

Traffic Impact and Access Study MGM Springfield

Prepared for:
MGM Resorts International Global Gaming Development, LLC

Prepared by:
TEC, Inc.
65 Glenn Street
Lawrence, Massachusetts 01843

December 17, 2012



Table of Contents

- Table of Contents i
- List of Figures..... ii
- Executive Summary..... 1
- I. Introduction 3
- II. Existing Conditions..... 4
 - Traffic Study Area** 4
 - Roadway Geometry** 4
 - Intersection Geometry** 6
 - Existing Traffic Volumes** 10
 - Seasonal Adjustment**..... 12
- III. Future Conditions 13
 - Background Traffic Growth** 13
 - No-Build Traffic Volumes**..... 15
 - Site Access Summary** 15
 - Site Generated Traffic**..... 16
 - Trip Distribution**..... 20
 - Redistributed Traffic (Closure of Howard and Bliss Streets)**..... 22
 - Build Traffic Volumes**..... 22
- IV. Traffic Operations Analysis..... 23
 - Methodology**..... 23
 - Unsignalized Intersections** 24
 - Signalized Intersections** 27
- V. Intersection and Roadway Improvements 33
 - Intersection Capacity and Safety Improvements** 33
 - Transportation Demand Management** 34
- VI. Parking Summary..... 39
 - Parking Supply** 39
 - Parking Demand**..... 39
- VI. Conclusion..... 42

List of Figures

No.	Title
1	Project Location Map
2	2012 Existing Conditions – Weekday Evening and Saturday Evening Peak Hour Traffic Volumes
3	2022 No-Build Conditions – Weekday Evening and Saturday Evening Peak Hour Traffic Volumes
4	Site Circulation – Patron & Employee Car Traffic
5	Site Circulation – Bus & Delivery Truck Access
6	Site Circulation – Pedestrian & Shuttle Access
7	Trip Distribution – Casino & Hotel Employees
8	Trip Distribution – Casino & Hotel Patrons
9	Trip Distribution – Armory Square Retail Center
10	NET Site Generated Trips – Weekday Evening Peak Hour Traffic Volumes
11	NET Site Generated Trips – Saturday Evening Peak Hour Traffic Volumes
12	Total Trip Distribution – All Users – Entering Volumes
13	Total Trip Distribution – All Users – Exiting Volumes
14	NET Redistributed Trips – Weekday Evening and Saturday Evening Peak Hour Traffic Volumes
15	2022 Build Conditions – Weekday Evening and Saturday Midday Peak Hour Traffic Volumes
16	Route Options & Traffic Management for I-291
17	Route Options & Traffic Management for I-91 Northbound
18	Route Options & Traffic Management for I-91 Southbound

Executive Summary

MGM Resorts International Global Gaming Development, LLC (MGM) proposes to construct a dynamic mixed-use casino, entertainment, hotel, shopping center, and residential apartment complex in the downtown core. The project site is bordered by East Columbus Avenue, State Street, Main Street, and Union Street. It was selected because it has significant potential for redevelopment, situated in an area of prior extensive tornado damage, and able to be woven into the fabric of an increasingly vibrant downtown. It lies in close proximity to several interstate highway ramps yet it is intricately tied to the downtown pedestrian experience along Main Street. The proposed uses, supply of parking, and pedestrian access points are expected to complement and revitalize the adjacent businesses and uses in Springfield's South End, such as the MassMutual Convention Center.

The site is currently occupied by multiple commercial, municipal, retail establishments, and for-fee surface parking fields and structures. MGM proposes to raze a majority of the structures on the site and construct the following:

- 592,700 SF casino resort that includes space for back of the house (BOH), retail / restaurant uses, and banquet facilities in addition to the gaming space
- 294-room multi-story hotel
- 54 residential apartment units
- 140,000 SF retail and entertainment center known as Armory Square, which will include multiple tenants, restaurants, event plaza, a multi-screen cinema and bowling alley
- 4,800-stall multi-story parking garage

This following study is based on current traffic data collected at key study area intersections in August and November 2012. The traffic projections for the proposed casino complex are based on historic studies and MGM-specific data from a comparable facility in Detroit. The trip characteristics for the proposed complex are compatible with the adjacent uses because their peaking events are different.

Parking data was collected to understand the needs for the adjacent courthouse and the downtown businesses. The courthouse and office uses see their demand peak in the weekday morning and midday periods when the casino complex is less active. Conversely, those same uses generate a negligible number of trips when the casino is most active during the weekday evening and weekend periods. This symbiosis of land uses allows for a shared parking supply in the MGM parking structure that can be used without fee.

The vehicular access configuration for the site was determined after a careful review of the capacity of the area street system. Fortunately, the streets and intersections have reserve capacity to handle additional traffic. The four Interstate 91 and 291 exits serving this area of downtown can accommodate regional traffic associated with the casino development. The multiple access points to the highway network and the downtown will create additional bypass traffic for downtown businesses while avoiding the residential neighborhoods. One key to the successful management of traffic is public information. TEC will be working with the City and State staff to identify measures, such as social media and intelligent transportation and information systems, to route traffic to the most appropriate route.

This preliminary traffic impact study demonstrates that the surface intersections, with modest improvements, can accommodate the entire development program and still attain acceptable levels of service. All intersections are expected to operate at an overall level of service D or better when assessed in a 10-year horizon. This means that there is still reserve capacity following construction of the MGM facility to accommodate additional growth and renewal in the downtown.

The Phase II RFP process allows for a dialogue of the proponent's project presentation, identification of comments from City staff and the general public, and a framework for future permitting and host agreements regarding off-site transportation mitigation and other related improvements. This preliminary traffic study is a document that can be used as the foundation for future analysis as part of the City's local permitting process and through the extensive State review process as part of the Massachusetts Environmental Policy Act (MEPA). With successful implementation of the improvements, the traffic from the casino complex can be safely and efficiently accommodated on the area roadways.

I. Introduction

TEC has been retained by MGM Resorts International Global Gaming Development, LLC (MGM) to prepare a preliminary traffic impact and access assessment for a proposed casino, hotel, retail, and entertainment center to be located on a series of parcels between East Columbus Avenue and Main Street and between State Street and Union Street, in Springfield, Massachusetts. The site is currently occupied by multiple commercial, municipal, retail establishments, and for-fee surface parking fields and structures. MGM proposes to raze a majority of the structures on the site and construct the following:

- 592,700 SF casino resort that includes space for back of the house (BOH), retail / restaurant uses, and banquet facilities in addition to the gaming space
- 294-room multi-story hotel
- 54 residential apartment units
- 140,000 SF retail and entertainment center known as Armory Square, which will include multiple tenants, restaurants, event plaza, a multi-screen cinema and bowling alley
- 4,800-stall multi-story parking garage

Primary access to the site is currently proposed via a full access and egress driveway along East Columbus Avenue, to be located at the present locations of Bliss Street. An exiting driveway is proposed along East Columbus Avenue at the present location of Howard Street. Secondary access is proposed along State Street and Union Street. The service vehicles and buses will be accommodated at a separate driveway along Union Street. Additional access to the smaller Armory Square parking areas will be provided via three full access and egress driveways along Union Street and Main Street. However, the principal parking supply will be provided within a multi-story parking garage oriented near East Columbus Avenue.

TEC evaluated the traffic operations for the intersections immediately surrounding the site under existing and future conditions. The future year planning horizon examines traffic operations under a 10-year design horizon (2022) for traffic volume projections in both the No-Build (without the proposed project) and Build Conditions (with the proposed project). These conditions were analyzed to determine what, if any, off-site mitigation is necessary to provide reasonable traffic operations in the area after the development is fully occupied and operational.

II. Existing Conditions

TRAFFIC STUDY AREA

The study area was selected to contain the major surface-level intersections providing regional and local access bounded by West Columbus Avenue to the west, Main Street to the east, Union Street to the south, and State Street to the north. The following intersections were included in the study area:

1. Union Street / West Union Street @ West Columbus Avenue
2. Union Street @ East Columbus Avenue
3. Union Street @ Southerly Parking Garage Exit Driveway (proposed)
4. Union Street @ Charter Bus Driveway (proposed)
5. Union Street @ Armory Square Westerly Driveway (proposed)
6. Union Street @ Armory Square Easterly Driveway (proposed)
7. Union Street @ Main Street
8. Howard Street @ East Columbus Avenue
9. Howard Street (future Armory Square Northerly Driveway) @ Main Street
10. Bliss Street @ East Columbus Avenue
11. Bliss Street @ Main Street
12. State Street @ West Columbus Avenue
13. State Street @ East Columbus Avenue
14. State Street @ Resort Northerly Driveway
15. State Street @ Main Street

The locus of the project and study area intersections are shown graphically in Figure 1. TEC anticipates that the City of Springfield and the Massachusetts Department of Transportation (MassDOT) may require data collection and analysis at other downtown intersections as part of a future detailed traffic impact and access study (TIAS) as part of local permitting or the Massachusetts Environmental Policy Act (MEPA) review processes.

ROADWAY GEOMETRY

TEC staff conducted a comprehensive field inventory of existing traffic conditions along the study area roadway from August to November 2012 to obtain information related to roadway geometry and lane usage. The field investigation consisted of an inventory of existing roadway geometrics, operating characteristics, and safety characteristics. A description of the existing roadway inventory is provided below.

Union Street

Union Street is generally a two-lane southwest-northeast local roadway maintained by the City of Springfield. The roadway provides connection from the East and West Columbus Avenues to the west to Maple and Walnut Street to the east. Although there is no posted speed limit, the existing travel speeds along Union Street are approximately 30 miles per hour (mph). Sidewalks are present along both sides of Union Street with no on-street parking available along its length. Land uses along East Columbus Avenue include retail, commercial, educational, and residential uses.

Howard Street

Howard Street is a two-lane 30-foot wide southwest-northeast local roadway maintained by the City of Springfield which runs parallel and between Union Street and State Street, south of Bliss Street. Directional flow along Howard Street is unmarked. The roadway provides connection from the East Columbus Avenue to the west and Main Street to the east. There is no posted speed limit along Howard Street. Howard Street tends to operate as a cut-through street for vehicles attempting to circumvent both State Street and Union Street. Sidewalks are present along both sides of Howard Street with on-street parking available along its northerly edge. Three land uses along Howard Street account for a majority of the street traffic; including, the newly constructed Berkshire Bank development, multiple surface for-fee parking lots, the Red Rose Pizzeria (parking access on Howard Street), and the Western Massachusetts Correctional Facility.

Bliss Street

Bliss Street is a two-lane 30-foot wide southwest-northeast local roadway maintained by the City of Springfield which runs parallel and between Union Street and State Street, north of Howard Street. Directional flow along Bliss Street is unmarked. The roadway provides connection from the East Columbus Avenue to the west and Main Street to the east. There is no posted speed limit along Bliss Street. Sidewalks are present along both sides of Howard Street with on-street parking available along its southerly edge. The majority of the street traffic is generated by the several for-fee surface parking lots which service a majority of the courthouse and South End related trips.

State Street

State Street is a two- to four-lane southwest-northeast urban minor arterial roadway maintained by the City of Springfield. State Street condenses to two-lanes west of Main Street. The roadway provides connection from the East and West Columbus Avenue to the west and East Springfield to the east. Sidewalks are present along both sides of State Street with on-street parking available along both sides of the roadway. Land uses along State Street in the vicinity of the study area include retail, commercial, recreational (MassMutual Center), office, and residential uses.

West Columbus Avenue

West Columbus Avenue is a two- to four-lane northwest-southeast urban collector roadway (urban minor arterial roadway north of State Street) maintained by the City of Springfield. West Columbus Avenue operates as a one-way roadway southbound with East Columbus Avenue paralleling the roadway to the east to balance directional flow. The roadway provides connection from various bridge crossings to the east and the Brightwood neighborhood to the north to Downtown Springfield and Points South. Along its length, West Columbus operates as a surface frontage road to Interstate 91 which runs adjacent and elevated to the surface roadway. The posted speed limit along West Columbus Avenue is 35 miles per hour (mph). A sidewalk is present along the westerly edge of the roadway. Land uses along West Columbus Avenue include retail, recreational (including the Basketball Hall of Fame), commercial, and hotel uses with various access points to municipal surface and garaged parking facilities.

East Columbus Avenue

East Columbus Avenue is a two- to four-lane southeast-northwest urban collector roadway (urban minor arterial roadway north of State Street) maintained by the City of Springfield. East Columbus Avenue operates as a one-way roadway northbound with West Columbus Avenue paralleling the roadway to the west to balance directional flow. The roadway provides connection from the South End and Forest Park neighborhoods to the south to Downtown Springfield and Points North. Along its length, East Columbus operates as a surface frontage road to Interstate 91 which runs adjacent and elevated to the surface roadway. The posted speed limit along East Columbus Avenue is 35 miles per hour (mph). A sidewalk is present along the easterly edge of the roadway. Land uses along East Columbus Avenue include retail, commercial, office, and hotel uses with various access points to municipal surface and garaged parking facilities.

Main Street

Main Street is a two- to four-lane southeast-northwest urban minor arterial roadway maintained by the City of Springfield. Main Street condenses to two-lanes south of State Street. The roadway provides connection from the Downtown Springfield to the north to the South End to the south. Although there is no posted speed limit, the existing travel speeds along Union Street are approximately 25 to 30 miles per hour (mph). Sidewalks are present along both sides of Main Street with on-street parking available along both sides of Main Street for much of its length. Land uses along East Columbus Avenue include retail, commercial, office, and residential uses.

INTERSECTION GEOMETRY

TEC staff conducted a comprehensive field inventory of existing traffic conditions at the study area intersections from August to November 2012 to obtain information related to intersection geometry and lane usage. The field investigation consisted of an inventory of existing roadway geometrics, operating characteristics, and safety characteristics. A description of the existing intersection inventory is provided below.

Union Street / West Union Street / West Columbus Avenue / I-91 Southbound Off-Ramp

Union Street and West Union Street intersects West Columbus Avenue to provide a three-way (four-legs), fully-actuated signalized intersection operating in coordination with various intersections along both East and West Columbus Avenues. Both the intersection of West Columbus Avenue / Union Street / I-91 NB On-Ramp and East Columbus Avenue / Union Street / West Union Street operates under one signal controller. The Union Street eastbound approach consists of a shared through / right-turn lane.

The Union Street westbound approach consists of an exclusive left-turn lane and a through lane. Directional flow along Union Street is separated by a marked centerline. The West Columbus Avenue southbound approach consists of an exclusive left-turn lane, a shared left-turn / through lane, a through lane, and a shared through / right-turn lane. West Columbus is one-way southbound. The off-ramp for motorists exiting I-91 southbound (Exit 6) intersects West Columbus Avenue just north of the intersection. The existing concrete barrier partially restricts visibility of the motorists on the off-ramp.

A sidewalk is provided along the westerly side of West Columbus Avenue, along the southerly side of Union Street east of the intersection, and along the northerly side of West Union Street west of the

intersection. Crosswalks are provided across the West Union Street eastbound approach and across West Columbus Avenue south of the intersection. The on-ramp to I-91 southbound (Exit 6) is located just south of the intersection.

Union Street / East Columbus Avenue / I-91 Northbound On-Ramp

Union Street and an I-91 Northbound On-Ramp intersect East Columbus Avenue to provide a three-way (five legs), fully-actuated signalized intersection operating in coordination with various intersections along both East and West Columbus Avenues. The intersections of East Columbus Avenue/ Union Street/ I-91 NB On-Ramp and West Columbus Avenue/ Union Street/ West Union Street operate under one traffic signal controller due to their close proximity.

The Union Street eastbound approach (under the bridge) consists of a shared left-through lane and an exclusive through lane. The Union Street westbound approach consists of one shared through-right lane. Directional flow along Union Street is separated by a marked centerline. The East Columbus Avenue northbound approach consists of a shared left-turn/ through lane, two through lanes, and a shared through/ right-turn lane. East Columbus is one-way northbound. Access to the I-91 northbound on-ramp is provided along East Columbus Avenue, immediately north of this intersection. The two left-most lanes on East Columbus Avenue are used to access the on-ramp during peak hours.

A sidewalk is provided along the easterly side of East Columbus Avenue, along the southerly side of Union Street west of the intersection, and along both sides of Union Street east of the intersection. Crosswalks are provided across the Union Street westbound approach and across the East Columbus Avenue northbound approach.

Union Street / Main Street

Union Street intersects Main Street to provide a four-way, fully-actuated signalized intersection. An exclusive pedestrian phase is included within the traffic signal timing plan. Both the eastbound and southbound approaches operate with lead protected left-turn phases allowing permitted left-turns during opposing green time. All four intersection approaches consist of single general-purpose travel lanes with directional flow separated by a marked centerline. There are “No Turn on Red” (NTOR) restrictions on all four approaches.

Sidewalks are provided along both sides of all four approaches and crosswalks are provided across all four intersection legs. On-street parking is available along both sides of Main Street north and south of the intersection.

Howard Street / East Columbus Avenue

Howard Street intersects East Columbus Avenue to provide a two-way (three-legged) unsignalized intersection. East Columbus Avenue operates as one-way northbound. Howard Street operates under STOP control while East Columbus Avenue is free-flowing. The Howard Street westbound approach consists of a single general-purpose travel lane with directional flow unmarked. The East Columbus Avenue northbound approach consists of dual general-purpose travel lanes. A sidewalk is provided along the easterly side of East Columbus Avenue and along both side of Howard Street. A crosswalk is provided across the Howard Street westbound approach. On-street parking is permitted along the northerly edge of Howard Street.

Howard Street / Main Street

Howard Street intersects Main Street to provide a three-way unsignalized intersection. Howard Street operates under STOP control while Main Street is free-flowing. The Howard Street eastbound approach consists of a single general-purpose travel lane with directional flow unmarked. Both the Main Street northbound and southbound approaches consist of single general-purpose travel lanes with directional flow separated by a marked centerline. A sidewalk is provided along both sides of all three approaches. A crosswalk is provided across the Howard Street eastbound approach. On-street parking is available on both sides of Main Street and is permitted along the northerly side of Howard Street.

Bliss Street / East Columbus Avenue

Bliss Street intersects East Columbus Avenue to provide a two-way (three-legged) unsignalized intersection. East Columbus Avenue operates as one-way northbound. Bliss Street operates under STOP control while East Columbus Avenue is free-flowing. The Bliss Street westbound approach consists of a single general-purpose travel lane with directional flow unmarked. The East Columbus Avenue northbound approach consists of dual general-purpose travel lanes. A sidewalk is provided along the easterly side of East Columbus Avenue and along both side of Bliss Street. A crosswalk is provided across the Bliss Street westbound approach. On-street parking is available along the southerly edge of Bliss Street.

Bliss Street / Main Street

Bliss Street intersects Main Street to provide a three-way unsignalized intersection. Bliss Street operates under STOP control while Main Street is free-flowing. The Bliss Street eastbound approach consists of a single general-purpose travel lane with directional flow unmarked. Left-turns exiting Bliss Street are prohibited. Both the Main Street northbound and southbound approaches consist of single general-purpose travel lanes with directional flow separated by a marked centerline. A sidewalk is provided along both sides of all three approaches. A crosswalk is provided across the Bliss Street eastbound approach. On-street parking is available on both sides of Main Street and is permitted along the southerly side of Bliss Street.

State Street / West Columbus Avenue

State Street intersects West Columbus Avenue to provide a four-legged, fully-actuated signalized intersection operating in coordination with various intersections along both East and West Columbus Avenues. The intersections of West Columbus Avenue/ State Street and East Columbus Avenue/ State Street operate under one signal controller.

The State Street eastbound approach consists of a shared through / right-turn lane. The State Street westbound approach consists of an exclusive left-turn lane and a through lane. The westbound through lane currently operates as a shared left-turn / through lane. Directional flow along State Street is separated by a marked centerline. West Columbus Avenue operates as one-way southbound. The West Columbus Avenue southbound approach to the intersection has an exclusive U-turn slip-lane that provides access under the I-91 overpass to the I-91 northbound on-ramp. It also accommodates an exclusive left-turn lane, a through lane, and a shared through / right-turn lane. West Columbus is one-way southbound. Access from I-91 southbound is provided to West Columbus Avenue just north of the

intersection.

A sidewalk is provided along the westerly side of West Columbus Avenue, along both side of State Street east of the intersection, and along the southerly side of State Street (parking lot) west of the intersection. Crosswalks are provided across West Columbus Avenue north and south of the intersection.

There is a small parking area on the west side of the intersection for the Connecticut Riverwalk and Bikeway that creates the fourth leg to the intersection, but contributes very little traffic to the intersection. Pedestrians are afforded an exclusive signal phase, during which they do not encounter any vehicle conflicts. The prominent pedestrian movement at the intersection occurs between the municipal parking garage (under the highway on the north side of the intersection) and the buildings located along State Street.

State Street / East Columbus Avenue

State Street intersects East Columbus Avenue to provide a three-way (four-leg), fully-actuated signalized intersection operating in coordination with various intersections along both East and West Columbus Avenues. The intersections of East Columbus Avenue / State Street and West Columbus Avenue / State Street operate under one traffic signal controller.

The State Street eastbound approach consists of an exclusive left-turn lane and an exclusive through lane. The State Street westbound approach consists of two through lanes and an exclusive right-turn lane. Directional flow along State Street is separated by a marked centerline. The East Columbus Avenue northbound approach consists of a shared left-turn / through lane, a through lane, and a shared through / right-turn lane. East Columbus is one-way northbound. The three approach lanes are used to distribute the flow of traffic onto State Street (in both directions), the I-91 northbound on-ramp, and East Columbus Avenue. Motorists currently use the two left-most lanes to access the I-91 northbound on-ramp, which is located just north of the intersection, depending on the volume of traffic turning left onto State Street under the bridge.

A sidewalk is provided along the easterly side of East Columbus Avenue, and along both side of State Street both east and west of the intersection. Crosswalks are provided across the State Street westbound approach and across East Columbus Avenue north and south of the intersection.

State Street / Main Street

State Street intersects Main Street to provide a four-way, fully-actuated signalized intersection operating in coordination with various intersections along State Street east of the study area. An exclusive pedestrian phase is included within the traffic signal timing plan and camera detection was recently incorporated into the signal infrastructure. Left-turn restrictions are posted for both the State Street eastbound and the Main Street northbound approaches.

The State Street eastbound approach consists of a single general-purpose travel lane with direction flow separated by a marked centerline. The State Street westbound approach consists of an exclusive left-turn lane, a through lane, and an exclusive right-turn lane with directional flow separated by a marked centerline. Both the northbound and southbound approaches of Main Street consist of dual general-purpose travel lanes. Directional flow along Main Street is separated by a marked centerline.

Sidewalks are provided along both sides of all four approaches and crosswalks are provided across all four intersection legs. On-street parking is available along both sides of Main Street north and south of the intersection, along both sides of State Street west of the intersection, and along the southerly side of State Street east of the intersection.

EXISTING TRAFFIC VOLUMES

Turning Movement Counts

In order to establish existing traffic volume conditions at the study area intersections, manual Turning Movement Counts (TMCs) were conducted during the weekday / Friday evening (4:00 PM – 6:00 PM) peak period at the study area intersections and adjacent on- and off-ramp locations on Thursday, August 2, 2012 and Friday, November 9, 2012 and during the Saturday midday (11:00 AM – 2:00 PM) and Saturday evening (3:00 PM – 6:00 PM) peak periods on Saturday, August 11, 2012 and Saturday, November 10, 2012. These counts were conducted to correspond with the downtown commuter peak periods where the traffic volumes on adjacent streets would be at a significantly higher level than that of off-peak downtown traffic. A detailed summary of the TMCs, partitioned into 15-minute intervals, is provided in Appendix A.

Although Saturday midday traffic volumes were collected at the study area intersections, the TMCs indicated that traffic-volumes during the Saturday evening peak period are greater than those during the midday peak. Therefore, capacity and queue analyses were only conducted for both the Friday evening and Saturday evening peak hour which will reflect the peak of adjacent street traffic conditions with incorporated peak hour of generator site trips.

Automatic Traffic Recorder Counts

In addition, Automatic Traffic Recorder (ATR) counts were conducted along East Columbus Avenue and West Columbus Avenue on Thursday, August 15 to Saturday, August 17, 2012 to gather daily traffic-volume data during a continuous 72 hour time period. ATRs were also conducted along Main Street, State Street, and Union Street concurrently with the on Thursday, November 8 to Saturday, November 10, 2012 to gather daily traffic-volume data during a continuous 72 hour time period. A summary of the Friday evening, Saturday midday, and Saturday evening ATR data is presented in Tables 1 and 2, respectively, on the following page. A detailed summary of the ATR data, partitioned into 15-minute intervals, is provided with Appendix B.

Table 1. Existing Friday Traffic Volume Summary

ATR Location	Friday ADT ^a	Friday Evening Peak Hour		
		Traffic Volume ^b	K Factor ^c	Directional Distribution ^d
West Columbus Avenue, between Bliss and Howard	10,213	1,111	10.9%	100.0% SB
East Columbus Avenue, between Bliss and Howard	10,962	809	7.4%	100.0% NB
Main Street, north of Howard Street	13,456	1,031	7.7%	50.6% SB
State Street, between East Columbus and Main Street	10,937	895	8.2%	66.1% WB
Union Street, between East Columbus and Main Street	10,755	840	7.8%	57.9% EB

^aDaily traffic expressed in vehicles per day.

^bExpressed in vehicles per hour.

^cPercent of daily traffic volumes which occurs during the peak hour.

^dPercent of peak-hour volume in the predominant direction of travel.

NB = northbound, SB = southbound, EB = eastbound, WB = westbound

Table 2. Existing Saturday Traffic Volume Summary

ATR Location	Saturday ADT ^a	Saturday Midday Peak Hour			Saturday Evening Peak Hour		
		Traffic Volume ^b	K Factor ^c	Directional Distribution ^d	Traffic Volume ^b	K Factor ^c	Directional Distribution ^d
West Columbus Avenue, between Bliss and Howard	5,197	487	9.4%	100.0% SB	491	9.4%	100.0% SB
East Columbus Avenue, between Bliss and Howard	5,890	501	8.5%	100.0% NB	377	6.4%	100.0% NB
Main Street, north of Howard Street	10,324	743	7.2%	51.0% NB	754	7.3%	50.7% NB
State Street, between East Columbus and Main Street	7,684	525	6.8%	63.8% WB	565	7.4%	65.7% WB
Union Street, between East Columbus and Main Street	6,857	482	7.0%	66.0% EB	494	7.2%	65.2% EB

^aDaily traffic expressed in vehicles per day.

^bExpressed in vehicles per hour.

^cPercent of daily traffic volumes which occurs during the peak hour.

^dPercent of peak-hour volume in the predominant direction of travel.

NB = northbound, SB = southbound, EB = eastbound, WB = westbound

Regional Average Daily Traffic

In order to supplement to the localized TMCs and ATR counts, TEC researched average daily traffic (ADT) data for locations along targeted major access roadways in the vicinity of Springfield to evaluate the potential increase in traffic volumes as a result of the proposed resort development. The review of historic traffic volume counts was conducted using the most recent published MassDOT temporary count station data for locations along Interstate 291 in Springfield, along Interstate 391 in Chicopee, along Route 57 in Agawam, and along Interstate 91 in West Springfield, Chicopee, Springfield, and Longmeadow. Table 3 presents a summary of ADT for these several locations.

Table 3. Average Daily Traffic Volume Summary

Roadway	Station	Location	City/Town	2006	2007	2008	2009
I-291	#2251	at Chicopee C.L.	Springfield	-	46,423	45,892	45,641
I-291	#2247	east of Chestnut St.	Springfield		93,800	86,700	83,300
I-391	#0033	south of Mass Pike	Chicopee	43,516	44,390	44,491	44,213
Rt 57	#2201	West of US Route 5	Agawam	37,300	39,000	38,600	36,800
I-91	#2258	Connecticut River	W. Springfield	77,600	83,100	-	73,000
I-91	#2257	at Springfield C.L.	Chicopee	-	-	103,700	-
I-91	#2255	North of I-291	Springfield	92,800	-	-	90,500
I-91	#0026	South of Springfield C.L.	Longmeadow	72,100	-	-	72,150

Table 3 shows that the average daily traffic along the major access roadways in the vicinity of Springfield have been slightly decreasing over the past few years. The data used to support the table above is provided within Appendix C

SEASONAL ADJUSTMENT

In accordance with MassDOT standards, traffic volumes are typically adjusted to average-month conditions. Based on a review of historic traffic volume counts collected by MassDOT at permanent count stations along Route 291 in Springfield^{1,2}, and along Route 5 in West Springfield³, traffic volumes in August are 3.6 percent higher than average-month conditions while traffic volumes in November are 2.9 percent lower than average-month conditions. Therefore, the November 2012 traffic counts were increased by 2.9 percent and the August 2012 traffic counts were unadjusted to reflect a conservative (worse case) analysis scenario. The resulting 2012 Existing Friday evening and Saturday evening peak hour traffic volume networks are illustrated in Figure 2. The MassDOT seasonal adjustment data is provided in Appendix D.

¹ MassDOT Permanent Count Station 31 – Springfield – Interstate 291 – south of Roosevelt Avenue

² MassDOT Permanent Count Station 2251 – Springfield – Interstate 291 – at Chicopee City Line

³ MassDOT Permanent Count Station 280 – West Springfield – Route 5 – at Holyoke City Line

III. Future Conditions

Traffic volumes in the study area were projected to the year 2022, which reflects a ten-year planning horizon in accordance with MassDOT guidelines for major projects. The traffic conditions for the year 2022, under No-Build conditions, were developed to document the operating conditions independent of the proposed project, including all existing traffic and new traffic resulting from background growth. Anticipated site-generated traffic volumes for the proposed casino resort and Armory Square were superimposed upon the No-Build traffic networks to reflect the Build conditions with the proposed project.

BACKGROUND TRAFFIC GROWTH

Traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. Traffic engineers frequently employ an annual ambient increase in traffic growth, which is applied to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

For the purposes of this due diligence effort, only general background was considered to assess future traffic volume projections. An analysis of traffic volume projections related to specific developments by others will be assessed in the subsequent traffic impact study. At this time, TEC is not aware of any other downtown projects, except for a potentially competing casino site, that are expected to contribute measureable amounts of traffic at the study area intersections.

General Background Growth

Traffic volume data compiled by MassDOT from several temporary count stations in Springfield were reviewed in order to determine traffic growth trends. Based on the MassDOT traffic volume data, traffic volumes in the area have been decreasing at a rate of 0.9 percent per year since 2000. In order to provide a conservative (worse case) analysis scenario, a 0.5 percent per year compounded annual background traffic growth rate was used to account for potential future traffic growth external to the study area and presently unforeseen development. As the project is located in downtown Springfield, a central business district, the use of a lower growth rate is appropriate. The data used to support the ambient traffic growth projections is provided in Appendix E.

Other Background Infrastructure Projects

The Massachusetts Department of Transportation (MassDOT) has jurisdiction over the major Interstate and State highways that traverse and provide access to the City of Springfield. Several new regional transportation projects are in the planning or design phases and should be considered as part of the

future efficiency or safety of the highway network. The following major projects have been identified based on early coordination with MassDOT officials:

I-91 Intelligent Transportation System (ITS) Improvements

MassDOT is implementing various phases of ITS improvements that involve new variable message signs, data sampling, monitoring cameras, and traveler information. TEC will be coordinating with MassDOT over the coming months to understand the timing of the ITS improvements along I-91 and I-291 and investigate the opportunities to use them for traffic management activities for the casino complex. Various elements of this project will be constructed independent of any casino project in Springfield.

Routes 5 / 57 Interchange Improvements

TEC understands that MassDOT is currently working with a consultant team to design new ramp improvements between I-91 and the westerly side of the river. Under existing conditions, there are queues that develop due to the weave of traffic on the approach to the Route 5/57 rotary. The currently proposed design will significantly modify the existing rotary, reduce the number of traffic conflict points and weaving movements, and add signalization. These improvements, which are approaching the 25% level of design, are expected to improve flow on I-91 southbound by reducing the congestion that occurs during the weekday evening peak hour. This regional improvement to traffic flow is programmed as a long-term improvement that will be advanced independent of any proposed casino project.

Interstate 91 (I-91) Corridor Study (Exits 1 to 5)

Based on discussions with MassDOT staff, an older corridor study for the southerly portion of I-91 is being updated to assess future highway needs. This planning work will be coordinated with the final design for the Routes 5/57 interchange, and is being commissioned separately from the casino proposals.

I-91 Viaduct

MassDOT officials recently met with City of Springfield officials to outline the considerations for future improvements to the highway viaduct (raised highway structure) as it passes through downtown Springfield. The State has identified the need to rehabilitate the viaduct structure, but will soon be evaluating the opportunities for alternate horizontal and vertical alignments to make the connections to I-291 and the local street network. This regional-scale improvement to traffic flow is programmed as a long-term improvement that will be advanced independent of any proposed casino project.

Occupancy of Berkshire Bank Property

The Berkshire Bank Development located at 1259 East Columbus Avenue (between Union and Howard Streets) was recently developed and is currently occupied by Berkshire Bank. Additional office and retail space is un-occupied on the existing parcel. To account for vehicle trips that could be generated by the full-occupancy of the retail and office space, TEC estimated vehicle trips using standard trip generation rates published in the Institute of Transportation Engineers publication *Trip Generation, 8th Edition* for Land Use Code (LUC) 710 – General Office Space and LUC 826 – Specialty Retail Center.

Trips associated with the full re-occupancy of the Berkshire Bank property are illustrated in Exhibit F.1, which is provided in Appendix F.

NO-BUILD TRAFFIC VOLUMES

The 2022 No-Build Friday evening and Saturday evening peak-hour traffic volume networks were developed by applying the 0.5 percent per year compounded annual background traffic growth rate to the 2012 Existing peak hour traffic volumes over the 10-year design and adding in traffic to be generated by the full-occupancy of the Berkshire Bank Development. The resulting 2022 No-Build Friday evening and Saturday midday peak-hour traffic volume networks are illustrated in Figure 3.

SITE ACCESS SUMMARY

The site has been designed to safely and efficiently process the patron, vendor, and employee traffic in a way that takes advantage of the redundant ramp access from I-91 and the important connections to downtown streets. The following is a brief list of the major elements of site access:

Patron & Employee Car Traffic (See Figure 4 for a graphical depiction)

- Patrons will access the casino, hotel, and retail parking facility from State Street and East Columbus Avenue.
 - I-91 Southbound traffic will be directed to use the Exit 7 off-ramp, turn left onto State Street, and right into the site.
 - I-91 Northbound traffic will be directed to use the Exit 6 off-ramp to East Columbus Avenue, and turn right onto Bliss Street.
 - I-291 Southbound traffic will be directed to use either Exit 2 to Dwight Street or the I-91 Exit 6 off-ramp to Union Street.
- The primary access point for the self-park garage will be located along Bliss Street and will be served by both East Columbus Avenue and State Street.
- The egress points are located along Union Street, Howard Street, State Street, and Bliss Street which distributes the impacts of the exiting traffic.
- The secondary access and egress point for the valet parking area, the pick-up/drop-off zone, and the hotel will be located along Bliss Street, just beyond the self-park access point.
- Patrons exiting the facility and destined for points to the south along I-91 have the option to use State Street to access West Columbus Avenue. They will also have the ability to exit the parking facility and turn right onto Union Street (westbound only), proceed under the I-91 bridge, and turn left onto the I-91 southbound on-ramp.
- Two small surface lots are provided adjacent to the Armory Retail facility. Some of this parking will be used by existing landowners and as part of short-term visits or drop-off and pick-up activities associated with the retail and restaurant tenants. It is expected that access to these lots will be managed by facility staff. As this area has a very limited parking supply, TEC distributed a very low number of patron vehicle trips to Union Street.

Bus & Delivery Truck Access (See Figure 5)

- The delivery area for trucks and the bus parking will be accommodated in a new access point along Union Street. An exclusive left-turn lane has been provided on Union Street to efficiently accommodate the heavy vehicles turning into the facility. The deliveries and bus traffic are expected to occur principally outside the traditional peak hours for the adjacent streets.

Pedestrian, Shuttle, & Trolley Access (See Figure 6)

- A significant majority of the pedestrian trips are expected along the Main Street corridor as patrons visit other establishments in the downtown. The traffic signals along Main Street have exclusive pedestrian phasing that allows pedestrians to enter the intersection while motor vehicle traffic is stopped.
- Other pedestrian and bicycle connections will be made to the Connecticut Riverwalk and Bikeway, the Basketball Hall of Fame, and other parks along the Connecticut River.
- Once the new parking garage is completed, the employees and visitors to the District Courthouse will be permitted to use the MGM parking facility and walk across State Street as they do today. The conceptual design of off-site improvements includes the creation of a median refuge island that will enable pedestrians to cross one lane of State Street at a time.

Site Generated Traffic

The project consists of the following floor areas and uses:

- ±592,700 SF casino resort that includes space for back of the house (BOH), retail / restaurant uses, and banquet / function facilities in addition to the gaming space, of which 432,700 SF is active employee, patron, and guest space
- 294-room multi-story hotel
- 54 residential apartment units
- 4,800-stall multi-story parking garage
- ±140,000 SF retail and entertainment center known as Armory Square which will include multiple retail tenants, restaurants, a small event plaza, a multi-screen cinema, and a bowling alley.

The methodology utilized to calculate the proposed trip generation is described below.

Trip Generation Methodology

In order to estimate the trips generated by the proposed casino and hotel and the adjacent Armory Square retail and entertainment center, TEC first estimated the trips that would be generated by each use separately and then assumed a shared-trip credit between each use. A detailed description of the methodology is provided below.

Casino Trips

TEC reviewed a number of sources to estimate the trip generation of the casino / retail / restaurant / banquet facilities contained within the proposed casino area. These sources included trip generation data from multiple other casinos, such as:

- Mohegan Sun and Foxwoods, Connecticut
- Tulalip Tribal Casino, Muckleshoot Indian Tribe Casino, Emerald Queen Casino, Washington
- Spirit Mountain Casino and Chinook Winds Casino, Oregon
- Jamul Indian Village Casino and Enterprise Rancheria Casino-Hotel, California
- Harvey's Casino, Ameristar Casino, and Bluffs Run Casino, Iowa
- Casino Queen, Illinois
- St. Charles Casino, Missouri

The Mohegan Sun site was determined to be the most analogous to the proposed Springfield casino in terms on location, size, and other amenities provided such as retail, restaurants, hotel, and convention center. TEC obtained trip rates for the Mohegan Sun resort-casino utilizing the *Project First Light Transportation Study* prepared by Howard/Stein-Hudson in May 2012 for a proposed resort-casino by the Mashpee Wampanoag tribe in Taunton, Massachusetts. The background studies and data are provided in Appendix G.

The trip rates were based on the number of patrons and the number of employees entering and exiting the resort-casino during each hour of the day. Trip rates per 1,000 SF of active floor area for both patrons and employees were tabulated within the May 2012 study. All of the trips generated by the casino were considered to be “new” trips. The retail and convention floor area that was included in these calculations consisted of only the retail, restaurant, and convention space that is enclosed within the proposed casino area. This did not include the retail and restaurant space proposed within “Armory Square” or trips associated with the proposed hotel.

The trip rate is applied to the entire active floor area for the casino (432,700 SF) that is used by employees, patrons, and guests. Although the “back of the house” floor area is more closely associated with employee and vendor vehicle trips, TEC included this active square footage to present an analysis that is consistent with other current permitting documents for casinos in Massachusetts. The remaining 160,000 SF of basement storage and utility “plant” space was excluded from the calculations as these areas are not part of the active trip-generating portion of the floor area. Based on other record data from Mohegan Sun, the employee trips account for approximately 10 percent of the total trip generation for a casino use.

Hotel Trips

For the hotel portion of the site, TEC estimated the site-generated trips using standard trip rates published in the (ITE publication *Trip Generation, 8th Edition* for LUC 310 – Hotel based on 294 rooms within the hotel. TEC anticipates that the majority of the patrons staying at the hotel will also utilize the casino or other retail and restaurants on the site. As such, TEC assumed an 80 percent shared-trip credit between the hotel and the casino. This methodology is consistent with that used by Howard/Stein-Hudson in the May 2012 traffic study for Project First Light in Taunton, Massachusetts.

Residential Trips

The plans call for 54 units of residential apartment space. TEC estimated the site-generated trips using standard trip rates published in the ITE publication *Trip Generation, 8th Edition* for LUC 220 – Apartment. TEC anticipates that these non-casino based trips to/from residential uses will have access to the general parking garage structure. No shared-trip credit was taken between casino and residential trips.

Armory Square Trips

For the retail, restaurant, and entertainment space that is included within Armory Square, TEC estimated the site-generated trips using standard ITE trip generation rates for LUC 820 (Shopping Center) based on 165,000 SF of gross floor area. However, since the time of TEC’s detailed analysis, the development program for the Armory has been reduced to 140,000 SF. Therefore, the enclosed analysis presents a conservative assessment of the traffic impacts. TEC anticipates that some local

residents will shop and dine at Armory Square as many of the shops and restaurants share Main Street and Union Street frontage, but a large portion of the trips will be shared with the casino and hotel. TEC assumed a 40 percent shared-trip credit between the casino and Armory Square.

Pass-by Trips (for Armory Square only)

Many of the retail and restaurant trips associated with the Armory Square shopping and entertainment center are already present in the existing traffic flow passing by the Project Area. For example, some vehicles that are already on the roadways may decide to visit a retail shop on their way to another destination. These vehicle trips are known as “pass-by” trips and are subtracted from the total trips to calculate the total primary (or “new”) trips that affect the volume of traffic within the study area away from the Project Area. Based on information contained in the ITE publication *Trip Generation Handbook, 2nd Edition*, approximately 26 to 34 percent of the traffic generated by retail uses typically represents pass-by traffic. The retail land uses proposed within Armory Square contain a cinema and bowling alley, which typically experience lower pass-by percentages. In order to provide a conservative (worst case) analysis scenario based on a lower expectation of pass-by trip usage, only 10 percent of the Project-generated traffic from retail uses was assumed to be pass-by trips.

Trip Generation Estimate

Table 4 on the following page provides a summary of the trips generated by the proposed development for the Full Build scenario. In order to provide a conservative analysis scenario, no credit was taken for trips generated by other existing land uses on the site. Due to the sites proximity to bus transit services, TEC applied a 5-percent transit trip credit for all land uses.

As shown in Table 4, the proposed casino resort development and Armory Square retail is anticipated to generate approximately 1,677 new vehicle trips (891 entering and 786 exiting) during the Friday evening peak hour and approximately 1,718 vehicle trips (992 entering and 726 exiting) during the Saturday evening peak hour.

Trip Generation Comparison

MGM provided TEC with trip generation information from another MGM casino in Detroit, Michigan within a memorandum entitled *MGM Springfield Visitation Analysis, Performed for use in Traffic Study* dated November 2012. A copy of this memorandum is included an Appendix H. This document provides daily footfall (entering walk-in patron traffic) information collected at entry points into the facility for each hour of each day of the year. The information is compiled to provide average footfall information for each day of the week, which has been separated by number of patrons and number of employees. The footfall information is then converted to number of vehicle trips based on percentages of patrons and employees traveling by car, taxi, charter bus, public transportation, or walking. The MGM data includes only arrivals to the facility and does not account for trips leaving the facility.

Based on the data and information provided by MGM, which indicated that the average employee shift is approximately 8 hours and the average patron stay in the casino is 3 to 4 hours, TEC estimated departing trips for employees based on arrivals 8 hours prior to the designated time period and estimated departing trips for patrons based on arrivals 3 hours prior to the designated time period. TEC’s detailed trip generation calculations using information from MGM’s Detroit casino are included in Appendix H.

Table 4. Trip Generation Summary

Time Period	Casino Trips	Hotel Trips	Armory Square Trips	Resident Trips	Total Trips	Multi-use Trips	5% Transit Trips	Pass-by Trips	New Primary Trips
Friday Evening									
Entering	902	92	436	30	1,460	495	49	25	891
<u>Exiting</u>	<u>799</u>	<u>81</u>	<u>454</u>	<u>16</u>	<u>1,350</u>	<u>495</u>	<u>44</u>	<u>25</u>	<u>786</u>
Total	1,701	173	890	46	2,810	990	93	50	1,677
Saturday Evening									
Entering	967	116	617	21	1,721	641	54	34	992
<u>Exiting</u>	<u>760</u>	<u>91</u>	<u>570</u>	<u>20</u>	<u>1,441</u>	<u>641</u>	<u>40</u>	<u>34</u>	<u>726</u>
Total	1,727	207	1,187	41	3,162	1,282	94	68	1,718

Table 5 shows a comparison of the trip generation estimate using the data provided from MGM’s Detroit casino versus the data included in TEC’s estimate of the trip generation using data from Mohegan Sun for the Springfield site. As shown in the table, the Friday and Saturday daily trip generation estimate using data from Mohegan Sun combined with ITE data is within 3 percent of the estimate using data provided by MGM for its Detroit casino. The Friday and Saturday evening peak hour trip generation estimate using Mohegan Sun data is 13 to 15 percent higher than the estimate using data provided by MGM for its Detroit casino. This provides another verification of the accuracy and applicability of the data used in TEC’s estimate, and suggests that TEC’s original estimate may be conservative.

Table 5. Trip Estimate Comparison (MGM Detroit vs. Mohegan Sun Data)

Time Period	MGM Data (from MGM Detroit Casino) ^a	TEC Calculation (Mohegan Sun Data) ^b	Net Difference
Friday Daily	26,006 vpd	26,577 vpd	+571 vpd
Friday Evening Peak Hour	1,586 vph	1,820 vph	+234 vph
Saturday Daily	30,724 vpd	29,798 vpd	-926 vpd
Saturday Evening Peak Hour	2,164 vph	1,880 vph	-284 vph

^aBased on hourly footfall information from MGM’s Detroit Casino provided in memorandum dated November 2012.

^bTotal trips minus multi-use trips from Table 4. Trip Generation Summary.

TRIP DISTRIBUTION

Casino / Hotel Employees

Directional distribution of employee trips to and from the proposed casino and hotel was based on US Census Journey-to-Work information for employees working in the City of Springfield. The detailed journey-to-work model is provided in Appendix I and the resulting trip distribution percentages are graphically depicted in Figure 7.

Casino / Hotel Patrons

Directional distribution of patron trips to and from the proposed casino and hotel was based on a gravity model using US Census 2010 population data for municipalities within a 2-hour driving radius of the proposed development. The detailed gravity model is provided in Appendix I and the resulting trip distribution percentages are graphically depicted in Figure 8.

In addition, MGM Resorts prepared an economic gravity model, which estimated that approximately 55 percent of the regional casino and hotel traffic is expected to/from the north along I-91 and I-291, and 45 percent is expected to/from the south along I-91. MGM’s economic gravity model was compared to the gravity model prepared using US Census population information to verify the validity of the model. As a comparison, TEC’s independent gravity model estimates that approximately 50 percent of casino and hotel traffic will be directed to/from the north along I-91 and I-291, approximately 40 percent will be directed to/from the south along I-91, and 10 percent will utilize local roadways. This model is consistent with the economic gravity model prepared by MGM.

Armory Square Retail Trips

Directional distribution of patron trips to and from the Armory Square retail was based on a gravity model using US Census 2010 population data for municipalities within a 20-mile driving radius of the proposed development. Adjustments were applied for travel time and presence of competing opportunities. The detailed gravity model is provided in Appendix I and the resulting trip distribution percentages are graphically depicted in Figure 9. As mentioned previously, the retail trips were conservatively prepared because the Armory Square portion of the development has been adjusted from 165,000 SF to 140,000 SF since the preparation of the detailed trip generation and capacity analyses.

Residential Trips

Based on US Census Journey-to-Work information, approximately 50 percent of City of Springfield's work-force also resides in the City. Therefore, 50 percent of the residents living within the proposed development were assumed to work outside the City and 50 percent were assumed to work within the City. Due to ease of access to I-91 and I-291, it was assumed that the majority of residents working outside Springfield and approximately half of residents working within Springfield would utilize I-91 and I-291 to travel to/from work. Therefore, approximately 75 percent of residential trips were assumed to/from I-91 and I-291, while the remaining 25 percent of residential trips were assumed to utilize local roadways. The directional distribution of residential trips was based on existing travel patterns in the area, location of major office / commercial centers, and anticipated travel routes.

Trip Distribution Summary

The resulting trip distribution by land use for the proposed development is summarized in Table 6. The site-generated traffic volume networks for each land use are presented in Appendix I. The resulting site-generated traffic-volume networks for Friday evening and Saturday midday peak hours are shown in Figures 10 and 11, respectively.

Table 6. Trip Distribution Summary

Origin/Destination	Casino / Hotel Employees	Casino / Hotel Patrons	Armory Square Retail	Residential
Interstate 91 to/from North	15%	32%	10%	10%
Interstate 291 to/from North	35%	20%	25%	31%
Interstate 91 to/from South	15%	36%	30%	34%
State Street to/from East	10%	2%	10%	1%
Main Street to/from North	5%	2%	5%	10%
Main St / Maple St to/from South	10%	3%	10%	14%
E./W. Columbus Ave to/from South	5%	3%	5%	---
<u>E./W. Columbus Ave to/from North</u>	<u>5%</u>	<u>2%</u>	<u>5%</u>	<u>---</u>
TOTAL	100%	100%	100%	100%

The regional scale distribution of trips is depicted in Figures 12 and 13 for the entering and exiting trips, respectively.

REDISTRIBUTED TRAFFIC (CLOSURE OF HOWARD AND BLISS STREETS)

As part of the proposed resort development project, both Howard and Bliss Streets will be closed to through traffic. The west end of Howard will remain open with full excess/egress to the Berkshire Bank property and will serve as a primary exit to the resort's multi-story parking structure. The eastern end of Howard Street will be converted to the Armory Square retail development's northerly driveway and maintain access to the Red Rose Pizzeria parking. The western end of Bliss Street is proposed to be widened and converted to the primary entrance to the resort. It will provide access to the parking structure, valet parking, and the hotel pick-up / drop-off area and allow connection directly to State Street. The eastern end of Bliss Street will be eliminated.

In order to provide a conservative (worst case) analysis scenario of the site driveway operations, TEC has assumed that all traffic currently parking in the for-fee surface parking lots and utilizing the Howard Street and Bliss Street on-street parking will utilize on-site parking spaces within the multi-story garage. Most of the existing trips accessing the for-fee parking lots are associated with the nearby courthouse. Therefore, trips accessing and egressing the site for this purpose were reassigned to enter the zone via Bliss Street along East Columbus Avenue and to exit via either Howard or Bliss Street along East Columbus Avenue or exit via the Northerly resort driveway via State Street. The redistribution of "Surface Parking" traffic volumes associated with the closing of for-fee surface parking lots is shown in Figure J-1 of Appendix J.

As part of the proposed resort development project, the existing Red Rose Pizzeria, the Berkshire Bank property, and the smaller for-fee surface lots near the State Street and East Columbus Avenue intersection will be remaining. TEC estimated the trips that are currently being generated by these developments and re-assigned their trip routes to access the developments by their future access and egress points. The redistribution of "Existing to Remain" traffic volumes associated with the closing of Howard and Bliss Streets is shown in Figure J-2 and J-3 of Appendix J for the Berkshire Bank property and Red Rose Pizzeria, respectively.

As Howard and Bliss Streets will no longer allow through movements from East Columbus Avenue to Main Street, cut-through traffic was removed from these surface roadways and redistributed to the most likely routes along State Street, Union Street and alternative cut-through streets between East Columbus Avenue and Main Street both north of State Street and south of Union Street. In addition, a small percentage of trips will divert from Union Street to State Street in conjunction with the addition of multiple resort driveways along Union Street. The redistribution of "Cut-Through Traffic" traffic volumes is shown in Figure J-4 of Appendix J. The Net Redistributed Trips traffic volume networks were obtained by combining the trips associated with the closing the for-fee surface parking lots, the redistribution of remaining trips for the Red Rose Pizzeria and Berkshire bank development, and the diversion of cut-through traffic. The resulting Net Redistributed Trips traffic-volume networks are shown in Figure 14.

BUILD TRAFFIC VOLUMES

The 2022 Build condition traffic volume networks consist of the 2022 No-Build traffic volumes with the addition of the redistributed traffic volumes resulting from the removal of Howard and Bliss Streets and the addition of the anticipated site-generated traffic. The resulting 2022 Build weekday evening and Saturday midday peak-hour traffic volume networks are presented in Figure 15.

IV. Traffic Operations Analysis

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity and vehicle queue analyses were conducted under Existing, No-Build, and Build traffic volume conditions at the four study area intersections along West and East Columbus Avenue. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

METHODOLOGY

Levels of Service

The capacity analysis was performed using the Synchro 7.0 intersection capacity analysis software which is also based upon the methodology and procedures presented in the 2000 HCM. A primary result of capacity analyses is the assignment of level-of-service to traffic facilities under various traffic-flow conditions.⁴ The concept of level-of-service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing the worst. Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

Queue Length Analysis

Vehicle queue analyses are a direct measurement of an intersections ability to process vehicles under various traffic control and volume scenarios and lane use arrangements.

The signalized intersection vehicle queue analysis was performed using the Synchro 7.0 intersection capacity analysis software which is also based upon the methodology and procedures presented in the 2000 HCM. Synchro reports both the 50th (average) and 95th percentile vehicle queues, which are based on the number of vehicles that experience a delay of six seconds or more at an intersection and is a function of the traffic signal timing; vehicle arrival patterns during the analysis period; and the saturation flow rate. The 50th percentile or average vehicle queue is the average number of vehicles that are projected to be delayed by six seconds or more at the intersection under study during the analysis period. The 95th percentile vehicle queue is the vehicle queue length that will be exceeded only 5 percent of the time; or approximately three minutes out of sixty minutes during the peak one hour of the day. During the remaining fifty-seven minutes, the vehicle queue length will be less than the 95th percentile queue length.

⁴The capacity analysis methodology is based on the concepts and procedures presented in the Highway Capacity Manual 2000; Transportation Research Board; Washington, DC; 2000.

UNSIGNALIZED INTERSECTIONS

The six levels of service for unsignalized intersections may be described as follows:

- LOS A represents a condition with little or no control delay to minor street traffic.
- LOS B represents a condition with short control delays to minor street traffic.
- LOS C represents a condition with average control delays to minor street traffic.
- LOS D represents a condition with long control delays to minor street traffic.
- LOS E represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- LOS F represents a condition where minor street demand volume exceeds capacity of an approach lane, with excessive control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the *2000 Highway Capacity Manual*. Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the *2000 Highway Capacity Manual 2000*. Table 7 below summarizes the relationship between level of service and average control delay.

Table 7. Level-of-Service Criteria for Unsignalized Intersections^a

Level of Service	Average Control Delay (seconds per vehicle)
A	≤ 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	>50.0

^aSource: *Highway Capacity Manual 2000*; Transportation Research Board; Washington, DC; 2000; page 17-2.

Unsignalized Intersection Capacity and Queue Analysis Results

Level-of-service analyses were conducted for 2012 Existing, 2022 No-Build, and 2022 Build conditions for the unsignalized intersections within the study area. The results of the unsignalized intersection capacity analysis are summarized in Table 8. The capacity analysis worksheets are provided in Attachment K.

Table 8. Unsignalized Intersection Capacity and Queue Analysis Summary

Overall Intersection Results	2012 Existing				2022 No-Build				2022 Build No Improvements				2022 Build With Improvements			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d
Union Street / Southerly Parking Garage Exit																
<i>Weekday Evening</i>																
Garage Exit SB RT	-	-	-	-	-	-	-	-	0.34	15.3	C	37	0.24	11.4	B	<25
<i>Saturday Evening</i>																
Garage Exit SB RT	-	-	-	-	-	-	-	-	0.23	12.3	B	<25	0.23	12.3	B	<25
Union Street / Armory Square Westerly Driveway																
<i>Weekday Evening</i>																
Union Street EB approach	-	-	-	-	-	-	-	-	0.05	1.2	A	<25	0.05	1.2	A	<25
Armory Square SB approach	-	-	-	-	-	-	-	-	0.12	12.4	B	<25	0.11	12.4	B	<25
<i>Saturday Evening</i>																
Union Street EB approach	-	-	-	-	-	-	-	-	0.06	1.7	A	<25	0.06	1.7	A	<25
Armory Square SB approach	-	-	-	-	-	-	-	-	0.12	11.1	B	<25	0.12	11.1	B	<25
Union Street / Armory Square Easterly Driveway																
<i>Weekday Evening</i>																
Union Street EB approach	-	-	-	-	-	-	-	-	0.04	1.2	A	<25	0.04	1.2	A	<25
Armory Square SB approach	-	-	-	-	-	-	-	-	0.10	11.4	B	<25	0.10	11.4	B	<25
<i>Saturday Evening</i>																
Union Street EB approach	-	-	-	-	-	-	-	-	0.05	1.8	A	<25	0.05	1.8	A	<25
Armory Square SB approach	-	-	-	-	-	-	-	-	0.10	10.3	B	<25	0.10	10.2	B	<25
East Columbus Avenue / Howard Street																
<i>Weekday Evening</i>																
Howard Street WB RT	0.16	9.9	A	<25	0.17	10.0	B	<25	0.39	12.5	B	46	0.36	11.6	B	41
<i>Saturday Evening</i>																
Howard Street WB RT	0.11	9.4	A	<25	0.11	9.4	A	<25	0.32	11.4	B	34	0.30	11.1	B	32
Main Street / Howard Street																
<i>Weekday Evening</i>																
Howard Street EB approach	0.17	15.6	C	<25	0.21	16.7	C	<25	0.39	22.7	C	45	0.39	22.6	C	45
Main Street NB approach	0.05	1.7	A	<25	0.06	1.8	A	<25	0.05	1.4	A	<25	0.05	1.4	A	<25
<i>Saturday Evening</i>																
Howard Street EB approach	0.38	18.3	C	44	0.43	19.7	C	52	0.52	31.8	D	70	0.79	53.0	F	153
Main Street NB approach	0.04	0.04	A	<25	0.04	1.7	A	<25	0.05	1.8	A	<25	0.05	1.8	A	<25
East Columbus Avenue / Bliss Street																
<i>Weekday Evening</i>																
Bliss Street WB RT	0.30	12.1	B	32	0.32	12.3	B	34	0.65	25.0	C	115	0.63	23.6	C	109
<i>Saturday Evening</i>																
Bliss Street WB RT	0.04	10.1	B	<25	0.04	10.1	B	<25	0.32	17.2	C	34	0.22	12.3	B	<25

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level of service

^d 50th Percentile Queue Length (feet)

Table 8 Continued. Unsignalized Intersection Capacity and Queue Analysis Summary

Overall Intersection Results	2012 Existing				2022 No-Build				2022 Build No Improvements				2022 Build With Improvements			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d
Main Street / Bliss Street																
<i>Weekday Evening</i>																
Bliss Street EB approach	0.24	16.4	C	<25	0.25	17.1	C	25	-	-	-	-	-	-	-	-
Main Street NB approach	0.05	1.4	A	<25	0.05	1.5	A	<25	-	-	-	-	-	-	-	-
<i>Saturday Evening</i>																
Bliss Street EB approach	0.07	12.8	B	<25	0.08	13.1	B	<25	-	-	-	-	-	-	-	-
Main Street NB approach	0.02	0.7	A	<25	0.02	0.7	A	<25	-	-	-	-	-	-	-	-
State Street / Northerly Resort Driveway																
<i>Weekday Evening</i>																
State Street WB approach	-	-	-	-	-	-	-	-	0.14	3.5	A	<25	0.14	9.4	A	<25
Resort Driveway NB approach	-	-	-	-	-	-	-	-	0.76	52.7	F	138	0.78	56.8	F	145
<i>Saturday Evening</i>																
State Street WB approach	-	-	-	-	-	-	-	-	0.13	3.4	A	<25	0.13	8.9	A	<25
Resort Driveway NB approach	-	-	-	-	-	-	-	-	0.39	18.9	C	45	0.39	18.6	C	45
Union Street / Charter Bus Driveway																
<i>Weekday Evening</i>																
Union Street EB approach	-	-	-	-	-	-	-	-	0.02	0.5	A	<25	0.02	10.2	B	<25
Bus Driveway SB approach	-	-	-	-	-	-	-	-	0.02	13.6	B	<25	0.02	13.5	B	<25
<i>Saturday Evening</i>																
Union Street EB approach	-	-	-	-	-	-	-	-	0.02	0.5	A	<25	0.02	9.5	A	<25
Bus Driveway SB approach	-	-	-	-	-	-	-	-	0.01	12.1	B	<25	0.01	12.1	B	<25

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level of service

^d 50th Percentile Queue Length (feet)

Summary of Unsignalized Intersection Capacity Analysis Results

Main Street / Howard Street (Proposed Armory Square Northerly Driveway)

Traffic on the Armory Square Northerly Driveway eastbound approach to this intersection is anticipated to experience long delays and queues under 2022 Build with Improvement conditions during the Saturday evening peak periods. However, the volume-to-capacity (V/C) ratio will be significantly below 1.00 indicating there will be adequate capacity to accommodate the anticipated traffic volume. As the approach is a site driveway and no significant delays or queues occur along Main Street at this location, no improvements to the site driveway are proposed.

State Street / Northerly Resort Driveway

Traffic on the Northerly Resort Driveway northbound approach to this intersection is anticipated to experience long delays and queues under 2022 Build and Build with Improvement conditions during the Friday evening peak periods. However, the (V/C) ratio will be significantly below 1.00 indicating there will be adequate capacity to accommodate the anticipated traffic volume. As the approach is a site driveway and no significant delays or queues occur along State Street at this location, no improvements to the site driveway are proposed. MGM will consider police details at this intersection during peak traffic and peak casino periods to alleviate potential traffic congestion. This intersection is not expected to warrant a traffic signal as traffic has the option to exit via Bliss Street.

Other Intersections

All movements at all other unsignalized study area intersections are anticipated to operate at acceptable levels of service (LOS C or better) under 2022 Build and Build with Improvement. In addition, volume-to-capacity (v/c) ratios will be below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes.

SIGNALIZED INTERSECTIONS

The six Levels of Service (LOS) for signalized intersections may be described as follows:

- LOS A describes operations with very low control delay; most vehicles do not stop at all.
- LOS B describes operations with relatively low control delay. However, more vehicles stop than LOS A.
- LOS C describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- LOS D describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable, whereby motorists are not able to get through the signal on one cycle.
- LOS E describes operations with high control delay values. Individual cycle failures are frequent occurrences.
- LOS F describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

LOS for signalized intersections is calculated using the operational analysis methodology of the 2000 Highway Capacity Manual. This method assesses the effects of signal type, timing, phasing, and

progression; vehicle mix; and geometrics on delay. LOS designations are based on the criterion of control or signal delay per vehicle. Control or signal delay can be related to driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. Table 6 summarizes the relationship between LOS and control delay. The tabulated control delay criterion may be applied in assigning LOS designations to individual lane groups, to individual intersection approaches, or to entire intersections.

Table 9. Level-of-Service Criteria for Signalized Intersections^a

Level of Service	Average Control (Signal) Delay (Seconds per Vehicle)
A	<10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	>80.0

^aSource: Highway Capacity Manual 2000; Transportation Research Board Washington, DC; 2000; page 16-2.

Signalized Intersection Capacity and Queue Analysis Results

Table 10 on the following page show the intersection capacity analysis summary for the signalized intersections within the study area during each peak period. The analysis includes a summary under 2012 Existing conditions as well as the 2022 No-Build and 2022 Build scenarios, and the 2022 Build scenario with the proposed geometric and signalization improvements.

Table 10. Signalized Intersection Capacity and Queue Analysis Summary

Overall Intersection Results	2012 Existing				2022 No-Build				2022 Build				2022 Build w/ Improvements			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d
Union Street / West Union Street / West Columbus Avenue																
<i>Weekday Evening</i>																
West Union Street EB approach	0.33	43.5	D	35/50	0.32	43.2	D	35/50	0.27	41.6	D	34/50	0.23	39.8	D	34/44
Union Street WB LT	0.53	36.4	D	93/158	0.57	37.0	D	98/167	0.94	64.0	E	177/212	0.63	37.9	D	165/251
Union Street WB LT/TH	0.53	36.4	D	93/158	0.56	37.0	D	98/166	0.92	61.3	E	175/208	0.62	37.6	D	162/247
West Columbus Avenue SB LT	0.43	18.0	B	154/322	0.46	18.3	B	165/339	0.64	18.9	B	248/502	0.68	18.9	B	276/447
West Columbus Avenue SB LT/TH/RT	0.52	22.8	C	238/382	0.55	23.3	C	254/401	0.64	16.6	B	277/469	0.68	11.8	B	279/119
Overall Intersection	0.50	24.5	C	-	0.53	24.9	C	-	0.66	26.2	C	-	0.60	18.6	B	-
<i>Saturday Evening</i>																
West Union Street EB approach	0.15	44.8	D	<25/28	0.14	44.7	D	<25/28	0.12	43.1	D	<25/28	0.08	40.3	D	<25/25
Union Street WB LT	0.39	34.3	C	64/88	0.41	34.3	C	67/90	0.69	45.9	D	128/195	0.46	36.7	D	115/195
Union Street WB LT/TH	0.39	34.2	C	65/89	0.41	34.4	C	68/92	0.69	45.9	D	128/195	0.46	36.7	D	115/195
West Columbus Avenue SB LT	0.22	12.6	B	48/184	0.23	12.8	B	53/189	0.34	14.8	B	104/255	0.36	15.4	B	108/230
West Columbus Avenue SB LT/TH/RT	0.22	14.0	B	38/186	0.23	14.4	B	46/198	0.34	17.1	B	124/262	0.36	14.9	B	77/220
Overall Intersection	0.25	18.5	B	-	0.26	18.8	B	-	0.39	23.9	C	-	0.36	20.5	C	-
Union Street / East Columbus Avenue																
<i>Weekday Evening</i>																
Union Street EB approach	0.60	18.9	B	43/199	0.65	20.2	C	44/222	<2.0	50.5	D	78/397	-	-	-	-
Union Street EB LT	-	-	-	-	-	-	-	-	-	-	-	-	0.54	14.8	B	28/55
Union Street EB TH	-	-	-	-	-	-	-	-	-	-	-	-	0.50	13.8	B	64/120
Union Street WB approach	0.62	32.2	C	184/397	0.66	33.5	C	197/427	1.11	104.7	F	412/804	-	-	-	-
Union Street WB TH	-	-	-	-	-	-	-	-	-	-	-	-	0.45	23.4	C	127/244
Union Street WB RT	-	-	-	-	-	-	-	-	-	-	-	-	0.45	23.7	C	98/208
East Columbus Avenue NB LT	0.57	21.5	C	178/209	0.60	21.8	C	190/226	0.57	20.5	C	177/224	0.52	16.8	B	186/227
East Columbus Avenue NB TH/RT	0.41	19.5	B	118/133	0.43	19.6	B	127/145	0.62	21.4	C	203/282	0.56	17.5	B	212/260
Overall Intersection	0.59	22.2	C	-	0.62	22.9	C	-	0.83	44.4	D	-	0.55	17.9	B	-
<i>Saturday Evening</i>																
Union Street EB approach	0.28	13.1	B	34/34	0.29	12.9	B	36/36	1.85	25.3	C	42/292	-	-	-	-
Union Street EB LT	-	-	-	-	-	-	-	-	-	-	-	-	0.36	12.0	B	26/27
Union Street EB TH	-	-	-	-	-	-	-	-	-	-	-	-	0.35	11.9	B	49/52
Union Street WB approach	0.29	25.3	C	69/158	0.31	25.2	C	74/167	0.75	36.6	D	242/542	-	-	-	-
Union Street WB TH	-	-	-	-	-	-	-	-	-	-	-	-	0.33	21.3	C	108/187
Union Street WB RT	-	-	-	-	-	-	-	-	-	-	-	-	0.29	20.9	C	71/142
East Columbus Avenue NB LT	0.43	19.6	B	137/137	0.46	20.2	C	146/146	0.44	20.3	C	131/139	0.39	16.0	B	137/158
East Columbus Avenue NB TH/RT	0.29	18.2	B	83/83	0.31	18.6	B	89/89	0.56	21.9	C	177/214	0.49	17.1	B	181/206
Overall Intersection	0.37	18.7	B	-	0.39	19.0	B	-	0.67	25.1	C	-	0.43	16.5	B	-
Union Street / Main Street																
<i>Weekday Evening</i>																
Union Street EB approach	0.75	22.8	C	187/550	0.82	27.5	C	225/601	0.90	39.5	D	262/614	0.88	41.7	D	311/584
Union Street WB approach	0.49	16.8	B	105/300	0.54	18.5	B	123/319	0.54	21.6	C	128/284	0.53	22.7	C	153/273
Main Street NB approach	0.55	24.2	C	116/253	0.56	24.0	C	125/270	0.61	24.0	C	142/311	0.60	28.5	C	183/328
Main Street SB approach	0.81	33.9	C	186/392	0.82	33.7	C	200/420	0.82	32.2	C	229/527	0.80	30.4	C	349/569
Overall Intersection	0.77	24.8	C	-	0.82	26.6	C	-	0.86	30.8	C	-	0.84	32.1	C	-

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level of service

^d 50th/95th Percentile Queue Length (feet)

Table 10 Continued. Signalized Intersection Capacity and Queue Analysis Summary

Overall Intersection Results	2012 Existing				2022 No-Build				2022 Build				2022 Build w/ Improvements			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d
Union Street / Main Street (Continued)																
<i>Saturday Evening</i>																
Union Street EB approach	0.58	15.1	B	45/188	0.60	15.6	B	50/204	0.57	15.5	B	49/222	0.81	42.5	D	175/247
Union Street WB approach	0.28	12.7	B	20/104	0.29	12.8	B	<25/111	0.31	13.2	B	26/126	0.43	28.8	C	93/139
Main Street NB approach	0.43	14.5	B	35/163	0.45	15.0	B	39/178	0.52	16.0	B	46/206	0.30	13.0	B	68/202
Main Street SB approach	0.50	15.0	B	42/173	0.52	15.5	B	45/187	0.54	16.1	B	51/224	0.31	8.9	A	87/206
Overall Intersection	0.54	14.5	B	-	0.56	15.0	B	-	0.56	15.4	B	-	0.47	23.0	C	-
State Street / West Columbus Avenue																
<i>Weekday Evening</i>																
State Street EB approach	0.15	45.4	D	<25/<25	0.15	45.4	D	<25/<25	0.13	44.8	D	<25/<25	0.13	44.8	D	<25/<25
State Street WB LT	0.46	34.2	C	93/93	0.47	33.8	C	98/98	0.50	28.3	C	103/103	0.50	29.5	C	117/117
State Street WB LT/TH	0.46	34.4	C	95/95	0.47	33.8	C	100/100	0.50	28.4	C	104/104	0.50	29.6	C	118/118
West Columbus Avenue SB LT	0.30	17.7	B	83/206	0.32	18.3	B	89/216	0.57	25.5	C	176/382	0.57	25.5	C	176/382
West Columbus Avenue SB TH/RT	0.53	20.3	C	178/387	0.57	21.2	C	192/420	0.70	27.5	C	244/463	0.70	27.5	C	244/463
Overall Intersection	0.48	23.7	C	-	0.50	24.2	C	-	0.58	27.6	C	-	0.58	27.9	C	-
<i>Saturday Evening</i>																
West Union Street EB approach	0.04	45.2	D	<25/<25	0.04	45.2	D	<25/<25	0.04	45.2	D	<25/<25	0.04	45.2	D	<25/<25
Union Street WB LT	0.40	37.3	D	63/63	0.40	34.7	C	55/55	0.35	24.2	C	56/58	0.35	24.2	C	56/58
Union Street WB LT/TH	0.40	37.3	D	63/63	0.40	34.7	C	55/55	0.35	24.3	C	56/60	0.35	24.3	C	57/58
West Columbus Avenue SB LT	0.13	12.7	B	29/96	0.14	13.1	B	32/102	0.33	17.2	B	91/231	0.33	17.2	B	91/231
West Columbus Avenue SB LT/TH/RT	0.19	13.2	B	49/126	0.21	13.7	B	54/135	0.26	16.4	B	73/165	0.26	16.4	B	73/165
Overall Intersection	0.23	20.9	C	-	0.24	20.4	C	-	0.31	18.9	B	-	0.31	18.9	B	-
State Street / East Columbus Avenue																
<i>Weekday Evening</i>																
State Street EB LT	0.06	16.3	B	<25/40	0.07	16.6	B	<25/42	0.07	19.5	B	<25/39	0.07	19.5	B	<25/39
State Street EBTH	0.22	15.5	B	34/154	0.23	15.8	B	36/164	0.36	18.6	B	54/265	0.36	18.6	B	54/265
State Street WB TH	0.15	6.9	A	<25/81	0.15	6.3	A	<25/80	0.18	6.3	A	<25/73	0.18	4.8	A	<25/63
State Street WB RT	0.18	19.2	B	<25/131	0.19	18.4	B	<25/117	0.23	13.2	B	<25/61	0.26	5.8	A	<25/39
East Columbus Avenue NB approach	0.70	30.7	C	214/253	0.74	31.3	C	229/268	0.86	40.4	D	295/349	0.86	38.4	D	278/336
Overall Intersection	0.39	23.1	C	-	0.41	23.3	C	-	0.54	27.6	C	-	0.54	25.0	C	-
<i>Saturday Evening</i>																
State Street EB LT	0.00	6.0	A	<25/<25	0.00	6.4	A	<25/<25	0.00	18.4	B	<25/<25	0.00	18.4	B	<25/<25
State Street EBTH	0.10	6.4	A	<25/27	0.11	6.7	A	<25/30	0.25	15.9	B	37/190	0.25	15.9	B	37/190
State Street WB TH	0.09	9.9	A	<25/49	0.09	10.2	B	<25/52	0.09	10.6	B	<25/61	0.09	10.6	B	<25/61
State Street WB RT	0.12	10.1	B	<25/<25	0.13	10.4	B	<25/<25	0.13	10.9	B	<25/45	0.13	10.9	B	<25/45
East Columbus Avenue NB approach	0.33	25.9	C	82/123	0.34	25.6	C	87/129	0.57	31.1	C	160/211	0.57	27.5	C	120/161
Overall Intersection	0.18	17.3	B	-	0.19	17.2	B	-	0.35	22.9	C	-	0.35	20.9	C	-

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level of service

^d 50th/95th Percentile Queue Length (feet)

Table 10 Continued. Signalized Intersection Capacity and Queue Analysis Summary

Overall Intersection Results	2012 Existing				2022 No-Build				2022 Build				2022 Build w/ Improvements			
	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d	V/C ^a	Delay ^b	LOS ^c	Queue ^d
State Street / Main Street																
<i>Weekday Evening</i>																
State Street EB approach	0.73	37.4	D	266/309	0.82	44.0	D	280/327	1.33	198.1	F	493/685	-	-	-	-
State Street EB TH	-	-	-	-	-	-	-	-	-	-	-	-	0.80	39.7	D	267/421
State Street EB RT	-	-	-	-	-	-	-	-	-	-	-	-	0.21	25.4	C	33/87
State Street WB LT	0.73	57.7	E	91/205	0.73	55.7	E	99/215	1.13	157.1	F	158/289	0.70	27.7	C	67/138
State Street WB TH	0.75	31.3	C	339/540	0.81	35.4	D	364/581	1.16	119.1	F	595/820	0.95	49.1	D	467/723
State Street WB RT	0.17	14.6	B	<25/25	0.18	15.3	B	<25/26	0.17	17.8	B	<25/25	0.16	11.9	B	<25/36
Main Street NB approach	0.53	37.7	D	97/155	0.54	37.0	D	106/182	0.58	34.6	C	147/268	0.84	39.7	D	170/261
Main Street SB approach	0.79	38.0	D	163/205	0.81	38.9	D	175/233	0.74	31.8	C	168/275	0.79	37.3	D	187/324
Overall Intersection	0.75	34.5	C	-	0.80	36.8	D	-	1.03	95.4	F	-	0.87	37.5	D	-
<i>Saturday Evening</i>																
State Street EB approach	0.32	25.8	C	72/174	0.36	27.2	C	79/182	0.87	51.6	D	200/459	-	-	-	-
State Street EB TH	-	-	-	-	-	-	-	-	-	-	-	-	0.48	25.9	C	114/280
State Street EB RT	-	-	-	-	-	-	-	-	-	-	-	-	0.12	20.7	C	<25/56
State Street WB LT	0.68	46.0	D	71/126	0.70	47.1	D	75/136	0.80	53.6	D	102/227	0.45	14.2	B	46/125
State Street WB TH	0.41	17.1	B	90/224	0.44	18.2	B	99/237	0.60	22.8	C	151/339	0.53	17.8	B	138/332
State Street WB RT	0.14	10.5	B	<25/<25	0.15	11.1	B	<25/<25	0.14	12.1	B	<25/25	0.13	9.3	A	<25/34
Main Street NB approach	0.61	37.9	D	81/172	0.61	36.9	D	89/187	0.62	35.6	D	96/255	0.77	40.8	D	104/206
Main Street SB approach	0.56	29.3	C	85/133	0.58	29.0	C	89/145	0.57	27.3	C	83/178	0.60	30.1	C	87/142
Overall Intersection	0.48	26.7	C	-	0.51	27.1	C	-	0.71	33.6	C	-	0.55	24.8	C	-

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level of service

^d 50th/95th Percentile Queue Length (feet)

Summary of Capacity Analysis Results

All movements at the signalized intersections surrounding the site will operate at acceptable levels-of-service (LOS D or better) during 2022 Build-with-Improvements conditions. In addition, V/C ratios will be below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes generated by the casino resort development. A detailed summary of improvements to the study area intersections and these improvements effect on the capacity and queues on the surrounding roadways is included in Chapter V.

V. Intersection and Roadway Improvements

After evaluating the capacity and safety characteristics of the study area roadways and intersections, the next step is to identify measures to improve the roadways and intersections based on existing and future deficiencies. The frontage roads, East Columbus Avenue and West Columbus Avenue, have shared jurisdiction between the City of Springfield and MassDOT, both of whom may require physical mitigation. The following section provides a summary of measures that are recommended in order to improve the existing and future operations of the study area intersections. A conceptual improvement plan depicting the proposed mitigation measures is included in Appendix L.

INTERSECTION CAPACITY AND SAFETY IMPROVEMENTS

TEC recommends the following improvements to mitigate the impacts of the new vehicle trips and improve the safety characteristics of existing facilities as part of the project:

1. Modify the barrier at the end of the I-91 southbound off-ramp and replace with guardrail to improve motorist sight distance at the merge area
2. Install vehicle queue detectors on the I-91 southbound off-ramp that will be wired to the traffic signal controller at the intersection of West Columbus Avenue / Union Street. These will be used to monitor traffic conditions and provide an extended green interval, if necessary.
3. Reconstruct the curb lines on Union Street under the I-91 bridge to accommodate five travel lanes where four exist today. The work can be completed between the existing bridge piers by implementing 10-foot wide left-turn lanes and 11-foot wide through lanes with 2-foot side shoulders (56 feet curb-to-curb). This may require adjustments to the bridge pier footings.
4. Perform partial traffic signal reconstruction at the intersections of East Columbus Avenue/ Union Street and West Columbus Avenue/ Union Street and improve signal phasing. The exclusive pedestrian phasing to cross West Columbus Avenue will be converted to concurrent operations, whereby pedestrians will walk at the same time as the parallel traffic. The phasing has been modified to move, or clear, traffic through the two intersections with limited potential for blocking.
5. Perform minor curb work and restripe the Union Street westbound approach to East Columbus Avenue to accommodate one through lane and one shared through-right lane. The eastbound receiving area will be limited to one lane. Additional lane use signs will be installed to direct motorists to the appropriate lane(s).
6. Improve the corner radii between East Columbus Avenue and Bliss Street to more efficiently process patron traffic entering and exiting the self-park garages.
7. Construct a 12-foot shoulder along East Columbus Avenue, between Howard Street and Bliss Street, to allow for acceleration and deceleration maneuvers associated with garage access.
8. Perform minor improvements to the alignment of the channelizing islands on East Columbus Avenue as it approaches the northerly Exit 7 on-ramp to I-91 northbound (just north of State Street).
9. Remove the existing on-street parking on State Street and resurface and restripe the pavement to accommodate a 10-foot left-turn lane into the hotel drop-off / valet parking area
10. Restripe a right-turn lane on State Street eastbound approach to Main Street within the existing curb lines. This better utilizes the existing pavement area.
11. Perform pedestrian facility improvements along the Main Street, State Street, and Union Street corridors and all roadways internal to the project. This includes upgrades to the bus stops and shelters that lie in front of the site along Main Street.
12. Install raised reflectorized stanchions along the painted centerline on Union Street and install regulatory signs to limit access into the self-park garage to right-in and right-out. The self-park exit is signed as a one-way exit.

13. Work with MassDOT to deploy variable message signs on I-91 and I-291 to notify motorists of traffic conditions in the downtown area. These would be used to inform the public of varying traffic conditions for all downtown events, including the casino.
14. Utilize on-site wayfinding signs to direct patrons to the access and egress points that are most efficient for the intended destination.
15. Coordinate the traffic signals and improve vehicle detection along Dwight Street, if necessary, to improve the flow of patron traffic from I-291.
16. Construct a pedestrian bridge between the project site and the MassMutual Convention Center.

TRANSPORTATION DEMAND MANAGEMENT

To reduce single-occupancy vehicle trips generated by the project, MGM will implement a transportation demand management (TDM) program to maximize employee vehicle occupancy and thereby reduce the vehicular demand on the site. Many other services can allow for multi-modal options for patrons. The program should consider rideshare programs, subsidized transit fares with the Pioneer Valley Transit Authority (PVTA), airport shuttle services, guest shuttle services to the Amtrak Station and area attractions, and zip car availability for hotel guests.

A number of transportation demand management (TDM) measures are recommended to reduce vehicle trips and better manage traffic generated by the proposed Project. These measures are summarized below and described in the following sections.

- **Transit Measures:**
 - Locate development in close proximity to PVTA bus and Amtrak services, including Union Station
 - Provide shuttle bus or trolley service between development, Union Station, and local attractions
 - Offer transit subsidies for employees
- **Pedestrian and Bicycle Treatments:**
 - Provide on-site bicycle racks
 - Provide bicycles and equipment for employees
 - Provide showers for employees that commute by walking or biking
 - Reconstruct sidewalks along study area roadways to improve pedestrian access
- **Parking Measures:**
 - Provide a reduced valet rate for vehicles with three or more patrons
 - Provide preferential parking for rideshare and carpool
 - Provide charging stations for electric vehicles
 - Implement parking fees in parking lots to discourage vehicle trips
 - Implement an IT System to direct drivers to open parking spaces
- **Other Measures:**
 - Maintain major employee shift times that are outside the traditional downtown peak hours of 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM
 - Provide a Transportation Coordinator on-site
 - Encourage vanpool and carpooling programs
 - Provide and update a monthly Commuter Bulletin
 - Facilitate events through coordination with MassRIDES and PVTA
 - Consider providing Zip Cars for employee and resident use

Public Transportation Services

The Project will be located in close proximity to the PVTA Union Station, which provides Amtrak and bus service throughout Springfield and surrounding municipalities. In addition, several PVTA bus routes operate throughout the study area. As part of the project, bus shelters with schedules and route maps will be constructed or enhanced along Main Street. The Proponents will coordinate with PVTA to identify the most appropriate locations for these bus shelters and any changes to bus routes that may be necessary.

MGM will sponsor a downtown trolley to facilitate trips along the Main Street corridor. This will reduce the number of patron vehicle trips that may occur between the casino and nearby land uses.

Transit Maps, Schedules, and Passes

To increase transit use by casino / hotel and retail patrons and employees, transit passes will be sold on-site at various locations. In addition, bus and Amtrak schedules with transit maps will be provided on-site at all locations where transit passes are sold, as well as at other key locations in information kiosks. The information for public transportation options are provided in Appendix M.

Transit Passes for Employees and Patrons

As previously noted, transit passes will be sold on-site for Project patrons. In addition, employees will be offered transit subsidies to their employees. Employers will distribute free or discounted transit passes to their employees, along with information regarding transit routes and schedules. An on-site Transportation Coordinator (TC) or Transportation Management Office (TMO), which is discussed further in a following section, will assist employers in distributing this information and passes to employees.

Pedestrian and Bicycle Treatments

Bicycle Racks

The developer will provide bicycle racks in appropriate locations throughout the site to facilitate bicycle trips to/from the development. Most racks will be located in secure, covered areas located in close proximity to major entrances to provide additional convenience.

Bicycles and Equipment for Employees and Residents

MGM will provide bicycles that may be used by employees to travel to/from the site. These bicycles may be provided in specialized locking racks on site. Employees can sign-out a key card, which will allow them to unlock these bicycles for use. MGM will also provide bicycle equipment such as helmets and bicycle locks to employees at free or discounted prices to further encourage bicycle travel to/from the site.

Bicycle and Pedestrian Route Maps

The TC or TMO will be responsible for coordinating with retailers to distribute bicycle and pedestrian route maps to patrons, employees, and residents. These maps will indicate to potential bicyclists and walkers the safest and most appropriate routes to travel.

Showers and Lockers for Employees

MGM will provide shower and locker facilities for employees to further encourage bicycling to/from work. These facilities will be available for use by employees of the Armory Square Shopping Center.

Sidewalk and Crosswalk Improvements

Sidewalks will be reconstructed along the study area roadways and crosswalks upgraded to meet ADA/AAB and MUTCD guidelines to improve walking to/from the site.

Parking Measures

Preferential Parking

Preferential parking will be offered to employees participating in rideshare or carpool programs. The TC or TMO would distribute parking passes or tags to employees participating in recognized rideshare or carpool programs at no cost to the employees. These passes would allow employees to park in reserved spaces dedicated for rideshare and carpool participants that are strategically located in convenient locations.

To encourage patrons to commute to the facility together, the Proponent will create a reduce valet parking rate for cars with three or more patrons.

Electric Vehicle Charging Stations

Charging stations for electric vehicles will be provided within the on-site parking garages. Directional signage will be implemented to direct drivers toward these electric vehicle charging stations.

IT Systems for Parking Lots

Although this technology will not reduce the number of vehicle trips traveling to/from the development from outside the study area, implementing Information Technology (IT) systems within parking lots to direct drivers to open spaces would reduce on-site congestion by minimizing recirculation of vehicles to look for open parking spaces. These systems would be integrated between parking areas to record the number of vehicles entering and exiting a parking lot and provide an indication to drivers of the availability of parking spaces within each parking area. When spaces are full, the dynamic messaging signs would direct drivers to other parking facilities with open spaces. Where spaces are open, the dynamic messaging signs would direct drivers to the open parking spaces within that parking area.

Other TDM Measures

Transportation Coordinator or Transportation Management Office

In order to facilitate the TDM program, a Transportation Coordinator (TC) or Transportation Management Office (TMO) will be provided to manage the TDM program and reach out to residents, business owners, and employees. The TC or TMO will be responsible for:

- Posting and distributing announcements
- Holding promotional events to encourage ridesharing, using public transit, bicycling, and walking
- Monitoring the program and assisting in the evaluation
- Providing transit schedules and information about program services
- Coordinating on-site sales of transit passes
- Managing transit subsidy programs for employees
- Coordinating rideshare and carpool programs and coordinating with employees to offer preferential parking for participants
- Coordinating with PVTA and MassRIDES to implement TDM programs and improve transit mode share

Zip Car

MGM will consider providing Zip Car services on-site for use by employees and residents. The TMO or property manager would likely be responsible for purchasing and providing Zip Cars. These vehicles would be parked in designated spaces and would be available for use by residents and employees when available on an as-needed basis. The provision of Zip Car allows residents and employees without vehicles to rely mostly on public transit, but provides a few shared vehicles that residents and employees may use for infrequent trips that require the use of a personal vehicle. This service can be extended to the public as a transportation resource for the South End neighborhood.

Rideshare or Carpool / Vanpool Programs

MGM will implement rideshare, carpool or vanpool programs to encourage ridesharing and reduce vehicle trips. The TC or TMO will assist employees and residents in finding appropriate carpool matches and send out match lists.

Guaranteed Ride Home Program

The concern of many potential carpool participants is how they would get home if either they or the driver in their carpool has an emergency or must leave unexpectedly. The fear of being stranded without a ride home can discourage employees from participating in carpool programs. To reduce these fears and increase carpool participation, the Proponents will offer a guaranteed ride home program. This program would be managed by the TC or TMO, and would allow anyone participating in a rideshare or carpool program to receive a free taxi ride home for unexpected events. Where transit service is available to the employee's home, the employee could be given a free transit pass to travel home should an unexpected

event occur. This program could also be extended to those walking or biking to work or commuting to work via transit services, such as Amtrak, which does not provide regular and frequent service throughout the day. In the event that an employee who traveled to work via Amtrak or bus needs to leave for an unexpected event, this employee could be granted a free taxi ride home. Additionally, employees who bicycle to work on inclement weather days will be provided with a ride home via either taxi, transit, or a rideshare service such as a multi-passenger van acting as a bus for employees bicycling to work.

MITIGATING FOR CONSTRUCTION PERIOD TRAFFIC AND SIDEWALK IMPACTS

The MGM design team will prepare Temporary Traffic Control Plans for use by the contractors during the construction of the transportation and utility improvements. These plans will comply with MUTCD Standards and depict the work zone; advance warning signs, barrel and barrier placement, temporary pavement markings, vehicular and pedestrian detours.

Main Street, State Street, and Union Street will remain open to thru traffic with minimum 11-foot lanes at most times during construction. The roadways will maintain two-way traffic flow whenever feasible and require temporary lane closures as necessary. As a result, parking will be temporarily prohibited along the south side of State Street and west side of Main Street for periods of construction. Short-term road closure at off-peak times may be required for final paving, pavement marking application and major utility construction including trunk-line improvements and service connections. Detours will be mapped out on the Temporary Traffic Control Plans showing routes and signage and will be prepared during the design process. Access will be maintained to those portions of Howard Street and Bliss Street that service the abutting properties; the remainder of those two streets will be closed permanently to allow construction of the MGM facility.

Pedestrian access, with ADA/AAB accessible ramps, will be maintained but limited to one side of the street opposite the work zone. Signs identifying sidewalk closures and crossing locations will be provided at the adjacent signalized intersections to direct pedestrians to the appropriate sidewalk route. Temporary mid-block crossings, if necessary, will maintain access to area businesses and will be installed with appropriate signs and pavement markings. Where travel on existing sidewalks must be maintained during building construction, the sidewalk will be shielded with scaffolding for debris protection.

VI. Parking Summary

PARKING SUPPLY

Existing Parking Supply

There are currently 859 for-fee surface parking spaces between State Street and Union Street within the boundaries of the redevelopment project. In addition, there are 46 on-street (metered and unmetered) parking spaces along Bliss and Howard Streets. Outside of the redevelopment project boundaries, there are 24 marked on-street spaces (metered and unmetered) along State Street between East Columbus Avenue and Main Street and 40 marked on-street parking spaces (metered and unmetered) along Main Street between State Street and Union Street. Currently, traffic accessing buildings in the immediate area also have the ability to access two structured parking facilities including the 687 space I-91 South Garage located under Interstate 91 between West and East Columbus Avenues just north of State Street. The second I-91 North Garage is also located north of Bridge Street under Interstate 91 and consists of 1,080 spaces.

Proposed Parking Supply

As part of the proposed MGM resort development, the existing parking facilities within the project boundaries will be eliminated (a total of 905 existing parking spaces) and a new multi-story parking facility will be constructed to accommodate the parking demands generated by the proposed casino and hotel developments. A total of 4,801 structured parking spaces are proposed within the parking garage. In addition, 169 surface lot parking spaces are proposed as part of the Armory Square Retail Development, which will provide a total of 4,970 parking spaces on the site for use by the proposed land uses.

PARKING DEMAND

Existing Parking Demand

TEC, Inc. conducted a parking utilization survey for the existing on-street and off-street parking spaces within the area bounded by State Street, Main Street, Union Street, and East Columbus Avenue, as well as the nearby I-91 South Garage. This parking survey was conducted on Friday, November 16, 2012 in 30-minute intervals from 11:00 AM to 5:00 PM. As the majority of majority of the users of these parking lots are visitors of the adjacent courthouse or employees working in nearby businesses, utilization of these parking lots is extremely low on Saturdays and Sundays. Therefore, weekend parking utilization surveys were not conducted for these parking lots. The detailed parking survey information is provided in Appendix N and the results of the survey are summarized in Table 11.

Table 11. Existing Parking Demand Summary

Time	Existing Parking Demand			
	I-91 South Garage	Off-Street Parking	On-Street Parking	Total Parking Demand
11:00 AM	430	599	101	1,130
11:30 AM	400	564	100	1,064
12:00 PM	379	515	87	981
12:30 PM	343	469	91	903
1:00 PM	328	446	79	853
1:30 PM	345	443	80	868
2:00 PM	338	446	94	878
2:30 PM	329	456	90	875
3:00 PM	309	455	83	847
3:30 PM	297	393	75	765
4:00 PM	271	334	78	683
4:30 PM	216	215	66	497
Peak	430	599	101	1,130

Casino / Hotel Parking

TEC utilized casino / hotel visitor information provided by MGM from another MGM casino in Detroit, Michigan (included in Appendix H) to estimate the parking demand generated by the proposed casino and hotel. This document provides hourly vehicle arrival information separated by patrons and employees, as well as by type of vehicle (passenger car, taxi, charter bus, etc.). Based on information provided by MGM, which indicated that the average employee shift is approximately 8 hours and the average patron stay in the casino is 3 to 4 hours, TEC estimated parking demand for employees based on total arrivals over an 8 hour period and estimated parking demand for patrons based on total arrivals over a 3 hour time period. The detailed parking demand generation calculations are included in Appendix N. This information indicates that the peak parking demand for the casino / hotel on a Friday is anticipated to be 3,926 passenger vehicles and 24 charter buses. The peak parking demand on a Saturday is anticipated to be 4,532 passenger vehicles and 28 charter buses.

Armory Retail Parking

TEC utilized parking demand generation rates contained in the ITE publication *Parking Generation, 4th Edition* for Land Use Codes (LUC) 820 (Shopping Center) and 445 (Multiplex Movie Theater) to estimate the parking demand generated by the Armory Retail Shopping Center. As discussed in the *Trip Generation* section of this report, approximately 40 percent of the Armory Retail traffic is estimated to be shared with the casino / hotel. Therefore, the parking demand generation rates were discounted by 40 percent to account for this sharing of trips / parking spaces. The detailed parking demand calculations are included in Appendix N. The peak parking demand for the Armory Retail that are not associated with a shared trip to the casino is anticipated to be 62 spaces on Friday and 54 spaces on Saturday.

Residential Parking

ITE parking demand generation rates for LUC 220 (Apartments) were used to estimate the parking demand generated by the proposed residential units. The peak parking demand for the residential units is anticipated to be 424 spaces on Friday and 450 spaces on Saturday.

Total Parking Demand

The parking demands for the casino / hotel, Armory Retail, and residential units for each hour of the day were calculated as discussed above and superimposed to estimate a total parking demand for the entire site. These calculations are included in Appendix N, and indicate that the peak parking demand for the entire site will be 4,292 spaces on a Friday and 4,910 spaces on a Saturday. A total of 4,970 parking spaces will be provided on the site. Therefore, the proposed parking supply will be adequate to accommodate the peak parking demand.

Shared Parking

The MGM parking facility will be free to the public. The demand for parking increases during the evening peak hours and the weekends when the courthouse is closed. There is sufficient parking supply to allow courthouse employees and visitors to use the MGM garage and still have a significant reserve supply during weekday daytime periods.

Construction Period Parking Impacts

The existing for-fee parking lots within the project limits will be closed during construction of the garage. Of the 700 parked vehicles, approximately 200 can be accommodated in the I-91 South Parking Garage. The remaining 500 motorists will be temporarily directed to the I-91 North parking facilities and shuttled to the courthouse and other adjacent businesses. Most of the contractors' employees will be directed to park in these off-site parking facilities and will be shuttled to the site. This is expected to occur over a 12-month period and shuttles will be provided non-stop between the hours of 7:00 AM and 6:00 PM for the adjacent businesses. Upon completion of the new parking structure, users will be redirected back to the site for access to the new facility.

VI. Conclusion

The proposed MGM complex has superior access to the local streets and regional highway network with access to several I-91 and I-291 interchanges. The pedestrian access to the adjacent land uses and the entire Main Street corridor will complement an increasingly vibrant downtown.

Parking data was collected to understand the needs for the adjacent courthouse and the downtown businesses. The courthouse and office uses see their demand peak in the weekday morning and midday periods when the casino complex is less active. Conversely, those same uses generate a negligible number of trips when the casino is most active during the weekday evening and weekend periods. This symbiosis of land uses allows for a shared parking supply in the MGM parking structure that can be used without fee. The parking analysis confirms that the proposed parking supply is adequate for both the casino complex and the surrounding land uses.

The multiple access points to the highway network and the downtown will create additional bypass traffic for downtown businesses while avoiding the residential neighborhoods. One key to the successful management of traffic is public information. The Proponent's traffic management plan includes a series of robust public information measures, such as social media and intelligent transportation and information systems to route traffic to the most appropriate route. These measures are complemented by a number of transportation demand management tools to reduce the number of site-generated automobile traffic, including shuttle and trolley services and public transportation options.

This preliminary traffic impact study was prepared based on record data from prior successful casino developments by MGM and within New England and peak hour analysis. It demonstrates that the local and interstate ramp intersections, with modest improvements, can accommodate the entire development program and still attain acceptable levels of service. All intersections are expected to operate at an overall level of service D or better when assessed in a 10-year horizon. This means that there is still reserve capacity following construction of the MGM facility to accommodate additional growth and renewal in the downtown.

The Phase II RFP process allows for a dialogue of the proponent's project presentation, identification of comments from City staff and the general public, and a framework for future permitting and host agreements regarding off-site transportation mitigation and other related improvements. This preliminary traffic study is a document that can be used as the foundation for future analysis as part of the City's local permitting process and through the extensive State review process as part of the Massachusetts Environmental Policy Act (MEPA). With successful implementation of the transportation and parking improvements, the traffic from the casino complex can be safely and efficiently accommodated on the area roadways.