

**FINAL**



**Date:** November 19th, 2012

**To:** John Yapp; Transportation Planner

**From:** Darian Nagle-Gamm; Traffic Engineering Planner

**Re:** Dubuque Street NE / North Liberty Road / 1<sup>st</sup> Avenue Area Traffic Study  
2012 Update

In 2012, an annexation agreement was reached between Coralville, North Liberty, and Johnson County regarding the area north of Interstate 80, west of the Coralville Reservoir / Iowa River, and east of the Coralville and North Liberty municipal borders. The annexation agreement clarifies which communities will be able to annex specific parcels of land in the future. With the annexation agreement finalized, the MPO was able to work with each municipality in developing expected housing and employment densities in the study area, which in turn affects forecasted traffic volumes on area roadways. During 2012, the MPOJC Travel Demand Model was also updated for the entire metropolitan area (including an updated 2040 socio-economic forecast) and recalibrated to the year 2040. In light of these changes, the traffic study and daily traffic forecasts for the Dubuque Street NE / North Liberty Road / 1<sup>st</sup> Avenue area have been updated.

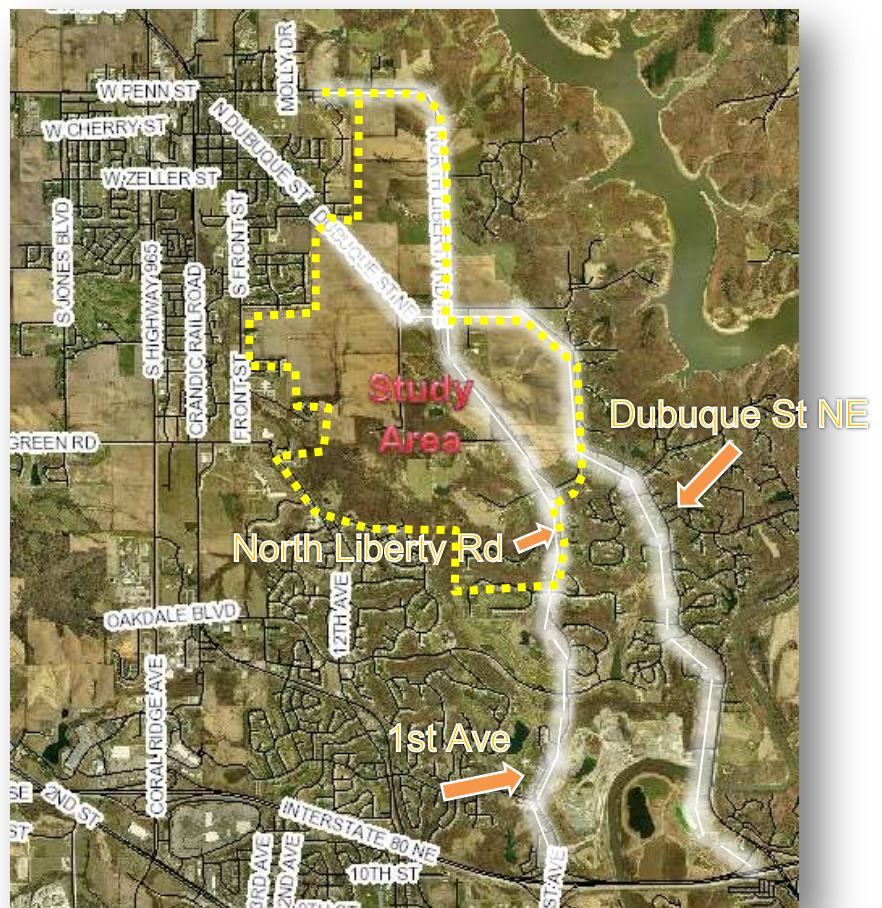
#### *Limitations of the traffic model*

Traffic analysis models are best used for general indications of traffic patterns in the area, but not for prediction of *exact* volumes. Future traffic volume data is generated with the best knowledge we have, but there is no model software that can predict specific land use decisions as well as the political, cultural, and economic decisions that influence future traffic. Traffic forecasts are produced using estimates of future socio-economic conditions that are generated using growth trends and community input. As such, these estimates and traffic forecasts may change as the socio-economic outlook changes over time.

#### **Study Area**

The study area is located mostly within unincorporated Johnson County north of Interstate 80 and west of the Coralville Reservoir / Iowa River.

**Map 1: Study Area**



## Roads

The study focuses on Dubuque Street NE from I-80 to the North Liberty city limits, 1<sup>st</sup> Avenue from I-80 to the Coralville city limits, and North Liberty Road from the Coralville city limits to the North Liberty city limits and a potential Forevergreen Road extension from 12<sup>th</sup> Avenue to Dubuque Street NE. Dubuque Street NE and North Liberty Road are relatively narrow roads that are rural in character while 1<sup>st</sup> Avenue is a mix of both rural and more urban street design. The speed limit on Dubuque Street NE is 35 mph from the Iowa City limits to north of West Overlook Road where it increases to 50 mph. The speed limit on 1<sup>st</sup> Avenue is 35 mph and the speed limit on North Liberty Road is 45 mph. Sight distance is somewhat limited on Dubuque Street NE due to horizontal (and some vertical) curvature. The reduced speed limits on Dubuque Street have been implemented due to the limited visibility and numerous driveways and intersections on Dubuque Street.

## Land Use

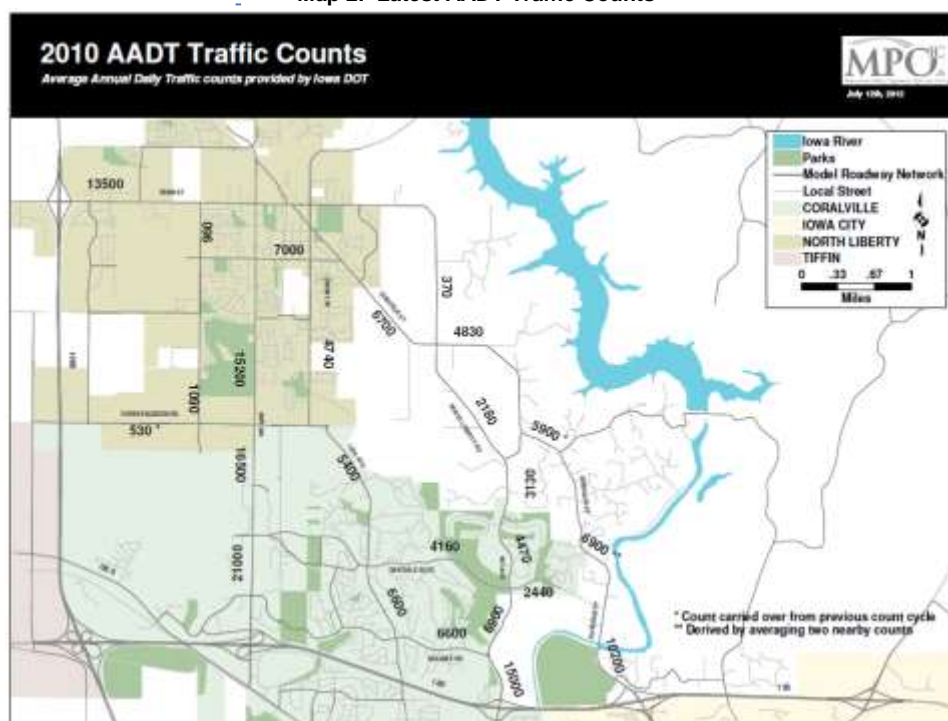
The study area is mostly residential or agricultural in nature. Housing densities in the unincorporated residential portion of the study area are lower; housing densities in the municipal areas are higher. Various housing growth scenarios were developed for a specific (relatively undeveloped) study area bounded by North Liberty Road to the north, North Liberty city limits to the west, Coralville city limits to the south, and Dubuque Street NE to the east. This area is mostly agricultural at this point in time.

## Existing Conditions

### Traffic Counts

In 2010, the DOT reported 6,700 AADT (average annual daily traffic) on Dubuque Street NE just south of the North Liberty City limits, 5,900 AADT north of West Overlook Road, and 10,200 north of I-80. Traffic counts taken on North Liberty Road / 1<sup>st</sup> Avenue were reported at 2,180 AADT north of Rustic Ridge Road, 4,470 AADT north of Oakdale Boulevard, and 6,900 AADT south of Oakdale Boulevard.

Map 2: Latest AADT Traffic Counts





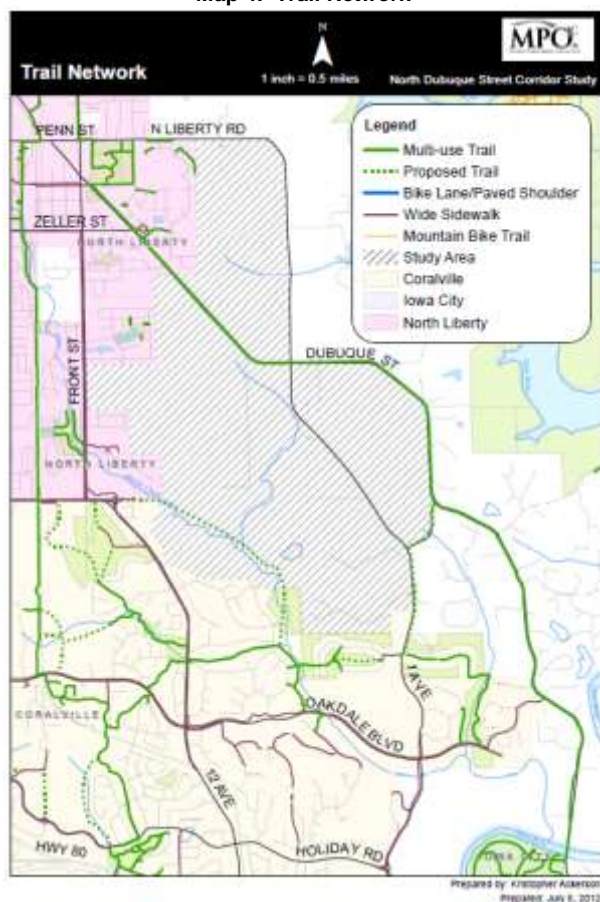
The DOT collects traffic counts throughout Johnson County every four years. The counts are usually taken over a 48 hour period using portable automatic traffic (tube) counters. Due to the short duration of the count and the fact that the data represents an average of traffic during a specific month (but does not provide an *annual* daily traffic average) the 48 hour traffic averages are annualized after they are collected. This is done by multiplying the 48-hour average by an “expansion factor” that has been generated with data provided by several Automatic Traffic Recorder (ATR) sites in the metropolitan area. The ATR sites collect traffic volume data on a daily basis throughout the year and provide insight into how local travel patterns seasonally change.

The majority of the DOT AADT counts reported during 2010 were new counts. Sometimes the DOT will report a “derived” count or they will carry over a count from the previous traffic count cycle. An example of a “derived” count would be averaging traffic counts at two intersections to approximate the mid-block traffic volumes. If a location was not able to be counted in the current year, the DOT may sometimes carry over a count from a previous count cycle.

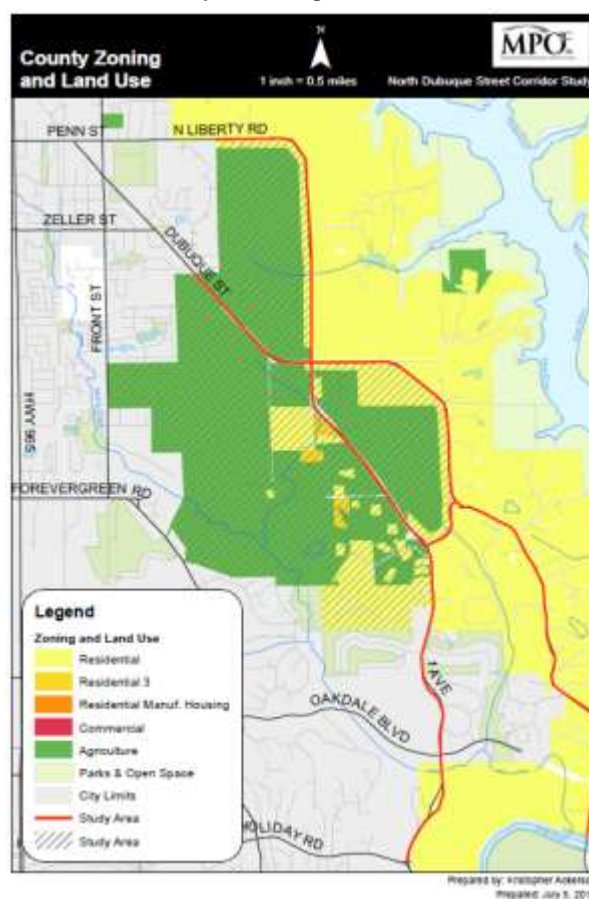
### County Zoning and Land Use

The northernmost portion of the study area is in the unincorporated area of Johnson County and is mostly zoned agricultural at this time. The southern portion of the study area is zoned almost exclusively residential. Residential development in the unincorporated area tends to be lower density while residential development in the municipal areas tends to be more moderate.

Map 4: Trail Network



Map 3: Zoning & Land Use



### Bicycle and Pedestrian Facilities

There is an extensive trail network in the metro area which has recently been extended north along Dubuque Street NE to North Liberty and has been a very popular addition to the trail system. In addition, a new dedicated pedestrian bridge has recently been constructed on Dubuque Street NE over the

Iowa River providing exclusive pedestrian and bicycle access to the Iowa River Trail. A trail / sidewalk connection between 12<sup>th</sup> Ave and Dubuque St in the vicinity of the Forevergreen Rd extension would improve pedestrian and bicycle circulation in the study area, by creating a more direct east-west connection.

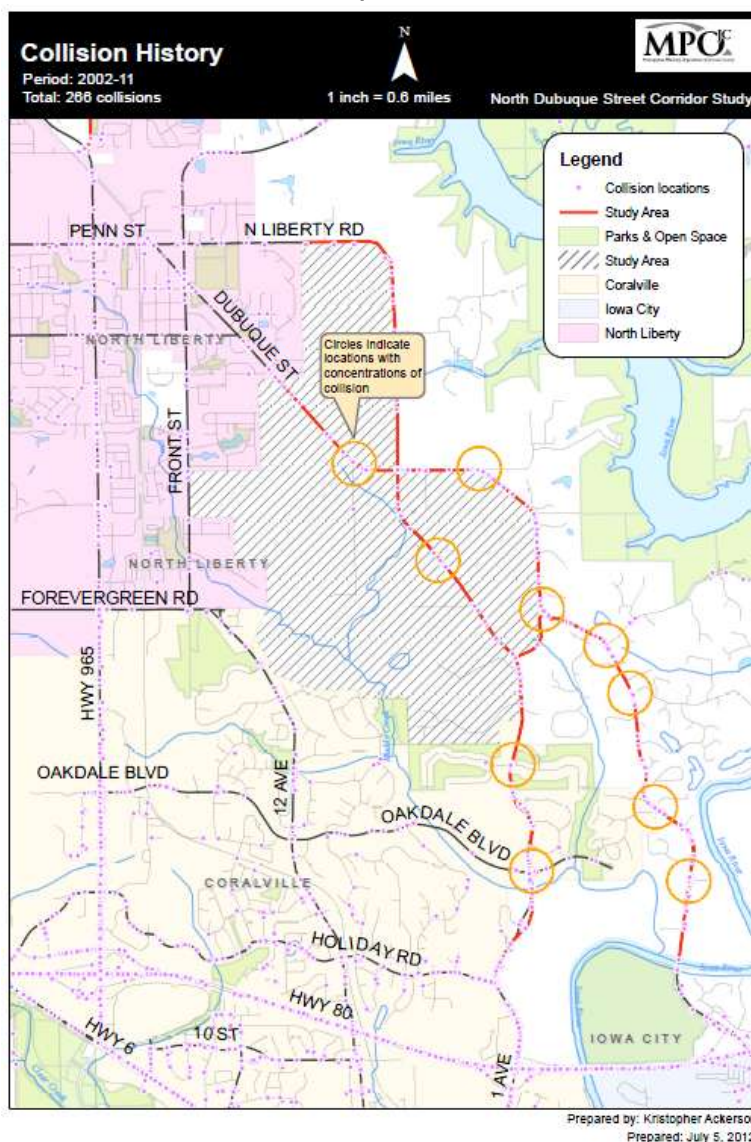
Map 5: Street Light Locations



### Street Light Inventory

There are street lights located at various intersections throughout the study area. The street lights are typically privately funded and installed by developers, homeowner's associations, or local residents.

Map 6: Collisions



### Collision History

The majority of collisions in the study area are attributed to:

- Animal collisions (28%)
- Driving too fast for conditions (12%)
- Swerving/evasive actions (10%)
- Failure to yield from a stop sign (7%)
- Following too close (6%)

Dubuque Street has a higher percentage of animal collisions (31% of total collisions) than North Liberty Road / 1<sup>st</sup> Avenue (22%) which is likely attributable to the fact the Dubuque Street NE corridor has more visibility issues due to curvature of the road and proximity to habitat. The high number of animal collisions can be attributed to the large amount of forested land (public and private) to the east of Dubuque Street in the Iowa River corridor. The majority of collisions in the study area are clustered around intersections, which is typical.

## Gap Study

In order to gauge the available gaps for minor street traffic turning onto 1<sup>st</sup> Avenue, North Liberty Road, or Dubuque Street NE, Staff performed AM and PM peak hour observations and performed gap counts during June 2012. According to the Iowa Department of Transportation's Design Manual (Section 6A-4), a left-turning *automobile* requires approximately 7.5 seconds to turn left from a minor street onto a major street and a left-turning *truck* requires approximately 9.5 seconds to make the same movement. Applying these metrics to the gap data collected, we were able to approximate the percentage of each peak hour that is adequate for drivers to make left-turn movements at five intersections in the study area (Table 1).

On average, there are more gaps in traffic during the AM than the PM. During the AM, there are adequate gaps available for automobiles 79% of the peak hour (averaging all intersections) and during the PM peak adequate gaps are available for 72% of the hour. This means that on average, traffic is able to turn from the minor street onto the major street approximately 45 minutes of each peak hour without significant delay.

The gap study focused on the delay *minor street traffic* incurred making a left-turn onto major streets in the study area. We recommend additional peak hour counts be conducted at intersections of concern to determine delay incurred by left-turning vehicles turning from major streets onto a minor street in the study area.

Table 1: % of Peak Hour that Adequate Gaps are Available

Minor Street	Time of Day	% of Peak Hr adequate gap available for <u>Automobiles</u>	% of Peak Hr that adequate gas available for <u>Trucks</u>
West Overlook Rd	AM	88%	86%
Oakdale Blvd		85%	82%
North Liberty Rd		85%	84%
Auburn Hills		82%	80%
Lincolnshire Pl		53%	46%
		<b>79%</b>	<b>76%</b>
Auburn Hills	PM	92%	90%
Lincolnshire Pl		85%	82%
North Liberty Rd		66%	61%
West Overlook Rd		64%	60%
Oakdale Blvd		52%	48%
		<b>72%</b>	<b>68%</b>



## 2040 Traffic Forecast - Methodology

The MPOJC Travel Demand model (calibrated to the year 2040) was used to develop daily traffic forecasts on Dubuque Street NE, 1<sup>st</sup> Avenue, North Liberty Road, and a potential Forevergreen Road extension under a variety of land-use and roadway scenarios in the study area. Eight different traffic forecasts were developed using combinations of three land-use scenarios and four roadway scenarios:

### Land Use Scenarios

#### 1) No housing growth

- No housing growth in the specific study area (Map 1), but anticipated population growth occurring throughout the rest of the metropolitan area.

#### 2) Expected housing growth (moderate)

- Density was estimated using growth trends, land use plans and feedback from municipalities expecting to annex parcels in the undeveloped study area. Densities are all 'net' after taking into account infrastructure, open space, waterways, etc.
  - i. Up to 2.0 DU/acre in study area directly north of a Forevergreen Road extension; up to 2.3 DU/acre in the northernmost portion of the study area north and east of Dubuque Street NE and west of North Liberty Road
  - ii. Up to .40 DU/acre south of Forevergreen Road extension

#### 3) High housing growth

- Higher than anticipated residential densities were used in this scenario. Densities are all 'net' after taking into account infrastructure, open space, waterways, etc.
  - i. Up to 3.25 DU/acre in study area north of a Forevergreen Road extension
  - ii. Up to 1.0 DU/acre in study area south of Forevergreen Road extension

### Roadway Scenarios

The land-use scenarios were also evaluated in tandem with four roadway scenarios. *It should be noted that all scenarios were modeled with an I-380 / Forevergreen Road interchange and the Oakdale Boulevard extension between Lincolnshire Place and Dubuque Street NE completed.*

- 1) **With Forevergreen Road extension** between 12<sup>th</sup> Avenue and Dubuque St. NE.  
*NOTE: The Forevergreen extension alignment reflected on the traffic forecast maps do not reflect an actual proposed extension alignment but was used for illustrative purposes to reflect road connectivity only.*
- 2) **Without Forevergreen Road extension** between 12<sup>th</sup> Avenue and Dubuque St. NE
- 3) **Existing road capacity** on 1<sup>st</sup> Avenue / North Liberty Road and Dubuque Street NE
- 4) **Center turn lane constructed on Dubuque St. NE** from I-80 to 275<sup>th</sup> St NE and existing capacity on 1<sup>st</sup> Avenue / North Liberty Road.

## 2040 Traffic Forecast – Assumptions

The below table reflects the various scenarios and their underlying assumptions that were evaluated using MPOJC's Travel Demand Model. Maps for each scenario, which include more detailed forecasted traffic volumes, are included in the appendix.

Table 2: Scenarios and underlying assumptions

Scenario #	Land-Use Scenario	Roadway Scenario(s)
1	No Growth (study area)	Without Forevergreen Extension Existing capacity on North Liberty Road / 1st Ave Existing capacity on Dubuque Street NE
2	No Growth (study area)	With Forevergreen Extension Existing capacity on North Liberty Road / 1st Ave Existing capacity on Dubuque Street NE
3	Expected growth	Without Forevergreen Extension Existing capacity on North Liberty Road / 1st Ave Existing capacity on Dubuque Street NE
4	Expected growth	With Forevergreen Extension Existing capacity on North Liberty Road / 1st Ave Existing capacity on Dubuque Street NE
5	Expected growth	Without Forevergreen Extension Existing capacity on North Liberty Road / 1st Ave Dubuque Street NE with center-turn lane from I-80 to 275th St NE
6	Expected growth	With Forevergreen Extension Existing capacity on North Liberty Road / 1st Ave Dubuque Street NE with center-turn lane from I-80 to 275th St NE
7	High growth	Without Forevergreen Extension Existing capacity on North Liberty Road / 1st Ave Existing capacity on Dubuque Street NE
8	High growth	With Forevergreen Extension Existing capacity on North Liberty Road / 1st Ave Existing capacity on Dubuque Street NE

## 2040 Traffic Forecast - General Findings

- The greatest effect of increased residential growth in the study area is increased traffic volumes on 1<sup>st</sup> Avenue / North Liberty Road. Traffic volumes will also increase on Dubuque St NE, but to a lesser degree.
- A Forevergreen Road extension between 12<sup>th</sup> Avenue and Dubuque Street would decrease traffic and congestion on 1<sup>st</sup> Avenue / North Liberty Road (by 1,000 to 2,000 vehicles per day). This is due to Forevergreen Road functioning to better distribute east-west traffic, therefore reducing traffic pressure on the north-south corridors serving this area.
- Generally speaking, a Forevergreen Road extension would slightly decrease traffic on Dubuque Street (by a few hundred vehicles per day). This is due to Forevergreen Road functioning to better distribute east-west traffic, therefore reducing traffic pressure on the north-south corridors serving this area.
- A Forevergreen Road extension would slightly increase traffic volumes on Coral Ridge Avenue (south of Forevergreen Road) by less than 1,000 vpd. This is due to Forevergreen Road functioning as a connector for motorists with destinations on Coral Ridge Ave.

- A Forevergreen Road extension would slightly decrease traffic on Oakdale Boulevard, the next east-west connector to the south in the corridor. This is due to Forevergreen Road serving as an east-west corridor for residents living in the study area.
- A Forevergreen Road extension would have a negligible impact on Holiday Road traffic, another east-west connector in the corridor.

## **Traffic Forecasts – Traffic Volumes**

### **Year 2040 - No Growth Scenario**

In the “no growth” scenario, no additional homes are built in the study area but there is overall general growth throughout the metropolitan area. No significant traffic congestion is predicted on Dubuque Street NE or on 1<sup>st</sup> Avenue / North Liberty Road in the study area (Appendix Map 1 & 2). Traffic estimates range from near 6,100 vehicles per day (vpd) on Dubuque Street NE near the North Liberty city limits, to just over 5,300 vpd north of West Overlook Road, to 8,600 vpd north of I-80. Traffic estimates on 1<sup>st</sup> Avenue / North Liberty Road range from 700 vpd north of Dubuque Street to 5,600 north of Oakdale Boulevard to 7,000 south of Oakdale Boulevard.

Forecasted traffic volumes on a Forevergreen Road extension are low, near 500 vehicles per day. This indicates that without significant housing growth in the study area, the model predicts that Forevergreen Road extension would have a relatively minor effect on area traffic circulation. The model assumes that drivers will use Oakdale Boulevard and Holiday Road more often to complete east-west trips in the area. Forevergreen Road is not expected to function as a significant cut-through or commuter route.

### **Year 2040 Expected Growth Scenario**

#### *Existing roadway conditions*

In this scenario, forecasted traffic volumes in the area increase due to the additional households forecasted in the study area. Based on area growth rates and feedback from municipalities, this is the most likely scenario. Congested traffic conditions are forecasted on 1<sup>st</sup> Avenue / North Liberty Road, but not on Dubuque Street NE. Traffic estimates with existing roadway capacity range from 8,400 vpd on Dubuque Street NE south of the North Liberty city limits, to 9,000 vpd north of West Overlook Road, to 12,800 vpd north of I-80 (Appendix Map 3 and 4). Traffic estimates on 1<sup>st</sup> Avenue / North Liberty Road range from 2,400 vpd north of Dubuque Street to 13,200 vpd north of Oakdale Boulevard, and 13,700 south of Oakdale Boulevard.

Forecasted traffic volumes a Forevergreen Road extension range from 700 vpd near Dubuque Street and 3,000 vpd near 12<sup>th</sup> Avenue. The model forecasts that a Forevergreen Road extension decreases traffic and congestion on North Liberty Road / 1<sup>st</sup> Avenue by approximately 1,000 vpd and slightly increases traffic on Dubuque Street NE by a several hundred vehicles per day by providing a new east-west connection in the area. The model also predicts that traffic would slightly increase on Coral Ridge Avenue south of Forevergreen Road by several hundred to over a thousand vehicles per day.

The majority of traffic on Forevergreen Road is generated by residents in the study area, traveling to and from their homes. Forevergreen Road is expected to serve as the main east-west access route to this area.



### *Dubuque Street NE with center-turn lane I-80 to 275<sup>th</sup> St NE*

Forecasted traffic volumes with a center-turn lane on Dubuque Street NE range from 8,900 south of the North Liberty city limits to 10,900 north of West Overlook Road to 14,400 north of I-80 (Appendix Map 5 & 6). Traffic estimates on 1<sup>st</sup> Avenue / North Liberty Road range from 2,300 vpd north of Dubuque Street to 13,100 vpd north of Oakdale Boulevard, to 12,700 south of Oakdale Boulevard. The model estimates that the housing growth and increased capacity on Dubuque Street NE could draw up to 2,000 additional vehicles per day to the corridor.

Forecasted traffic volumes on an extension of Forevergreen Boulevard range from 2,000 vpd near Dubuque Street to 3,000 vpd near 12<sup>th</sup> Avenue. The model forecasts that a Forevergreen Road extension decreases traffic and congestion on North Liberty Road / 1<sup>st</sup> Avenue by 1,000 to 2,000 vpd and slightly decreases traffic on Dubuque Street NE by a maximum of a several hundred vehicles per day. The model also predicts that traffic would slightly increase on Coral Ridge Avenue south of Forevergreen Road by several hundred vehicles per day as a result of the new east-west connector.

### **High Growth Scenario**

#### *Existing roadway conditions*

In this scenario, forecasted traffic volumes in the area are expected to increase if the study area builds out at a greater housing density than the municipalities predict at this time. Traffic estimates under existing roadway conditions range from 10,000 vpd on Dubuque Street NE south of the North Liberty City limits, to 12,100 vpd north of West Overlook Road, to 16,000 vpd north of I-80 (Appendix Map 7 & 8). Traffic estimates on 1<sup>st</sup> Avenue / North Liberty Road range from 3,000 vpd north of Dubuque Street to 18,700 vpd north of Oakdale Boulevard, and 18,900 south of Oakdale Boulevard.

Forecasted traffic volumes on a Forevergreen Road extension range from 2,300 vpd near Dubuque Street to 6,600 vpd near 12<sup>th</sup> Avenue. The model forecasts that a Forevergreen Road extension decreases traffic on North Liberty Road / 1<sup>st</sup> Avenue south of the extension by 1,000 to 2,000 vehicles per day and very slightly decreases traffic on Dubuque Street NE by a few hundred vehicles per day. The model also predicts that traffic would very slightly increase on Coral Ridge Avenue south of Forevergreen Road by several hundred vehicles per day as a result of the new east-west connector.

## Effects of Proposed High School and Elementary School

There is speculation that a new high school will be built in the study area in the future, however there are no known proposed locations or a proposed construction date at this time. As such, it is difficult to evaluate its potential effect on traffic using the MPO's traffic model. As an alternative, we reviewed entering and exiting traffic counts from the City High campus taken in 2011. During the AM school peak half-hour (7:40 – 8:10 AM), approximately 500 vehicles were counted entering and 200 vehicles exiting the City High campus, for a total of 700 additional AM peak trips generated by the school. During the PM peak half-hour (2:50 – 3:40 PM) there were approximately 225 vehicles entering and 350 vehicles exiting the City High campus, for a total of 575 PM peak trips generated by the school. There are less trips generated during the PM peak period presumably because after school activities keep some students until later in the evening. These estimates could be reasonably applied to any road in the study area where a high school might be located. These volumes indicate turn lanes are warranted and potentially a traffic signal will be warranted at a proposed high school due to peak volumes. These volumes, however, do not indicate a need for additional overall roadway capacity.

In terms of a future elementary school, the school district has purchased a parcel of property on the east side of North Liberty Road approximately a half mile south of the intersection with Dubuque Street NE, however we have not received confirmation that a school *will* be built on this property. To gauge the potential traffic impacts of a proposed elementary school, we reviewed AM peak hour traffic counts at Buford Garner Elementary school in North Liberty taken in 2010. During the AM peak half-hour (7:45 – 8:30 AM), 119 vehicles were counted entering and 79 vehicles were counted exiting the school property, totally nearly 200 vehicles. As there are few after school activities at the elementary school level, it can be assumed that the traffic during the post-school PM peak half-hour (2:40 – 3:10 PM) is similar to AM traffic. It should also be noted there are a good number of students/parents who walk to this particular school due to its close proximity to a neighborhood. If a proposed elementary school in the study area was *not* located in reasonable walking distance to a significant number of households, the number of school related vehicle trips could increase up to 300 trips in the AM and PM school peak times. Pedestrian facilities and safe routes should be developed for any proposed elementary school location. These traffic estimates could be reasonably applied to roadways adjacent to any potential new elementary school location in the study area.

## Conclusion

Dubuque Street NE, 1<sup>st</sup> Avenue, and North Liberty Road in the study area currently are well under daily capacity (approximately 15,800 vehicles per day at Level of Service E), and experience relatively little delay, except for short periods during the AM and PM peak hours. Visibility is somewhat limited on Dubuque Street NE due to the road curvature. There are a significant number of driveways and minor streets that have direct access on Dubuque Street NE increasing the number of potential conflict points. Speed limits are appropriately set lower in the areas of the greatest safety concern. Visibility due to road curvature is less of an issue on 1<sup>st</sup> Avenue / North Liberty Road due to differing topography and significantly fewer direct access points.

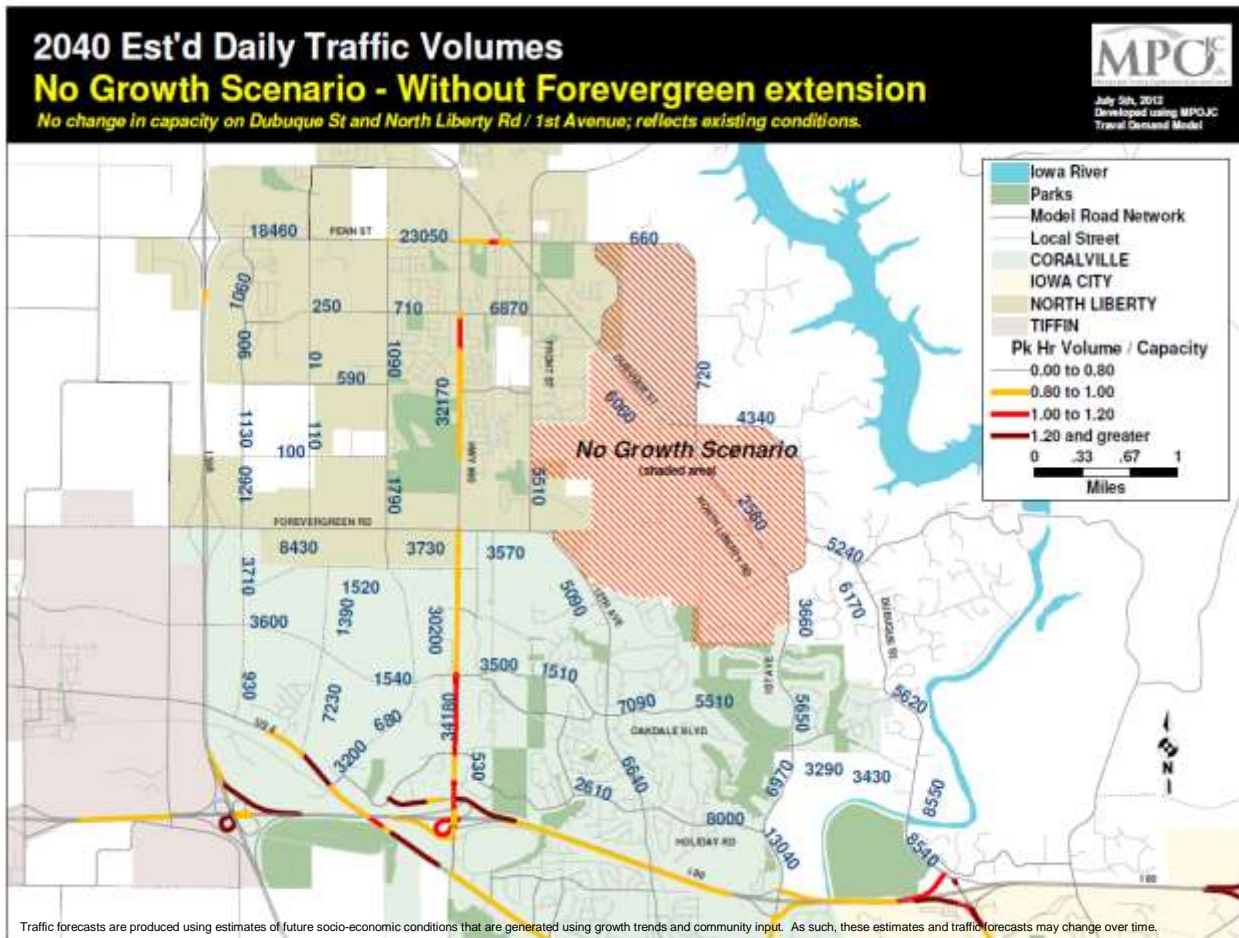
In the year 2040 expected growth scenario (considered the most likely) with existing roadway capacity, traffic volumes on the study area roads would still be under maximum daily capacity, but 1<sup>st</sup> Avenue and some portions of North Liberty Road would experience peak-hour congestion. In this scenario, it is expected that traffic volumes will increase on Dubuque Street NE, but significant peak hour congestion is not anticipated as more drivers from the study area are expected to use the North Liberty Road and 1<sup>st</sup> Avenue corridor for their daily trips. Adding a center-turn lane on Dubuque Street NE would likely reduce some rear-end collisions by

removing left-turning vehicles from the through-lane, but it would not likely have a significant impact on animal collisions, the top cause of collisions in the area. The addition of a center-turn lane on Dubuque Street NE would remove left-turners from the travelled lane and thereby increase the capacity for additional traffic. Due to the curvature and existing development in the Dubuque St corridor, a full center left turn lane is unlikely. It is recommended that as traffic volumes increase, left turn lanes at the major intersections be pursued to improve safety at intersections.

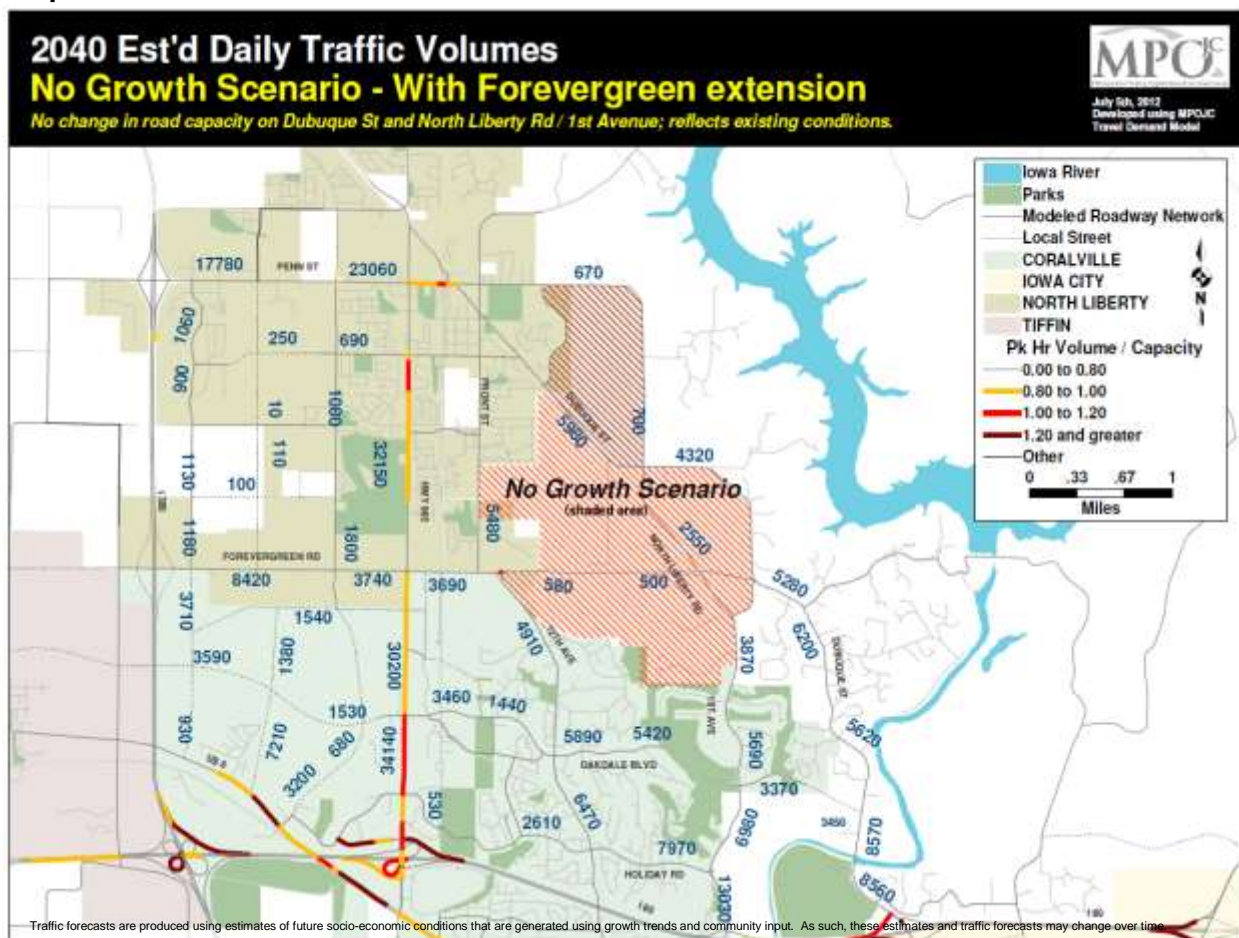
In the year 2040 expected growth scenario, the model forecasts that a Forevergreen Road extension between 12<sup>th</sup> Avenue and Dubuque Street NE would attract about 3,000 vehicles per day, which is about half as much traffic as Oakdale Boulevard or Holiday Road, the other east-west connectors in the study area. This is likely because the latter roads are surrounded by much higher density housing and are located closer to the high-density commercial areas near I-80 / Coral Ridge Avenue. A Forevergreen Road extension would reduce traffic volumes and congestion on North Liberty Road / 1<sup>st</sup> Avenue, providing a new east-west connection in the study area. A Forevergreen Road extension would improve traffic distribution. The model predicts that Dubuque Street NE would experience slight reduction in traffic volumes (a few hundred vehicles per day) as a result of a Forevergreen Road extension. A two lane arterial street design is appropriate for a future Forevergreen Road extension.

A new high school and/or elementary school in the study area would not make a significant impact on overall daily traffic, but each could be expected increase traffic volumes by several hundred vehicles during school opening, closing, and special events. It is recommended that turn lanes be installed at any location where a high school is built to remove turning traffic from the through lanes, reducing the risk of rear-end collisions, and reducing congestion. A traffic signal may also be warranted due to peak-hour traffic conditions. Turn lanes may also be warranted at a proposed elementary school location, especially where traffic speeds are relatively high.

## Appendix: Map 1

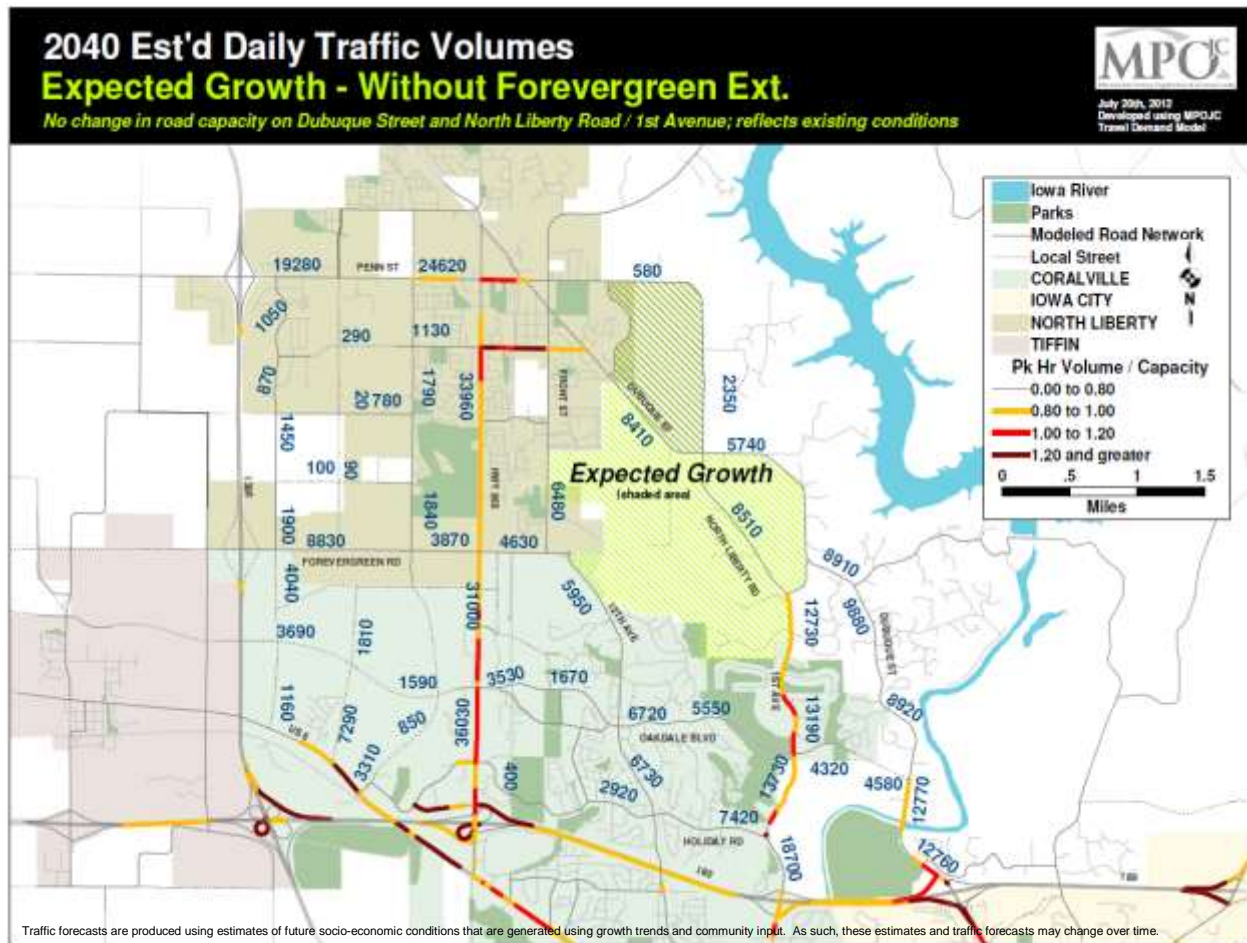


## Map 2

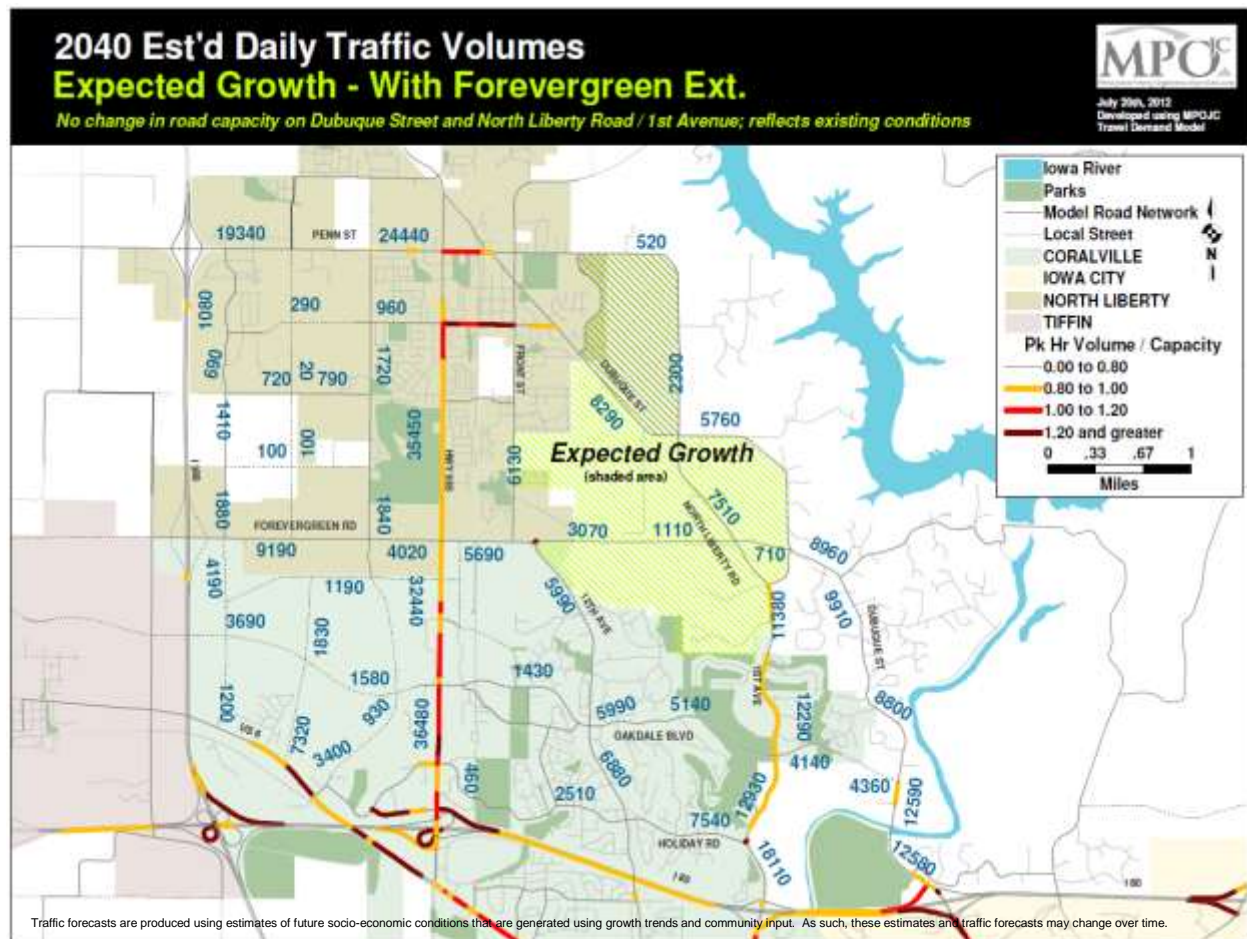




Map 3

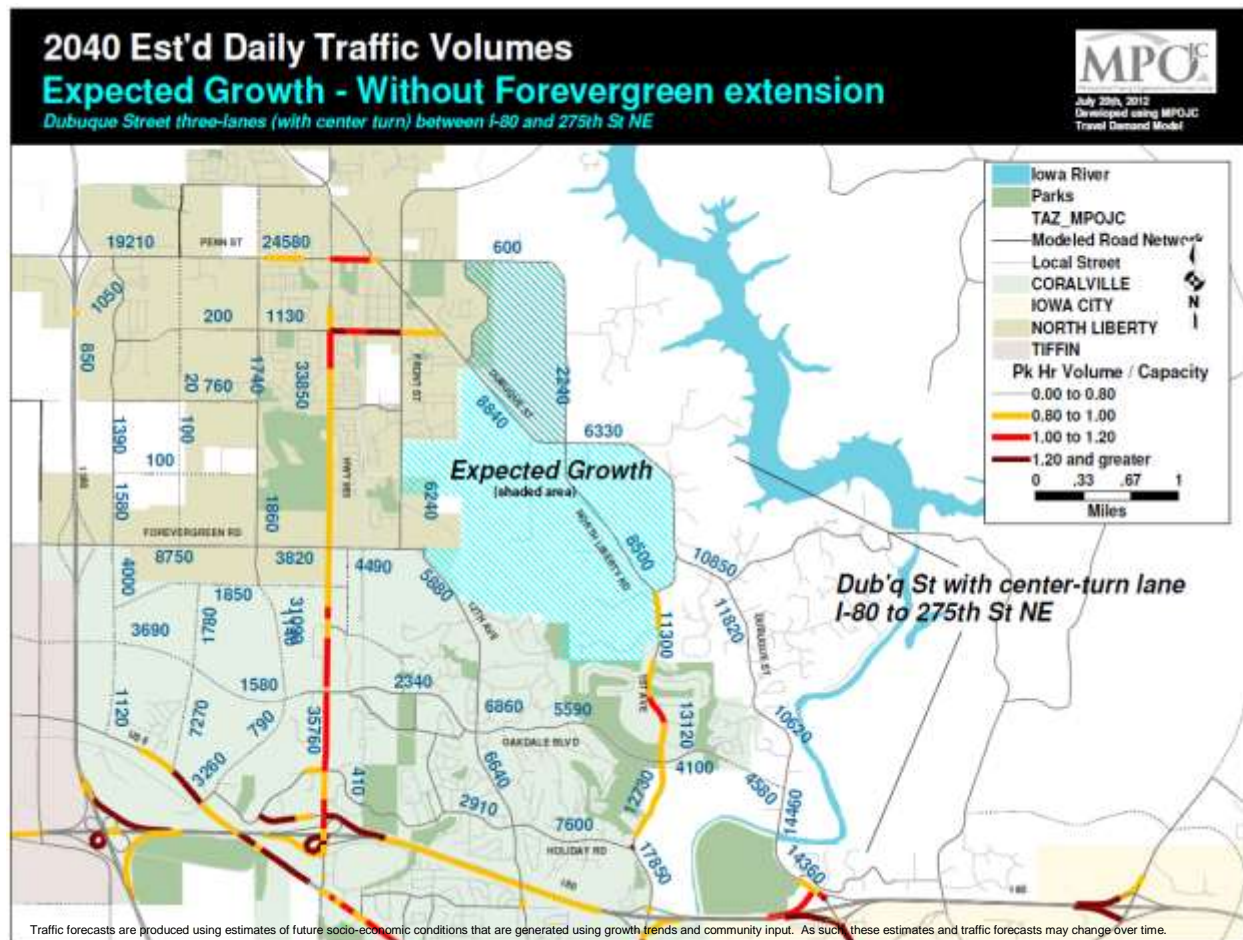


Map 4

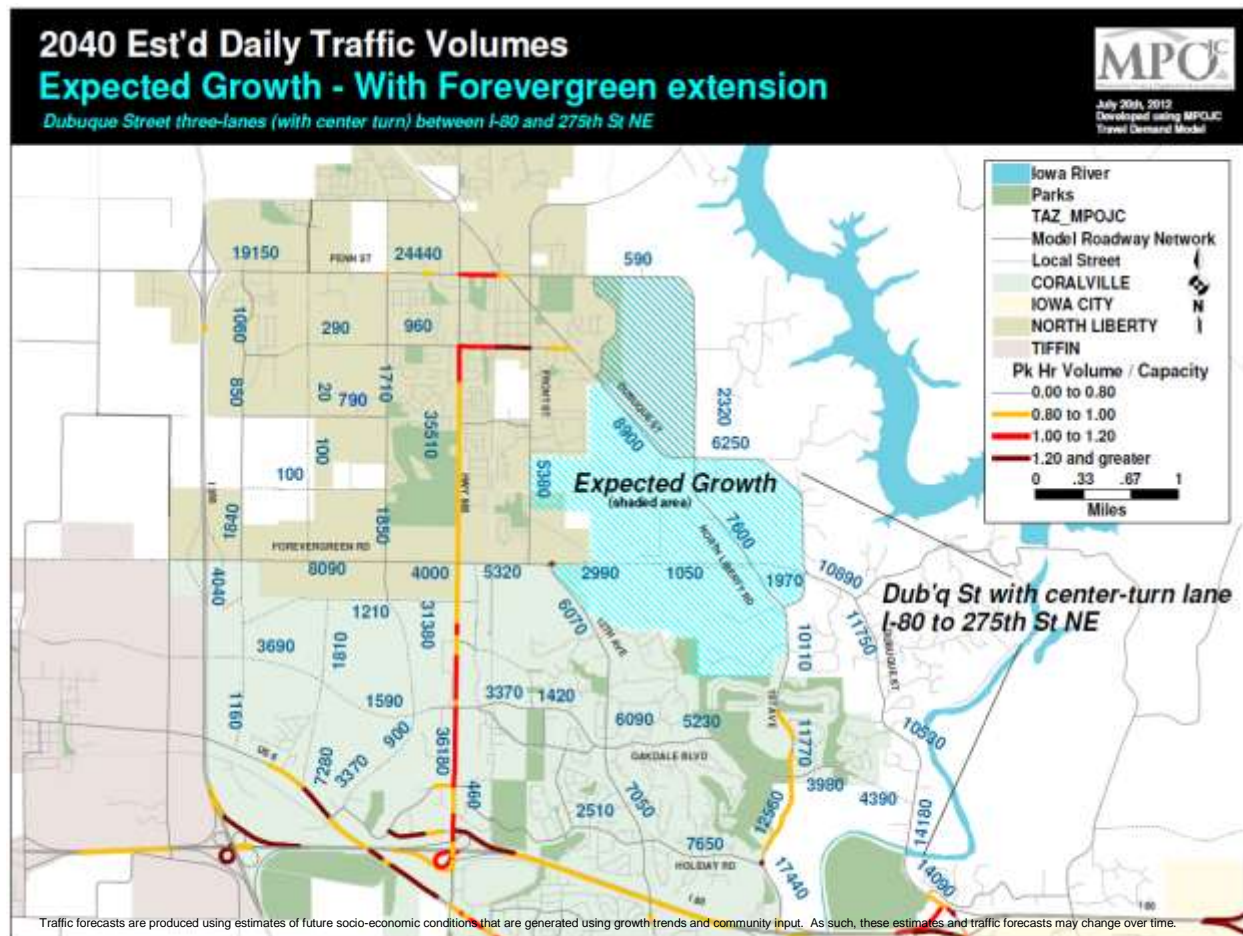




Map 5

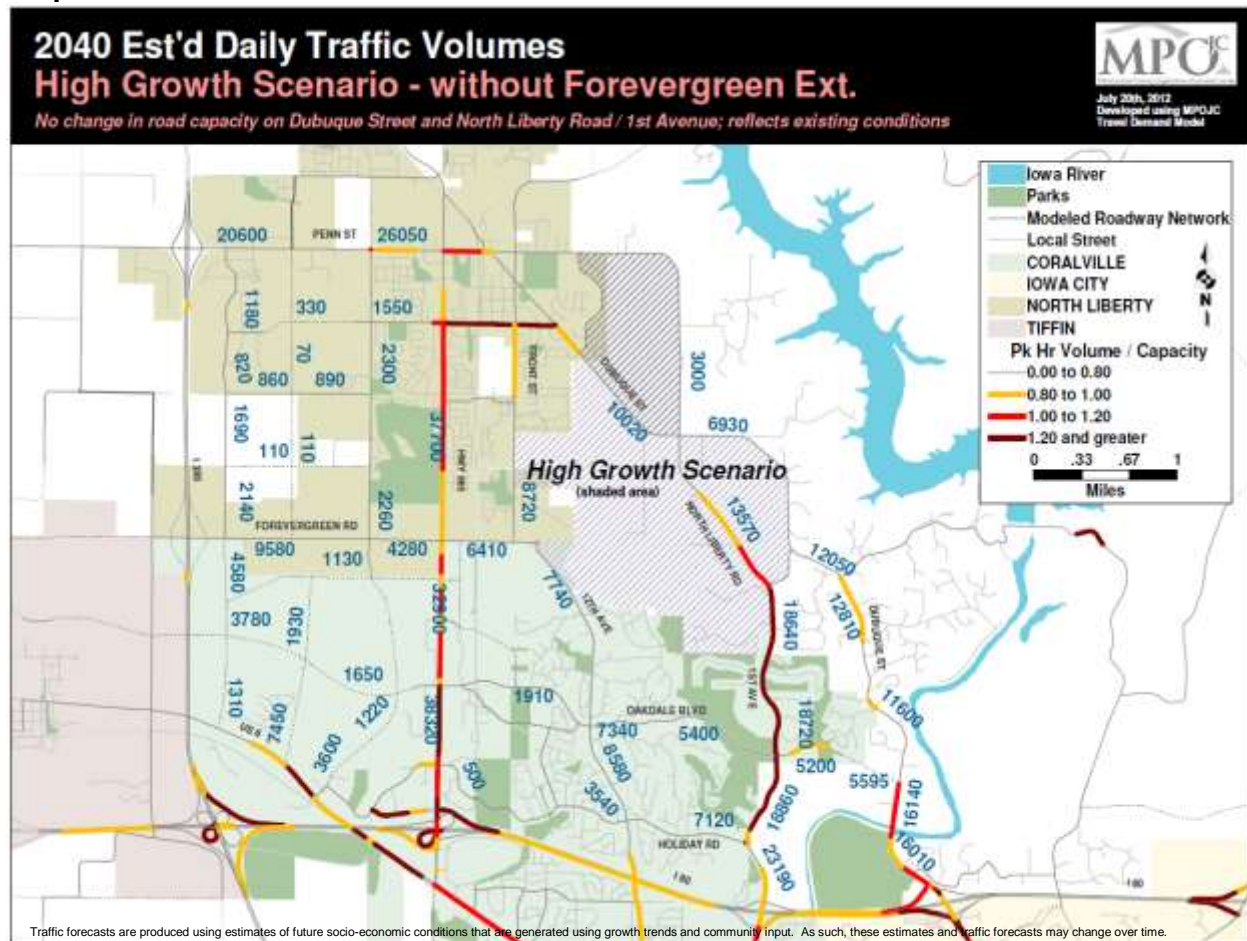


Map 6





Map 7



Map 8

