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Transportation Technical Memorandum

Taco Johns
Methuen, MA

Prepared for:



Taco John's
436 Broadway
Methuen, MA 01844

Submitted by:

ASB design group
363 Boston Street
Topsfield, MA 01983

ASB Project #202302

Transportation Technical Memorandum

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1 Introduction

The purpose of this transportation technical memorandum is to document the existing traffic information and assess safety, traffic circulation, and traffic access/egress associated with the proposed Taco John's Restaurant located at 436 Broadway in Methuen, Massachusetts in accordance with the City of Methuen and the Massachusetts Department of Transportation (MassDOT) Rules and Regulations.

Figure T1 is the Locus Map showing the proximity of the proposed Taco John's Restaurant and the surrounding roadway network.

1.1 Existing Site

Northeastern section of the main parking lot at Village Mall is the site where the new Taco John's Restaurant is proposed to be located at. The Village Mall is a 92,646 +/- SF shopping center located within a heavily traveled retail corridor in the community of Methuen that also includes the following:

- The Mall at Rockingham Park,
- The new Tuscan Village Development,
- Lowe's,
- Home Depot,
- Market Basket,
- Best Buy,
- Target, and
- A variety of other retailers.

The current tenants at the Village Mall include:

- Jo-Ann Fabrics,
- Ellie's Farmhouse Restaurant, and
- Dollar Tree.

Adjacent to the Texas Roadhouse Restaurant, the Mall is accessed via the signalized intersection of Broadway at Rosewood Road.

1.2 Proposed Development

The proposed project is a 2,200 square-foot drive-through restaurant to be located at the northeasterly portion of the parking lot adjacent to Broadway.

Ingress and egress to the site will be consistent with the existing site.

1.3 Study Area

The study area includes the existing site, plus five roadways and five intersections as follows:

Roadways

1. Broadway; and
2. Rosewood Road.

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Intersections

1. Broadway at Rosewood Road

1.4 Methodology

We have conducted this traffic assessment in two phases. The first phase involves an evaluation of existing traffic conditions within the study area, including an inventory of existing roadway and intersection geometry, observations of traffic volumes, and evaluation of parking utilization.

The second phase of the study establishes the framework for evaluating the transportation impacts of the proposed dispensary and assessing the travel demand forecasts for the site. This phase also includes an evaluation of parking demand generated by the project.

The standards used for this study conform to the most recent editions of the ***Manual on Uniform Traffic Control Devices (MUTCD)***, the ***Highway Capacity Manual (HCM)***, and are consistent with the guidelines set forth by the ***Massachusetts Department of Transportation (MassDOT)***.



Figure T1: Locus Plan
Taco John's, Methuen, MA

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2 Existing Conditions

2.1 Roadways

Broadway

Broadway (MA Route 28) is classified by the MassDOT as an urban principal arterial and runs in the south-north directions with its southern terminus in Methuen at the City of Lawrence city line and its northern terminus at the New Hampshire state line. The posted speed limit along the roadway is 30 miles per hour. The land use along Broadway near the project site is commercial. The roadway in the study area is within the jurisdiction of the Massachusetts Department of Transportation (MassDOT).

Rosewood Road

Rosewood Road is classified by the MassDOT as an urban collector, and runs in the east-west directions, with its eastern terminus at Hampshire Street and its western terminus at Broadway (MA Route 28). The roadway is not posted with a speed limit. The land use along Rosewood Road near the project site is residential. The roadway is within the jurisdiction of the City of Methuen.

2.2 Intersections

Broadway at Rosewood Road (signalized)

Broadway and Rosewood Road intersect as a four-way signalized intersection. Broadway approaches from the south and the north, and Rosewood Road approaches from the east and the Village Mall drive from the west. ADA accessible crosswalk are present at the Broadway southbound, Rosewood Road westbound and Village Mall Driveway eastbound approaches to the intersection.

From the south, Broadway is a two-way roadway with two lanes in each direction, separated by a double yellow line. Approaching the intersection, the approach consists of two lanes, one shared through and right lane that permits through movements transitioning onto Broadway NB and right-turn movements transitioning east onto Rosewood Road EB, and one shared through and left-turn lane that permits through movements transitioning onto Broadway NB and left-turn movements transitioning west onto Village Mall. The width of the roadway at the intersection is approximately 50 feet. Bituminous concrete sidewalks are present on both sides of the road. There is no bicycle facility along Broadway near the project site.

From the north, Broadway is a two-way roadway with two lanes in each direction, separated by a double yellow line. Approaching the intersection, the approach consists of two lanes, one shared through and right lane that permits through movements transitioning onto Broadway SB and right-turn movements transitioning west onto Village Mall, and one shared through and left-turn lane that permits through movements transitioning onto Broadway SB and left-turn movements transitioning west onto Rosewood Road EB. The width of the roadway at the intersection is approximately 50 feet. Bituminous concrete sidewalks are present on both sides of the road. There is no bicycle facility along Broadway near the project site.

From west, Village Mall Drive is a two-way roadway with two lanes in the EB direction and one lane in the WB direction, separated by a six-foot bituminous concrete median island. Approaching the intersection, the approach consists of two lanes, one shared trough and left lane that permits through movements transitioning onto Rosewood Road EB and left-turn movements transitioning to the north onto Broadway NB, and one exclusive right-turn lane that transitions to the south onto Broadway SB. The width of the roadway at the intersection is approximately 50 feet. Bituminous concrete sidewalks are present on both sides of the Village Mall Drive at the intersection.

From the east, Rosewood Road is a two-way roadway with one lane in each direction, separated by a double yellow line. Approaching the intersection, the approach consists of one general purpose lane that permits through movements transitioning onto the Village Mall, right-turn movements transitioning north onto Broadway NB, and left-turn movement transitioning to the south onto Broadway SB. The width of the roadway at the intersection is approximately 28 feet. Bituminous concrete sidewalk is present on south side of Rosewood Road.

3 Existing Traffic Volumes

3.1 Automated Traffic Recorders

A traffic counting program is conducted each year by the Statewide Traffic Data Collection section of the MassDOT. The program involves the systematic collection of traffic data utilizing automatic traffic recorders located on various roadways throughout the state.

The principal traffic volume parameters from MassDOT data at count station 5020 [*located on Broadway (MA Route 28), just south of the New Hampshire State Line*] in Methuen is given below in **Table T1** for this section of the roadway.

Table T1 - MassDOT Statewide Traffic Data from Count Station # 5020

Location	ADT	D	Midday Peak	P.M. Peak
Broadway (Route 28)	27,934	52% SB	2,162	2,633

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4 Safety Analysis

4.1 Crash Data

ASB queried the MassDOT Crash Portal database using the Map Filter for the five most recent years (2016 to 2020). The total crashes, severity, manner of collision, and percentage that occurred during peak hours and/or wet/icy weather conditions for each intersection are presented in **Table T2 - Crash Summary**.

Table T2 - Crash Summary

Location	Number of Crashes			Severity				Manner of Collision					Percent During	
	Year	Total Crashes	Average	PD ^a	PI ^b	NR ^c	F ^d	A ^e	RE ^f	HO ^g	Other ^h	Incl. Ped-Bike ⁱ	Peak Hours ^k	Wet/Icy Conditions
Fall River Avenue (US 6)	2016	22	17.2	19	3	0	0	10	4	2	6	0	32%	32%
	2017	25		21	4	0	0	9	10	1	5	0	28%	24%
	2018	19		14	5	0	0	8	7	0	4	0	30%	37%
	2019	10		8	2	0	0	4	3	1	2	0	40%	30%
	2020	10		6	4	0	0	4	3	1	2	0	40%	20%
	Total	86		68	18	0	0	35	27	5	19	0	33%	29%

^aProperty Damage Only; ^bPersonal Injury Only (non-Fatal Injury); ^cNot Reported; ^dFatality; ^eAngle; ^fRear end; ^gHead on; ^hSideswipe, opposite direction; sideswipe, same direction, single vehicle crash, rear-to-rear, not reported, unknown, etc.; ⁱIncludes pedestrian or cyclist; ^kOccurred between 7-9am or 4-6pm

In terms of severity, 68 reported property damages and 18 reported personal injury. In terms of the type of collision, 35 reported an angle collision, another 27 reported rear-end, five were head on, and 19 reported other type. None of the crashes included a bicycle or a pedestrian. In total 20% of the crashes occurred during wet/icy conditions, and 40% of the crashes occurred during peak hours. Analyzing the crash data, as most crashes were of angle or rear-end type, the crashes were most likely caused by driver carelessness or inattentiveness.

5 Proposed Conditions

The proposed new Taco John's Drive-Through Restaurant will be located at 436 Broadway, situated at the northeasterly portion of the Village Mall. Access to the proposed restaurant will be from the Village Mall Drive (the main entrance to the mall), approximately 70 Feet west of Broadway via a 24 foot-wide one-way driveway in the northbound direction. The driveway will include two lanes, one providing access to the 11 dedicated parking spaces and the other one, an approximately 200 feet long counterclockwise loop around the restaurant building, serving the drive-through patrons. The drive-through lane can accommodate approximately 10 cars in the queue for the check-out window. Two one-way driveways, (one to the north and one to the south, both within the mall parking lot) will be the egress points. Both egress driveways will be controlled by stop signs. **Figure T2** is the Site Plan of the proposed Taco John's Restaurant.

6 Future Vehicular Traffic

6.1 Trip Generation

ASB used the Institute of Transportation Engineers (ITE) publication Trip Generation, 11th Edition to estimate the vehicle trip rates for the proposed drive-through restaurant. Trip generation rates for the restaurant was based on the Land Use Code (LUC) 934 (Fast-Food Restaurant with Drive-Through Window).

The proposed Taco John's will be a 2,200 square-foot fast-food restaurant with one-bay drive-through window. Hours of Operation is proposed to be 7:00 AM - 10:00 PM Monday through Sunday, with maximum 12 employees per shift.

Table T3 summarize the total Project generated trips (employees and customers) for the daily morning, daily midday, daily evening, and Saturday midday peak hours.

Table T3 - Site Generated Trips

	Proposed Trips (LUC 934)
Weekday Daily	1028
Entering	514
Exiting	514
Weekday Morning Peak	98
Entering	50
Exiting	48
Weekday Midday Peak	111
Entering	58
Exiting	53
Weekday Evening Peak	112
Entering	57
Exiting	55
Saturday Midday Peak	122
Entering	62
Exiting	60

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As illustrated in **Table T3**, approximately 1028 net new daily trips (514 trips in and 514 trips out) are expected to be generated by the drive-through restaurant, with 98 net new trips (50 in and 48 out) during the weekday Morning peak hour, 111 net new trips (58 in and 53 out) during the weekday Midday peak hour, 112 net new trips (57 in and 55 out) during the weekday evening peak hour, and 122 net new trips (62 in and 60 out) during the Saturday midday peak hour.

6.2 Adjustments to Trip Generation Rates

Due to the land use nature of this development, a percentage of vehicular traffic entering and exiting the site currently exists on the adjacent roadway network. This traffic is defined by ITE Trip Generation Handbook as pass-by trips. Pass-by traffic is not considered to be new traffic to the overall area. The proposed restaurant is expected to experience the two basic trip types discussed below:

Primary Trips are trips made specifically to visit the site and are considered new trips. Primary trips would not have been made if the proposed development did not exist. Therefore, this is the only trip type that increases the total number of trips made on an area basis.

Pass-By Trips are related trips that already exist on Broadway directly adjacent to the proposed restaurant site. Pass-by trips do not create any increase in the traffic volumes within the primary study area. Moreover, pass-by trips have no additional impact on the roadway system beyond the development's access or immediately adjacent intersections.

ITE notes the nature of fast-food restaurant patrons is such that they stop for food on the way to home, and a large number of the trips could be pass-by. Based on the ITE Trip Generation Manual, 11th Edition, the average pass-by trip rate for LUC 934 (Fast-Food Restaurant with Drive-Through Window) is 55%. Applying the pass-by trip reduction, the proposed restaurant is anticipated to generate the following primary and pass-by trips as shown in **Table T4**.

Table T4 – Primary and Pass-By Trips

	Proposed Trips (LUC 934)	Primary Trips	Pass-By Trips
Weekday Daily	1028	464	564
	Entering 514	232	282
	Exiting 514	232	282
Weekday Morning Peak	98	44	54
	Entering 50	23	27
	Exiting 48	21	27
Weekday Midday Peak	111	50	61
	Entering 58	26	32
	Exiting 53	24	29
Weekday Evening Peak	112	51	61
	Entering 57	26	31
	Exiting 55	25	30
Saturday Midday Peak	122	55	67
	Entering 62	28	34
	Exiting 60	27	33

Based on the MassDOT Statewide Traffic Data, above site generated trips, and the fact that both the access and the egress to the restaurant are within the Mall's parking lot, we believe that the proposed restaurant will not significantly impact the area traffic, and Broadway (MA Route 28) will continue to operate at its current levels of service with no additional delays on all approaches.

6.3 Drive-Through Queue Length

The study of appropriate storage lengths for drive-through lanes of various land uses is ongoing amongst transportation professionals. It is often viewed that excessive drive-through queuing tends to be self-regulating. Patrons typically choose to visit a different facility rather than risk waiting in a long queue, especially for simple convenience retailers such as a fast-food restaurant or a coffee shop.

Based on data that was gathered for drive-through operations, ITE recommends that a drive-through lane having a storage length of 120 feet (enough to handle six vehicles) be provided. ITE further states that the 120-foot distance should be sufficient to accommodate nearly all vehicles that are likely to arrive during the evening peak hour time. The proposed Taco John's, however, is providing approximately 200 feet of storage length (sufficient to handle 10 vehicles).

The stacking lane at the drive-through of a fast-food restaurant has two windows: an ordering window or board, and a pick-up window. Our observation of several fast-food restaurants with drive-through window during weekday peak hours indicates that in average, it takes approximately 45 seconds to two minutes from the time a vehicle arrives at the ordering board to the time it picks up its order and leave, or approximately 45 seconds at each window. This means that the restaurant can process approximately 60 drive-through patrons per hour.

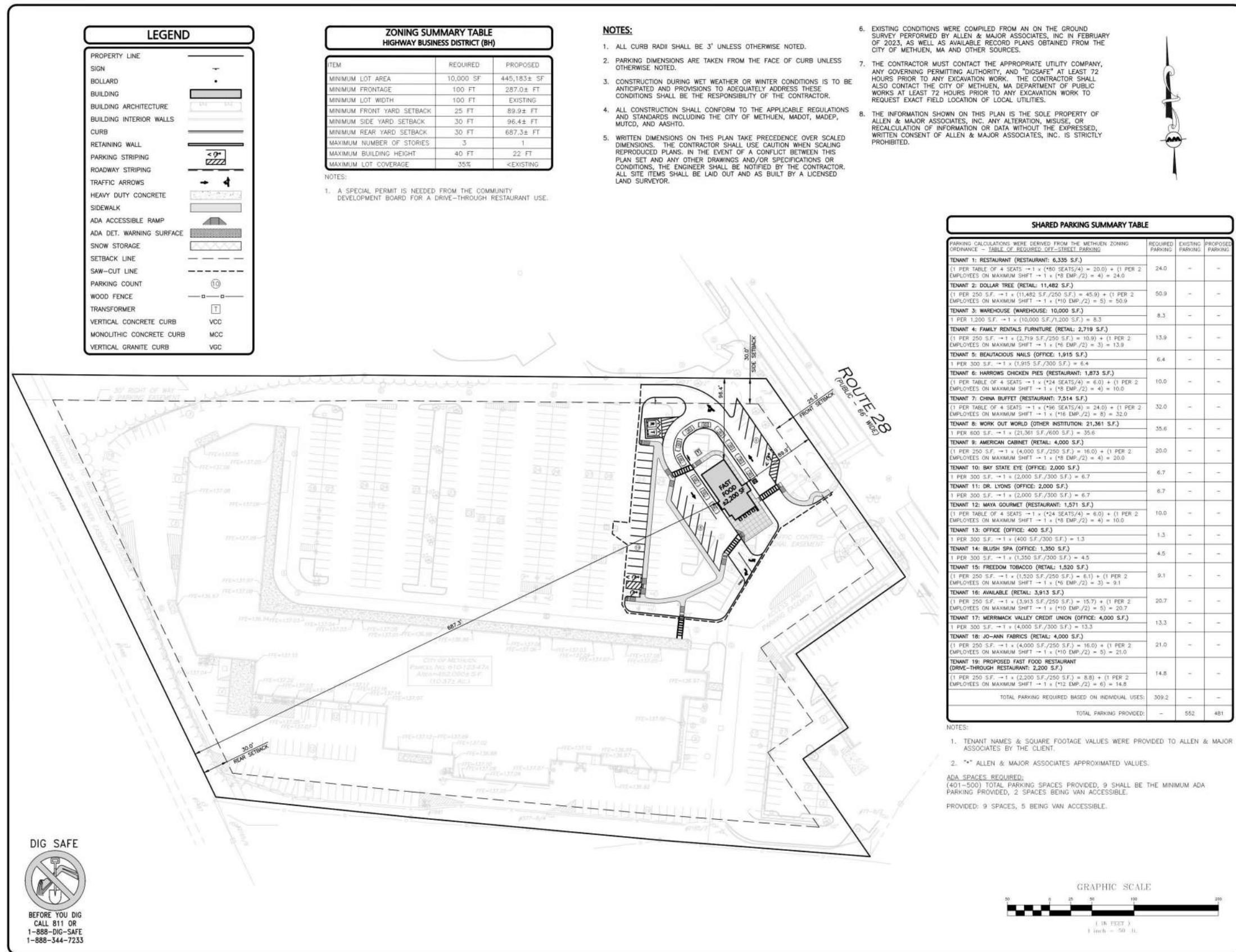


Figure T2: Site Plan
Taco John's, Methuen, MA

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7 Parking Generation and Adequacy

ASB used the Institute of Transportation Engineers (ITE) publication *Parking Generation Manual*, 5th Edition to estimate the parking demand for the proposed restaurant. Parking generation rates for the retail shop and dispensary were based on LUC 934 (Fast-Food Restaurant with Drive-Through Window). The calculated parking demand for an approximately 2,200 square-foot drive-through restaurant is 19 spaces.

Since the restaurant will be a drive-through restaurant, the number of seats will be limited. To be conservative in our assessment and maximize the required parking spaces, we assumed the same requirements as a retail establishment. The City of Methuen Zoning Ordinance (Table of Required Off-Street Parking) requires one space per each 250 square feet of a Retail Establishment, plus one space for each two employees. The calculated parking demand for approximately 2,200 square feet Retail Establishment with 12 employees is approximately 15 spaces.

7.1 Parking Adequacy

The proposed parking lot provides 33 dedicated parking spaces, which exceed 15 parking spaces recommended by the City of Methuen Zoning Ordinance, as well as the calculated parking demand recommended by the ITE. This number includes two ADA van accessible and one standard ADA accessible parking spaces. As shown on the Shared Parking Summary Table in Figure 2 – Site Plan, the new restaurant will replace approximately 71 parking spaces in the northeasterly portion of the Mall's parking lot, reducing the total number of parking space to 481. The Table also provides parking demand calculations based on individual use (IU) of the tenants of the Village Mall. The parking required based on IU is 310 spaces.

As indicated above, once the restaurant project is completed, the Mall parking lot will provide 481 parking spaces, which exceed 310 parking spaces required by the City of Methuen Zoning Ordinance.

8 Site Distance

Sight distance is the length of roadway ahead that is visible to the roadway user. In most cases, specific sight distance measures apply to motor vehicles and bicyclists. At intersections sight distance is provided to allow drivers to perceive the presence of potentially conflicting vehicles. This should occur in sufficient time for a motorist to stop or adjust their speed, as appropriate, to avoid colliding in the intersection. Sight distance also allows drivers of stopped vehicles with a sufficient view of the intersecting roadway to decide when to enter or cross the intersecting roadway. AASHTO's *A Policy on the Geometric Design of Highways and Streets* provides procedures to determine desirable sight distances at intersections for various cases are described below and include:

- Case A – Intersections with no control on any approach
- **Case B – Intersections with stop control on the minor street**
- Case C – Intersections with yield control on the minor street
- Case D – Intersections with traffic signal control
- Case E – Intersections with all-way stop sign control
- Case F – Left turns from the major road

The **Taco John's** driveway is the minor movement at the 3-legged intersection and is controlled by a stop sign, which is in conformance with Case B. The excerpt below from Section 3.7.4.4 of MassDOT Project

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Development & Design Guide 2006 Edition describes the method used to determine the desirable Site Distance.

Case B – Stop Control on Minor Street

At an intersection with stop control on the minor street, as illustrated in **Table T5**, the stopped minor-street driver must be able to see motor vehicles and bicycles approaching on the major street from either direction, at sufficient distance to allow crossing or turning maneuvers from the minor street. The leg of the intersection sight triangle on the minor street (Dimension A) is the distance between the driver's eye and front of vehicle (8 feet) plus distance from front of vehicle to edge of pavement (6.5 feet, prefer 10 feet) plus the distance from edge of pavement to middle of lane of interest (e.g., 6 feet for a right turn, 18 feet for a left turn on an undivided 2-lane highway, etc.) The major street leg of the triangle is the intersection sight distance along the major road (Dimension B).

Left Turns from Stop Controlled Minor Street

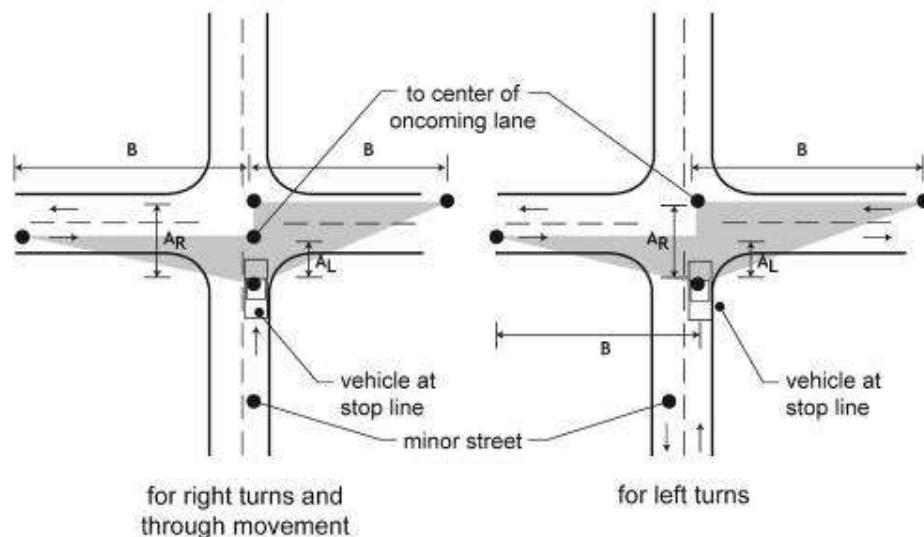
For motor vehicles making a left turn, the intersection sight distance along the major street (Dimension B) is given for an intersection with two 2-lane streets in **Table T5**. It is recommended that this intersection sight distance (Dimension B) be applied along the major street for left turns. At a design speed of 10 miles per hour for entrance to the mall parking lot, the recommended intersection sight distance (Dimension B) is approximately 115 feet. The present layout has a minimum of 145'.

Right Turns from Stop Controlled Minor Street

For motor vehicles making a right turn from the minor street, the intersection sight distances are given in **Table T5**. It is recommended that this intersection sight distance (Dimension B) be applied along the major street for right turns. At a design speed of 10 miles per hour for entrance to the mall parking lot, the recommended intersection sight distance (Dimension B) is 90 feet. The present layout has a minimum of 145'.

Table T5 - Sight Distance Criteria - Sight Triangle Case B

Departure Sight Triangles



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Sight Triangle Legs: Case B – Stop Control on Cross Street

Major Street Design Speed (mph)	Length of Sight Triangle Legs (feet)			
	Minor Street for Vehicles Approaching From Right (A _R , feet)	Minor Street for Vehicles Approaching From Left (A _L , feet)	Major Street For Left Turns (B, feet)	Major Street for Right Turns or Through (B, feet)
15	32.5	20.5	170	145
20	32.5	20.5	225	195
25	32.5	20.5	280	240
30	32.5	20.5	335	290
35	32.5	20.5	390	335
40	32.5	20.5	445	385
45	32.5	20.5	500	430
50	32.5	20.5	555	480
55	32.5	20.5	610	530
60	32.5	20.5	665	575
65	32.5	20.5	720	625
70	32.5	20.5	775	670
75	32.5	20.5	830	720

Sight triangle legs shown are for passenger car crossing or turning into a two-lane street, with grades (all approaches) 3 percent or less. For other grades and for other major street widths, recalculate using AASHTO *Green Book* formulas.

Source: *A Policy on Geometric Design of Streets and Highways*, AASHTO, Washington DC, 2004, Chapter 3 Elements of Design.

Stopping Sight Distance (SSD) is the length of the roadway ahead that is visible to the driver and should be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. Stopping sight distance is the sum of the distance traversed by the vehicle from the instant the driver sights an object necessitating a stop to the instant the brakes are applied and the distance needed to stop the vehicle from the instant brake application begins.

The SSD values associated with a given design speed are shown in **Table T6**. The site distance evaluations for the intersection are shown in **Table T7**.

Table T6 - Sight Distance Criteria

DESIGN SPEED (MPH)	DESIGN STOPPING SIGHT DISTANCE VALUE1 (SSD) (FT)	RECOMMENDED INTERSECTION SIGHT DISTANCE VALUE2 (ISD) (FT)
15	80	170
20	115	225
25	155	280
30	200	335
35	250	390
40	305	445
45	360	500
50	425	555
55	495	610
60	570	665

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65	645	720
70	730	775
75	820	830
80	910	885

Source: A Policy on Geometric Design of Highways and Streets, AASHTO, Washington DC (2011)

¹Design value based on a grade of less than 3%, a brake reaction distance predicted on a time of 2.5 seconds and a deceleration rate of 11.2 ft/s²

²Recommended value based on Case B1 - a stopped passenger car to turn left onto a two-lane highway with no median and grades 3% or less

We used the estimated speed limit for the mall parking lot, which is 10 MPH to calculate the minimum sight distances.

Table T7 - Proposed Sight Distance Evaluation

INTERSECTION	ESTIMATED SPEED (MPH)	MINIMUM (FEET) ^{1,2}	MEASURED (FEET)	OBSTRUCTION
<u>The Village Mall Entrance at the driveway</u>				
Stopping Sight Distance:				
The Village Mall Drive EB	10	50	145	
The Village Mall Drive WB	10	50	145	
Intersection Sight Distance:				
Looking to the right from driveway	10	115	145	
Looking to the left from driveway	10	115	145	

Source: A Policy on Geometric Design of Highways and Streets, AASHTO, Washington DC (2011)

¹ Table 3-1. Stopping Sight Distance on Level Roadways

² Table 9-6. Design Intersection Sight Distance - Case B1, Left Turn from Stop

At the Mall entrance and Taco John's driveway intersection the values for SSD and ISD are both above the minimum values.

9 Summary

ASB has prepared this technical memorandum to document the existing traffic information at the proposed Taco John's Drive-Through Restaurant, located at 436 Broadway (MA route 28) in Methuen, Massachusetts. The project consists of the developing the northeastern portion of the parking lot at the Village Mall.

According to the estimated trip generation rates identified in **Table T3**, it is expected that the facility will serve approximately 514 patrons daily.

Based on the MassDOT Statewide Traffic Data, above site generated trips, and the fact that both the access and the egress to the restaurant are within the Mall's parking lot, we believe that the proposed restaurant will not significantly impact the area traffic, and Broadway (MA Route 28) will continue to operate at its current levels of service with no additional delays on all approaches.