

Downtown Mansfield Circulation/Parking Study



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Table of Contents

| | |
|------------------------------------|-------|
| Introduction | 1 |
| Roadway Characteristics | 2-6 |
| Major Intersection Characteristics | 6-9 |
| Parking | 10-14 |
| Future Traffic Conditions | 14-16 |
| Corridor Improvement Scenarios | 16-22 |
| Conclusions and Recommendations | 22-23 |



List of Figures and Tables

Figures

| | |
|--|----|
| Figure 1: North Main Street Study Area | 1 |
| Figure 2: Study Area Road Widths and Circulation | 3 |
| Figure 3: Study Area Bicycle Accommodations | 4 |
| Figure 4: Curb-cut and Crosswalk at North Main Street/East Street | 5 |
| Figure 5: North Main Street @ Chauncy Street Intersection | 6 |
| Figure 6: North Main Street @ Old Colony Way (north) Intersection | 7 |
| Figure 7: North Main Street @ Old Colony Way (south) Intersection | 8 |
| Figure 8: North Main Street/South Main Street @ East Street/West Street Intersection | 9 |
| Figure 9: Study Area Parking Supply | 10 |
| Figure 10: Mansfield Bank Public Parking Lot Tables | 13 |
| Figure 11: North Main Street @ Chauncy Street Stand-Alone Improvements | 15 |
| Figure 12: Roundabout at North Main Street/Church Street/Old Colony Way Intersection | 16 |
| Figure 13: MassDOT Design Standards for a Roundabout | 17 |
| Figure 14: Alternative 2a | 18 |
| Figure 15: Alternative 2b | 19 |
| Figure 16: Alternative 3a | 20 |
| Figure 17: Alternative 3b Roundabout | 21 |
| Figure 18: 2010, 2035 Alternative 1, Alternative 2 and Alternative 3 ADTs | 22 |

Tables

| | |
|---|----|
| Table 1: Bicycle Level of Service in Study Area | 4 |
| Table 2: Pedestrian Level of Service in Study Area | 5 |
| Table 3: Study Area Parking Supply, Demand and Use | 12 |
| Table 4: Public Parking Lot Use | 14 |
| Table 5: Parking Space Loss With Improvement Alternatives | 21 |



Downtown Mansfield Parking/Circulation Study

Introduction

Downtown Mansfield is an urban, walkable town center with train access to Boston. The downtown area is home not only to a train station, but a number of restaurants, small independently-owned retail shops and different financial institutions including insurance companies and banks.

The two major arteries serving the downtown area are Chauncy Street (Route 106) and North Main Street. Chauncy Street runs east to west through the downtown while North Main Street runs north to south. North of High Street, North Main Street becomes a one-way in the northbound direction. Old Colony Way, which splits off of North Main Street just south of Chauncy Street, serves traffic traveling the corridor in the southbound direction. Old Colony Way rejoins North Main Street between Church Street and High Street. This study will look at traffic flow and parking along the North Main Street corridor in the downtown area and determine if changes to traffic orientation along the one-way sections of North Main Street and Old Colony Way are feasible. Figure 1 displays the limits of this study.

Downtown Mansfield is an urban, walkable town center with train access to Boston.



Figure 1:
North Main Street Study Area

North Main Street (One-way section, High Street to Old Colony Way North)

This section of North Main Street is a one-way in the northbound direction and is classified as an urban minor arterial. There is parking on both sides of the street north of Cottage Street and a single travel lane for the entire section. South of Cottage Street there is only parking on the east side of the street. The width of the roadway between Church Street and High Street, adjacent to the “Middle Common” is 21 feet. From Church Street to Cottage Street the width is 27 feet. From Cottage Street to Pleasant Street the roadway width is 35 feet. North of Pleasant Street to Old Colony Way North, the roadway width is 37 feet.

Generally, parking lanes require widths of eight to ten feet. According to MassDOT Design Standards, urban minor arterials should have lane widths of 11 to 12 feet.

Average daily traffic volume (ADT) along this section is approximately 5,400 vehicles.

North Main Street (High Street, South to East Street/West Street)

This section of North Main Street is bi-directional with parking on both sides of the street and two travel lanes. It is classified as an urban minor arterial. Roadway widths vary from 42 feet just north of East Street to 35 feet near High Street. ADT along this section is approximately 8,900 vehicles.

Old Colony Way

Old Colony Way from North Main Street to Rumford Avenue is one-way westbound with parking on both sides of the street. It is classified as a local roadway. The roadway width varies from 45 feet just west of North Main Street down to 32 feet at the curve leading around to Rumford Avenue. ADT along this section is approximately 5,300 vehicles.

Old Colony Way south of Rumford Avenue is one-way southbound with parking on both sides of the street and a bike lane on the western side to Cottage Street. It is classified as a local roadway, and therefore has a recommended lane width of 9 to 12 feet. The roadway is generally 39-40 feet wide for this stretch. ADT along this section is approximately 4,260 vehicles.

Figure 2 summarizes roadway widths and circulation patterns in the study area.

Bicycle and Pedestrian Accommodation

The North Main Street corridor has accommodations for non-motorized transportation in the form of bikeways, sidewalks and crosswalks. Not all of these accommodations, however, meet the guidelines laid forth in the Public Rights-of-Way Access Guidelines (PROWAG). The PROWAG summarizes accommodations necessary for people with disabilities on public rights-of-way, in accordance with the Americans with Disabilities Act.

Bicycle accommodations in the study area include a southbound bicycle lane on

North Main Street carries traffic going northbound while Old Colony Way carries traffic going southbound.

Figure 2: Study Area Road Widths and Circulation



Old Colony Way and the Mansfield Bike Path that begins along the parking area south of Samoset Avenue. The bike path runs south all the way to the Mansfield Airport on Fruit Street. Between Samoset Avenue and East Street, the bike path shares pavement with both public and private residential parking, meaning motor vehicles are allowed along it for this stretch. There is no northbound bicycle lane on North Main Street complimentary to the southbound bicycle lane on Old Colony Way. There is also no shoulder on North Main Street due to on-street parking. An alternative route in the northbound from the bike path is High Street to Rumford Avenue, off of which is a walkway to the Mansfield train station. Figure 3 illustrates bicycle accommodations in the study area.

Figure 3:
Study Area Bicycle Accommodations



Table 1:
Bicycle Level of Service in Study Area

| Section | BLOS |
|-----------------------------------|------|
| North Main St (Church to Chauncy) | D |
| North Main St (West to Church) | D |
| Old Colony Way | B |

Bicycle Level of Service (BLOS) for the corridor was calculated to evaluate the bicycle accommodations present. BLOS is an A through F rating that measures on-road bicycling conditions. An A rating means that conditions are very good for bicyclists, while a rate of F means that conditions are quite poor for bicyclists. Traffic volumes, vehicle speed, shoulder widths, etc. are all a part of this rating. Table 1 summarizes BLOS for different roadway sections in the study area.

As evident from Table 1, North Main Street is lacking adequate bicycle accommodations, resulting in a BLOS D for the entire corridor. This is primarily due to the lack of shoulder space and prevalence of on-street parking in the



Figure 4:
Curb-cut and Crosswalk at North
Main Street/East Street

area. The Mansfield Bike Path, however, does parallel North Main Street from Samoset Avenue to East Street, providing a safe alternative to bicycling along North Main Street. Old Colony Way has acceptable bicycle accommodations primarily due to its 6-foot wide bicycle lane, resulting in a BLOS B.

Pedestrians along the corridor are accommodated by sidewalks and crosswalks at every intersection. Curb ramps are included at every crosswalk, however they are not compliant with the PROWAG due to the lack of Detectable Warning Panels on them. The crosswalks and adjacent apex curb-cut on the northeast corner of the North Main Street/East Street intersection also does not meet PROWAG guidelines. Apex curb-cuts require four feet of width to the corner of the crosswalk. Figure 4 illustrates this issue.

At the two signalized intersections along the corridor (Chauncy Street and East/West Street), pedestrians have access to push-buttons that initiate an all-red phase at the intersection, or “pedestrian scatter phase”, in which pedestrians can cross in any direction.

Pedestrian Level of Service (PLOS) is similar to BLOS and measures conditions for pedestrians along a corridor using an A to F rating. Sidewalk presence and width, on-street parking presence and use, ADT and the presence of sidewalk amenities are all factors in determining PLOS. Table 2 summarizes PLOS for different sections of the study area.

North Main Street north of Church Street and Old Colony Way have good conditions for pedestrians, both with a PLOS B. Wide sidewalks, high on-street parking occupancy and low ADT contribute to this. North Main Street south of Church Street has narrower sidewalks and less on-street parking utilization, resulting in a PLOS C. Missing from the entire study area are street trees and landscaped buffers between the street and sidewalks. These measures would improve PLOS.

Table 2:
Pedestrian Level of Service in Study
Area

| Section | PLOS |
|---|------|
| North Main St (Church to Chauncy) | B |
| North Main St (West to Church) | C |
| Old Colony Way | B |

Public Transportation

GATRA and the MBTA both provide transit service to the study area.

The study area is served by the Greater Attleboro Taunton Regional Transit Authority (GATRA) and the Massachusetts Bay Transportation Authority (MBTA). GATRA's Route 140 runs from Wheaton College in Norton to the Mansfield MBTA train station via North Main Street. The Route is coordinated with MBTA train arrival and departure times. The service runs seven days per week during the following time periods: 6:15am to 11:25pm Monday through Wednesday, 6:15am to 1am Thursday and Friday, 8:30am to 12am Saturday and 12:50pm to 9:50pm on Sundays. The route also connects with GATRA's Route 18 which runs from Norton into downtown Taunton.

The MBTA train service from Mansfield connects to Back Bay Station and South Station in Boston to the north and Providence and T.F. Green Airport to the south. Weekday service runs from 5:30am until 12:30am. Saturday service runs from 7am until 12am and Sunday service runs from 11:45am until 11:50pm.

GATRA has recently considered extending Mansfield bus service to connect to major employers in the Cabot Industrial Park and the Mansfield Crossing Shopping Plaza. A route connecting this area to the train station and North Main Street corridor is being explored.

Major Intersection Characteristics

North Main Street at Chauncy Street (Rte 106)

This is a four-approach signalized intersection at the northern end of the corridor. The signal system has concurrent permitted/protected left-turns at the eastbound and westbound approaches on Chauncy Street. The northbound approach on North Main Street has a northbound left-turn lead over the southbound approach, followed by a concurrent northbound/southbound phase in which left-turns from both approaches are permitted. A pedestrian phase is

Figure 5:
North Main Street @ Chauncy
Street Intersection



also included in the signal, though most pedestrians cross Chauncy Street using the overpass adjacent to the railroad tracks west of the intersection. The northbound approach has three lanes: a left-turn lane, a thru lane and a right-turn lane. The southbound approach also has three lanes: a left-turn lane, a thru lane and a right-turn lane. The eastbound and westbound approaches both have two lanes: a left-turn lane and a shared thru/right-turn lane. Immediately south of the intersection, North Main Street splits with Old Colony Way and carries traffic in the northbound direction only, with southbound traffic using Old Colony Way. Figure 5 illustrates the layout of this intersection. In 2008, this intersection operated at an unacceptable Level of Service (LOS) F during the PM Peak Hour, with an average delay per vehicle (delay) of 82 seconds. During the AM Peak Hour, it operated at LOS C with a delay of 34 seconds. Level of Service, or LOS, is an A through F rating of the efficiency of an intersection based on the average amount of delay per vehicle. LOS A represents minimal delay while LOS F represents gridlock conditions. Typically a LOS C during peak travel times is considered acceptable along an urban mixed-use corridor. LOS D may also be considered acceptable in densely built-up areas, particularly within urbanized Central Business Districts. The most congested movements at this intersection are the eastbound thru and left, both operating at LOS D during the PM Peak Hour, and the southbound thru/left which operates at LOS F during the PM Peak Hour.

North Main Street at Old Colony Way North

This intersection splits northbound and southbound traffic traveling on North Main Street to and from the Chauncy Street intersection. Old Colony Way is a one-way leading away from North Main Street, while North Main Street is one way northbound. Southbound traffic on North Main Street coming from the Chauncy Street intersection is immediately forced onto Old Colony Way at this location. Northbound traffic on North Main Street can access Old Colony Way as well via a left-turn bay. Figure 6 illustrates this intersection. Old Colony Way is two lanes leading away from North Main Street. North Main



*Figure 6:
North Main Street @ Old Colony
Way (north) Intersection*

Street approaching the intersection from the south is three lanes: a left-turn bay to access Old Colony Way a center lane that eventually becomes a left-turn lane at Chauncy Street, and a right lane that eventually becomes a shared thru/right-turn lane at Chauncy Street. North Main Street southbound from Chauncy Street is a single lane that is forced to turn right onto Old Colony Way. In 2009, this intersection had a total AM Peak Hour approach volume of 718 vehicles and a total PM Peak Hour approach volume of 806. There are no traffic controls at the intersection and therefore no delay, with the exception of delays further upstream from the Chauncy Street intersection.

North Main Street at Church Street/Old Colony Way South

This intersection rejoins northbound and southbound traffic onto North Main Street. Old Colony Way is one-way southbound with two approach lanes. One lane accommodates right turns onto Church Street and thru movements onto North Main Street in the southbound direction. The other lane splits and accommodates u-turns onto North Main Street northbound and left-turns onto Church Street. Church Street and West Church Street both have a single travel lane and are one-way away from North Main Street. North Main Street in the northbound direction has a single approach lane and becomes one-way northbound at this intersection. Figure 7 illustrates this intersection.

North Main Street flows freely through this intersection. Old Colony Way southbound onto North Main Street southbound also flows freely. Old Colony Way to Church Street is under stop-sign control, and Old Colony Way onto North Main Street northbound is under a yield control. Church Street westbound approaching the intersection is under stop-sign control. The island at the center of this intersection is generally referred to as the “Middle Common” and is signed as such.

*Figure 7:
North Main Street @ Old Colony
Way (south) Intersection*



In 2009, the total AM Peak Hour approach volume at this intersection was 686 vehicles. The PM Peak Hour total approach volume was 635. During the AM Peak Hour this intersection operates at LOS A with a delay of 4 seconds per vehicle. During the PM Peak Hour, it operates at LOS A with a delay of 7 seconds per vehicle.

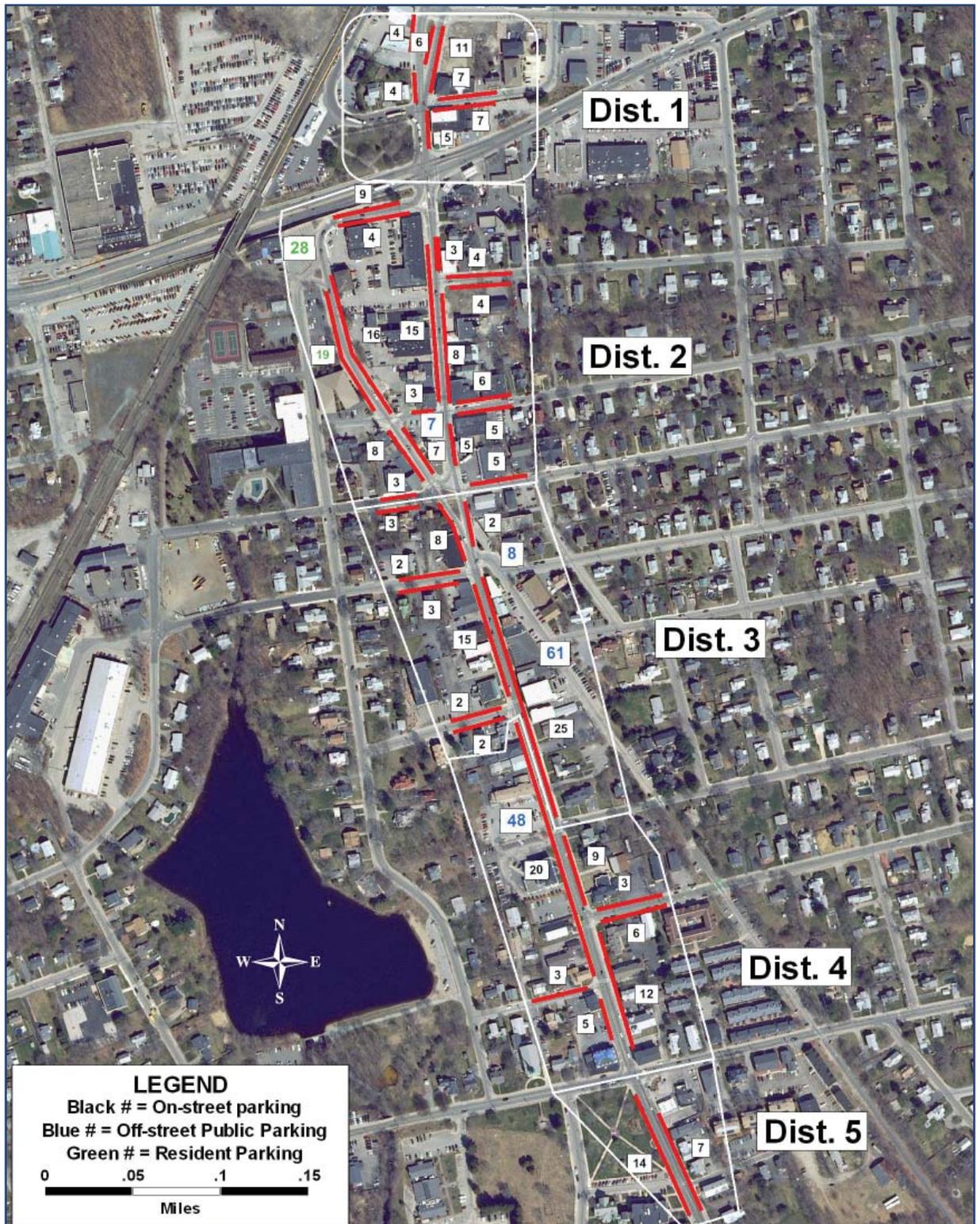
North Main Street/South Main Street at East Street/West Street

This is a four-approach intersection with two signal phases. Northbound and southbound proceed simultaneously, followed by eastbound and westbound. A pedestrian phase is also included in the signal, allowing pedestrians to cross in any direction. The northbound and southbound approaches both have two lanes: a right-turn lane and a shared thru/left-turn lane. The eastbound and westbound approaches both have a single approach lane that accommodates all movements, though cars can generally slip around left-turning vehicles if they pull far enough into the intersection. Figure 8 illustrates this intersection. In 2008, this intersection had a total AM Peak Hour approach volume of 1,525 vehicles and operated at LOS C with an average delay per vehicle of 20 seconds. For the PM Peak Hour, the intersection had a total approach volume of 2,139 vehicles and operated at LOS C with an average delay per vehicle of 28 seconds. The most congested movements are the westbound left (LOS F) and the northbound thru (LOS D).



*Figure 8:
North Main Street/South Main
Street @ East Street/West Street
Intersection*

Figure 9: Study Area Parking Supply



Parking in the study area is accommodated in on-street spaces, public parking lots and on private property for individual residences and businesses.

Parking Supply

Along North Main Street, Old Colony Way and the side streets off of each there are a total of 286 on-street parking spaces available. All of these spaces are unmetered with a two hour parking limit. Additionally, the Town of Mansfield has four short term parking lots (also with two hour maximums) available for public parking, adding another 124 spaces (not including handicapped spaces). Many of the businesses along the corridor also have their own private parking for both employees and customers.

The Town also has several parking lots for use by MBTA commuters. The majority of these are north of Chauncy Street, with two along the south side of Chauncy Street. A private lot also exists for MBTA parking north of Chauncy Street. 19 on-street resident parking spaces also exist on Old Colony Way south of Rumford Ave with no time limit.

The study area was broken up into five parking “districts”, as it is assumed that people do not wish to walk more than a few blocks to reach their destination. Figure 9 illustrates these districts and the public parking areas within them.

Parking Demand

An inventory of the businesses along North Main Street and Old Colony Way was conducted in order to determine the demand for parking by both employees and customers on a daily basis by parking district. The ITE publication, Transportation Planning Handbook, describes the effective supply of parking as the level of occupancy for optimum operating efficiency. The handbook states that a parking facility can be perceived as full at a level that is less than its actual capacity (number of spaces), which is at a range of 85 to 95 percent.

A peak parking scenario as well as an average parking scenario was developed based on responses from businesses. Peak parking assumes that the maximum number of employees and customers are at the business. Average parking assumes that the average number of employees and customers visiting each business midday on a daily basis are present. Due to the mix of businesses, often all businesses do not have the same parking time demands. For example, restaurants tend to have higher demand at lunch and dinner hours, whereas a hair salon may be busiest during the afternoon or on a weekend. A parking utilization count was also performed on a weekday morning at 10am, the typical peak parking period. In all five districts, parking utilization was below capacity and below average and peak parking demand. Table 3 summarizes parking conditions in the study area.

District one extends from Chauncy Street north to Pratt Street. This district has a total of 40 on-street parking spaces, all with a 2-hour limit. A parking space utilization count revealed that 40% of the on-street parking spaces were being used during the morning parking peak period. Under peak parking conditions, a total of 80 public spaces may be needed to accommodate customers and any employees utilizing public parking. This leaves a deficit of 36 spaces. Under average conditions, however, there is a deficit of only two spaces, all of which could be accommodated on side streets, such as Pratt Street, a short distance to the north. Given this district’s proximity to the train station, potential customers may be on foot or already parked at the train station as well, lessening demand

An inventory of the businesses along North Main Street and Old Colony Way was conducted in order to determine the demand for parking by both employees and customers

Table 3: Study Area Parking Supply, Demand and Use

| District | 1 | 2 | 3 | 4 | 5 |
|------------------------------|---------------|---------------|---------------|---------------|---------------|
| Avg # Employees | 25 | 50 | 67 | 77 | 10 |
| Avg # Customers | 28 | 103 | 66 | 42 | 32 |
| Avg Public Space Demand | 46 | 69 | 72 | 45 | 19 |
| Public Space Deficit/Surplus | -2 | 43 | 59 | 61 | 2 |
| On-street spaces | 44 | 105 | 62 | 58 | 21 |
| On-street Spaces Filled | 16 | 22 | 20 | 8 | 17 |
| % Filled On-street | 40.00% | 21.00% | 32.30% | 13.80% | 81.00% |
| Public Lot Spaces | 0 | 7 | 69 | 48 | 0 |
| Public Lot Spaces filled | 0 | 2 | 33 | 43 | 0 |
| % Filled Public Lots | n/a | 28.60% | 47.80% | 89.60% | n/a |
| Total Public Spaces | 40 | 112 | 131 | 106 | 21 |
| Total Filled | 16 | 24 | 53 | 51 | 17 |
| % Filled | 40.00% | 21.40% | 40.50% | 48.10% | 81.00% |

for parking further. Therefore, it is assumed that there is no parking shortage in this district.

District two extends from Chauncy Street south to Church Street and includes Old Colony Way. This district has a total of 112 two-hour limit spaces in both town parking lots and on-street. Additionally, there are 19 “resident only” spaces on Old Colony Way, and a 28-space parking lot also for “residents only” on the corner of Old Colony Way and Rumford Avenue. Both of these areas are used by patrons of the MBTA. Public parking utilization during the morning peak period was 21% in this district.

The North Commons Marketplace (including Mansfield Fabric) has approximately 78 private parking spaces for its patrons and employees, thus not necessitating much off-street parking in this area. Total peak parking demand for public spaces is 169, while average parking demand for public spaces is only 69. This leaves a 57-space deficit during peak parking periods but a 43-space surplus during average parking periods. This area’s close proximity to the train station and to several large apartment complexes also lends it well to being accessed by people on foot. With this fact and the surplus under average conditions, it is assumed that this district has sufficient parking as well.

District three extends from Church Street south to Villa Street on the west side of North Main Street and Court Street on the east side. This district contains a total of 131 public parking spaces, including 69 in public lots. All spaces have a two-hour time limit. There are several vacant storefronts in this area, but it was assumed for parking demand that they are filled with businesses similar to those around them. Public parking utilization is 41% in this district during the morning peak period.

Under peak parking conditions, there is demand for 231 public parking spaces. This large demand is due in part to the location of two restaurants in this section and an Elks Club. 94 of the peak parking spaces necessary can be attributed to the two restaurants alone. An additional 40 can be attributed to a busy salon. Since these businesses would be most popular in the evening and on weekends,

The public parking lot next to Mansfield Bank has 48 regular parking spaces.

the average parking demand is much lower, at 72 spaces. Given the surplus of 59 spaces under average conditions, it is assumed that there is sufficient parking in this district. However, if the several vacant storefronts were to be filled with a high demand business such as a restaurant then parking availability could become an issue.

District four extends from Villa Street and Court Street south to East and West Streets. This district contains a total of 106 public parking spaces, including 48 in a town lot next to Mansfield Bank. Public parking utilization is 48% in this district during the morning peak period. Under peak parking conditions, there is demand for 114 spaces, leaving a deficit of only six spaces. Under average conditions, there is a surplus of 61 spaces. Several businesses in this district, such as the ice cream shop, may have periods with higher parking demand. However, these periods are typically on weekends or in the evening when businesses such as Mansfield Bank are closed. It is assumed that this district has ample parking.

District five extends from East and West Streets southward to Mansfield Town Hall. This district contains on-street parking for 21 vehicles, plus an additional 27 public spaces at Town Hall. These spaces are open to patrons of Town Hall and to the general public during off-business hours. On-street parking utilization is 81% in this district during the morning peak period. Peak parking demand in this district comes primarily from two restaurants located along this stretch of South Main Street. Public parking demand peaks at 54 spaces, but on average only necessitates 19. Since the restaurants often see most customers on weekends and during the evening, parking at the Town Hall is often feasible. Including the spaces at town hall, there would only be a six space deficit during peak periods and a 29 space surplus otherwise.

Morning peak period parking utilization is nearing capacity at 81%. On-street parking is allowed along South Main Street however beyond the limits of this district, allowing patrons of the restaurants and Town Hall a place to park if

The four individual parking lots in the study area are all below capacity with the exception of the lot on North Main Street adjacent to Mansfield Bank.



*Figure 10:
Mansfield Bank Public Parking Lot*

conditions become congested.

A look at the four individual parking lots in the study area reveals that they are all below capacity with the exception of the lot on North Main Street adjacent to Mansfield Bank. This lot had 43 of its 48 spaces filled, representing a utilization rate of 90%. This lot's central location directly on North Main Street, proximity to a major trip generator (Mansfield Bank) and ease of navigating around it make it very popular. Figure 10 depicts this parking lot. The nearby parking lot along the bike path to the east of North Main Street had a much lower utilization rate at only 44%. Though the two parking lots are in close proximity, the bike path lot is more difficult to access and has poor pavement conditions. Improved signage directing people to use this lot along with a resurfacing could help ease the parking congestion currently being experienced at the lot next to Mansfield Bank. Table 4 summarizes parking lot utilization in downtown Mansfield.

Table 4:
Public Parking Lot Use

| Parking Lots | Total Spaces | Spaces Filled | % Used |
|---------------------------|--------------|---------------|---------------|
| Cottage St. Lot | 7 | 2 | 28.60% |
| Old Colony Lot | 8 | 6 | 75.00% |
| Bike Path Lot | 61 | 27 | 44.30% |
| Mansfield Bank Public Lot | 48 | 43 | 89.60% |

Overall, there is sufficient public parking along the North Main Street corridor in Mansfield with average demand. Though a shortage would exist if every business along the corridor experienced their peak number of customers at the same time, this is not the case due to the varying nature of the businesses. Any additional business relocation to the corridor, however, should evaluate their parking demand and provide ample off-street parking for employees and customers. The town should also investigate allowing an extended park by permit system for employees in the public lot along the bike path. Several businesses do not have any off-street parking available and nearly all employees work longer than the current two-hour time limit.

Future Traffic Conditions

Determining future traffic conditions along a corridor is essential to recommending improvements that will not be obsolete within the next 25 years. As part of this, 2035 traffic volumes were calculated in the study area using SRPEDD's Regional Travel Demand Model.

North Main Street between the two Old Colony Way intersections would have an average daily traffic volume (ADT) of 5,750 vehicles by the year 2035. Old Colony Way south of Rumford Avenue would have an ADT of 5,850 vehicles. Between East/West Streets and Church Street, North Main Street would have an ADT of 11,700 vehicles.

Future conditions at the two signalized intersections along the corridor were also determined. Improvements to these intersections are possible without making major changes to traffic flow in the study area.

North Main Street at Chauncy Street

By the year 2035, conditions at this intersection will deteriorate significantly.

Regardless of the configuration of North Main Street and Old Colony Way, there are several different options for improving the North Main Street at Chauncy Street intersection.

Reconfiguring lane use and changing signal phasing would have some benefit to this intersection. Restriping the westbound left-turn lane as a shared thru/left-turn lane would increase capacity at this approach. The westbound left-turn lead phase would be retained. In the eastbound direction, the eastbound left-turn lane could also be re-striped as a shared thru/left-turn lane. The eastbound left-turn lead phase would have to be changed to a lag phase. Both eastbound and westbound left-turns would be permitted during eastbound and westbound thru phases as well. With these improvements, PM Peak Hour Level of Service would be improved to an E with a delay of 69.0 seconds per vehicle and AM Peak Hour Level of Service would be improved to a B with a delay of 18.8 seconds per vehicle. Figure 11 illustrates these improvements.

Emergency vehicle preemptive devices should also be included with any signal modifications at this intersection due to its proximity to the fire station on North Main Street. The demand signal at the fire station should also be replaced and upgraded.

North Main Street/South Main Street at East Street/West Street

This intersection could benefit from short-term improvements. Striping an official eastbound left-turn lane would help clarify motorist confusion at this location, since the approach is wide enough for two lanes and is used as such.

Under 2035 traffic conditions, this intersection will deteriorate significantly to LOS C during the AM Peak Hour and LOS F during the PM Peak Hour. Severe congestion will exist at the eastbound, northbound and westbound approaches. A widening of the intersection would be necessary to allow two thru travel lanes at all of these approaches. This is highly unlikely, however, due to significant



Figure 11:
North Main Street @ Chauncy
Street Stand-Alone Improvements

land constraints around the intersection.

Emergency vehicle preemptive devices should also be included with any signal modifications at this intersection due to its proximity to the fire station on North Main Street.

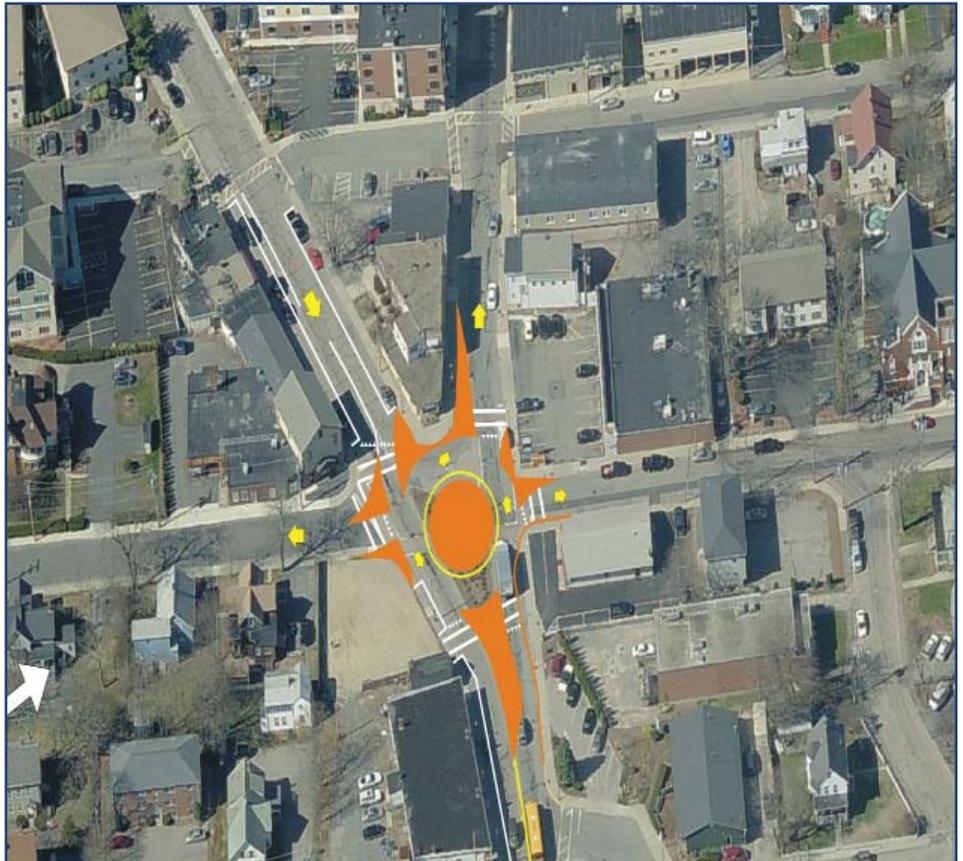
Corridor Improvement Scenarios

In order to improve traffic flow and offer better access to businesses along the corridor, three different scenarios were analyzed under future conditions: a future no-build scenario, a two-way North Main Street and a two-way North Main Street with a two-way Old Colony Way. All three scenarios were also looked at with a roundabout constructed at the North Main Street/Old Colony Way/Church Street intersection.

Alternative 1a: No-build

Under this alternative, there would be no changes to directional traffic flow in the study area. North Main Street north of Church Street would remain one-way northbound and Old Colony Way would remain one-way southbound. The stand-alone improvements to North Main Street at Chauncy Street and North Main Street at East and West Streets mentioned in the previous section would also be a part of this scenario.

Figure 12:
Roundabout at North Main Street/
Church Street/Old Colony Way
Intersection



The North Main Street/Church Street/Old Colony Way South intersection would continue to operate at LOS A during both the AM and PM Peak Hours through the year 2035. There is little delay at this intersection due to the free flowing movement from Old Colony Way onto North Main Street southbound.

Alternative 1b: No-build with Roundabout

The North Main Street/Old Colony Way/Church Street intersection could benefit from the construction of a roundabout both to enhance the appearance of the Middle Common and to calm traffic along the corridor. Figure 12 illustrates this option. Two on-street parking spaces would be lost with this reconfiguration: one on Old Colony Way and one on North Main Street to accommodate a crosswalk. Under 2035 traffic conditions, a roundabout at this location would have a maximum volume to capacity ratio (max v/c) of 0.75 during the AM Peak Hour and 0.51 during the PM Peak Hour. A v/c of 0.80 or higher would be considered congested.

According to MassDOT Design Standards for roundabouts, a minimum of 100 feet in diameter would be necessary on an arterial roadway in order to accommodate a tractor trailer truck. At its most constrained point, the Middle Common area is only 88 feet in width (from the southwest corner of West Church Street/Old Colony Way to the northeast corner of North Main Street/Church Street). Land takings would therefore be necessary to accommodate a standard roundabout, most likely on the southwest corner where there is vacant land. Without takings, a design exception would be necessary and tractor trailers would have to be prohibited from using the corridor. Figure 13 illustrates MassDOT design standards for a roundabout.

Three improvement scenarios were analyzed along the corridor.

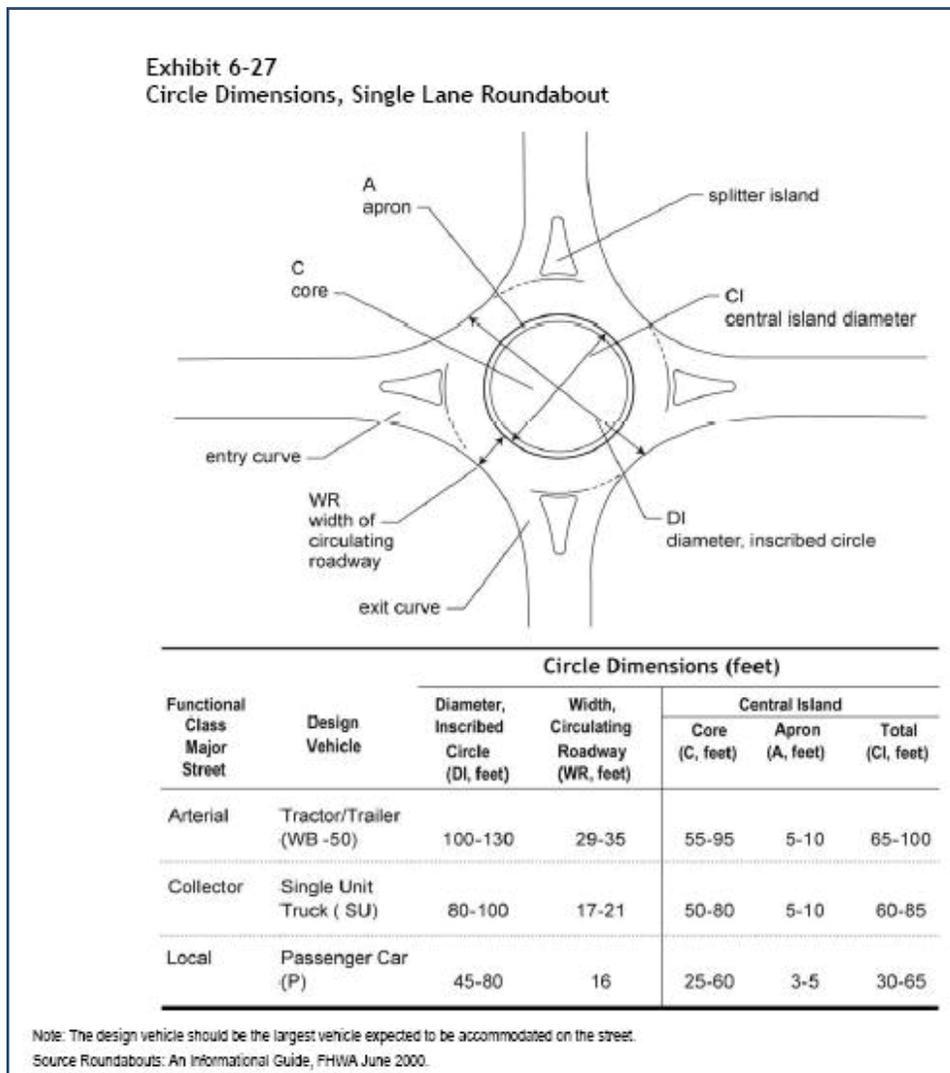


Figure 13: MassDOT Design Standards for a Roundabout

Alternative 2a: Two-way North Main Street/One-way Old Colony Way

This scenario would convert the existing one-way North Main Street section into a two-way street. The 27-foot wide section from Old Colony Way northward to Cottage Street is too narrow to accommodate the parking lane and two travel lanes, which would necessitate a total of 30 feet. This would result in the elimination of five on-street parking spaces. The 35-foot section from Cottage Street to Pleasant Street is too narrow to accommodate two parking lanes and two travel lanes, which necessitates 38 total feet. This would eliminate eight on-street parking spaces on one side of the roadway. The 37-foot section from Pleasant Street to Old Colony Way could accommodate two eight-foot parking lanes and two 10.5-foot travel lanes (exactly 37 total feet).

In total, the elimination of approximately 13 parking spaces would be necessary with this scenario. If travel lanes were reduced to 9.5 feet then all 13 spaces could be retained. However, 9.5-foot travel lanes on an arterial roadway would go against MassDOT Design Guide standards; though an identical 9.5-foot travel lane layout is present on North Main Street between High Street and Villa Street currently. Considering Mansfield fire engines are 9 feet wide mirror to mirror, this would not be desirable. Additionally, with two-way travel, customers would only have the option of looking for an open spot on one side of the street at a time. In effect, this limits the customers' choice of an available parking space to one side of North Main Street, half of the available supply. This encourages customers to "circle the block" in an attempt to find a space closer to their destination.

Changes to the Chauncy Street intersection and the Old Colony Way intersections would be necessary with this scenario as well. The island diverting southbound traffic from the Chauncy Street intersection onto Old Colony Way would have to be removed, and the northbound left-turn lane onto Old Colony Way would be converted to the southbound lane. Left-turns from North Main Street onto Old Colony Way would be in the queue from the Chauncy Street intersection, due to their close proximity. This would add to the left lane queue at this intersection.

At Old Colony Way/Church Street, a complete reconfiguration of the traffic island would be necessary. The "Middle Common" would have to be rounded on its northwestern corner in order to accommodate southbound thru traffic on North Main Street. Figure 14 illustrates this scenario.

Under this alternative in 2035 traffic conditions, Old Colony Way (south) at North Main Street would operate at LOS A with an AM Peak Hour Delay of 1.4 seconds per vehicle and a PM Peak Hour delay of 1.5 seconds per vehicle. The Old Colony Way approach would operate at LOS B during both the AM and PM Peak Hours with delays of 12.9 and 13.8 seconds per vehicle respectively.

Alternative 2b: Two-way North Main Street/One-way Old Colony Way with Roundabout

This alternative would have the same directional traffic flow as Alternative 2a with a roundabout at the North Main Street/Old Colony Way/Church Street intersection. The Middle Common would be converted into a circular island with the appropriate approach medians and pavement markings. This would greatly

Figure 14:
Alternative 2a



eliminate turning conflicts at this intersection while maintaining the character of the downtown. One additional parking space on North Main Street and one on Old Colony Way would have to be eliminated in order to accommodate this layout, bringing the total number of potential spaces lost to 15 under this alternative. Under 2035 traffic conditions, a roundabout at this location would have a max v/c of 0.71 during the AM Peak Hour and 0.51 during the PM Peak Hour.

Figure 15 illustrates this alternative with a roundabout. As previously mentioned, land takings and/or a design exception would be necessary in order to have a roundabout at this location.

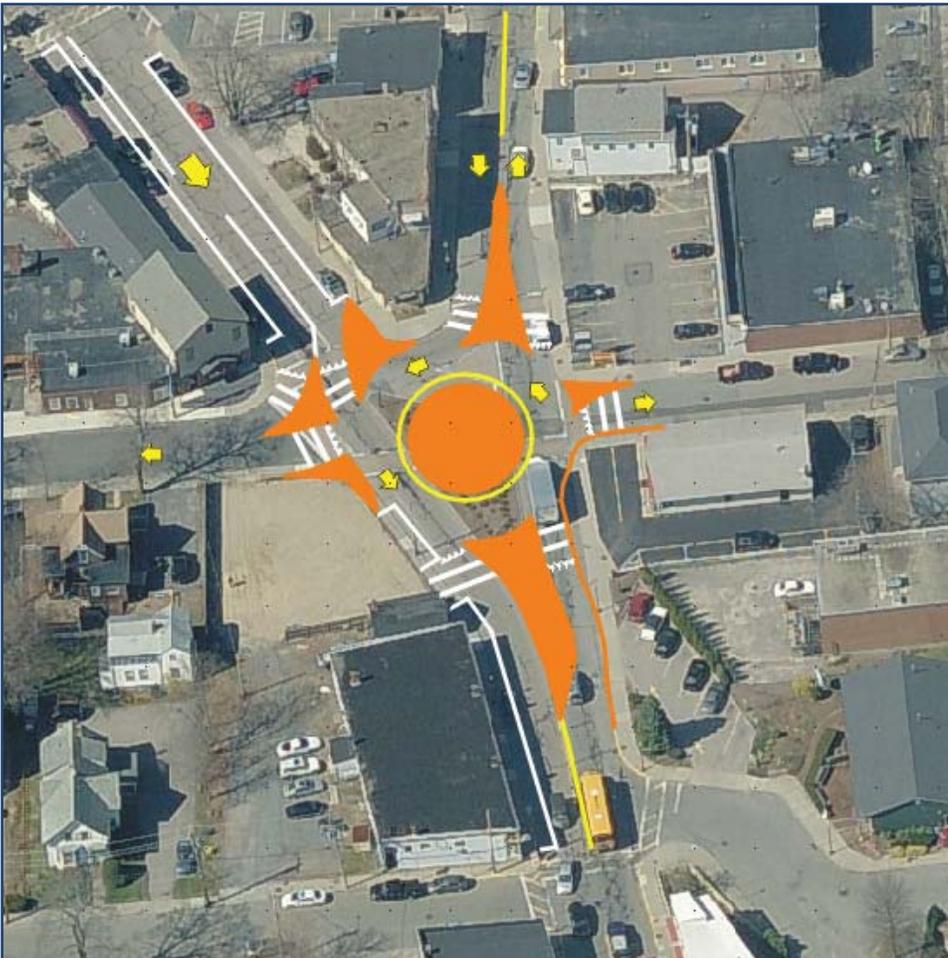


Figure 15:
Alternative 2b

Overall, Alternatives 2a and 2b would attract more vehicles to the North Main Street corridor, thus increasing 2035 traffic volumes at the Chauncy Street and East and West Street intersections. North Main Street at Chauncy Street (with the stand-alone improvements previously mentioned) would operate at LOS B (delay of 17.2 seconds per vehicle) during the AM Peak Hour and North Main Street at East and West Streets would operate at LOS E (delay of 58.6 seconds per vehicle). During the PM Peak Hour, North Main Street at Chauncy Street would operate at LOS E (delay of 73.3 seconds per vehicle) and North Main Street at East and West Streets would operate at LOS F (delay > 120 seconds per vehicle).

Overall ADT by the year 2035 along North Main Street would increase from

5,700 vehicles in a no-build scenario to 8,600 vehicles, a 50% increase. Along Old Colony Way, ADT would drop from 5,850 vehicles to just 700 south of Rumford Avenue. Between Church Street and East/West Streets, ADT on North Main Street would increase from 11,700 vehicles to 16,150 vehicles, an increase of 38%.

Alternative 3a: Two-way North Main Street/Two-way Old Colony Way

This option would have the same characteristics as Alternative 2a along North Main Street. Old Colony Way, however, would allow for northbound and southbound traffic in two lanes. All of the existing on-street parking on Old Colony Way would be retained under this scenario, as the roadway layout is 40 feet in width. The existing southbound bike lane could be retained, however it should have a northbound counterpart which would not fit within the 40 foot current roadway layout. Even if two nine-foot travel lanes were striped with two eight-foot parking lanes, there would be only enough width for two three-foot bike lanes, which is too narrow according to MassDOT design standards. As an alternative, Rumford Avenue and High Street (both approximately 28 feet wide) could be striped with two nine-foot travel lanes and two five-foot bike lanes. Parking would have to be removed from both streets, however. The lanes would end at North Main Street across from the entrance to the Mansfield Bike Path. Access to the Mansfield Commuter Rail Station could be designated through the parking lot at the corner of Rumford Ave and Old Colony Way and along the existing overpass over Chauncy Street.

Figure 16:
Alternative 3a



Old Colony Way (north) at North Main Street should be designated as a right-turn in/right-turn out only intersection. As with Alternative 1, the “Middle Common” would have to be altered in order to accommodate a two-way Old Colony Way. The loss of one additional parking spaces on North Main Street adjacent to the Common would be necessary under this alternative, bringing the total number of potential spaces lost to 14. Figure 16 depicts this alternative.

Under this alternative in 2035 traffic conditions, Old Colony Way South at North Main Street would operate at LOS B during the AM and PM Peak Hours, with delays per vehicle of 2.6 and 2.5 seconds respectively. The Old Colony Way approach would operate at LOS D during the AM and PM Peak Hours, with delays per vehicle of 30.3 and 26.5 seconds respectively.

Alternative 3b: Two-way North Main Street/Two-way Old Colony Way with Roundabout

This alternative would have the same directional characteristics as Alternative 3a with a roundabout at the North Main Street/Old Colony Way/Church Street intersection. A roundabout would best suit this location given its confusing layout and conflicting turning movements between Old Colony Way and Church Street. Figure 17 depicts a potential roundabout layout at this location. One additional parking space on Old Colony Way would be lost with a roundabout, bringing the total number of spaces lost to 15. Under 2035 traffic conditions, a roundabout at this location would have a max v/c of 0.75 during the AM Peak Hour and 0.55 during the PM Peak Hour.

The Chauncy Street and East and West Street intersections would operate the same under Alternatives 3a and 3b as they would under Alternatives 2a and

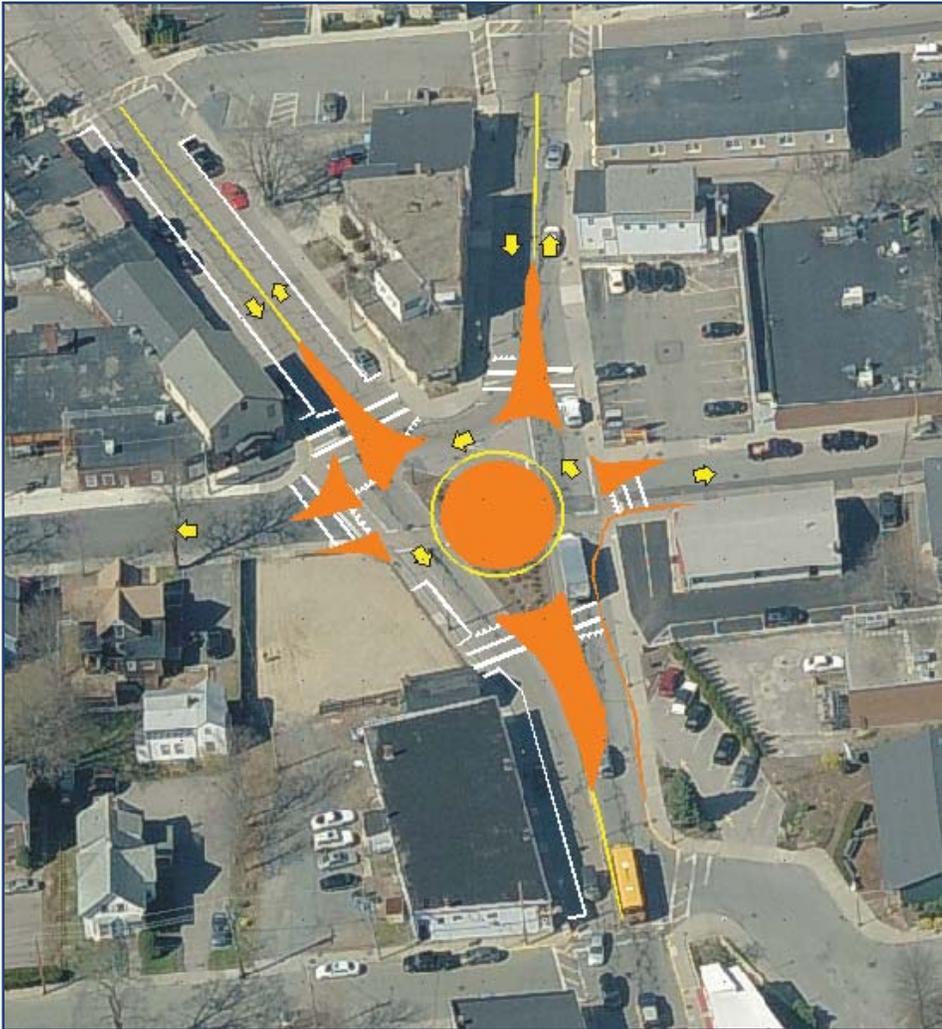


Figure 17:
Alternative 3b Roundabout

2b. Overall ADT by the year 2035 along North Main Street would increase from 5,700 vehicles in a no-build scenario to 8,200 vehicles, a 43% increase. Along Old Colony Way, ADT would drop from 5,850 vehicles to 950 south of Rumford Avenue. Between Church Street and East/West Streets, ADT on North Main Street would increase from 11,700 vehicles to 16,150 vehicles, an increase of 38%. Figure 18 illustrates 2035 traffic volumes along the corridor under Alternatives 1, 2 and 3.

Parking

Table 5 summarizes on-street parking spaces lost under the different alternatives discussed previously, with and without roundabouts. Maximum loss of spaces would occur if MassDOT Design Standards for arterials were followed along North Main Street, necessitating 11-foot travel lanes. Using 9.5-foot travel lanes along North Main Street in constrained sections would result in minimal loss of parking spaces.

Table 5:
Parking Space Loss With Improvement Alternatives

| Alternative | Min. Parking Space Loss | Max. Parking Space Loss |
|-------------|-------------------------|-------------------------|
| 1a | 0 | 0 |
| 1b | 2 | 2 |
| 2a | 0 | 13 |
| 2b | 2 | 15 |
| 3a | 1 | 14 |
| 3b | 2 | 15 |

Figure 18:
2010, 2035 Alternative 1, Alternative 2 and Alternative 3 ADTs



Conclusions and Recommendations

A reconfiguring of the traffic circulation in downtown Mansfield would have both positive and negative effects on traffic flow and economic development.

Alternatives 2a and 2b

Reconfiguring North Main Street as a two-way street from Chauncy Street to Church Street would have the following effects:

Positive:

- An overall increase in traffic flow along the North Main Street corridor, resulting in more pass-by trips for businesses along the corridor.
- Better connectivity between the area around Town Hall and the train station.

Negative:

- A loss of up to 13 parking spaces along the corridor without a roundabout; 15 with a roundabout.
- An increase in congestion over a no-build scenario at both the Chauncy Street intersection and the East/West Streets intersection.
- Less opportunities for drivers along North Main Street to find an available

on-street parking space, since they can only easily park in spaces facing their direction of travel.

- A significant loss in traffic volumes along Old Colony Way, which would result in less pass-by trips for businesses located along it.

Alternatives 3a and 3b

Reconfiguring both Old Colony Way and North Main Street into two-way sections would have nearly the same results as Alternatives 2a and 2b. Two additional parking spaces under Alternative 3a would be lost over Alternative 2a, bringing the total number of potential spaces lost to 15 spaces. An additional space would be lost under Alternative 3b due to the roundabout. Old Colony Way would retain slightly more of its no-build traffic volume however, since it would also have two-directional travel. This would result in slightly more pass-by trips along Old Colony Way.

Overall, SRPEDD recommends that the Town of Mansfield keep North Main Street and Old Colony Way in their current one-way configurations. This would maximize on-street parking and access to this parking.

SRPEDD also recommends improvements to the following intersections along the corridor:

- Chauncy Street: A re-striping and re-phasing of the intersection to include a shared thru/left-turn lane at both Chauncy Street approaches, as pictured in Figure 9. A leading permitted/protected left-turn phase would be included at the eastbound approach and a lagging permitted/protected left-turn phase would be included at the westbound approach.
- East Street/West Street: Striping of a left-turn lane on the eastbound West Street approach.
- Emergency vehicle preemption in the Chauncy Street and East/West Street signal systems, and an upgraded demand signal at the fire station.
- Old Colony Way South/Church Street: Construction of a roundabout at this location, as pictured in Figure 10 as Alternative 1b.
- Upgrades to pedestrian network throughout the study area to meet ADA guidelines set forth in the PROWAG, including accessible pedestrian signals, detectable warning panels and proper crosswalks.

Parking

Although downtown Mansfield does have sufficient parking facilities at this time, there are several different options that would enhance parking downtown in the future:

- Improvements to the Bike Path Parking Lot, including new signage directing customers to the lot, a resurfacing and the institution of a downtown employee permit parking system to allow downtown employees to park there for longer than two hours
- By-law stating that any new business relocating to the corridor needs to provide ample off-street parking for employees.

Overall, SRPEDD recommends that the Town of Mansfield keep North Main Street and Old Colony Way in their current one-way configurations to maximize on-street parking and access to their parking.

**North Main Street @
Pratt Street Intersection
Improvements**

This intersection has four approaches and one driveway approach. Oakland Street has a single lane and is a one-way away from the intersection in the northbound direction. North Main Street has two travel lanes in each direction, as does Pratt Street. There is on-street parking along North Main Street south of the intersection and along Oakland Street both north and south of the intersection. Figure A-1 illustrates the layout of this intersection.

Figure A-1: North Main Street @ Pratt Street/Oakland Street



North Main Street and Oakland Street flow freely through the intersection without traffic controls. The Pratt Street approach is under stop-sign control.

Pedestrians are accommodated with sidewalks and curb cuts along all approaches and a crosswalk across North Main Street and Oakland Street from Pratt Street. A grassy island separates North Main Street and Oakland Street just south of the intersection. This island provides a point of refuge for pedestrians crossing the two streets in the crosswalk. There are no official bicycle accommodations at the intersection, though Oakland Street is wide enough for shared travel between automobiles and bicycles.

In 2011, this intersection operated at LOS A with an average delay per vehicle of 3.0 seconds during both the AM and PM Peak Hours. The Pratt Street approach operates at LOS B during both peak hours. Much of the traffic volume associated with this intersection is accessing the resident parking along Mansfield Avenue for the MBTA trains.

There is much confusion at this intersection due to its difficult layout. Motorists exiting Pratt Street wishing to access North Main Street must first cross Oakland Street and then wait in the space between North Main Street and Oakland Street for a gap in North Main Street traffic. Additionally, many vehicles were observed making u-turns from Oakland Street onto North Main Street southbound when looking for parking, a potentially dangerous movement given North Main Street's bi-directional layout.

Town Goal: Two-way Oakland Street

The Town has expressed interest in making Oakland Street bi-directional. Oakland Street north of Pratt Street is approximately 38 feet in width with parking on both sides of the street. In order to retain all of these spaces in two 8-foot parking lanes, the northbound and southbound travel lanes would have to be 11 feet each in width. These are adequate lane widths for this type of roadway, despite the heavy truck traffic that occurs along it.

A two-way Oakland Street would eliminate the need for southbound traffic to use Mansfield Avenue, as it currently does. This would increase traffic through the Pratt Street intersection but lessen volume on Mansfield Avenue in front of the train station, allowing it to function as a parking lot with angled parking instead of parallel parking. Crocker Street west of North Main Street could then be reconfigured as a bi-directional street offering access to the train station. An analysis of AM Peak Hour traffic flow in the area showed that approximately 93% of the southbound traffic on Mansfield Avenue is through traffic continuing southbound, with the remainder being drop-offs at the train station or residents parking at the train station.

Alternative 1: A potential improvement to traffic operations and safety at this intersection would be a roundabout. In

Figure A-2: Roundabout with Two-Way Oakland Street/Mansfield Ave Reconfiguration (Alternative 1)



order to meet MassDOT design standards and accommodate tractor-trailers, a minimum 100-foot in diameter roundabout would be necessary at this location. At its most constrained point (southwest corner at MassGlass to northeast corner at Genos Restaurant) this intersection is approximately 101 feet in width. Therefore, a roundabout could fit at this location without major land takings. Both the apron in the center of the roundabout and the island separating North Main Street from Oakland Street on the northern side of the roundabout would need to be engineered properly in order to accommodate tractor-trailers and fire trucks navigating the intersection. Modifications to traffic flow would be necessary at each approach, including the MassGlass parking area, in order for a roundabout to properly function. Figure A-2 illustrates a roundabout layout at this location with a two-way Oakland Street and an angled parking lot on Mansfield Avenue.

Approximately 10 on-street parking spaces would have to be eliminated in order to accommodate the roundabout. Given the existing two-space deficit in average parking demand that this district already experiences, this may be an issue that requires attention by the Town.

Under 2011 traffic conditions, a roundabout with a two-way Oakland Street would operate with minimal delay during the AM and PM Peak Hours. The maximum volume to capacity ratio (max v/c) would be 0.44 during the AM Peak Hour and 0.47 during the PM Peak Hour. A v/c ratio of 0.8 or higher would be considered congested. Under 2035 traffic conditions, the roundabout would have a max v/c of 0.52 during the AM Peak Hour and 0.55 during the PM Peak Hour.

A roundabout at this location could improve accessibility, traffic flow and safety. Roundabouts reduce delay by not requiring vehicles to make full stops. They also eliminate dangerous right-angle collisions. The Town could consider a roundabout at this location with the proper apron and approach design to accommodate the heavy truck traffic that would utilize it.

Alternative 2: A second improvement alternative at this location would be a reconfiguration of the split between North Main Street and Oakland Street between Crocker Street and Pratt Street. Under this alternative, the one-way Oakland Street side would function as an angled parking lot, while the Oakland Street/Pratt Street approaches to North Main Street would be consolidated and realigned. Oakland Street would be under stop-sign control at its terminus to North Main Street, and Pratt Street would be under stop-sign control at its terminus to Oakland Street. Figure A-3 illustrates these improvements. This alternative would maximize parking spaces in a parking district identified as having a small deficit. It would also help eliminate conflicts between drivers exiting Pratt Street and allow for two-way travel on Oakland Street. The configuration of the Oakland Street/Pratt Street intersection should allow for Oakland Street to have priority over Pratt Street, necessitating stop sign control on the Pratt Street approach where it meets with Oakland Street. Under 2011 traffic conditions, the Pratt Street approach would have an average delay per vehicle of 15 seconds, or LOS B during the PM peak hour, and 16 seconds per vehicle or LOS C during the AM peak hour. The Oakland Street approach to North Main Street would subsequently have an average delay per vehicle of 50 seconds during the PM peak hour (LOS E) and 41 seconds during the AM peak hour (LOS E). Under 2035 PM peak hour conditions, the Pratt Street approach would have an average delay per vehicle of 17 seconds, or LOS C. Under 2035 AM peak hour conditions, the Pratt Street approach would have an average delay per vehicle of 19 seconds, or LOS C. The Oakland Street approach to North Main Street would have an average delay per vehicle of 113 seconds, or LOS F during the 2035 PM peak hour and 84 seconds per vehicle (also LOS F) during the 2035 AM peak hour. This would be unacceptable.

A traffic signal at this location could help to minimize delay with the configuration noted above. Under this alternative, there would be signal phases: North Main Street northbound and southbound, Oakland Street and the parking area, and finally Pratt Street, possibly coupled with the MassGlass parking area. With this configuration, the intersection would operate at LOS C with an average delay per vehicle of 21 seconds during the 2035 PM peak hour and 24 seconds during the AM peak hour. Here, Pratt Street and Oakland Street would each have their own signal phases, along with North Main Street. Under 2011 traffic conditions, this intersection would operate at LOS B with an average delay per vehicle of 16 seconds during the PM peak hour and 19 seconds during the AM peak hour. Figure A-4 illustrates this configuration with a traffic signal.

Figure A-3: Alternative 2, Stop-sign Control



Figure A-4: Alternative 2, Signal Control



Alternative 3: A third alternative would be similar to alternatives 2 and 3, however the angled parking area would be located along the North Main Street side and the North Main Street northbound approach would line up with Oakland Street with Oakland Street to North Main Street being the primary orientation. Figure A-5 illustrates this alternative. Since Oakland Street has double the amount of daily traffic as does North Main Street (north of Oakland Street), this configuration would prioritize the legs of the intersection with the highest traffic volumes. The North Main Street southbound approach to the intersection, the Pratt Street approach and the parking area exit would be under stop-sign control. The MassGlass parking area would share an exit with the angled parking area and its entrance would be moved to Mansfield Avenue. Figure A-5 illustrates this configuration.

Alternative 3 could operate with even greater efficiency if a traffic signal were installed, resulting in better levels of service for the North Main Street southbound and Pratt Street approaches. The signal would have three green phases: Oakland Street and North Main Street northbound, North Main Street southbound and finally, Pratt Street and the parking area exit. Figure A-6 illustrates this configuration with a traffic signal. Table A-1 summarizes average delays per vehicle for each approach under this configuration with and without a traffic signal.

Figure A-5: Alternative 3, Stop-sign Control

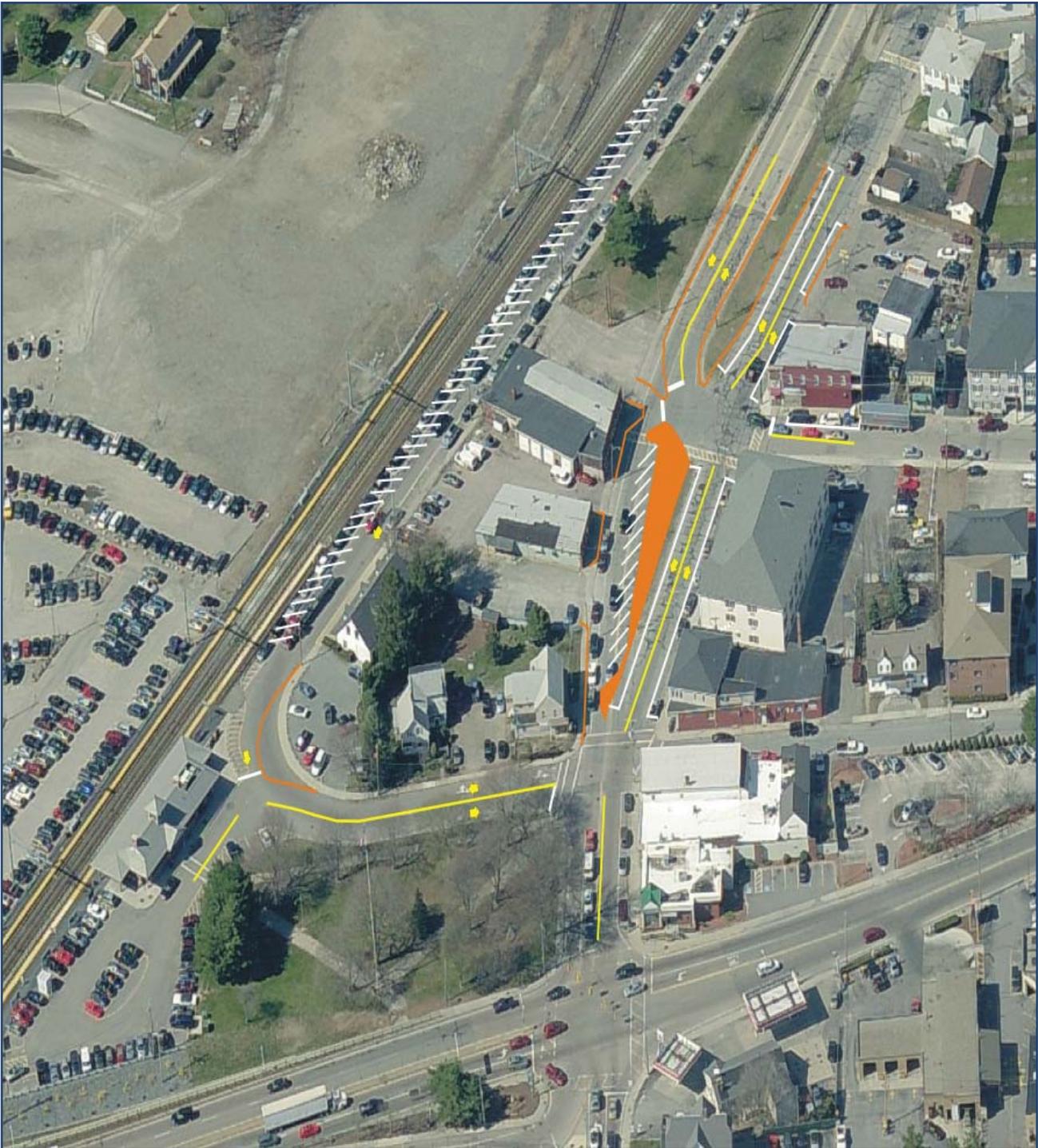


Figure A-6: Alternative 3, Signal Control



Table A-1: Alternative 3 Delay per Vehicle/LOS, 2011 and 2035 Peak Hours

| | 2011 AM | | 2011 PM | | 2035 AM | | 2035 PM | |
|---------------------------|---------|-----|---------|-----|---------|-----|---------|-----|
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Alt 3 Unsignalized | 7 | C | 10 | C | 11 | C | 15 | D |
| Oakland St SB | 0 | A | 0 | A | 0 | A | 0 | A |
| N Main SB | 21 | C | 26 | D | 31 | D | 46 | E |
| N Main NB | 3 | A | 3 | A | 3 | A | 4 | A |
| Pratt St WB | 29 | C | 32 | C | 42 | E | 53 | F |
| Alt 3 Signalized | 13 | B | 13 | B | 13 | B | 17 | B |
| Oakland St SB | 9 | A | 7 | A | 7 | A | 9 | A |
| N Main SB | 17 | B | 21 | C | 25 | C | 23 | C |
| N Main NB | 12 | B | 11 | B | 12 | B | 17 | B |
| Pratt St WB | 23 | C | 23 | C | 22 | C | 26 | C |

Table A-2: Summary of LOS and Delay per Vehicle for Improvement Alternatives

| | 2011 AM | | 2011 PM | | 2035 AM | | 2035 PM | |
|---------------------------|---------|-----|---------|-----|---------|-----|---------|-----|
| | Delay | LOS | Delay | LOS | Delay | LOS | Delay | LOS |
| Alt 1 | n/a | | n/a | | n/a | | n/a | |
| Alt 2 Unsignalized | 16 | C | 17 | D | 32 | D | 37 | D |
| Oakland St SB | 41 | E | 50 | E | 84 | F | 113 | F |
| Pratt St WB | 16 | C | 15 | B | 19 | C | 17 | C |
| Alt 2 Signalized | 19 | B | 16 | B | 24 | C | 21 | C |
| Oakland St SB | 21 | C | 18 | B | 27 | C | 25 | C |
| Pratt St WB | 22 | C | 23 | C | 29 | C | 25 | C |
| Alt 3 Unsignalized | 7 | C | 10 | C | 11 | C | 15 | D |
| Oakland St SB | 0 | A | 0 | A | 0 | A | 0 | A |
| N Main SB | 21 | C | 26 | D | 31 | D | 46 | E |
| N Main NB | 3 | A | 3 | A | 3 | A | 4 | A |
| Pratt St WB | 29 | C | 32 | C | 42 | E | 53 | F |
| Alt 3 Signalized | 13 | B | 13 | B | 13 | B | 17 | B |
| Oakland St SB | 9 | A | 7 | A | 7 | A | 9 | A |
| N Main SB | 17 | B | 21 | C | 25 | C | 23 | C |
| N Main NB | 12 | B | 11 | B | 12 | B | 17 | B |
| Pratt St WB | 23 | C | 23 | C | 22 | C | 26 | C |