main Street traffic lights at Delaware Avenue. About 3,300 vehicles per day pass in each direction on East Delaware Avenue heading to Pennington-Rocky Hill Road.

The DVRPC daily data is generated from hourly counts which allows the visualization of how traffic is distributed during the day. Figure A2 shows three examples: southbound Route 31, north of Pennington-Harbourton Road; westbound East Delaware Avenue, east of Main Street; and northbound South Main Street, north of Curlis Avenue. All show morning and afternoon peaks with lesser peaks around lunchtime. Peaks for Route 31 are just under 700 vehicles per hour, Delaware Avenue 300 per hour and northbound Main Street 250 cars per hour. We will explore with DVRPC the opportunity to gather additional data.

The New Jersey Office of Information Technology (NJOIT - data.nj.gov) also provides annual average daily traffic by location (county and municipality) and route. See: https://data.nj.gov/Transportation/Annual-Average-Daily-Traffic-by-Location-and-Route/dfun-zupj. Data was collected between 2016 to 2019. We chose to use the more recent DVRPC data.

Figure A1. DVRPC Annual Average Daily Traffic counts presented on a schematic map of Pennington

Annual Average Daily Traffic (AADT) is an estimate of all traffic during a 24-hour period at the location indicated for the year in which it was collected. AADT counts for roads in and around Pennington have been extracted from data for Zip Code 08534 and presented in Table A1.

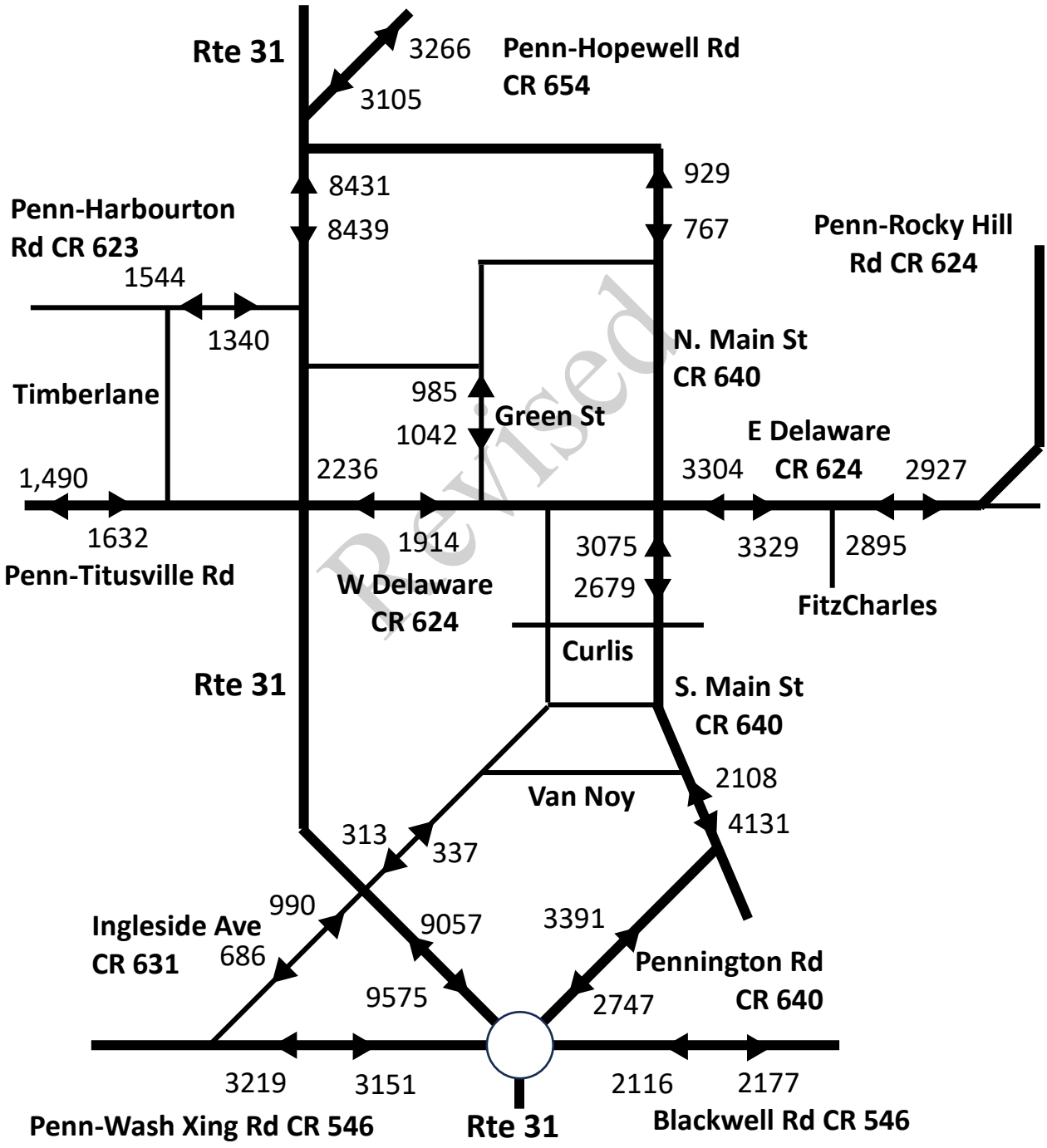
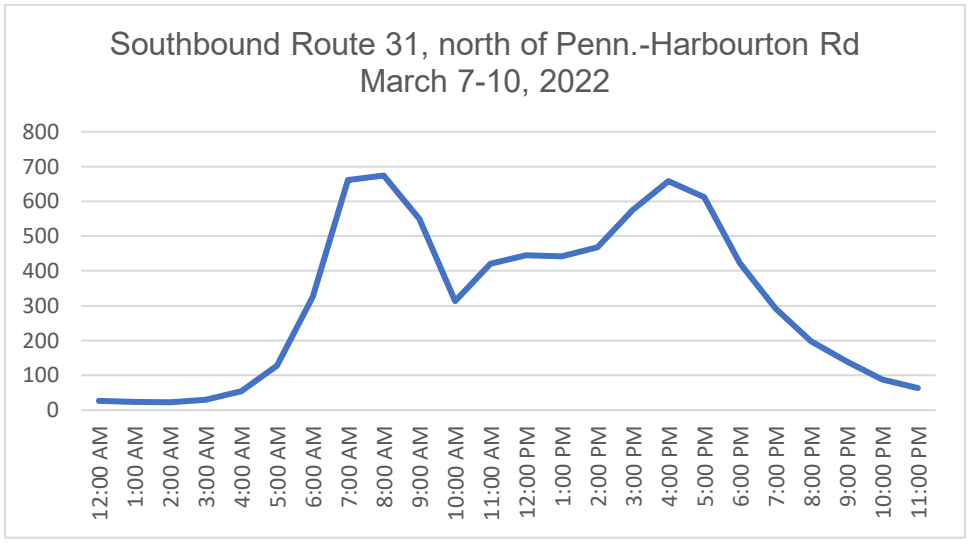
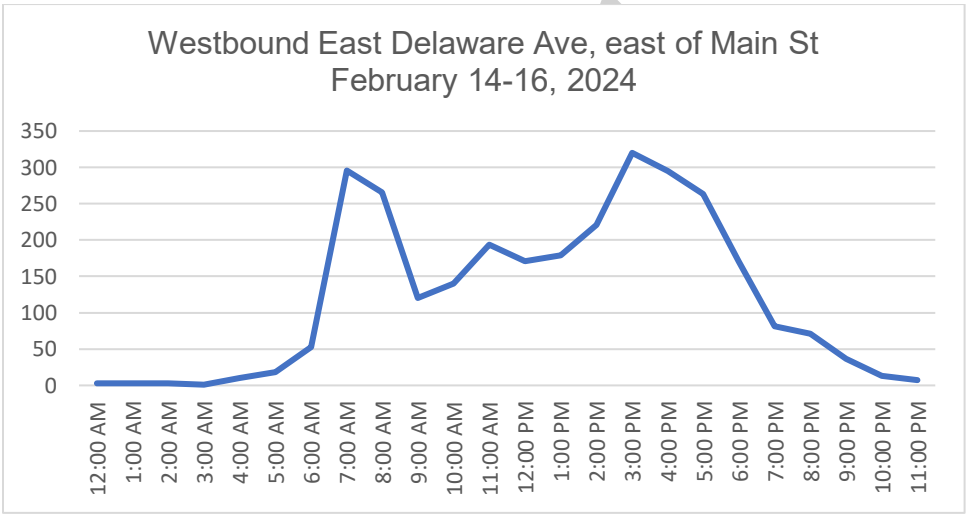


Figure A2. DVRPC hourly traffic counts for four roads





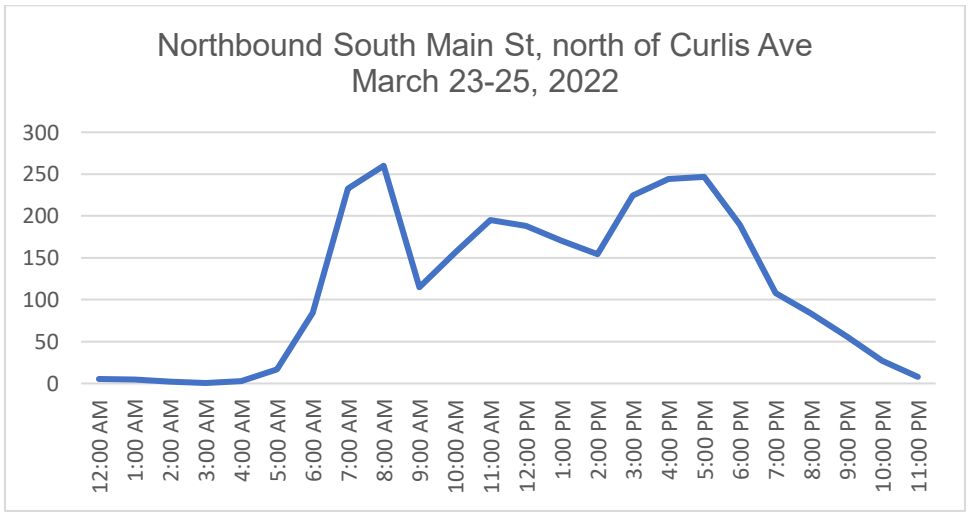


Table A1. Vehicle counts from the Delaware Valley Regional Planning Commission

https://www.dvrpc.org/webmaps/trafficcounts/

Road	Location	Veh./day	Month
NJ 31 - SB	North of West Franklin	8,439	Mar-22
NJ 31 - NB	North of West Franklin	8,431	Mar-22
NJ 31 - SB	South of Search Ave	9,575	Mar-22
NJ 31 - NB	South of Search Ave	9,057	Mar-22
Pennington Titusville Rd - WB	West of Timberlane	1,490	Feb-24
Pennington Titusville Rd - EB	West of Timberlane	1,632	Feb-24
W Delaware Ave - WB	West of Green St	2,236	Jun-20
W Delaware Ave - EB	West of Green St	1,914	Jun-20
Green St - SB	South of Broemel Place	1,042	May-23
Green St - NB	South of Broemel Place	985	May-23
E Delaware Ave - WB	East of Main St	3,304	Feb-24
E Delaware Ave - EB	East of Main St	3,329	Feb-24
CR 624 E Delaware Ave - SB	East of Fitzcharles	2,895	Feb-24
CR 624 E Delaware Ave - NB	East of Fitzcharles	2,927	Feb-24
CR 640 N Main St - SB	South of Railroad Pl	767	Mar-21
CR 640 N Main St - NB	South of Railroad Pl	929	Mar-21
CR 640 S Main St - SB	North of Curlis	2,679	Mar-22
CR 640 S Main St - NB	North of Curlis	3,075	Mar-22
CR 640 S Main St - SB	South of Vannoy	4,131	Mar-22
CR 640 S Main St - NB	South of Vannoy	2,108	Mar-22
CR 640 Pennington Rd - SB	North of the Circle	2,747	Feb-24
CR 640 Pennington Rd - NB	North of the Circle	3,391	Feb-24
CR 631 Ingleside Ave - SB	North of Search Ave	686	Mar-23
CR 631 Ingleside Ave - NB	North of Search Ave	990	Mar-23
CR 631 Ingleside Ave - SB	West of Vannoy	313	Mar-21
CR 631 Ingleside Ave - NB	West of Vannoy	337	Mar-21
CR 654 Pennington Hopewell Rd - SB	Just north of Rte 31	3,105	Mar-23
CR 654 Pennington Hopewell Rd - NB	Just north of Rte 31	3,266	Mar-23
CR 623 Pennington Harbourton Rd - WB	East of Timberlane Dr	1,544	Mar-22
CR 623 Pennington Harbourton Rd - EB	East of Timberlane Dr	1,340	Mar-22
CR 546 Pennington Wash Xing Rd - WB	West of Dublin Rd	3,219	Mar-24
CR 546 Pennington Wash Xing Rd - EB	West of Dublin Rd	3,151	Mar-24
CR 546 Blackwell Rd - WB	East of Circle	2,116	Feb-24
CR 546 Blackwell Rd - EB	East of Circle	2,177	Feb-24

The DVRPC Congestion Management Process (CMP) analysis of Pennington is as follows:

Corridor 8, Sub-corridor C: Pennington Borough

This sub-corridor area includes Pennington Borough, which has a mix of main street/village and strip development patterns. It is impacted by through truck traffic on NJ 31. It is in the top 20% of NJ sub-corridors for anticipated volume to capacity ratio (V/C), transit score and land use centers.

Priority Congested Corridor and Sub-corridor Area: **No**

Congested Corridor and Sub-corridor Area with Major single-occupant vehicle (SOV) Capacity-Adding Strategies: **No**

Very Appropriate Strategies

1. Signal Improvements
   Strategies, ranging from basic to sophisticated, that improve the efficiency of signals individually and in systems. This includes specific applications, such as for pre-emption for emergency vehicles or buses.
2. Improve Circulation
   Strategies designed to move more vehicles through the existing road system, often using engineering approaches.
3. Walking and Bicycling Improvements
   These are strategies to reduce congestion and promote livability by making it safer and more convenient to travel by walking and bicycling.
4. Turning Movement Enhancements
   Strategies to reduce congestion and crashes through safer turning movements.
5. Land Use/Transportation Policies
   Strategies that reduce congestion by changing land use and development patterns to encourage mobility options and limit new trip generation.
6. Transportation Services for Specific Populations
   This is the provision of services that addresses specific needs or populations and includes employer-supported shuttles for employees. It also includes services oriented towards senior citizens and persons with disabilities.

Strategy Notes

1. Proposed walking and bicycling improvements as part of the Great Western Bikeway project near Pennington.
2. Given the levels of anticipated congestion, adding capacity to existing roads and transit capacity-adding strategies are appropriate in this sub-corridor if strategies further up the list cannot adequately address problems without also mixing in new capacity.
3. Placemaking and non-motorized transportation for corridors like this one that are high in land use centers.

Appendix B. Review of Pennington Circulation Plan components from the 1998 Master Plan and the 2005, 2013 and 2023 Reexamination Reports

1998 Pennington Borough Master Plan, pages 14-15

https://www.penningtonboro.org/sites/g/files/vyhlif5426/f/uploads/1998_master_plan.pdf .

The following is a summary of the concerns and suggestions in the 1998 Plan:

1. Increased truck traffic on Route 31 since I-287 was completed in northern New Jersey was a concern. A suggestion about widening Route 31 in the Borough and adjacent areas was not deemed acceptable. The existing right of way can accommodate four lanes of traffic. Widening of Route 31 has been part of the State Highway master plan for many years, but no implementation date has been set.
2. Merrill Lynch and Bristol Myers Squibb will likely increase traffic on Borough streets. The Borough should work with the Township, Mercer County, and NJDOT to develop solutions to reduce this impact. Solutions included providing alternate routes and discouraging through traffic with traffic calming techniques.
3. A Town Center Area Concept Plan map suggested an access road to link Green Street with an expanded Town Center parking lot. A walkway/bike path from Borough Hall to Broemel Place and sidewalk to Green Street was also suggested.
4. Street trees, especially with branches that overhang the street, can have a calming effect on traffic. It is recommended that the current excellent street planting program be augmented with an expanded effort to plant additional trees on those streets with high traffic. Special consideration would be given to the main entrances to the Borough, e.g. North and South Main, East and West Delaware, Ingleside, and West Franklin.
5. The 1998 Plan contained a “Circulation and Sidewalk Plan” map. The policy of the Plan is that high volume streets have sidewalks on both sides and that low volume streets, such as cul-de-sacs, loop, and other non-through streets have sidewalks on at least one side. Also shown on the map is a walkway/bike path linkage between Curlis Avenue and Welling Avenue, using the former Baldwin Boulevard right-of-way.
6. It was recommended that the more intensively used crosswalks be designated by permanent crosswalk “pavers."
7. The reactivation of passenger service had been proposed for the West Trenton line. Possible sites for a new station should be explored.

The actions that have been taken regarding 1998 recommendations are as follows:

1. A bike/sidewalk connection from North Main Street to the proposed (Township) development on the west side of Route 31 was installed, with a traffic light.
2. A "four way" pedestrian crossing was implemented at the intersection of Main Street and Delaware Avenue.

2005 Pennington Borough Reexamination Report, pages 9-10 and 25-27.

https://www.penningtonboro.org/sites/g/files/vyhlif5426/f/uploads/a_master_plan_reexam_-_2005_1.pdf .

Due to concern over Route 31, Pennington Borough participated with Hopewell Township in the "Route 31 Design Study" conducted by Dodson Associates with the aid of a Smart Growth Planning Grant. Recommendations for improvements pertaining to Route 31 in Pennington from the Study Report of 2002 are summarized in Section 3. Since these improvements are proposed within the State right-of-way, it was recommended that Pennington Borough and Hopewell Township should continue to work with the State Department of Transportation on the execution of these recommendations.

The following is a summary of the concerns and suggestions in the 2005 Reexamination:

1. Traffic congestion along State Highway Route 31 and Delaware Avenue has increased over the years, especially during the peak hours. The construction of the new Merrill Lynch facility in Hopewell Township to the west of the Borough has brought more traffic along State Highway Route 31 and through the Borough.
2. Truck traffic on Route 31 continues to be a major concern. In 1995, NJDOT announced a six (6) point action plan to address truck safety concerns on Route 31, which included reducing speed limits; implementing a truck safety inspection plan by the State Police; pursuing a permanent truck inspection station; forming a truck safety advisory group including municipal, county and state representatives; and working with the New Jersey Turnpike Authority on a truck-friendly policy to encourage the use of the Turnpike as a major through corridor for commercial traffic.
3. As confirmed by the community at the public meetings held by Dodson Associates during the study, making Route 31 an undivided four lane highway is not acceptable to Pennington Borough and the surrounding community.
4. The report proposes several Route 31roadway improvements in Pennington Borough for consideration, including the following:
    a. A two (2) lane roadway with enhanced striping and medians at the signalized intersections for the safe crossing of pedestrians and bicyclists;
    b. A two (2) lane roadway with either a signalized intersection or a modem roundabout; or
    c. A four (4) lane boulevard with either a signalized intersection or a modem roundabout.

    Since the middle and high schools serve students in Pennington Borough, safe pedestrian and bicycle crossings are high priorities for any improvement plan to the highway.
5. The design of any roadway improvements to State Highway Route 31 should effect the goals and objectives of the Borough of Pennington, as follows:
    a. Any improvements to State Highway Route 31 should not divert through traffic onto other roads through the Borough;
    b. Safe and convenient pedestrian access within designated crosswalks across State Highway Route 31 should be provided; and
    c. No left turning movements should be permitted onto State Highway Route 31, except at signalized intersections.

Additionally, improvements to the State Highway Route 31 intersection with Broemel Place are necessary to alleviate any impediments to emergency vehicle access to and from the Pennington Fire Company and Pennington First Aid Squad facilities on Broemel Place. An emergency vehicle signal, at minimum, should be erected at the intersection.

6. A Streetscape Committee report recommended improvements to Main Street and Delaware Avenue to create a better alignment at the intersection to facilitate the flow of traffic and to provide safe pedestrian crossings.
7. The sidewalk along the north side of East Delaware Avenue should continue eastward to the Borough border at the Stony Brook bridge, then connect with the Lawrence Hopewell Trail along Pennington Rocky Hill Road.
8. Delaware Avenue has been designated through the Borough to its intersection with Federal City Road as a bicycle compatible roadway, as indicated in "Bicycling Mercer County: A Guide To Bicycling In And Around The Capitol County", which was prepared by the Greater Mercer Transportation Management Association with input from local cycling clubs and advocacy groups, the Delaware Valley Regional Planning Commission, Mercer County, the New Jersey Department of Transportation and various municipalities. Improvements to the northeasterly extension of East Delaware Avenue to its connection to the Lawrence Hopewell Trail are recommended to complete the safe bicycle accessibility of the roadway.

Actions that have been taken on 2005 Reexamination recommendations are as follows:

1. A collaborative partnership between non-profit organizations, citizens, private corporations, and local, county and state government lead to the planning of the Lawrence Hopewell Trail. This twenty-mile biking and walking pathway will loop through Lawrence and Hopewell Townships to connect several corporate parks, schools, residential areas and recreational sites, including Rosedale Park and Northwest Mercer County Park east of Pennington Borough.
2. Bristol Myers Squibb received approval from the Hopewell Township Planning Board to build the first link of the proposed pathway along Pennington-Rocky Hill Road from Old Mill Road to the Titus Mill and Wargo Roads intersection.
3. Pedestrian improvements along Route 31 in concert with the 1998 "Circulation and Sidewalk Plan" provide connections between the Straube Center and West Franklin Avenue to the north and between Broemel Place and the U.S. Post Office to the south.
4. The new traffic light at the intersection of the realigned North Main Street with Route 31 provides protected pedestrian and bike crossings and improved left turns onto Route 31.
5. A traffic light at Elm Ridge Road and improvements made by Bristol Meyers Squibb to Pennington-Rocky Hill Road also have helped with the traffic circulation in the eastern portion of the Borough.

2013 Pennington Borough Reexamination Report, pages 8-9

https://www.penningtonboro.org/sites/g/files/vyhlif5426/f/uploads/2013_master_plan_reexamination_0.pdf .

The following is a summary of the concerns and suggestions in the 2013 Reexamination:

1. The need to provide for better traffic and pedestrian circulation in the Route 31 corridor still exists. Although the development of the Shoppes at Pennington along Route 31

incorporated design recommendations found in the 2002 Route 31 Design Study, traffic continues to build on Route 31 creating pedestrian difficulties for crossing the highway and vehicular access problems for traffic crossing or entering the highway.

Additional actions that have been taken on 2005 Reexamination recommendations reported in the 2013 reexamination are as follows:

1. Pedestrian circulation has been addressed since 2005 with the construction of new sidewalks on lower King George Road and on the east side of Sked Street south of Sked Street Park. In addition, pedestrian activated flashing signals have been installed at two crosswalks to improve pedestrian safety primarily for school children crossing South Main Street at Curlis Avenue and crossing West Delaware Avenue at Green Street.
2. Pennington residents on foot or on bicycle will also soon benefit by having access to the Lawrence-Hopewell Trail via the Pennington Connection starting at the Stony Brook bridge on Pennington-Rocky Hill Road.
3. Although not following the expansive scope of the "Streetscape Report", the Borough this year had less costly but significant improvements made to enhance the pedestrian environment in the downtown area. New sidewalks with brick pavers, decorative streetlights and signage, benches, free guards, bollards, and additional trees were included in the improvements. However, many of the recommendations made in the 1998 and 2005 Master Plan documents remain.

[Note: No additions to the circulation plan were made in the 2014 Land Use Plan Amendment.]

2023 Pennington Borough Reexamination Report

https://www.penningtonboro.org/sites/g/files/vyhlif5426/f/uploads/pennington_reexamination_report_adopted_5-10-23.pdf .

Pennington Borough Planning Board adopted its ten-year reexamination report in a public meeting at Borough Hall on May 10, 2023. It reviewed progress on the 1998 Master Plan goals and the additional goals from the 2005 and 2013 reexamination reports and discussed those goals which were not yet met or had been discontinued. It also reported on progress that had been made in the Borough since 2013 through the actions of Borough Council. It then reported changes in assumptions, policies and objectives at the local, county and state levels that need to be considered for the Master Plan and concluded that it was time for an updated plan. Target date is 2025 and this new Mobility (Circulation) Plan will one of 12 elements in Master Plan 2025.

Mobility issues addressed throughout the 2023 Reexamination Report are summarized here.

Concerns remaining from the 1998 Master Plan and 2005 and 2013 reexaminations:

1. The visual quality and historic character of the Borough should be protected and enhanced. Reduce through traffic and enhance pedestrian safety and access.
   - Through traffic and pedestrian safety and access remain a concern. Sidewalks in the area of Main Street and Delaware Avenue were improved under the Streetscape project.
2. The existing distinction between highway business uses and town center housing and business uses should be maintained. Pedestrian linkages between the two business areas should be improved.

- Pedestrian linkages between the two business areas remain as they were in 2013, although the pedestrian environment near Main Street and Delaware Avenue has been improved.

3. The Borough should work toward a more proactive effort on regional issues such as traffic and circulation, open space preservation, community facilities, stream corridor protection, and water quality improvement.
   - Pennington and Hopewell Township have worked together on Route 31 traffic and safety issues. They have not always agreed but have generally worked to influence NJ DOT on safety issues. The Borough prevailed over the Township on the speed limit on Route 31 in the Borough which is set at 35 mph rather than the Township's preferred 40 mph.
4. The 2002 Route 31 Design Study detailed design guidelines for the corridor and for roadway improvements along State Highway Route 31.
   - Certain improvements to the roadway have been constructed along the Route 31 corridor since the time of this recommendation. The intersection of Route 31 and West Delaware Avenue now has left turn lanes in all four directions and left turn traffic lights. The lights also allow pedestrian crossings, although there is still a risk of pedestrian conflict with cars turning left or right at a green light and with cars turning right at a red light. The speed limit in the Pennington Borough section of Route 31 is 35 mph, although it is frequently exceeded. The intersection of North Main Street and Route 31 now has pedestrian crossings controlled by traffic lights. A concrete sidewalk now runs along the east side of Route 31 from the Pennington Golf Center north to West Franklin Avenue. There is no sidewalk on the west side of Route 31.

Council actions and concerns on Mobility since 2013:

1. The Borough remains concerned about traffic safety particularly at the intersection of Route 31 and West Delaware Avenue given that as many as 100 children and pedestrians cross this intersection daily to get to and from Timberlane Middle School and Hopewell Valley Central High School. A pedestrian fatality occurred there in October 2021, which prompted the Borough Council to pass Resolution 2021-11.14 urging NJDOT to re-visit the 2002 study of the Route 31 and West Delaware intersection in Pennington Borough. In response, the mayor received a letter from the NJDOT indicating that they do not see a problem with the intersection. The Council then passed Resolution 2022-5.19 reaffirming the previous resolution and sent certified copies to the Governor, Senator, Members of the Assembly, and the Mercer County Executive.
2. Two new Hopewell Township developments taking place on Scotch Road and Washington Crossing Road will have a major impact on traffic. The Scotch Road development, by US Home Corp./Lennar, brings 1077 new living units onto the market. The Washington Crossing Road development by US Home at Hopewell Urban Renewal brings 379 units. The total of 1456 added units exceeds Pennington's existing 1146 housing units. These large residential developments will significantly increase traffic in the area and, of concern to the Borough, will be increased traffic crossing Route 31 at West Delaware Avenue, Ingleside Avenue, and Pennington Circle. In 2014, Borough Council adopted the NJ DOT Complete Streets policy. The benefits of complete streets include improving safety for pedestrians, bicyclists, children, older citizens, and the mobility challenged, reducing traffic congestion and reliance on carbon fuels, and saving

money by incorporating sidewalks, bike lanes, and safe crossings into the initial design of a project to spare the expense of later retrofits. The Council reaffirmed the policy in 2016 but allowed four exemptions, which must be documented and approved by the Council, for the following four conditions, where:

   a. Bicyclists and pedestrians are prohibited by law from using the roadway. Detrimental environmental or social impacts outweigh the need for these accommodations.
   b. The safety or timing of a project is compromised by the inclusion of Complete Streets design practices.
   c. The cost of incorporating new bicycle, pedestrian, and/or public transit facilities is excessive.
   d. The need for and/or probable use of the facility shall be considered in making the determination as to whether an exception should be approved at this time or held for future consideration.

3. In 2021, the Council adopted a resolution in support of the 2020 Mercer County Bicycle Master Plan. In 2022, a resolution was adopted to endorse Vision Zero, which encourages municipalities to adopt achievable goals to prevent traffic-related severe injuries and fatalities based on the following principles:
   a. Deaths and severe injuries caused by traffic accidents are preventable.
   b. Human life and health should be prioritized in all transportation systems and in all aspects of transportation planning.
   c. Human error is inevitable, and transportation systems should be forgiving.
   d. Transportation planning should focus on systems-level changes above influencing individual behavior.
   e. Speed is the single most important factor in crash severity.
4. A "Streetscape Report" prepared by the Streetscape Committee of the Borough set forth recommendations for hardscape and other improvements within the Town Center area and the report was incorporated into the Master Plan by reference. The streetscape improvements recommended in the area around the Main Street and Delaware Avenue intersection are being constructed as funding from NJ DOT's Transport Alternatives is obtained. The first project, to improve curbing on North Main Street was completed in 2014. In 2017 a grant was approved for a Phase II project on improvements on East and West Delaware Avenue and South Main Street. The project is ongoing.
5. The Council is also concerned that the responsibility of adjacent property owners to maintain their sidewalks is often ignored. Chapter 177 of the Borough Code covers repair of sidewalks, snow and ice removal, and the clearance and control of debris and overgrowth. Responsibility for enforcement needs to be clarified.

Changes in assumptions, policies and objectives at the local, county and state levels:

1. The COVID-19 pandemic will have a lasting impact on the State's economy and how its residents and businesses operate and interact with one another in the future.
   a. Pedestrian and bicycle facilities: With the temporary closure of businesses and residents working from home, the desire to walk and bike around the community for recreation increased. It is likely this will create new habits among residents and increase the demand for safe and convenient pedestrian and bicycle facilities.

The Borough should explore how these facilities can be provided between destinations where they do not exist and where enhancements are necessary.

b. Drop-off / Pick-up: Temporary closure of businesses and concern about safety of indoor spaces have generated increased demand for take-out food and deliveries of online purchases and restaurant food. The Borough may be faced with increased demand for customer pick-up locations and home delivery. Such accommodation has already generated reconfigured parking lots and curbside pick-up arrangements. These accommodations have addressed not only health and safety concerns for employees and customers, but also enhanced convenience for local businesses.

2. The popularity of electric personal vehicles has grown substantially.
    a. While many owners will conduct charging at their home and will do so in accordance with the applicable building code, many will also need and/or desire to charge while at work, shopping or otherwise out of their homes. This requires electric vehicle charging stations. Support for charging stations is consistent with the Strategy 1 of the *2020 New Jersey Energy Master Plan* which states as a goal: "Reducing Energy Consumption and Emissions from the Transportation Sector, including encouraging electric vehicle adoption, electrifying transportation systems, and leveraging technology to reduce emissions and miles traveled."
    b. Amendments to the Municipal Land Use Law adopted in August 2021 included many provisions specific to the installation of electric vehicle supply equipment, which are detailed in the 2023 Master Plan Reexamination report, Section C8, Electric Vehicles.

Appendix C. Greenhouse Gas Emissions Calculations

It is instructive to estimate the annual CO_2e (carbon dioxide equivalent) emissions reduction possible if Pennington Borough residents converted to electric vehicles. The US EPA reports annual data on CO_2e emissions in the United States, and a breakdown by sector in: https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#transportation .
Data on energy annual usage can be found in charts prepared by Lawrence Livermore National Laboratory from DOE/EIA data in https://flowcharts.llnl.gov/commodities/energy.

In 2021, transportation in NJ used 0.132 Quads (39 TWh) of fossil fuel energy and contributed 40.7 MMT (million metric tons) per year of CO_2e to the atmosphere. At the same time, NJ electricity generation of 0.194 Quads (57 TWh) contributed only 13.5 MMT of CO_2e (this can be converted to 0.52 lb/kWh). If the 39 TWh required to move vehicles came from electricity at the current rate of CO2e production, it would contribute only 9.2 MMT of CO2e (13.5 x 39/57), saving 31.5 MMT (40.7 - 9.2) per year. Personal vehicles (cars, SUVs, pickup trucks and minivans) generate 57% of the emissions, so changing to battery powered electric vehicles in New Jersey would save about 18.0 MMT (57% of 31.5).

The population of Pennington is around 2,800, and of New Jersey is about 9.3 million, so on a proportional basis, the CO_2e reduction from Pennington with all electric personal vehicles would be 5,400 MT (metric tons)/year. This is about 20 times the 276 MT used by Borough operations, which Borough Council resolved to reduce to zero by 2035, as discussed earlier. As New Jersey moves towards its goal of zero CO2e emissions from electric power generation by 2035, the 9.2 MMT from the generation of the electricity to power vehicles would drop to zero and the total CO2e reduction from personal vehicles in New Jersey would be 23 MMT (57% of 40.7). For Pennington, this would be about 7,000 MT per year, which is 2.5 MT per resident per year.

This analysis reasonably assumes the efficiency of electric motors is close to 100%, compared with an average of around 21% for internal combustion engines. In 2018, the Delaware Valley Regional Planning Commission completed a regional energy use and greenhouse gas emissions inventory for the nine-county DVRPC region. As part of this inventory, DVRPC allocated both energy use and greenhouse gas emissions to individual counties and municipalities based on 2015 data. For Pennington, the report allocated 15,200 MT of CO2e to all transportation. Multiplying by the 57% allocated by the state to cars, SUVs, pickup trucks and minivans gives 8,700 MT, or 3.1 MT per resident per year, which is not far from the 2.5 MT estimated above. See https://www.dvrpc.org/webmaps/MunicipalEnergy/mcdDetail.aspx?mcdcode=3402157600

Looking at this on an individual car basis, the average EV gets 2.9 miles/kWh. To go 2.9 miles, a 30-mpg gasoline car uses 2.9/30 = 0.097 US gallons of gasoline and at 19.6 lbs of CO2e per US gallon, CO2e from the gas car = 19.6 x 0.097 = 1.9 lbs/kWh. As detailed above, electricity generated in New Jersey produces 0.52 lbs/kWh, which is 3.7 times lower. (Wyoming and West Virginia electricity generation produces over 2.0 lbs/kWh due to the prevalence of coal-fired power stations so their EVs give no CO2e benefit). Two issues being addressed by the EV industry are increasing the energy storage density of batteries to increase range, and battery recharging time.

To compare EV to gasoline charging times, the reference is that the 10 gallons needed for a range of 300 miles with the 30-mpg car takes about a minute to pump at a gas station. For the EV average 2.9 kWh/mile, a charge of 103 (300/2.9) kWh is needed. There are 3 classes of EV charger, and the time needed to deliver 103 kWh can be calculated for each:

- Home Level 1 Charger: 120V 20A = 2.4 kW. 103 kWh/2.4kW = 43 hours per 300 miles
- Home Level 2 Charger: 240V 40A = 9.6 kW. 103 kWh/9.6kW = 11 hours per 300 miles
- Commercial Level 3, NJ: 480V 310A = 150 kW. 103 kWh/150kW = 40 mins per 300 miles
- Commercial Level 3, max: 480V 730A = 350 kW. 103 kWh/350kW = 18 mins per 300 miles

The charging rate depends on the EV's battery control system, so actual times may be longer. Also, the total number of Level 3 charges during the lifetime of an EV battery may be limited due to the high amperage. The analysis tells us that a 120 V Level home charger would only give a range of about 80 miles after an overnight 12-hour charge. This may be sufficient if all car use is local and infrequent, but for many users, a Level 2 charger is needed.