



TECHNICAL MEMORANDUM #4: SHARED PARKING

To: Town of Concord
From: Nelson\Nygaard
Date: March 20, 2013
Subject: Shared Parking Analysis

OVERVIEW

Parking does not exist independently. It is intricately intertwined with the overall mix of land uses and activity it serves. As Concord Center and West Concord evolve and attract a variety of land uses, this relationship is critical. This memo explores the current relationship between parking and land use in Concord.

Concord Center and West Concord are not typical suburban development. The mix and proximity of land uses, the walkable environments, and the presence of transit help enhance their village-styles. When land is at a premium in these centers of activity, careful consideration of what the land is dedicated to (built environment, roadways, open space, parking) has a significant impact on the vitality of these walkable places.

This memo compares the parking demand that is recommended using national standards (based on land uses) and compares that figure to how much parking actually exists on the ground today. Next, the land uses are used in a shared parking model that determines how much parking is needed when parking is shared. The results of the shared parking analysis are then compared to how much parking demand was actually observed. Finally, the last section undergoes an analysis on several buildout scenarios, and what impact these scenarios would have on the existing parking supply.

Specifically, this memo presents the following analysis for Concord Center and West Concord:

- Existing Land Use – within the study areas
- Parking Supply – observed supply compared to expected supply by land use
- Expected Parking Demand – based on land use, observations and national demand models
- Shared Use Parking Analysis – an analysis based on Shared Parking methodology
- Observed Parking Demand – on-the-ground data collection utilization counts
- Future Growth - using the development scenarios that informed the ongoing wastewater management study, the shared parking model demonstrates how the potential buildout scenarios would impact parking supply

CONCORD CENTER

KEY FINDINGS

- The study area encompasses over two million square feet of buildings/structures
- Nearly 60% is residential, including single-family homes, apartments, townhomes, and condos
- Concord Center has about 1,500 more parking spaces in the study area than many national standards indicate are required
- Observed parking demand closely mirrors the shared parking model demand estimates throughout the day
- There are 1,800 available parking spaces at peak when parking is shared, which indicates that Concord Center may be able to absorb additional development without building many new parking spaces

Existing Land Use

The consultant team analyzed existing built square footage in Concord Center and West Concord in relationship to parking supply and utilization. The Town of Concord provided all land use data.

Overall, there is just over two million built square feet in the Concord Center study area. Figure 1 shows the breakdown of land use by category in the study area. Single-family residential homes comprise the most square footage (nearly 900,000 square feet). The commercial and retail space classification includes nearly a half-million square feet, followed by residential apartments, townhomes, and condos, and office space, which includes both private and municipal offices.

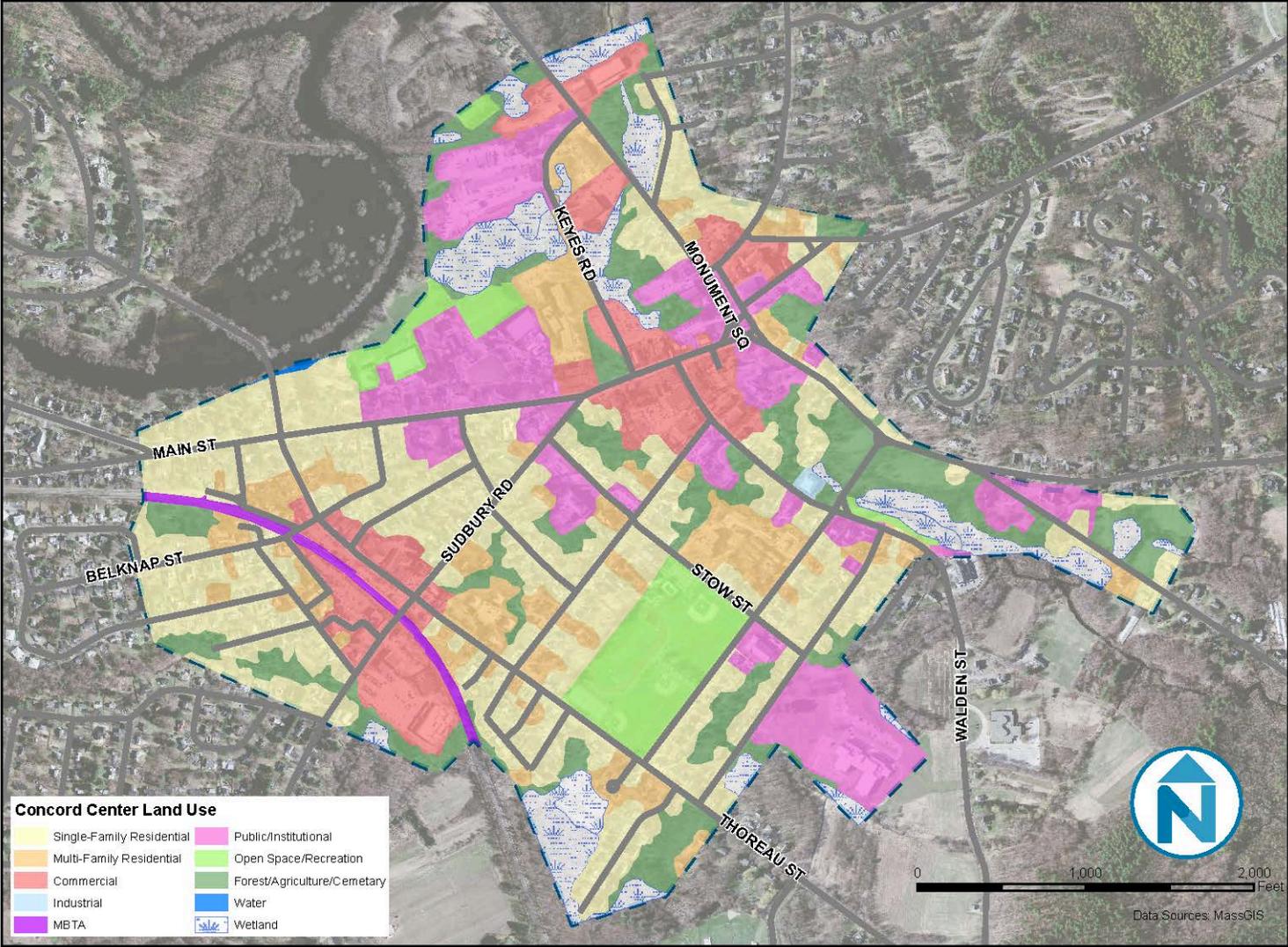
Figure 2 shows land uses within the Concord Center/Thoreau Depot area graphically.

Figure 1 Existing Land Use in Concord Center

Land Use	Square Feet	Percentage
Residential – Apartments, townhomes, condos	309,092	15%
Residential – Single family homes	865,013	42%
Retail/Commercial – Banks, shops, restaurants, performing arts, hotels, museums, etc.	444,586	22%
Schools – Public and private	120,634	6%
Industrial	0	0%
Office – Office, including municipal offices	311,983	15%
Total	2,051,308	

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Figure 2 Concord Center Land Use Map



Parking Supply

The Concord Center study area includes nearly 4,000 inventoried parking spaces. Nearly three-quarters of these parking spaces are in off-street facilities. Figure 3 shows the parking supply in Concord Center. An additional breakdown is provided by parking access, or who parking is "available to". Restricted access parking is dedicated to a specific population, such as customers, tenants, or employees of a particular property or use. General access parking is available for public use and is generally owned by a public entity.

While this inventory includes the Concord Center study area as shown in Figure 2, Concord Center includes several centers of activity, in particular, the Monument Square/Main Street shopping area, the Thoreau/Depot rail station area, and Emerson Playground area.

Figure 3 Parking Inventory: Concord Center

	Count	Percentage	% Restricted Access	% General Access
On-street	1,191	30%	0%	100%
Off-street	2,708	70%	73%	27%
Total	3,899		54%	46%

Expected Parking Demand

The Institute of Transportation Engineers (ITE) produces a periodic report titled Parking Generation, which is the prevailing 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. The most recent parking generation manual available is the 4th edition (2010) and is a comparative starting point to determine baseline assumptions. This study includes ITE peak period parking demand rates as guidelines to benchmark how Concord Center's existing supply compares to its land uses.

The average peak period parking demand rate calculation is meant to represent the number of parked cars at the peak period divided by the quantity of the independent variable, such as building area or employees. Standard rates come from the ITE manual. To estimate the average peak period demand in Concord Center, this study used Town Assessor's data to determine the square footage of each land use, and multiplied that square footage (or other independent variable, such as residential units or employees) by the ITE average peak period demand. The ITE rates for land uses in the Concord Center study area are in Figure 4.

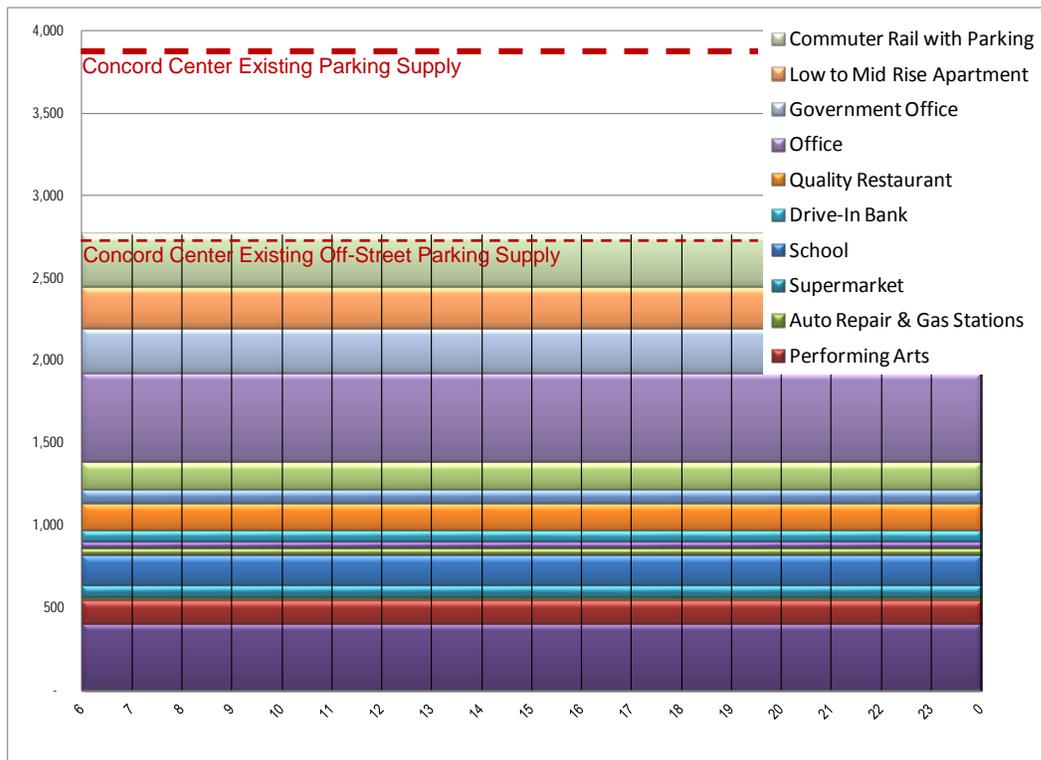
Expected parking demand is a way to examine the amount of parking that would be needed to support the level of development and activity present within the study area. In this case, the analysis is completed using industry standard methodology to equate land use with expected parking demand. We note in Technical Memorandum #3 that existing parking requirements in Concord zoning typically match or exceed industry standards.

Figure 4 ITE Parking Demand Rates in Concord Center

Land Use	SF or Units	ITE Weekday Rate	Parking Spaces
Residential (non-single family)	309,092 (203 units)	1.23 / unit	250
Commercial/Retail	444,586	0.52 - 10.60 / KSF	1,212
Schools	120,634 (765 students)	0.23 / student	176
Industrial	0		
Office	311,983	2.84 - 4.15 / KSF	810
Commuter Rail	567 daily boardings	Assumes 33% non-auto share and 1.2 boardings/vehicle	317
TOTAL			2,765

According to national parking standard calculations from ITE, the needed number of parking spaces for Concord Center is 2,765 spaces. The study area has 2,708 off-street spaces plus 1,191 on-street spaces (total of 3,899 spaces). This confirms that Concord's zoning code is comparable to national standards. When including on-street spaces, the study area has about 1,000 spaces more than what it called for by the national ITE parking standard calculations (Figure 5). Single family residences are excluded from this analysis, as most of the single family units in Concord Center have dedicated driveways (which were not included in the parking supply count).

Figure 5 ITE Parking by Land Use (Unshared) in Concord Center



ITE parking standards are often based on peak hour demands of suburban sites with isolated, single land uses which have free parking (Institute of Transportation Engineers, Parking Generation 4th Edition, 2010, page 2). Nelson\Nygaard's experience indicates that projections using standard ITE parking rates tend to overestimate demand for downtown areas like Concord Center. Mixed-use areas offer the opportunity to share parking supply between various uses. This reduces the total number of spaces which would be required by the same land-uses in stand-alone developments. An example of shared parking in Concord Center is the current configuration of the Keyes Road lots. Also, the parking near the train stations used for commuters on the weekdays can be used for other purposes on the weekends.

Shared Use Analysis

Concord's walkable environment allows for parking to be shared. Visitors can park once and walk to multiple downtown destinations; employees can park once for the day and walk to run errands. Each land use does not need its own dedicated supply of parking, yet that is exactly what standard analysis and zoning indicate is needed. In reality, throughout the day, different uses have different peak demands: for example, an office may have a high demand until 5pm, and a restaurant open for dinner may have a high demand only after 5pm.

Concord Center has some existing shared parking arrangements; for example, the Christian Science Center church on Lowell Road leases parking spaces to Colonial Inn and other downtown employees. Whether formal or informal, shared parking opportunities allow for better use of available parking resources and management, and can allow for the accommodation of additional development.

To model this type of activity, Nelson\Nygaard used an adapted shared parking model using inputs from the Urban Land Institute's (ULI) Shared Parking Manual (2nd Edition, 2005) and ITE's Parking Generation (4th Edition, 2010). Besides demand by time of day, we tailored the shared parking model for Concord to include a parking demand reduction for internal capture. Mixed-use downtowns allow for parking efficiencies through "internal capture" or "captive market" trips. Such trips are made by patrons who, having already parked, travel between uses without accessing their vehicle. Restaurants and retail services are common generators of internal capture trips in mixed-use developments, as they serve both employees and residents within the same area. The shared parking model includes a conservative percent reduction to account for the mix of Concord development patterns.

If each land use were to build enough parking to accommodate its peak demand, then the supply of spaces would be grossly underutilized. Shared parking allows for accommodation of peak parking demand, but shares a supply among different uses. This concept is demonstrated in Figure 6 below. The bar chart on the left shows that each land use needs more than 2,000 parking spaces; the shared parking chart (right) shows the number of spaces needed with shared parking (in this example, 38% less).

Figure 6 Shared Parking Conceptual Illustration

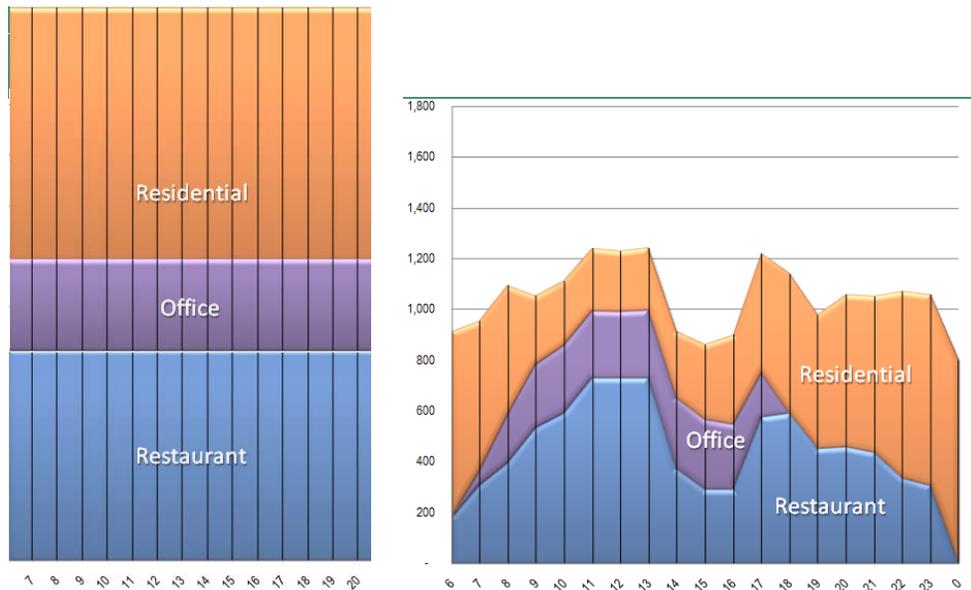
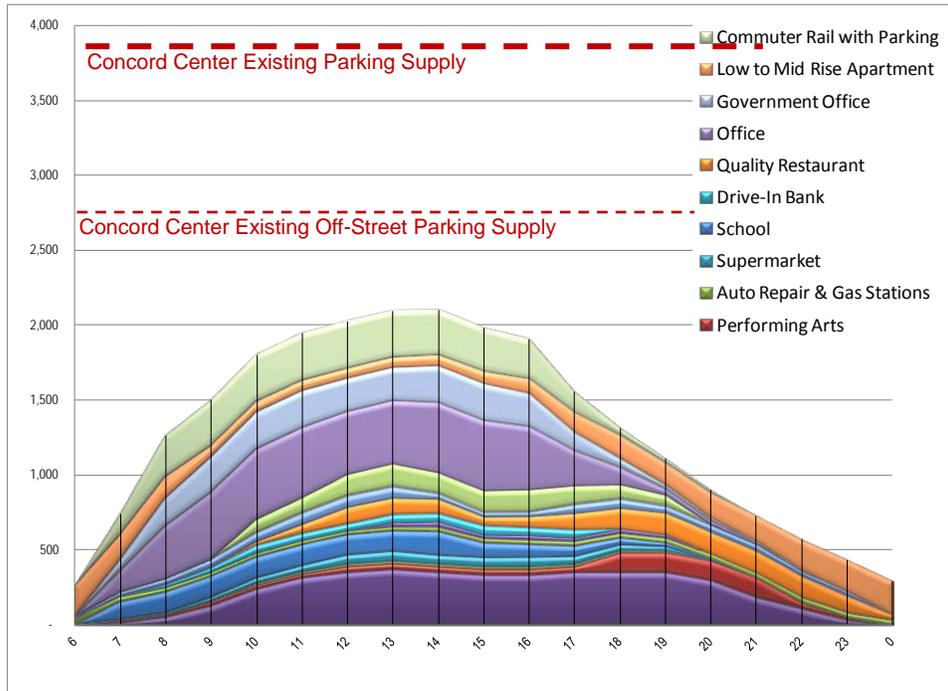


Figure 5 shows the number of parking spaces, by land use, that ITE estimates are needed in Concord Center (2,765 total parking spaces). Figure 7 is the output of the shared parking model, which demonstrates the number of parking spaces needed in Concord Center (by land use) after factoring in the shared parking reductions. The model starts with the ITE estimated demand of 2,765 spaces. Shared parking peak demand is estimated to be 2,102 spaces at 2pm. With Concord Center's current supply of 3,899 parking spaces, at peak, there are nearly 1,800 available spaces when parking is shared.

Figure 7 ITE Parking by Land Use (Shared) in Concord Center



Observed Parking Demand

Understanding how realistic the shared parking model assumptions are can be tested by comparing them to the actual observed parking demand in Concord Center.

Figure 8 compares the modeled shared parking throughout the day to actual observed parking demand (on- and off-street) in Concord Center. Observed peak demand was 1,987 between 11am – 1pm, with second highest demand immediately following from 1pm – 3pm, with 1,936 observed cars. With a peak of 1,987 cars and 1,186,295 square feet of development (not including single-family residential), the Concord Center's "ITE" peak parking rate is 1.67 spaces per 1,000 square feet of land use.

Concord Center's "ITE" peak parking rate is 1.67 spaces per 1,000 square feet of land use.

Figure 9 shows the same observed demand curve (Figure 8) on top of the expected shared parking curve. The graphic shows that throughout the day, observed parking demand closely mirrors the modeled shared parking curve, with the exception of the evening (after 7pm) where the observed demand is much significantly higher than what is expected. This may be due to an evening event or higher than expected restaurant activity.

Figure 8 Concord Center Parking Observed Demand (Weekday)

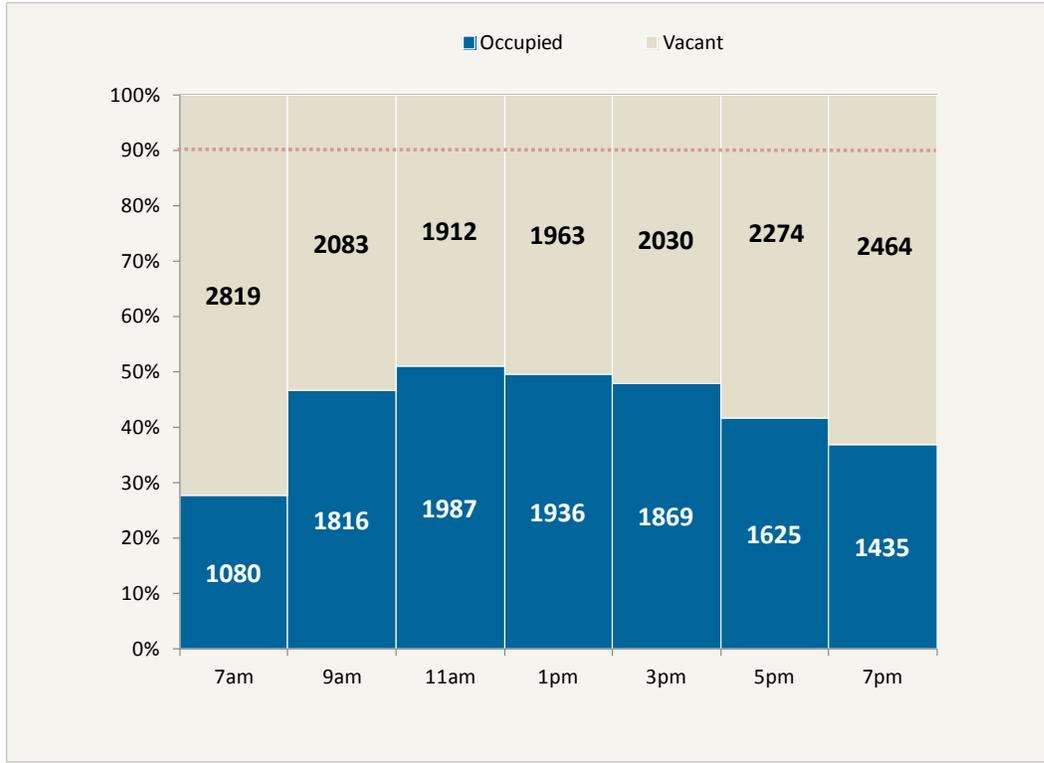
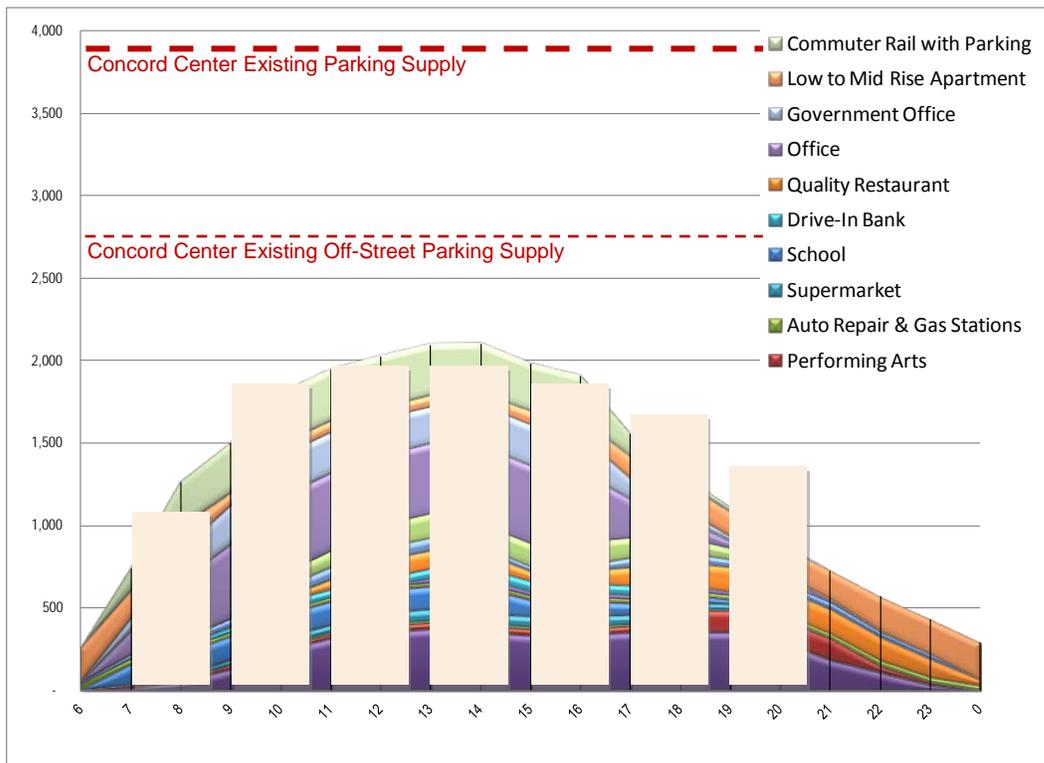


Figure 9 ITE Parking by Land Use (Shared) in Concord Center Compared to Observed Demand



WEST CONCORD

KEY FINDINGS

- The study area encompasses over one million square feet of development
- About half of development is residential, including single-family homes, apartments, townhomes, condos, and assisted living
- West Concord has about 1,000 more parking spaces in the study area compared to how many national standards indicate are required
- When parking is shared, at peak, there are about 1,500 available spaces in West Concord, which indicates that West Concord may be able to absorb additional development without building many new parking spaces

Existing Land Use

Overall, there is just over one million built square feet in the West Concord study area. Figure 10 shows the breakdown of land use by category in the study area. Single-family residential homes have the most square footage (over 300,000 square feet). The retail and commercial space classification includes nearly a half-million square feet, followed by residential apartments, townhomes, and condos; office space, which includes both private and municipal offices; and industrial uses.

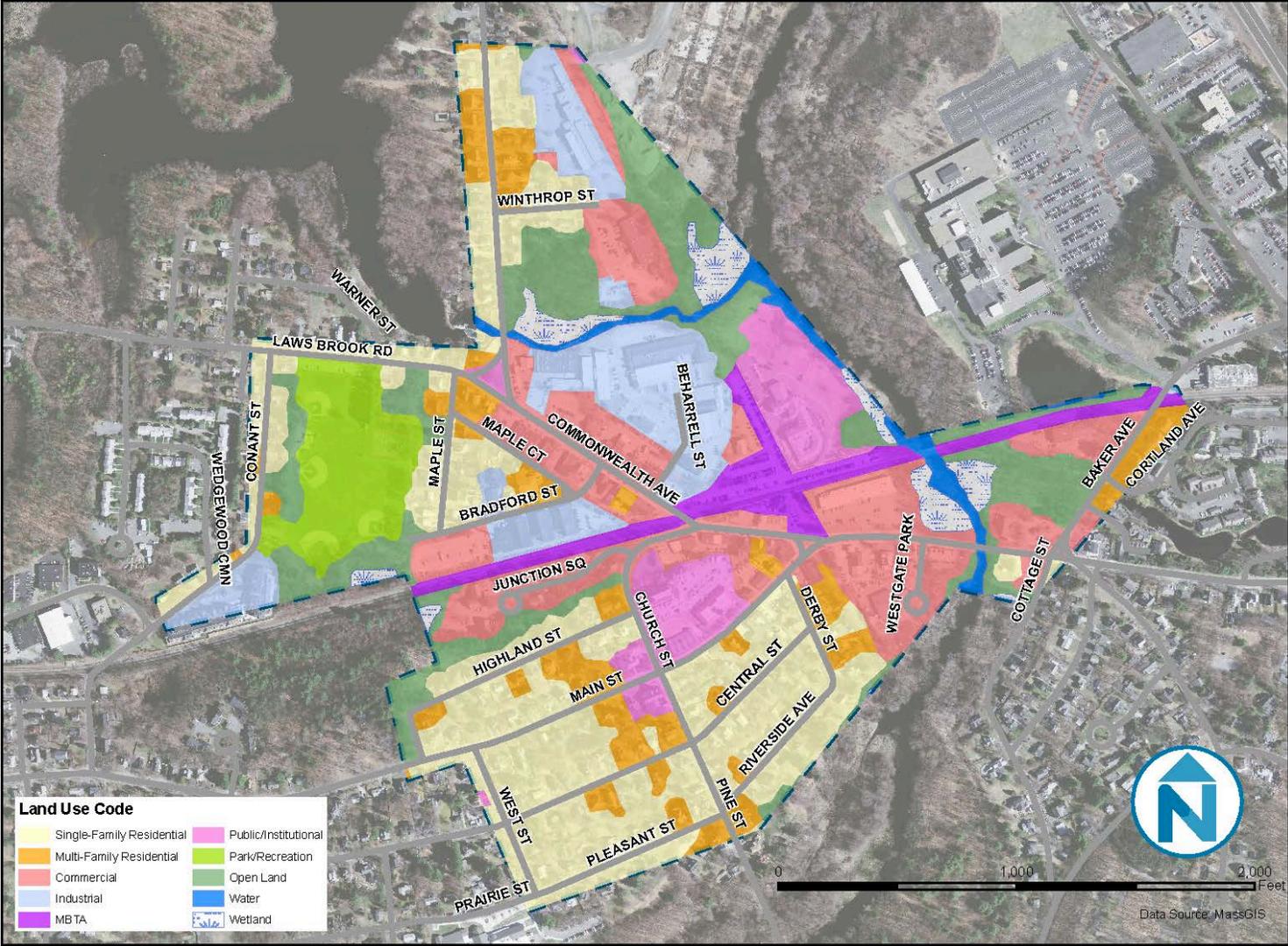
Figure 11 shows land uses within the West Concord study area graphically.

Figure 10 Existing Land Use in West Concord

Land Use	Square Feet	Percentage
Residential – Apartments, townhomes, condos, assisted living	220,181	21%
Residential – Single family homes	325,376	32%
Retail/Commercial – Banks, shops, restaurants, performing arts, hotels, museums, etc.	202,647	20%
Schools – Public and private	0	0%
Industrial	89,266	9%
Office – Office, including municipal offices	192,601	19%
Total	1,030,071	

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Figure 11 West Concord Land Use Map



Parking Supply

The West Concord study area includes nearly 3,000 inventoried parking spaces. Three-quarters of parking spaces are located in off-street facilities. An additional breakdown is provided by parking access, or who parking is "available to". Restricted access parking is dedicated to a specific population, such as customers, tenants, or employees of a particular property or use. General access parking is available for public use and is generally owned by a public entity. Most of the off-street parking supply is restricted to specific users, e.g. customer-only, employee-only, and tenant-only parking of a particular property or use. Figure 12 below shows the parking supply in West Concord.

Figure 12 Parking Inventory: West Concord

	Count	Percentage	% Restricted Access	% General Access
On-street	678	25%	1%	99%
Off-street	2,094	75%	86%	14%
Total	2,772		65%	35%

Expected Parking Demand

This analysis includes ITE peak period parking demand rates as guidelines to benchmark how West Concord's existing supply compares to its land uses.

The average peak period demand rate calculation is meant to represent the number of parked cars observed at the peak period divided by the quantity of the independent variable, such as building area or employees. Standard rates come from the ITE manual. To estimate the average peak period demand in West Concord, this study used Assessor's data to determine the square footage of each land use in West Concord, and multiplied that square footage (or other independent variable, such as residential units or employees) by the ITE average peak period demand. The ITE rates for land uses in the West Concord study area are in Figure 13.

Expected parking demand is a way to examine the amount of parking that would be needed to support the level of development and activity present within the study area. In this case, the analysis is completed using industry standard methodology to equate land use with expected parking demand. We note in Technical Memorandum #3 that existing parking requirements in Concord zoning typically match or exceed industry standards.

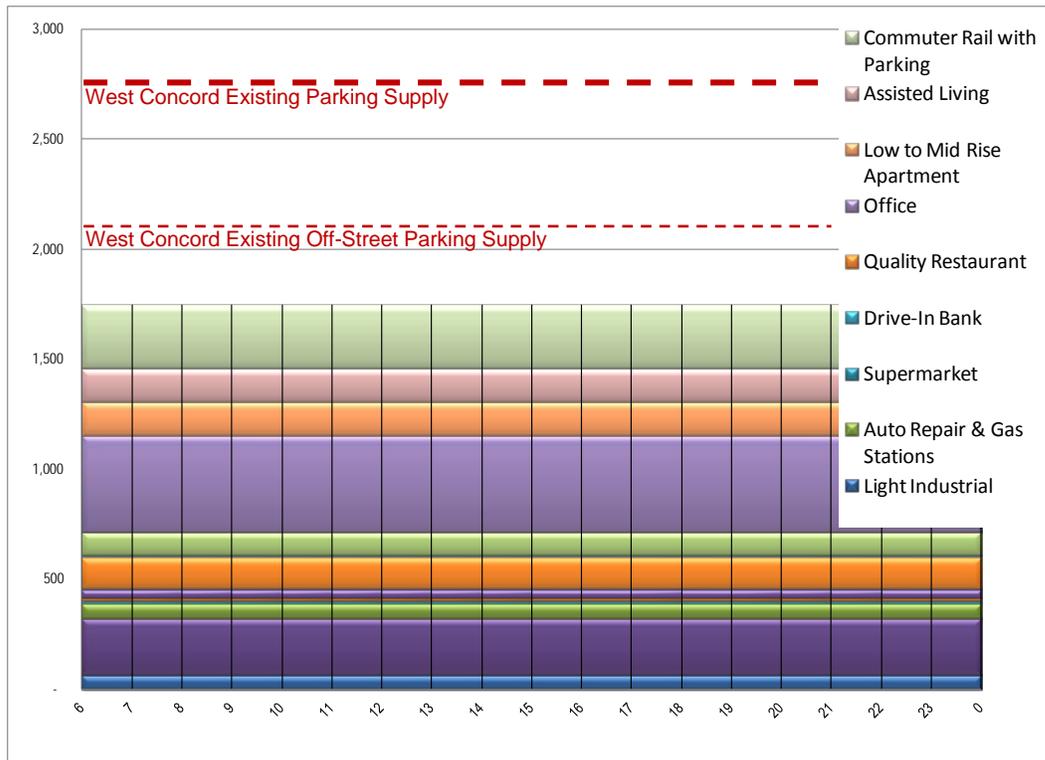
Figure 13 ITE Parking Demand Rates in West Concord

Land Use	SF or Units	ITE Weekday Rate	Parking Spaces
Residential (non-single family)	220,181 (201 units)	1.23 / unit	301
Commercial/Retail	202,647	0.52 - 10.60 / KSF	648
Industrial	89,266		67
Office	192,601	2.84 - 4.15 / KSF	441
Commuter Rail	518 daily boardings	Assumes 33% non-auto share and 1.2 boardings/vehicle	289
TOTAL			1,746

According to national parking standard calculations from ITE, the indicated number of parking spaces for West Concord is 1,746 spaces. Today, West Concord has 2,094 off-street spaces and 678 on-street spaces. Single family residences are excluded from this analysis, as most of the single family units in West Concord have dedicated driveways (which were not included in the parking supply count).

West Concord has about 1,000 total spaces more than what is called for by the national ITE parking standard calculations (Figure 14), and about 350 more parking spaces in just its off-street parking supply.

Figure 14 ITE Parking by Land Use (Unshared) in West Concord



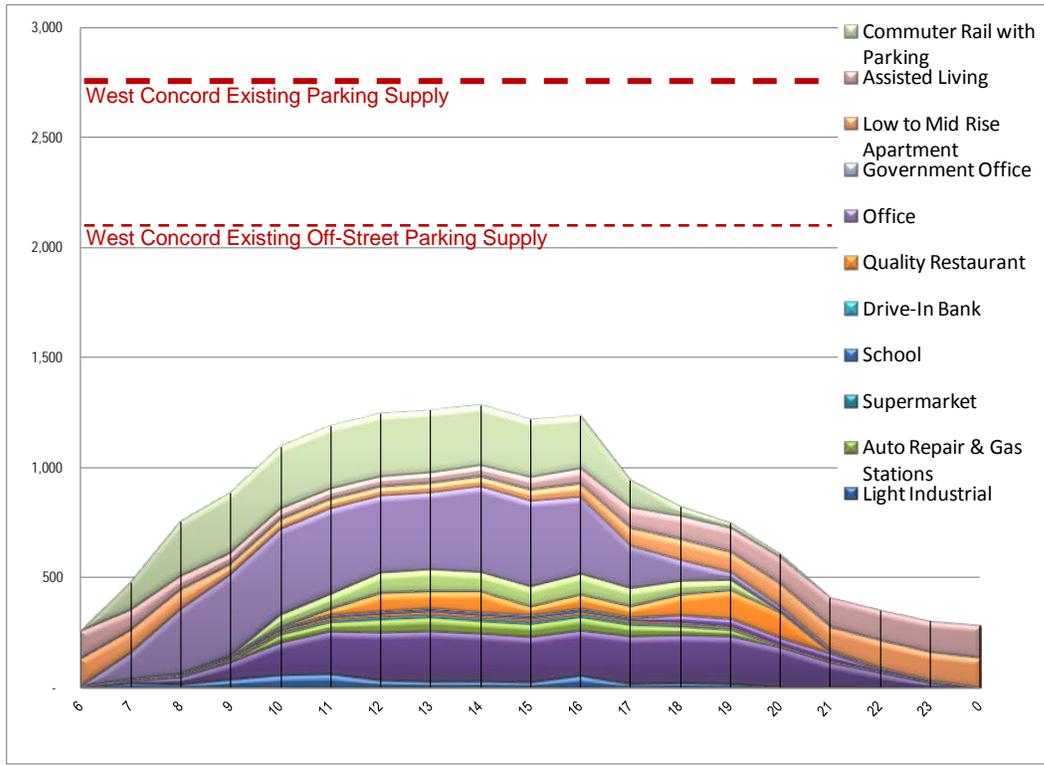
Shared Use Analysis

Similar to Concord Center, West Concord has a walkable environment that allows for parking to be shared. Visitors can park once and walk to multiple downtown destinations; employees can park once for the day and walk to run errands. Shared parking does exist: the parking lot behind Debra's Natural Gourmet, the Gatehouse, the 5&10, and Concord Outfitters received a special permit from the Board of Appeals to share a lot. More informally, Debra's Natural Gourmet leases spaces for employees (on a month-by-month basis) from the Bradford Mill property. In addition, the parking used for commuters on the weekdays has the potential to be used for weekend activity.

To model this type of activity, Nelson\Nygaard used an adapted shared parking model using inputs from the Urban Land Institute's (ULI) Shared Parking Manual (2nd Edition, 2005) and ITE's Parking Generation (4th Edition, 2010). Besides demand by time of day, we tailored the shared parking model for West Concord to include a parking demand reduction for internal capture. Mixed-use downtowns allow for parking efficiencies through "internal capture" or "captive market" trips. Such trips are made by patrons who, having already parked, travel between uses without accessing their vehicle. Restaurants and retail services are common generators of internal capture trips in mixed-use developments, as they serve both employees and residents within the same area. The shared parking model includes a conservative percent reduction to account for the mix of West Concord development patterns.

Figure 14 shows the number of parking spaces, by land use, that ITE estimates are needed in West Concord (1,746 total parking spaces). Figure 15 is the output of the shared parking model, which demonstrates the number of parking spaces needed in West Concord (by land use) after factoring in the shared parking reductions. The model starts with the ITE estimated demand of 1,746 spaces. Peak demand is estimated to be 1,283 spaces at 2pm. With West Concord's current supply of 2,772 parking spaces, at peak, there are about 1,500 available spaces when parking is shared.

Figure 15 ITE Parking by Land Use (Shared) in West Concord



Observed Parking Demand

Understanding how realistic the shared parking model assumptions are can be tested by comparing them to the actual observed parking demand (on- and off-street) in Concord Center. The observed parking demand profile for West Concord is shown in Figure 16. With a peak of 1,078 cars and 704,695 square feet of development (not including single-family residential), West Concord's "ITE" peak parking rate is 1.50 spaces per 1,000 square feet of land use.

West Concord's "ITE" peak parking rate is 1.50 spaces per 1,000 square feet of land use.

Figure 17 compares the modeled shared parking throughout the day to actual observed parking demand in West Concord. Observed peak demand was 1,078 between 11am – 1pm, with second highest demand immediately following from 1pm – 3pm, with 1,055 observed cars. Throughout the day, observed parking demand closely mirrors the modeled shared parking curve.

Figure 16 West Concord Parking Demand (Weekday)

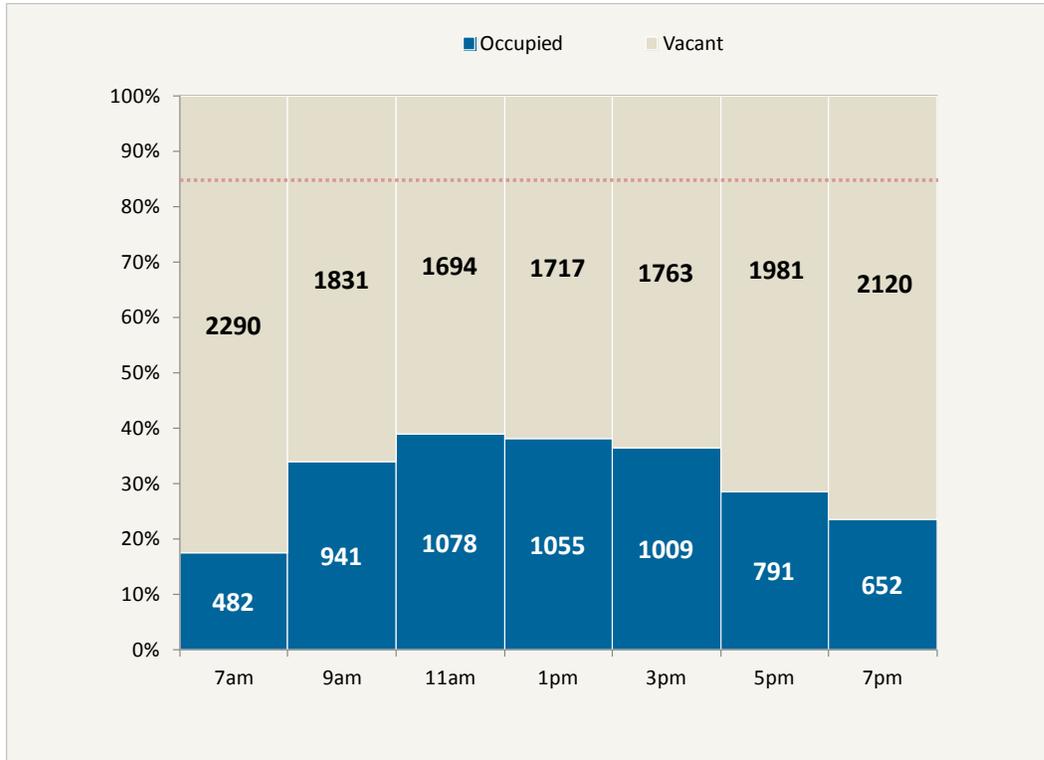
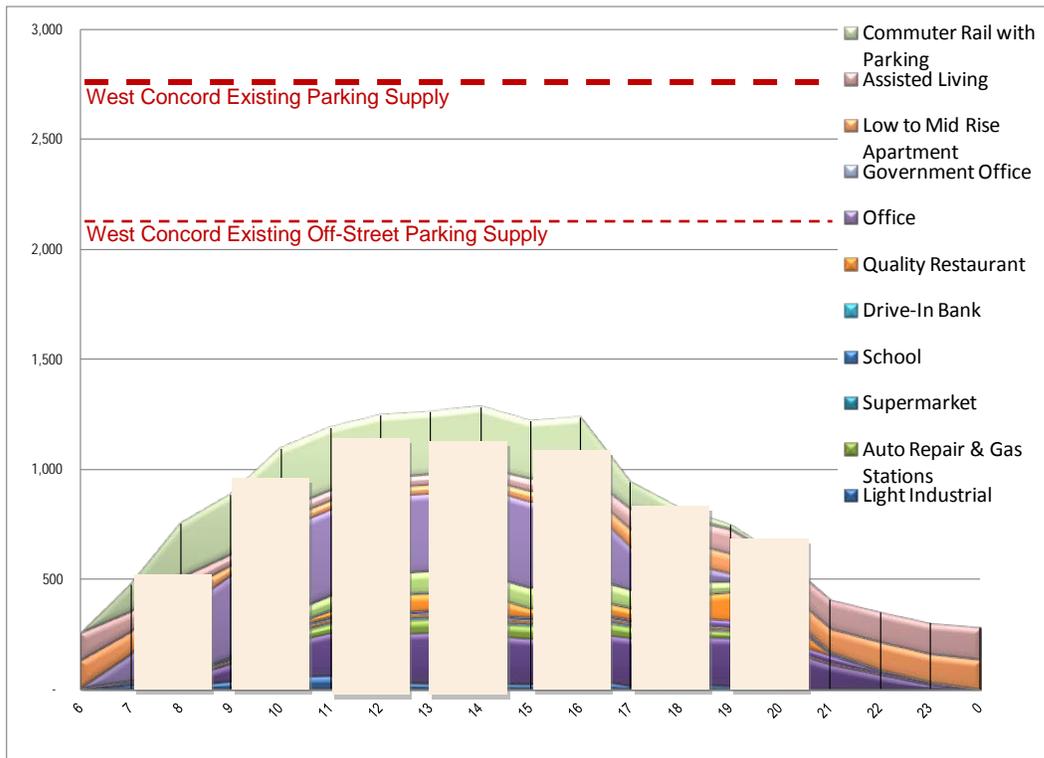


Figure 17 ITE Parking by Land Use (Shared) in West Concord Compared to Observed Demand



FUTURE GROWTH: SHARED PARKING ANALYSIS

An important component of the shared parking analysis is to understand what impact future development may have on the available existing parking supply. This section demonstrates this impact using growth scenarios to determine future parking demand, and compares the future demand to what available parking already exists. This type of analysis is important because it helps to guide zoning code and management of parking going forward.

In coordination with the Concord town staff, the team utilized growth scenarios developed in the Town's 2009 Wastewater Planning Task Force report. In the 2009 report, the scenarios were used to quantify how much additional municipal wastewater capacity might be needed in the future; in this Technical Memorandum, the same land use scenarios are used, but instead analyzed from a parking perspective.

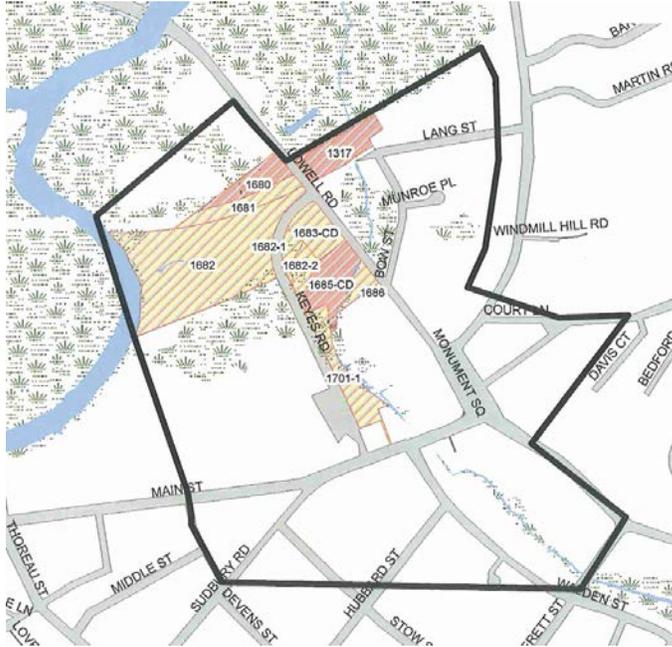
These growth scenarios were used as a proxy to understand potential buildout and demonstrate the "high end" of potential growth, as they include several full buildout scenarios under existing and future zoning codes. In addition, it is important to note that this type of large-scale development is likely to happen over a long period of time, not all at once.

The wastewater report details potential development and zoning changes for three primary study areas: Concord Center, Thoreau Street/Sudbury Road, and West Concord.

Concord Center Buildout

The Concord Center wastewater buildout analysis includes the shaded parcels on Keyes Road and Lowell Road, shown below (Figure 18). The outlined polygon indicates the proposed village district, which is a good proxy for a five to ten minute walk from the highlighted parcels.

Figure 18 Buildout Scenario Focus Area for Concord Center



The Concord Center analysis includes three land use scenarios:

- **Existing Land Use:** There is about 66,000 square feet of non-residential floor area on these parcels today, comprised of office and retail, municipal town offices, and industrial uses. One residential unit exists within these parcels.
- **Buildout with Existing Zoning:** Buildout under existing zoning would reach a total of 175,000 square feet of non-residential floor area. Substantial floor area would be added to the office, retail, and industrial land uses. One residential unit would still exist within these parcels.
- **Buildout with New Zoning¹:** New zoning would indicate that there would be about 215,000 square feet of mixed-use commercial with 178 residential units, plus nearly 100,000 square feet of small retail and services.

Figure 19 shows the land use for each scenario.

Today, in the proposed village district (the polygon outline in Figure 18), there are 2,935 parking spaces with an observed weekday peak utilization of 780 cars, or 27% utilization. This means that

¹ As defined in the 2009 Wastewater Planning Task Force Summary document, Attachment A2, revised zoning assumes build out to 85% maximum lot coverage with a 50/50 mix of residential and non-residential, with all surface parking accommodated on-site.

there is the potential for 2,155 spaces in this area to be used as parking supply for new development.

Using Concord's Zoning Code (April 2011), the zoning code indicates that today, the highlighted parcels in Figure 18 would be required to build 218 parking spaces with the existing land uses, 556 spaces for the buildout with existing zoning, and 1,602 spaces with the new zoning.

The Concord minimum parking zoning requirements designate a minimum number of spaces per land use, without considering sharing parking among uses. If the parcels shared an on-site parking supply, the existing land use would need 228 spaces, the buildout with existing zoning would need 351 spaces, and the buildout with new zoning would need 816 spaces.

Since each of the surrounding land uses already has ample underutilized parking, fewer spaces would need to be built on-site. The last column of Figure 19 shows the number of spaces that would need to be built based on the proposed land uses and the number of already-built available spaces within the village districts. Since there are more than 2,000 spaces available in this area, in effect, this means that no new parking would have to be built with new development in either of these scenarios.

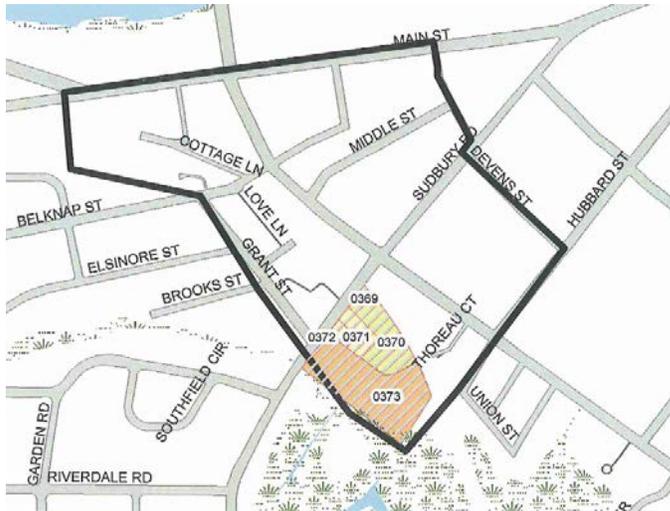
Figure 19 Buildout Scenarios for Concord Center

Scenario	Land Use	Existing		Scenarios		
		Parking Supply (Village District)	Vacant Parking Spaces at Peak Utilization	Parking Required per Concord Zoning	Needed with Shared Parking	NEW Parking Needed
Existing Land Use	<ul style="list-style-type: none"> ▪ 15,309 sq ft industrial (tanks holding fuel, lumber yard, auto repair) ▪ 30,730 sq ft office and retail ▪ 20,000 sq ft municipal town offices ▪ 1 residential unit 	2,935	2,155	218	228	0
Buildout with Existing Zoning	<ul style="list-style-type: none"> ▪ 84,020 sq ft industrial (tanks holding fuel, lumber yard, auto repair) ▪ 71,458 sq ft office and retail ▪ 20,000 sq ft municipal town offices ▪ 1 residential unit 	2,935	2,155	556	351	0
Buildout with New Zoning	<ul style="list-style-type: none"> ▪ 96,507 sq ft small retail and services ▪ 215,110 sq ft multiple uses (commercial) ▪ 178 residential units 	2,935	2,155	1,602	816	0

Thoreau Street/Sudbury Road Buildout

The Thoreau Street/Sudbury Road focus area includes the highlighted parcels on Sudbury Road just south of Thoreau Street, shown below (Figure 20). The outlined polygon indicates the proposed village district, which is a good proxy for a five minute walk from the highlighted parcels.

Figure 20 Buildout Scenario Focus Area for Thoreau Street/Sudbury Road



The Thoreau Street/Sudbury Road wastewater buildout analysis includes four land use scenarios:

- **Existing Land Use:** About 60,000 square feet of non-residential floor area includes a majority of supermarkets (which includes retail and small restaurants), as well as general office building and other small retail, restaurant, and service uses. Five residential units exist within these parcels.
- **Buildout with Existing Zoning:** Buildout would double the land use of supermarkets, substantially increase small retail, restaurant, and service uses, and marginally increase general office. Total buildout under existing zoning is close to 130,000 square feet. Five residential units exist within these parcels.
- **Scenario 1:** The first scenario with new zoning has a buildout to 25% residential and 75% non-residential. This includes about 300,000 square feet in commercial development, with 83 residential units.
- **Scenario 2:** The second scenario with new zoning has a buildout to 50% residential and 50% non-residential. This includes about 200,000 square feet in commercial development, with 169 residential units.

Figure 21 shows the land use for non-residential and residential units for each scenario.

In the proposed village district (the polygon outline in Figure 20), there are 1,257 parking spaces with an observed weekday peak utilization of 703 cars, or 56% utilized. This means that there is the potential for 554 spaces to be used as supply for new development.

Using Concord's Zoning Code (April 2011), the zoning code indicates that today, the highlighted parcels in Figure 20 would be required to build 266 parking spaces with the existing land uses, 706 spaces for the buildout with existing zoning, and 1,375 and 1,144 spaces under the two scenarios.

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The Concord minimum parking zoning requirements designate a minimum number of spaces per land use, without considering sharing parking among uses. If the parcels shared an on-site parking supply, the existing land use would need 219 spaces, the buildout with existing zoning would need 459 spaces, and the scenario buildouts would need either 722 or 568 spaces.

Since each of the surrounding land uses already has vacant parking, fewer spaces need to be built on-site. The last column of Figure 21 shows the number of spaces that would need to be built based on the proposed land uses and the number of already-built available spaces within the village districts.

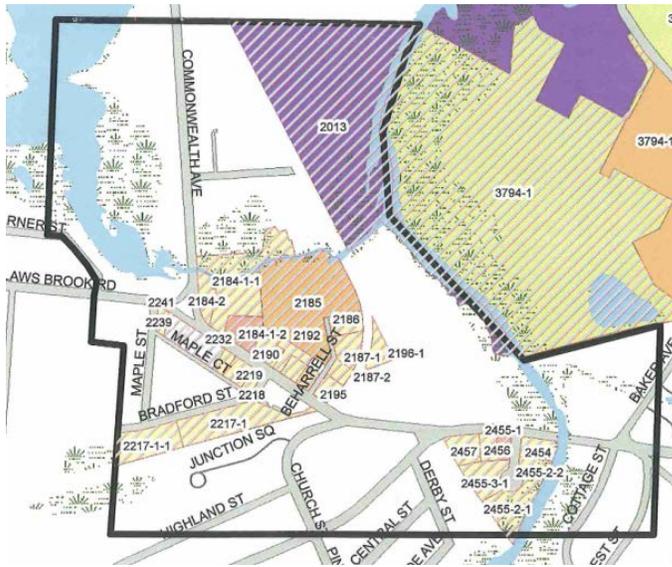
Figure 21 Buildout Scenarios for Thoreau Street/Sudbury Road

Scenario	Land Use	Existing		Scenarios		
		Parking Supply (Village District)	Vacant Parking Spaces at Peak Utilization	Parking Required per Concord Zoning	Needed with Shared Parking	NEW Parking Needed
Existing Land Use	<ul style="list-style-type: none"> ▪ 32,910 sq ft supermarkets ▪ 6,200 sq ft eating and drinking establishments ▪ 20,512 sq ft office ▪ 0 residential units 	1,257	554	266	219	0
Buildout with Existing Zoning	<ul style="list-style-type: none"> ▪ 76,302 sq ft supermarkets ▪ 31,145 sq ft eating and drinking establishments ▪ 21,226 sq ft office ▪ 0 residential units 	1,257	554	706	459	0
Scenario 1	<ul style="list-style-type: none"> ▪ 302,160 sq ft commercial with residential ▪ 83 residential units 	1,257	554	1,375	722	168
Scenario 2	<ul style="list-style-type: none"> ▪ 201,510 sq ft commercial with residential ▪ 169 residential units 	1,257	554	1,144	568	14

West Concord Buildout

The West Concord wastewater buildout analysis includes the parcels within the outlined polygon, including the MA Department of Corrections property, Bradford Street parcels, and Beharrell St and Commonwealth Avenue land uses, shown in Figure 22. Note that the wastewater report also included analysis of the Baker Avenue properties; this memorandum does not include this area.

Figure 22 Buildout Scenario Focus Area for West Concord



The West Concord wastewater buildout analysis includes five land use scenarios in the wastewater report; this analysis includes three:

- **Existing Land Use:** The focus area has about 200,000 square feet of non-residential floor area, including a majority of industrial land use, plus some commercial and office space. 17 residential units exist within these parcels.
- **Buildout with Existing Zoning:** Buildout would nearly triple the existing square footage in this area. Industrial uses would reach almost 450,000 square feet, and office space would increase substantially. Three residential units would exist within these parcels.
- **Scenario 4:** The fourth scenario is the most aggressive and included in this analysis. This includes about 315,000 square feet of buildout plus 268 residential units, a significant increase in housing.

Figure 23 shows the land use for non-residential and residential units for each scenario.

In the proposed village district (the polygon outline in Figure 20), there are 2,540 parking spaces with an observed weekday peak utilization of 1,071 cars, or 42% utilized. This means that there is the potential for 1,469 spaces to be used as supply for new development.

Using Concord's Zoning Code (April 2011), the zoning code indicates that today, the highlighted parcels in Figure 20 would be required to build 1,209 parking spaces with the existing land uses, 2,510 spaces for the buildout with existing zoning, and 1,717 with scenario four.

The Concord minimum parking zoning requirements designate a minimum number of spaces per land use, without considering sharing parking among uses. If the parcels shared an on-site

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parking supply, the existing land use would need 303 spaces, the buildout with existing zoning would need 668 spaces, and the scenario buildout would need 908 spaces.

Since each of the surrounding land uses already has vacant parking, fewer spaces need to be built on-site. The last column of Figure 23 shows the number of spaces that would need to be built based on the proposed land uses and the number of already-built available spaces within the village districts. Due to the ample parking already available, none or very few spaces would need to be built, when parking is shared.

Figure 23 Buildout Scenarios for West Concord

Scenario	Land Use	Existing		Scenarios		
		Parking Supply (Village District)	Vacant Parking Spaces at Peak Utilization	Parking Required per Concord Zoning	Needed with Shared Parking	NEW Parking Needed
Existing Land Use	<ul style="list-style-type: none"> ▪ 144,077 sq ft industrial ▪ 16,811 sq ft retail/commercial ▪ 28,165 sq ft auto sales, repair, gas stations ▪ 5,320 sq ft office ▪ 3,009 sq ft restaurant ▪ 2,032 sq ft fire station ▪ 17 residential units 	2,540	1,469	1,209	303	0
Buildout with Existing Zoning	<ul style="list-style-type: none"> ▪ 440,233 sq ft industrial ▪ 77,753 sq ft retail/commercial ▪ 21,506 sq ft auto sales, repair, gas stations ▪ 34,638 sq ft office ▪ 5,119 sq ft restaurant ▪ 2,032 sq ft fire station ▪ 3 residential units 	2,540	1,469	2,510	668	0
Scenario 4	<ul style="list-style-type: none"> ▪ 295,192 sq ft retail/commercial ▪ 12,007 sq ft auto sales, repair, gas stations ▪ 6,831 sq ft restaurant ▪ 268 residential units 	2,540	1,469	1,717	908	0