

APPENDIX D: LAND USE ANALYSIS



MEMORANDUM

To: Town of Barnstable

From: Nelson\Nygaard

Date: March 29, 2017

Subject: Hyannis Parking Study: Land Use Analysis

A successful downtown parking system is closely connected to the mix of land uses and activities that surrounds it. For downtown Hyannis this means the parking system should reflect the opportunities presented by the historic business district, connections to transit, and close proximity of a diversity of land uses, while acknowledging the seasonal parking demand created by tourism and the ferry services. It also means that the parking system must be flexible and able to adapt as vacant parcel are redeveloped and as Hyannis continues to grow. In practice, this means a better balance between hot spots of high parking demand and the location of available parking supply.

This technical memorandum examines existing supply and demand in four subzones in downtown Hyannis. In order to gain a better understanding of the parking patterns in downtown Hyannis, this analysis will supplement the existing parking demand analysis by determining how much of the area's parking is driven by local uses versus ferry ridership and how this may change over time.

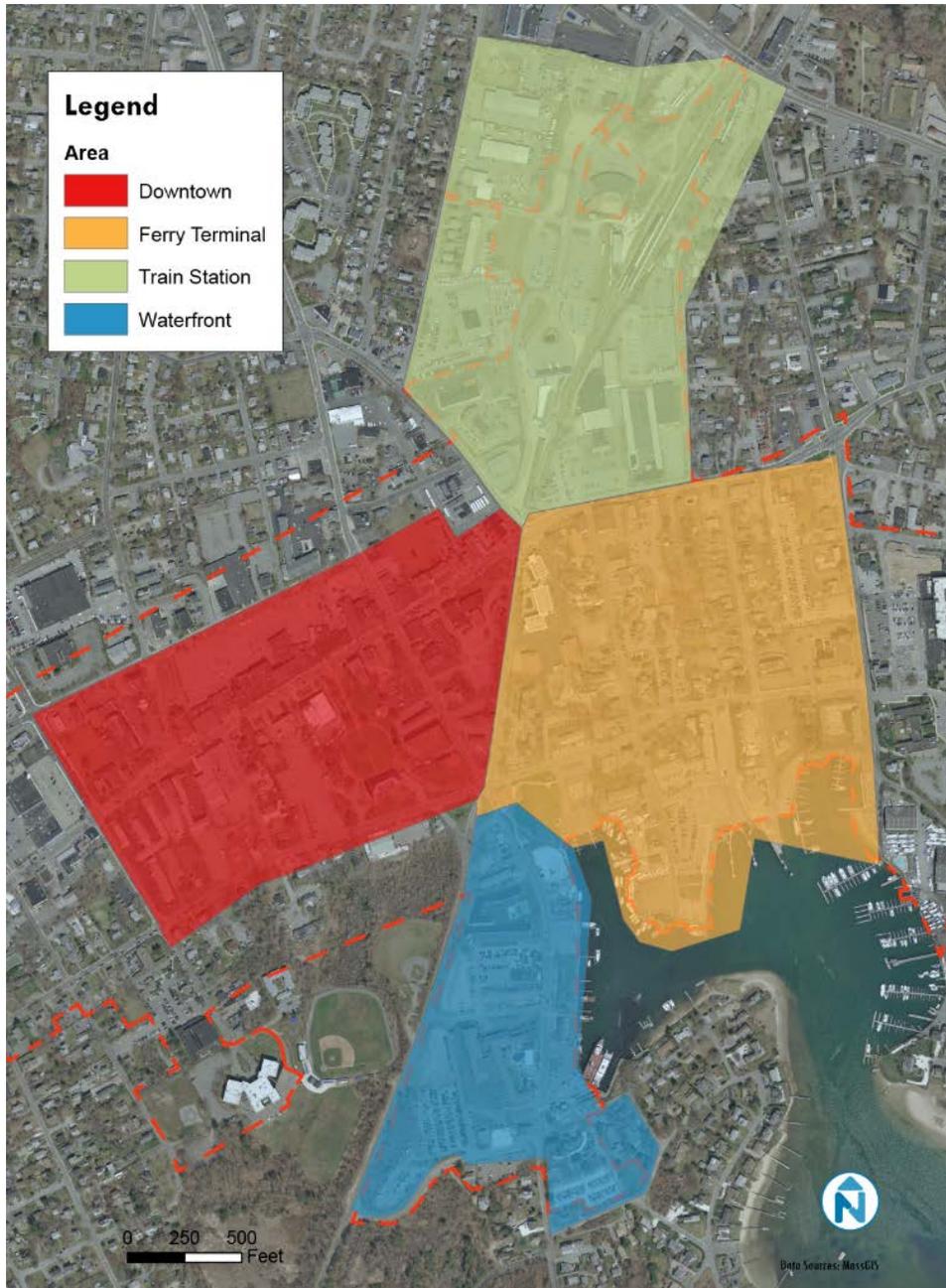
KEY FINDINGS

- Downtown Hyannis currently has over 2,000 more vehicles parking in the area than would be expected given local land uses, which can be attributed to ferry passengers
- This demand is growing: between 2004 and 2014, annual ferry ridership grew by 20%
- There is an excess of parking supply in many areas of Hyannis, particularly near the train station
- Parking demand in downtown Hyannis could be moved to existing remote and underutilized parking areas within the district to encourage infill development
- Findings indicate that projected ferry ridership is anticipated to add over 2,600 additional vehicles to the downtown area overall. Nearly half of this parking demand can be supported by existing unused parking supply in the Train Station zone.
- If the large parking areas in the Waterfront and the Ferry Terminal zones were to be redeveloped, there would be a need create sufficient parking for an additional 1,300 vehicles in the Train Station area.

Study Area and Parking Zones

Within the entire parking study area, four zones were identified as places to conduct a more detailed analysis on parking demand including Downtown – mostly the eastern half of Main Street where parking demand is highest, the waterfront where there is high seasonal demand, the “Ferry Terminal” area and the area surrounding the RTA bus terminal and train station. Each of these areas has somewhat unique parking demands and land uses. See Figure 1. Please note that for every utilization chart the red dotted line represents the 90% occupancy line, which is considered to be a functionally full parking area.

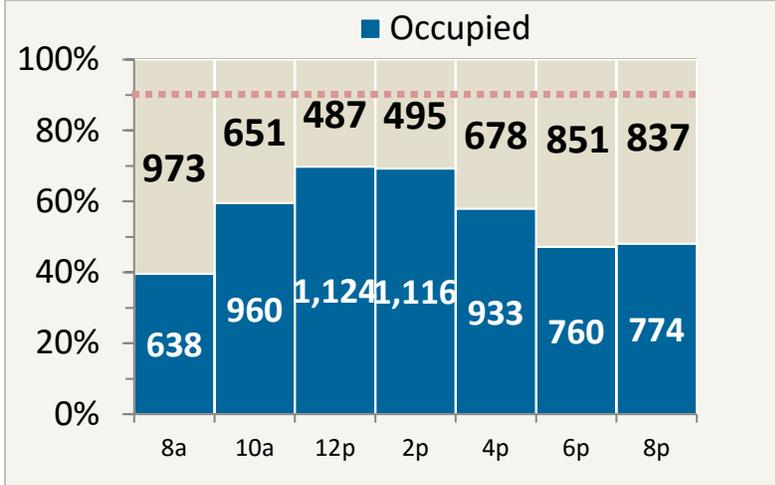
Figure 1 Parking Demand Analysis Zones



Downtown

The downtown zone was narrowed to the parcels and parking lots within a block of Main Street between High School Road and Center Street / Old Colony Road. This area includes a comparatively higher density of land uses, as well as a moderate weekday parking demand as shown in Figure 2. In total, this zone has approximately 1,600 parking spaces.

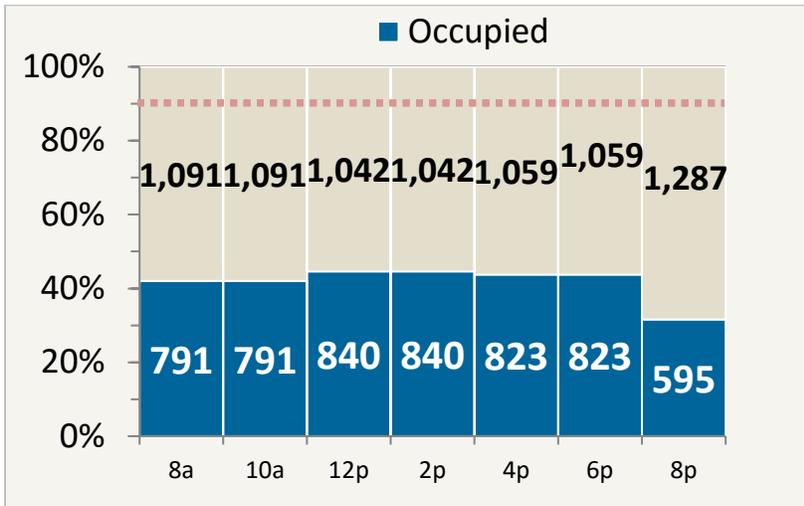
Figure 2 Downtown Zone July Weekday Parking Utilization



Ferry Terminal

The Ferry Terminal zone was designated as the area bound by Old Colony Road, Main Street, Lewis Bay Road, and the harbor to the south. Primarily a residential area, this area has two large parking lots belonging to the Steamship Authority as well as several larger parking lots. The parking demand for this area is relatively flat throughout the day as shown in Figure 3. Though this area is predominantly residential, it has the most parking of the four zones with nearly 1,900 parking spaces.

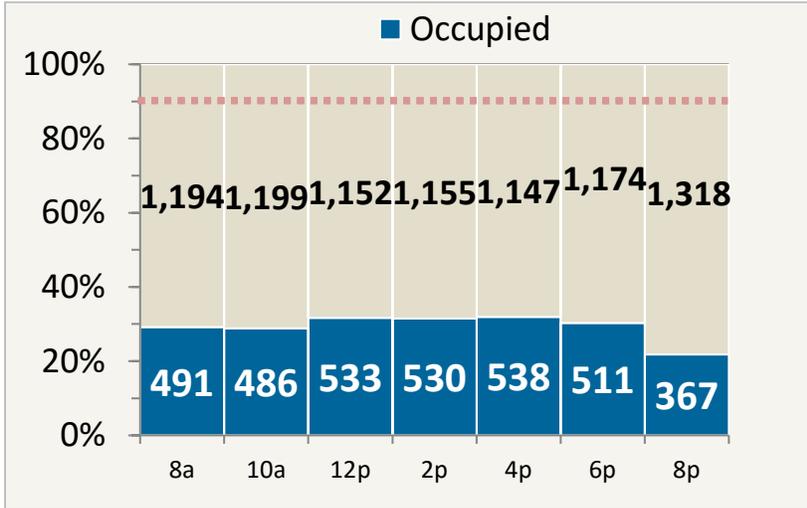
Figure 3 Ferry Terminal Zone July Weekday Parking Utilization



Train Station

The Train Station zone includes most of the area found within a block of the Cape Cod Central Railroad station and is largely bound by Center Street, Ridgewood Avenue, Iyannough Road, Yarmouth Road, and Main Street. This area has a mix of industrial and commercial uses, and experiences the lowest overall weekday parking demand of any of the four areas both in absolute and relative terms as shown in Figure 4. In total, this area has 1,685 parking spaces.

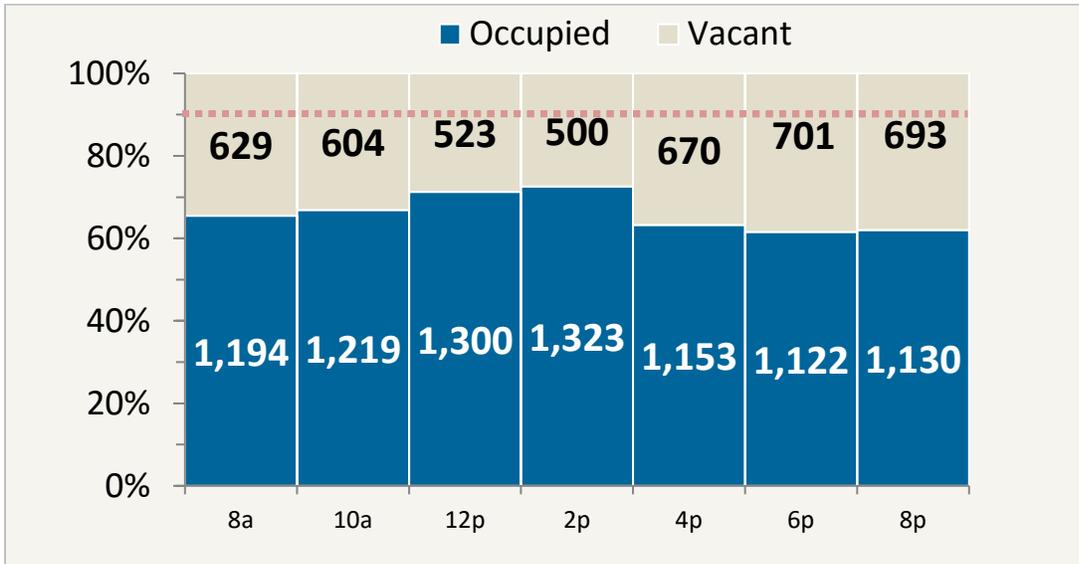
Figure 4 Train Station Zone July Weekday Parking Utilization



Waterfront

The Waterfront zone is the smallest of the four cones and is bound by Old Colony Road to the west, Nantucket Street, and the waterfront itself. This area has a variety of commercial uses including hotels and restaurants, and, as shown in Figure 5, the Waterfront area has the greatest amount of parking demand in the area both in real and relative terms. In total this area has 1,823 parking spaces.

Figure 5 Waterfront Zone July Weekday Parking Utilization



PARKING DEMAND MODELING METHODOLOGY

To determine parking demand for a development, Nelson\Nygaard typically compare the size of the development with “standard” parking generation rates that are often per 1,000 square feet, per unit, etc. The Institute of Transportation Engineers (ITE) produces a report titled Parking Generation, which is the current national standard in determining parking demand for a development. ITE standards are based on parking demand studies submitted to ITE by a variety of parties, including public agencies, developers and consulting firms.

While the most robust available database of observed parking demand, ITE parking rates often do not reflect the actual demand profile of mixed-use downtown areas. Typically, in mixed-use developments, customers and visitors can visit multiple destinations on foot and only park once. Moreover, throughout the day, different uses have different peak demands: for example, an office may have a high demand until 5 p.m., and a restaurant open for dinner may have a high demand only after 5 p.m., indicating “staggered peaks” which can utilize the same parking supply.

To more accurately model downtown parking activity, Nelson\Nygaard used an adapted land use model from the Urban Land Institute’s (ULI) Shared Parking Manual (2nd Edition, 2005). Besides capturing the “staggered peaks” of demand from various uses by time of day, the model is tailored to include a parking demand reduction for using the same parking spaces at the same time for different land use activities, which is known as “internal capture.” Such trips are made by those who, having already parked, travel between uses without accessing their vehicle. Restaurants and retail services, for example, are common generators of internal capture trips in mixed-use developments, as they serve both employees and residents within the same area. The land use model includes a conservative reduction in demand to account for the mix of Hyannis’ development patterns.

This Shared Parking analysis estimates how much parking might be required to match demand, and compares the modeled demand to the observed to calibrate. The modeled demand is based on the factors described above, creating the expected actual parking demand throughout the course of an average weekday. Parking utilization survey counts collected within the same activity area are then overlaid on top of the existing modeled shared curve, and the curve is adjusted based on observed demand patterns.

Hyannis Model Calibration

The shared parking model for each activity area was adjusted to best reflect the unique environment in downtown Hyannis and in each sub area, based on the factors below. Please note these adjustment factors may vary according to the particular zone.

Reserve Parking Supply

The models in this analysis assume that no more than 90% of the parking supply should be full. At 90%, parking feels functionally “full” as only one of every 10 spaces is available. In addition, this 10% reserve accounts for additional operational reserve such as overflow during events.

Vacancy

The existing analysis accounts for commercial retail, office, and residential vacancy adjustments derived from field observations, and in conversations with stakeholders. Though actual vacancy rates may be higher or lower than estimated, adjusted vacancy rates help to modify and calibrate the existing land use inputs to match observed demand patterns within each activity area. The study estimates a 10% vacancy rate for retail and restaurants in the Downtown zone, and no vacancy in the other zones.

Time of Day

Time of day adjustment factors provide a more accurate depiction of parking demand profile throughout the course of a day by land use. For example, residential land uses generate greater demand during the early morning and evening peaks when residents are at home, and office buildings generate greater parking demand during regular working hours. These adjustments were tailored for each type of land use based off of ULI's Shared Parking demand rates by time of day, and help to produce staggered peaks for different land uses. This creates a more accurate depiction of how parking supply is actually used throughout the course of a day.

Internal Capture

Unlike stand-alone shopping centers, downtown Hyannis' existing mixed-use and walkable environment encourages and provides opportunities for residents, visitors, and employees to visit multiple destinations on foot, rather than having to drive and park multiple times during a visit. For example, a downtown coffee shop generally does not generate any additional car trips, or need many dedicated parking spaces; most customer trips are generated on foot by nearby employees. This type of behavior is classified as "internal capture". Internal capture reductions were applied to activity areas based on the land use mix. For both commercial and residential land uses, an internal capture rate of 30% was estimated for the Downtown zone. All other zones were estimated to have a captive market effect of 10% for commercial uses, and 5% for residential uses.

Transportation Demand Management

Another parking demand reduction factor included in the analysis is an adjustment for transportation demand management (TDM). These types of programs work collectively to change how, when, where, and why people travel and provide transportation options other than the single-occupant vehicle. TDM measures include a range of cycling, walking, transit, and carpooling incentives and infrastructure that can range from simple improvements such as bicycle parking and transit shelters to comprehensive programs such as discounted/free transit passes for employees and even employee shuttle programs.

To model parking demand in the study zones, the analysis included a TDM factor of 5% for employees and 5% for residents in the Downtown zone, and 15% for both types in the other three areas. This accounts for a small reduction in parking demand due to factors such as transit service to Hyannis, and the relative walkability of the environment compared to more suburban-style development.

Observed Parking Demand

In the spring and summer of 2016, Nelson\Nygaard worked with the local officials to identify "typical" days in downtown Hyannis for parking utilization counts. The team conducted the counts on a Thursday, and a Saturday. Data collectors captured parking demand for 12 hours, beginning at 8:00 a.m. and ending the last count at 8:00 p.m., with counts every two hours. Data collection began in the early morning to identify if/when employee parking would fill to capacity. In the evening, data was collected until 8:00 p.m. to assess parking demand associated with the area's evening activities.

Estimated Parking Demand

Using the factors described above, estimated demand was calculated for each of the four zones according to the local land uses. The demand estimates for each area were then compared to the observed demand, and can be seen in Figure 6 and Figure 7. For all areas other than the downtown area, the observed parking demand exceeded the estimated demand for the area. It is believed that this excess parking is represented by ferry passengers. For example, given the land uses in the Ferry Terminal area, the anticipated parking demand for the area would be 327 vehicles. The observed demand however nears 800 cars, so the some 460 additional cars are expected to be from ferry riders. As can be seen in the figures below, there is excess demand in the Ferry Terminal, Train Station, and

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Waterfront zones on both the weekday and weekend parking periods. The Waterfront area in particularly displays a notable difference between the estimated parking, and the actual utilization in the area.

Figure 6 Estimated Weekday Parking Demand and Observed Demand by Zone

Zone	Measure	Existing July Weekday Demand						
Downtown	Shared Parking Projected Demand	402	983	1,593	1,353	1,163	1,520	1,325
	Actual Demand	638	960	1,124	1,116	933	760	774
	Estimated Ferry Parking (Delta)	236	-	-	-	-	-	-
Ferry Terminal	Shared Parking Projected Demand	327	502	546	515	532	599	479
	Actual Demand	791	791	840	840	823	823	595
	Estimated Ferry Parking (Delta)	464	289	294	325	291	224	116
Train Station	Shared Parking Projected Demand	188	380	536	488	481	516	401
	Actual Demand	491	486	533	530	538	511	367
	Estimated Ferry Parking (Delta)	303	106	-	42	57	-	-
Waterfront	Shared Parking Projected Demand	37	63	197	129	114	333	293
	Actual Demand	1,194	1,219	1,300	1,323	1,153	1,122	1,130
	Estimated Ferry Parking (Delta)	1,157	1,156	1,103	1,194	1,039	789	837

Figure 7 Estimated Weekend Parking Demand and Observed Demand by Zone

Zone	Measure	Existing July Weekday Demand						
		8a	10a	12p	2p	4p	6p	8p
Downtown	Shared Parking Projected Demand	477	986	1,885	1,798	1,847	2,239	1,606
	Actual Demand	430	595	776	711	674	790	854
	Estimated Ferry Parking (Delta)	-	-	-	-	-	-	-
Ferry Terminal	Shared Parking Projected Demand	408	393	439	419	487	608	581
	Actual Demand	1,115	1,115	867	867	1,034	1,034	728
	Estimated Ferry Parking (Delta)	707	722	428	448	547	426	147
Train Station	Shared Parking Projected Demand	255	352	442	423	465	592	544
	Actual Demand	652	650	609	608	626	624	496
	Estimated Ferry Parking (Delta)	397	298	167	185	161	32	-
Waterfront	Shared Parking Projected Demand	70	92	215	224	298	451	386
	Actual Demand	1,340	1,400	1,480	1,445	1,190	1,184	969
	Estimated Ferry Parking (Delta)	1,270	1,308	1,265	1,221	892	733	583

Ferry Ridership

In addition to the observed and estimated parking demand for each area, the study team also looked at the amount of ferry ridership in the area between 2004 and 2015 as shown in Figure 8. From the ridership figures for the Steamship Authority’s ferries between Hyannis and Nantucket, and the Hy-Line’s ferries between Hyannis and Martha’s Vineyard, the compound annual growth rate was calculated for both ferries. The CAGR for the Hy-Line (with one fewer year of data) was adjusted to reflect the growth rate trends of the SSA, and was increased by 0.58% as was observed for the SSA when altering the CAGR from 2004-2014 to 2004-2015. These numbers were then rounded up.

Figure 8 2004-2015 Hyannis Ferry Ridership

Year	SSA Annual Ridership	Hy-line Ridership	Total
2004	508,990	399,116	908,106
2005	511,798	393,145	904,943
2006	515,437	404,143	919,580
2007	549,206	383,193	932,399
2008	517,846	381,180	899,026
2009	513,611	342,635	856,246
2010	522,347	355,858	878,205
2011	522,517	408,189	930,706
2012	558,539	432,061	990,600
2013	582,983	451,568	1,034,551
2014	605,852	487,758	1,093,610
2015	644,787	N/A	-
CAGR 2004-2014	1.59%	1.84%	1.7%
CAGR 2004-2015	2.17%	N/A	-
Adjusted CAGR	2.20%	2.4%	-

The adjusted CAGR for each ferry line was then applied for 2016-2025 as shown in Figure 9.

Figure 9 2016-2025 Projected Hyannis Ferry Ridership

Year	SSA Annual Ridership	Hy-line Ridership	Total
2016	675,415	543,249	1,218,664
2017	690,274	556,287	1,246,561
2018	705,460	569,637	1,275,097
2019	720,981	583,309	1,304,290
2020	736,842	597,308	1,334,150
2021	753,053	611,643	1,364,696
2022	769,620	626,323	1,395,943

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2023	786,552	641,355	1,427,907
2024	803,856	656,747	1,460,603
2025	821,540	672,509	1,494,049

Future Parking Scenario

The total passenger growth from 2016-2026 was calculated as 22.6%. This amount of growth was then applied to the existing parking demand attributed to ferry ridership, and can be seen below in Figure 10 broken out by zone.

Figure 10 Future Parking Demand by Zone

Zone	Measure	Projected August Weekday Demand						
		8a	10a	12p	2p	4p	6p	8p
Downtown	2016 Ferry Parking	236	-	-	-	-	-	-
	Estimated 2026 Ferry Parking	289	194	-	15	-	-	-
Ferry Terminal	2016 Ferry Parking	464	289	294	325	291	224	116
	Estimated 2026 Ferry Parking	569	354	360	398	357	275	142
Train Station	2016 Ferry Parking	303	106	-	42	57	-	-
	Estimated 2026 Ferry Parking	371	130	117	51	70	110	49
Waterfront	2016 Ferry Parking	1,157	1,156	1,103	1,194	1,039	789	837
	Estimated 2026 Ferry Parking	1,418	1,417	1,352	1,464	1,274	967	1,026
Total Estimated 2026 Ferry Parking		2,647	2,095	1,829	1,928	1,701	1,352	1,217

At its peak, ferry ridership is anticipated to add over 2,600 additional vehicles to the downtown area overall. Nearly half of this parking demand is supported by existing unused parking supply in the Train Station zone.

If the Town however instead chose to redevelop the large parking areas in the Waterfront and the Ferry Terminal zones, there would be a need create sufficient parking for an additional 1,300 vehicles in the Train Station area. Moving the ferry parking to the Train Station could facilitate growth in the areas near the water in Hyannis, alleviate traffic, and promote better land uses near the ferry. Passengers could use buses to and from the ferry terminals to parking locations near the train station as they currently do in Woods Hole. Such an opportunity could create a valuable opportunity to add a greater variety of uses near the waterfront, and boost the commercial, retail, and residential opportunities in Hyannis.