Analysis of Multi-Use Path Connections between Freeport Schools

Background

In the fall of 2021, the Town of Freeport contacted the Greater Portland Council of Governments to request a multi-use path feasibility analysis between the areas north and south of Mallett Drive. The area north of Mallett Drive contains the Freeport Middle School and the Freeport Community Library while the area south of Mallett Drive contains the Freeport High School, several athletic fields, and access to the Freeport Downtown commercial district.

Mallett Drive was identified by the Town as a barrier for school-aged children and other bicyclists and pedestrians. The purpose of the study is to provide Freeport with reasonable multi-use path alternatives to safely connect the areas north and south of Mallett Drive. The analysis included multiple site visits throughout 2022 for data gathering and observations along Mallett Drive and the surrounding local roads, including Maple Ave, Elm Street, Oak Ave, and Guptil Ave.

The primary stakeholder in this study is the Town of Freeport, but potential stakeholders could include the Freeport Active Living Committee, private landowners and businesses on either side of Mallett Drive and west of I-295, MaineDOT, RSU 5 (the Freeport School District), and the Freeport Community Library.

Existing Site Conditions

Crash Data

GPCOG staff gathered crash data for the study area from Maine Public Crash Query Tool for the three-year period 2019-2021. The crashes that occurred in the study area during that three-year time frame are summarized in Table 1. The limits of the Mallett Drive crash data query were from and including the Mallett Drive and Main Street intersection along Mallett Drive until the I-295 northbound on-ramp. The I-295 northbound off-ramp crash data is not included.

Table 1 – Crashes in the study area (2019-2021)

Date	Time	Day of the Week	Injury Level	Type of Crash	Approximate Location
5/24/2019	12:16 PM	Friday	Injury (non-fatal)	Went Off Road	Intersection of Main St
7/13/2019	12:20 PM	Saturday	Property Damage	Rear End/Sideswipe	Intersection of Main St
9/4/2019	6:05 AM	Wednesday	Injury (non-fatal)	Intersection Movement	Intersection of Main St
11/2/2019	6:02 AM	Saturday	Injury (non-fatal)	Pedestrians	Intersection of Main St
7/16/2020	1:58 PM	Thursday	Property Damage	Went Off Road	Intersection of Main St
12/19/2020	3:54 PM	Saturday	Property Damage	Rear End/Sideswipe	Intersection of Main St
9/30/2021	2:14 PM	Thursday	Property Damage	Rear End/Sideswipe	Intersection of Main St
10/27/2019	1:58 PM	Sunday	Property Damage	Rear End/Sideswipe	McDonald's Driveway
2/14/2020	6:13 PM	Friday	Property Damage	Rear End/Sideswipe	McDonald's Driveway
5/20/2020	7:09 PM	Wednesday	Property Damage	Rear End/Sideswipe	McDonald's Driveway
11/24/2020	1:30 PM	Tuesday	Property Damage	Rear End/Sideswipe	McDonald's Driveway
12/5/2021	6:40 PM	Sunday	Property Damage	Rear End/Sideswipe	McDonald's Driveway
11/30/2020	4:39 PM	Monday	Property Damage	Intersection Movement	Irving Driveway and I-295 NB
10/25/2021	2:48 PM	Monday	Injury (non-fatal)	Rear End/Sideswipe	Irving Driveway and I-295 NB
11/30/2019	6:57 AM	Saturday	Property Damage	Went Off Road	Freeport Lodge No. 23 Driveway
6/24/2020	7:07 PM	Wednesday	Property Damage	Went Off Road	Maple Ave

As can be seen in Table 1, there were 15 crashes along Mallett Drive and 1 crash on Maple Ave. None of the locations meet the criteria set by the Maine Department of Transportation (MaineDOT) to be considered a high crash location[1].

At the intersection of Mallett Drive and Main Street, three crashes resulted in injuries, one of which involved a pedestrian. One crash located near the I-295 northbound on-ramp resulted in an injury. No other crashes in Table 1 involved pedestrians. There were no other crashes along Mallett Drive involving pedestrians dating back to the 10-year period from 2011-2021. At the time of this report, there were no reported pedestrian-involved crashes in 2022.

Roadway Classifications and Daily Traffic Estimates

The Federal Highway Administration (FHWA) classifies roadways into four different categories – interstates, other arterials, collectors, and local roads. Interstates and other arterials have the highest mobility and the highest speeds. Collector roads have lower mobility and lower speeds. Local roads have the lowest mobility and the lowest speeds. Mallett Drive is classified as a Major Collector, while Maple Ave, Elm Street, Oak Ave, and Guptil Ave are all local roads. The available daily traffic levels on the roads in the study area are shown in Table 2, provided by the MaineDOT Traffic Division interactive map[2] and the MaineDOT Public Map Viewer[3].

[1] A location that has had eight (8) or more traffic crashes and a Critical Rate Factor (CRF) greater than 1.00 in a three-year period.
[2] https://mainedottrafficdata.drakewell.com/publicmultinodemap.asp
[3] https://www.maine.gov/mdot/mapviewer/

Table 2 – Annual Average Daily Traffic Estimates[4] for Study Area Roadways

Streets	Annual Average Daily Traffic (Year)
Mallett Drive	11,920 (2019)
Elm Street	620 (2019)
Maple Avenue	277
Oak Avenue	55
Guptil Avenue	55

As can be seen from Table 2, Mallett Drive carries a large amount of traffic. This is expected as Mallett Drive is a connection between I-295, Routes 125 and 136 to the east and Route 1 and downtown Freeport to the west.

Traffic Counts

GPCOG staff counted vehicle and pedestrian traffic at the intersection of Mallett Drive and Main Street using Miovision cameras.[5] The data recording was collected from 6:00 a.m. to 6:00 p.m. on Tuesday, June 7th 2022, which was around 50°F and partly cloudy.

The hourly vehicle and pedestrian counts are in Appendix A. Table 3 provides a summary of the counts at the Mallett Drive and Main Street intersection.

Table 3 – Pedestrian and Vehicle Counts at the intersection of Mallett Drive and Main Street

	Main Street Southbound	Main Street Northbound	Mallett Drive Eastbound	Mallett Drive Westbound	Main St – Mallett Dr Intersection
Hour of Highest Vehicle Traffic	7:15 – 8:15 a.m.	4:30 – 5:30 p.m.	7:15 – 8:15 a.m.	4:30 – 5:30 p.m.	4:30 – 5:30 p.m.
Highest Traffic (veh./ hour)	302	708	528	740	1,462
% Single Unit Trucks	3.3%	0.6%	0.9%	0.7%	0.6%
% Articulated Trucks	0.0%	0.4%	0.4%	0.4%	0.2%
Bicycles per hour	1	4	3	1	5
Hour of Highest Pedestrian Crossings	9:45 – 10:45 a.m.	10:00 – 11:00 a.m.	10:00 – 11:00 a.m.	10:00 – 11:00 a.m.	10:00 – 11:00 p.m.
Highest Pedestrian Crossings (ped./hour)	3	4	37	37	42
Vehicles during highest ped. Crossings (veh./hour)	153	392	399	388	954

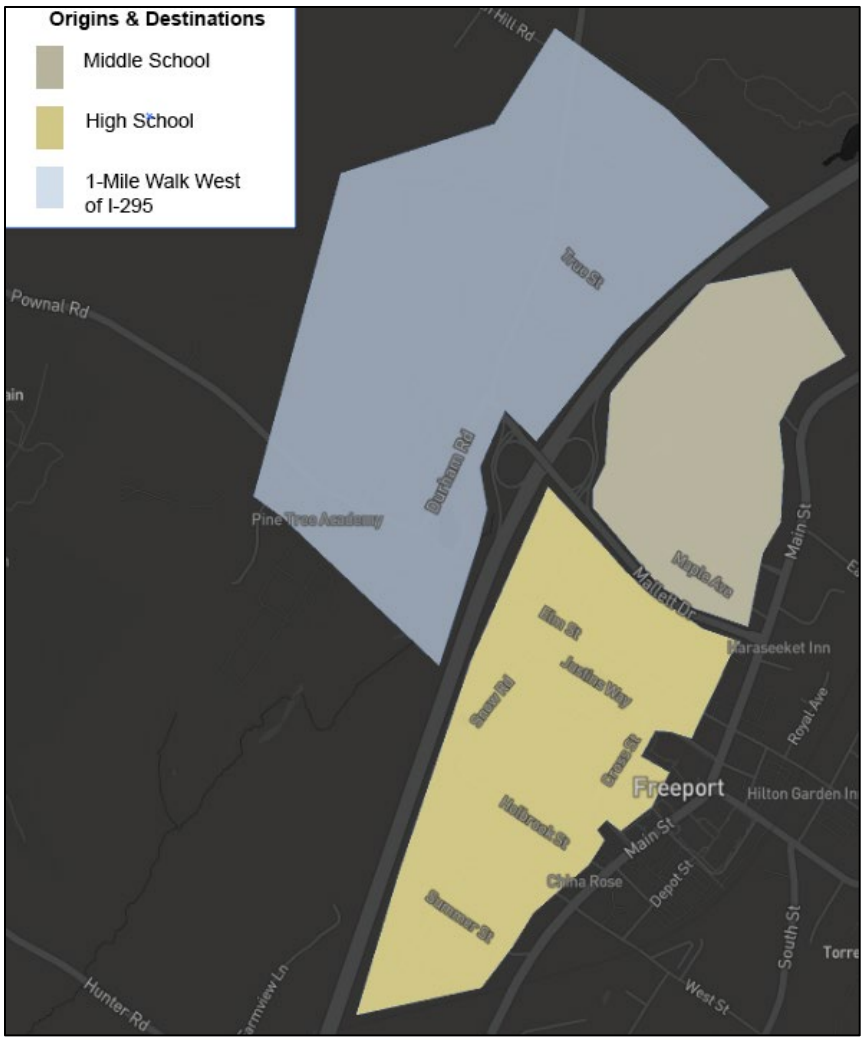
[4] Annual Average Daily Traffic is estimated by MaineDOT and published on their Mapviewer https://www.maine.gov/mdot/mapviewer/

[5] Portable cameras used to record vehicle and pedestrian traffic.

As can be seen from Table 3, the highest hourly traffic on Mallett Drive eastbound is 528 vehicles per hour. At this location, the highest vehicular traffic corresponds to the time when students are arriving at the nearby schools. The highest hourly pedestrian crossings on Mallett Drive were 37 per hour from 10:00-11:00 a.m.

Estimated Pedestrian Travel Demand

Figure 1 – Origins & Destinations Map



Pedestrian travel demand between Freeport Middle School and Freeport High School was estimated by using cell phone data provided by StreetLight. StreetLight is a third party company that analyzes location-based service data to provide origin and destination trip data for vehicles, bicycles and pedestrians.

To gather the trips that could use a path and crossing between the middle school and high school, we set up three zones – a zone around the Freeport Middle School (FMS), a zone around the Freeport High School (FHS), and a zone within a one mile walking distance to the schools and west of I-295 (WI295) as shown in Figure 1. The zones were set up so that trips between the zones could be within a walkable distance and could potentially use a Mallett Drive crossing and multi-use path. Parking lots of retail locations near Route 1 were excluded from the zones.

The average daily weekday trips that originated within the three zones and destined for one of the other two zones during the month of September 2019 are shown in Table 4.

Table 4 – Trips between the Middle School, High School, and within Walking Distance East of I-295

Mode of Travel	Vehicle Trips	Pedestrian Trips
Trips from FMS to FHS	100	56
Trips from FHS to FMS	33	20
Trips from FMS to WI295	4	12
Trips from WI295 to FMS	21	7
Trips from FHS to WI295	38	34
Trips from WI295 to FHS	32	13
Total	228	142

As can be seen from Table 4, there are already 142 walking trips per weekday that could use the path and crossing and an additional 228 vehicle trips per weekday that could convert to a walking trip if a path and crossing were provided.

Sight Distance

An important aspect of determining where to safely mark a crosswalk is to ensure that there is adequate distance for a vehicle traveling on the roadway to have enough time to stop for a person in the roadway. This distance is known as the stopping sight distance. Stopping sight distance is defined in "A Policy on Geometric Design of Highways and Streets" by the American Association of State Highway and Transportation Officials (a.k.a. the AASHTO Green Book)[6]. According to the AASHTO Green Book, the stopping sight distance is the sum of the distance traversed during the brake reaction time and the distance to brake the vehicle to a stop. MaineDOT has requirements for the stopping sight distance needed at crosswalks[7]. Table 4 shows the required minimum stopping sight distances for a roadway at different posted speed limits.

Table 5 – MaineDOT Sight Distance for Crosswalks

Posted Speed (mph)	Sight distance (ft.)
20	155
25	200
30	250
35	305
40	360

Source: MaineDOT Guidelines on Crosswalks (Appendix A)

[6] American Association of State Highway and Transportation Officials. A Policy of Geometric Design of Highways and Streets. 2018

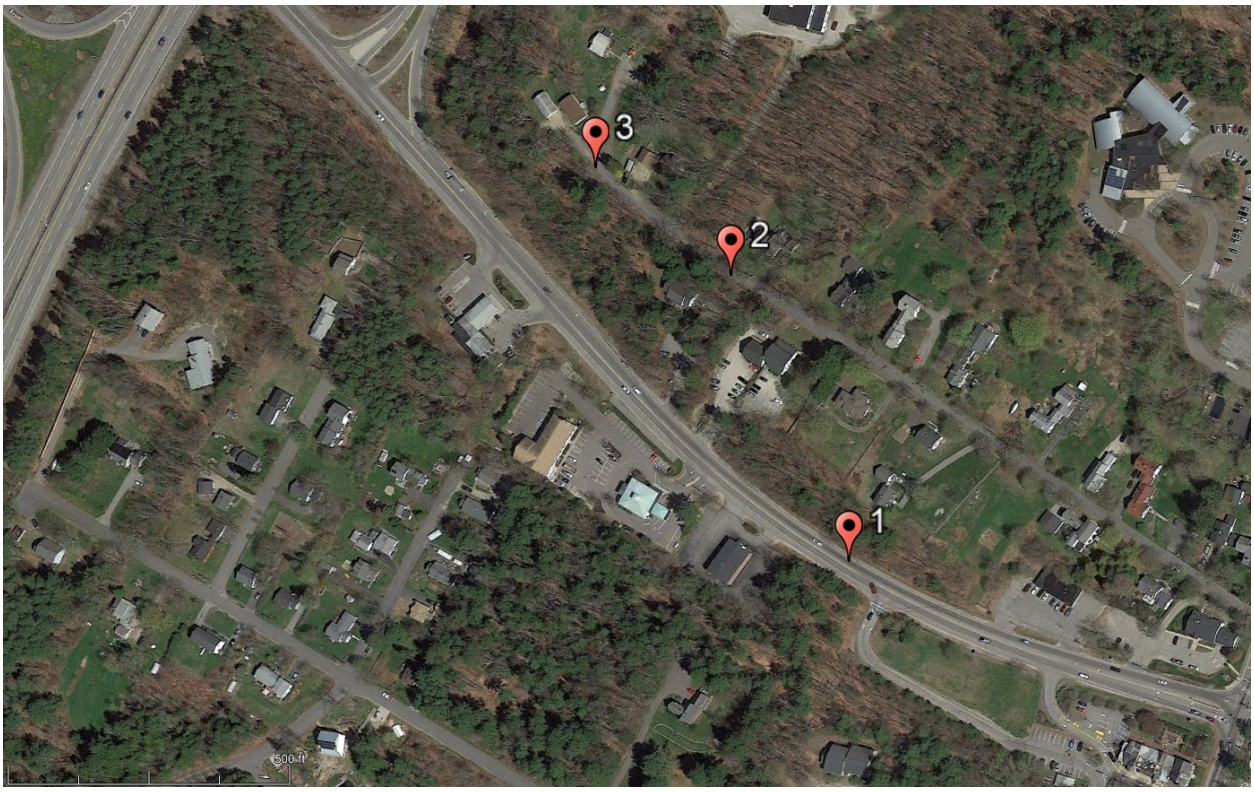
[7] State of Maine Department of Transportation. MaineDOT Guidelines at Crosswalks.2019

As can be seen from Table 5, the higher the speeds, the more sight distance is needed. Also, more sight distance is needed for downgrades and less for upgrades. The speed limit along Mallett Drive is 35 mph, which corresponds to a required sight distance of 305'. Maple Avenue does not have a posted speed limit. A speed of 30 mph was assumed for Maple Avenue, which corresponds to a sight distance of 250 feet.

Measurements and Observations

For sight distance calculations, MaineDOT recommends a height of the driver's eye at 3.50 ft above the road surface and a height of 3.5 ft above the surface for an object in the roadway. GPCOG measured sight distances using this metric at a few locations in the study area along Mallett Drive and Maple Avenue.

Figure 2: Sight Distance Limitations



During the site visit, it was noted that there were a few areas where the geometry of the study area roadway limits sight distance. Those are shown in Figure 2 and are described below.

1. The horizontal curve on Mallett Drive southeast of Freeport Dental
2. The vertical curve on Maple Avenue at the eastern end of the Freeport Dental lot
3. The horizontal curve on Maple Avenue at the western end of the street

During the site visit, staff were not able to measure sight distance on Mallett Drive at the I-295 interchange due to construction.

Design Standards

The proposed alignments for multi-use paths meet accessibility guidelines as set forth in the 2010 ADA Standards for Accessible Design. According to those standards, ramps can have a maximum running

slope of 8.33%. A ramp run rise cannot be more than 30 inches and requires a landing of 5 feet minimum.

It is assumed that a path is not needed on the local, low traffic volume streets. According to AASHTO Pedestrian Guide (2004), "on local streets with less than 400 vehicles per day, no separated pedestrian infrastructure may be necessary." Oak Avenue, Guptil Avenue, and Maple Avenue all have less than 400 vehicles per day. Elm Street has a sidewalk from Route 1 to Guptil Avenue. It is likely that the traffic northwest of Guptil Avenue on Elm Street is also less than 400 vehicles per day because Elm Street ends 600 feet past Guptil Avenue.

Review of Topographical and Right of Way Maps

GPCOG staff used the information available on MaineDOT's Public Map Viewer to analyze topographical, right-of-way and available wetland data. Based on that analysis, GPCOG pulled together the following information on potential paths leading to Mallett Drive.

Paths South of Mallett Drive

The potential paths described in this section connect the streets south of Mallett Drive to Mallett Drive.

Alternative S1 – Path from Elm Street to Mallett Drive.

This potential path would start at the western end of Elm Street, follow along edge of the I-295 right-of-way and connect to Mallett Drive (see Figure 3). The approximate distance of this path would be 1,100 feet. However, the grade near Mallett Drive is about 40%. To create an accessible path, a ramp and retaining wall of a minimum 150 feet length would need to be built somewhat parallel to Mallett Drive. Since the elevation of Mallett Drive climbs in the southeast direction and the driveway to the gas station is also southeast of the path terminus, it is recommended that the ramp be built northwest of the path terminus. The end of the ramp would then be near the traffic signal with the I-295 NB ramps. Placing a pedestrian crossing on Mallett Drive at the signal would provide a safer crossing than at an unsignalized crossing. No wetland impacts were identified on the Public Map Viewer, however, a wetland survey would be needed to verify.

Alternative S2 – Path from Oak Avenue to Mallett Drive.

This potential path would start at the northern end of Oak Avenue, follow along the edge of the right-of-way and connect to Mallett Drive (see Figure 3). The approximate distance of this path would be 475 feet. However, the grade near Mallett Drive is about 40%. To create an accessible path, a ramp and retaining wall of a minimum 150 feet length would need to be built somewhat parallel to Mallett Drive. Since the elevation of Mallett Drive climbs in the southeast direction and the driveway to the gas station is also southeast of the path terminus, it is recommended that the ramp be built northwest of the path terminus. The end of the ramp would then be near the traffic signal with the I-295 NB ramps. Placing a pedestrian crossing on Mallett Drive at the signal would provide a safer crossing than at an unsignalized crossing. No wetland impacts were identified on the Public Map Viewer, however, a wetland survey would be needed to verify.

Figure 3: Potential path alternatives near Mallett Drive

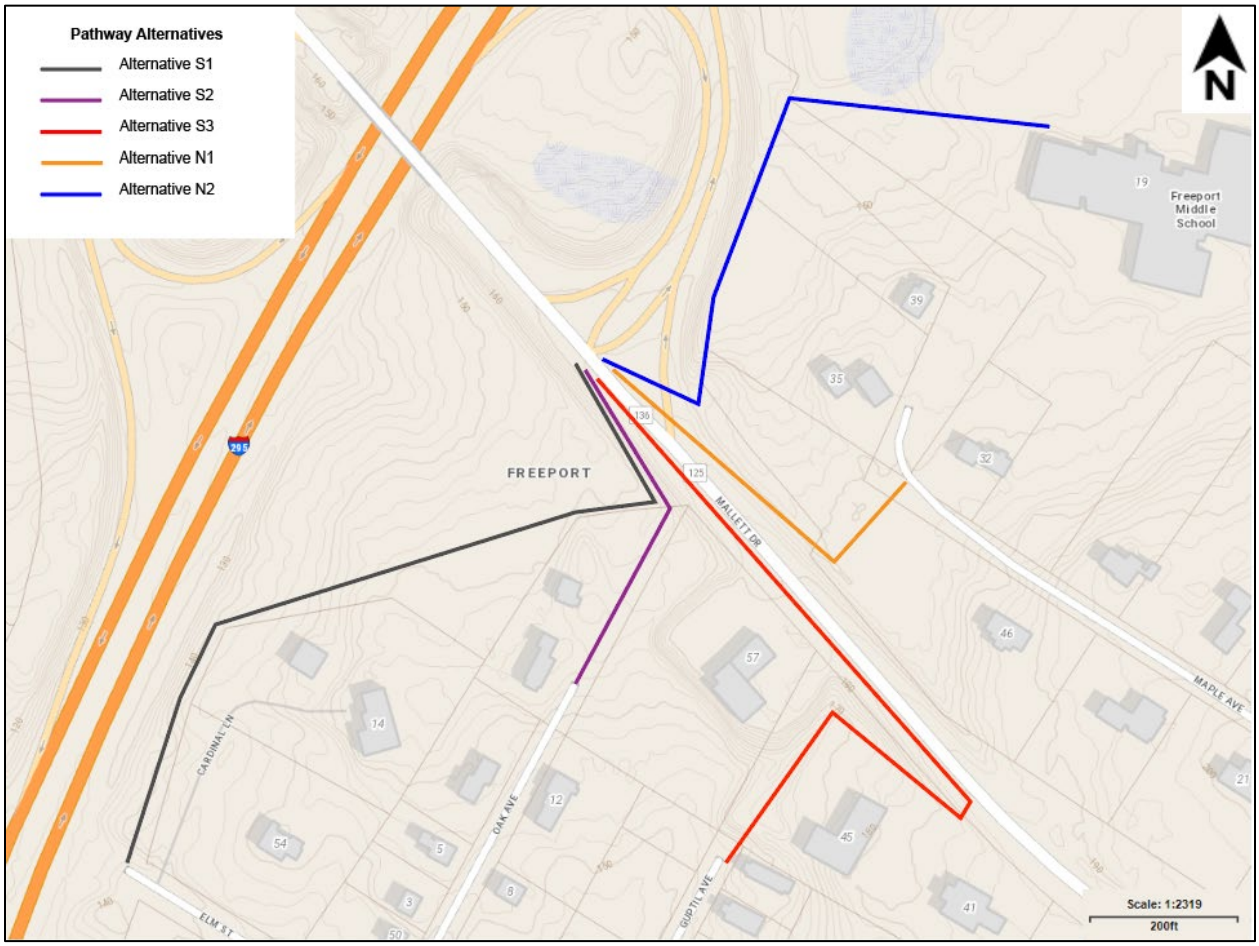


Figure 3 Note: Alternative S3 and Alternative N1 are not recommended for further consideration.

Alternative S3 – Path from Guptil Avenue to Mallett Drive.

This potential path would start at the northern end of Guptil Avenue and connect to Mallett Drive. The elevation of the northern end of Guptil is 154 feet. The elevation of Mallett Drive north of Guptil is 182 feet. To create an accessible path, the path would need to be at a maximum 8.33% slope for 30 feet increments with 5-foot landings for its entire length. The path would need to ramp up somewhat parallel to Mallett Drive for a minimum distance of 175 feet which would include a retaining wall. If the ramp were directed northwest, it would interfere with the gas station driveway. If the ramp were directed southeast, it would interfere with the chiropractor office parking lot. The total approximate distance of this path would be 425 feet. No wetland impacts were identified on the Public Map Viewer. A site visit revealed a possible area. A wetland survey would be needed to verify. Because of the grade differential between Guptil Avenue and Mallett Drive and the potential impacts to the adjacent businesses, it is not recommended that this potential path be considered further.

Paths North of Mallett Drive

The potential paths described in this section connect the Middle School lot north of Mallett Drive to Mallett Drive.

Alternative N1 – Path from Mallett Drive to Maple Avenue.

This potential path would start at Mallett Drive, follow along an easement and connect to Maple Avenue (see Figure 3). The minimum distance of this path would be 250 feet. The grade near Mallett Drive is over 30%. To create an accessible path, a ramp and retaining wall of a minimum 100 feet would need to be built. This alternative would also require a path to be built along the northeast side of Mallett Drive from the I-295 ramp intersection for a minimum of 250 feet (if the pedestrian crossing is located at the intersection). No wetland impacts were identified on the Public Map Viewer, however, a wetland survey would be needed to verify.

Alternative N2 – Path from Mallett Drive to the Freeport Middle School lot.

This potential path would start at Mallett Drive, follow along the edge of the I-295 right-of-way and connect to the Freeport Middle School lot. The minimum distance of this path would be 600 feet. The grade near Mallett Drive is over 25% and the grade to the west of the path is over 50%. To create an accessible path, a ramp and retaining wall of a minimum 400 feet would need to be built. In addition, wetland impacts were identified on the Public Map Viewer. Because of the significant retaining wall needed and likely wetland impacts, it is not recommended that this potential path move forward.

Summary of Path Alternatives

An analysis was done to determine how much these alternatives would reduce the walking distance between the three zones - the Freeport Middle School (FMS), the Freeport High School (FHS), and west of I-295 (WI295) (shown in Figure 1). Distances measured for the zone west of I-295 are measured from the intersection of Durham Road and Mallett Drive. Table 6 summarizes the walking distances.

Table 6 – Summary of Walking Distances with Path Alignment Alternatives

	Current Distance (ft.)	Distance with Alt. S1 and N1	Distance with Alt. S1 and N2	Distance with Alt. S2 and N1	Distance with Alt. S2 and N2	Distance with Alt. S3 and N1	Distance with Alt. S3 and N2
FMS to FHS	6,900	5,400	5,100	4,800	4,500	5,100	4,900
WI295 to FMS	6,900	2,700	2,400	2,700	2,400	2,700	2,400
WI295 to FHS	6,300	4,800	4,800	4,200	4,200	4,600	4,600

As can be seen from Table 6, the biggest reduction in walking distance from a multi-use path and crossing on Mallett Drive would be for walking trips from the zone west of I-295 to the Freeport Middle School, where all alternative paths would cut the distance by more than half.

Table 7 provides a summary of the impacts of the Alternatives.

Table 7 – Summary of Path Alignment Alternatives

	Alternative S1	Alternative S2	Alternative S3	Alternative N1	Alternative N2
Approx. Total Length (ft.)	1,100	475	425	250	600
Approx. Length Retaining Wall	150	150	175	100	400
Wetland Impacts	Unlikely	Unlikely	Possible	Unlikely	Likely
Impact to Nearby Driveways	No	No	Yes	No	No
Reduction in Walking Distance*	24%	33%	27%	61%	65%
Cost	High	High	Highest	High	Highest
Recommended for Further Consideration	Yes	Yes	No	Yes	No

*Reduction in walking distance from west of I-295 to the middle school for N1 and N2 or to the high school for S1, S2, and S3.

Recommendations

Due to the complexity of this study, the recommendations suggested by the GPCOG team have been split into three categories.

North of Mallett Dive

The GPCOG team recommends further investigating the opportunity to construct a multi-use path connecting Freeport Middle School to Mallett Drive via Maple Avenue (Alternative N1). This recommendation would include the private right-of-way acquirement for the multi-use path.

Crosswalk

The GPCOG team recommends a crosswalk be constructed at the intersection of Mallett Drive and the I-295 Northbound ramps. This newly signalized intersection is the recommended location for a crosswalk because it eliminates any of the potential risk factors associated with the installation of a mid-block crosswalk. It also falls near the terminus of the potential paths south of Mallett Drive.

Note: To connect the path north of Mallett Drive with a crosswalk located at the intersection with the I-295 North on-ramp, an approximate additional length of 250 feet of a multi-use path would need to be constructed.

South of Mallett Drive

Two of the path alternatives south of Mallett Drive should be investigated further. Alternatives S1 and S2 are likely to be the lower cost alternatives with fewest impacts.

The GPCOG team recommends further investigating the opportunity to construct a multi-use path connecting Mallet Drive to the westernmost extent of Elm Street through MaineDOT-owned property adjacent to I-295 South (Alternative S1). This connection is desirable, as the grade of the landscape is relatively flat, making ADA compliance achievable. Additionally, throughout the research for this study conducted by GPCOG staff, MaineDOT representatives have agreed to work with the Town of Freeport to construct a multi-use path on land owned by the DOT. This connection on the south end of the study area avoids the potential hurdles associated with the private right-of-way acquisition.

The GPCOG team also recommends further investigating the opportunity to construct a multi-use path connecting Mallet Drive with Oak Avenue (Alternative S2). This recommendation would include the private right-of-way acquisition for the multi-use path. The total distance of this path would be less than half of a path along the I-295 right-of-way and could be comparable in cost.