CITY OF IOWA CITY
MEMORANDUM

Date: March 27, 2014

To: Tom Markus, City Manager

From: Rick Fosse, Public Works Director RAF

Re: Gateway Project Design Elements

Based on our discussion at the March 25, 2014 City Council work session, we have prepared the attached table summarizing staff recommendations for design elements of the Gateway Project. Our intent is to use this table to facilitate discussion and decision making at the April 1st work session. This table will also serve as an attachment for a resolution establishing design elements that will be placed on the formal agenda. If the Council wishes to act on the design elements at the April 1st meeting, the table attached to the resolution will need to be amended to reflect the Council's decisions where they differ from the recommendations.

Also attached are the following two documents:

- **Dubuque Street and Park Road Energy and Delay Memorandum** – This memorandum summarizes impacts of delay for the existing configuration of the Dubuque Street / Park Road intersection. This study quantifies cumulative time of delay and additional fuel consumed by the delay. Given the existing weekday traffic volume at this intersection, the proposed improvements would provide an approximate annual savings of 23,000 gallons of fuel and 31,000 hours of time. This analysis is limited to weekday commutes and does not quantify improvements for event traffic.

- **2006 Traffic Study by Anderson Bogert Engineers** recommending improvements to the Dubuque Street / Park Road intersection. This study confirms HNTB's findings regarding the need for a southbound right turn lane and three eastbound lanes on the bridge, including dual left turn lanes. Two west bound lanes were not a part of the Anderson Bogert's recommendation because a new bridge was not contemplated at that time.

Staff will be at the April 1st work session to facilitate discussion and answer questions.

Cc: Ron Knoche, City Engineer
Melissa Clow, Special Projects Administrator

Exhibit A – Gateway Project Design Elements

	Trail and Sidewalk	Cross Walks	Parkway Width	Travel Lanes	Turn Lanes	Lane Width	Curb & Gutter Width	Speed Limit	Design Speed
Dubuque @ Foster	10' Trail on west 6' Sidewalk on east	Yes – at signalized intersection with Foster	8' min west 0'- 8' east	2 northbound 2 southbound	Left turn for NB at Foster	12'	1.5'	35 mph	40 mph
Dubuque @ Taft	10' Trail on west 6' Sidewalk on east	None	8' min west 8' east	2 northbound 2 southbound with median	None	12'	1.5'	35 mph	40 mph
Dubuque @ Ridge	10' Trail on west 6' Sidewalk on east	None	8' min west 8' east	2 northbound 2 southbound with median	None	12'	1.5'	35 mph	40 mph
Dubuque @ Mayflower	10' Trail on west 8' Sidewalk on east	Yes – midblock non-signalized	8' min west 8' east	2 northbound 2 southbound with median	None	12'	1.5'	35 mph	40 mph
Dubuque @Kimball	10' Trail on west 8' Sidewalk on east	None	8' min west 8' east	2 northbound 2 southbound	None	12'	1.5'	Transition to 25 mph	30 mph
Dubuque @Park Road	10' Trail on west 8' Sidewalk on east	Yes- at signalized intersection	8'west 8' east	2 northbound 2 southbound	Right turn for southbound Left turn for northbound	12'	1.5'	25 mph	30 mph
Park Road Bridge	10' on both sides of the bridge	Yes – grade separated under west abutment	Not applicable	5 Lanes total 3 eastbound 2 westbound		12'	2.0'	25 mph	30 mph
Park Road to Riverside	8' Sidewalk on south 6' Sidewalk on north	Yes- midblock non-signalized at west end of bridge	8' south 0'– 8' north	1 eastbound 1 westbound	Center turn lane	11' through lanes with 12' center turn lane	1.5'	25 mph	30 mph

Dubuque Street and Park Road Energy and Delay Memorandum

March 2014

In response to questions heard from Council at the March 25th work session, City staff requested that HNTB provide additional information related to the traffic analysis completed for the intersection of Dubuque Street and Park Road. The additional analysis concerned computing the peak hour and annual vehicle delays and fuel consumption. Following below, please find a summary discussion regarding the analysis of peak hour and annual vehicle delay as well as fuel used during the delays at the Dubuque Street and Park Road intersection.

For the analysis, HNTB performed and reviewed the Synchro traffic analysis for the existing 2010 traffic in the AM and PM peak hour. The existing 2010 traffic was analyzed using the existing intersection configuration, as well as the configuration for the Design Concept. The Design Concept configuration includes a southbound right turn lane and a five-lane Park Road Bridge. A feature of the Synchro software includes the ability to compute the seconds of delay each vehicle experiences in the peak hour, the total delay for the peak hour and how many gallons of fuel are expended during the delay in the peak hour. By multiplying those values by 250 days (weekdays per year, minus holidays), the software provides the total annual delay and fuel used.

AM Peak

For the AM peak hour the Synchro analysis was run on the existing intersection configuration first. The analysis found that during the morning peak period, the Dubuque Street southbound approach was the worst performing movement. During the morning peak hour, vehicles traveling southbound experienced 217 seconds of delay per vehicle, which used 91 gallons of fuel. Analysis of operations of all movements at the intersection found that vehicles experience 149 seconds of delay per vehicle with 99 gallons of fuel used during the morning peak hour.

In the recommended Design Concept's intersection configuration includes a right turn lane on southbound Dubuque Street. The addition of the southbound right turn lane improves intersection operations. This reduces the seconds of delay per vehicle to 22 seconds. Likewise, the fuel used due to delays on southbound Dubuque decreased to 22 gallons in the morning peak hour. Operations for the intersection as a whole improved to 19 seconds of delay per vehicle and 30 gallons of fuel consumed.

If the recommended Design Concept's intersection configuration is implemented to include a right turn lane for southbound Dubuque, the analysis indicated that delays would decrease by approximately 23,000 hours annually, with approximately 17,000 gallons of fuel saved each year.

PM Peak

For the PM peak hour, the Synchro analysis was run with existing 2010 traffic on the existing intersection configuration as well as the Design Concept's intersection configuration. The analysis found that the eastbound left turn movement experienced the greatest delay during the afternoon peak hour. During the afternoon peak hour, the eastbound left movement experienced 240 seconds of delay per vehicle, with 34 gallons of fuel used. The intersection as a whole experienced 58 seconds of delay per vehicle and 60 gallons of fuel used during the peak hour.

With the Design Concept's intersection configuration, Park Road eastbound has two dedicated left turn lanes and one dedicated right turn lane. Implementation of the Design Concept would lead to a reduction of vehicle delays and fuel used during delays. During the PM peak hour, eastbound left vehicles would experience 34 seconds of delay, with a decrease to approximately 10 gallons of fuel consumed. For the intersection as a whole, the delay per vehicle decreases to 16 seconds with 34 gallons of fuel used. On an annual basis, the Design Concept would reduce delays on the eastbound left turn by approximately 8,000 hours, helping to save 6,000 gallons of fuel.

JCCOG

memo

Date: May 19, 2006

To: Rick Fosse, Iowa City Public Works Director
Ron Knoche, Iowa City City Engineer

From: Anissa Williams, Traffic Engineering Planner AW

Re: Traffic study final report for the intersection of Dubuque Street and Park Road, Iowa City, Iowa

Following is the final report of a traffic study for the intersection of Dubuque Street and Park Road completed for JCCOG by Anderson Bogert Engineers. This study was undertaken at the request of Iowa City to determine if the current lane configuration is adequate or should be redesigned.

The study concludes that to optimize capacity at this intersection, convert the interior westbound lane of Park Road should be converted to an eastbound left turn lane by removing and rebuilding the median a lane width to the north. A 300 foot long southbound right turn lane is also recommended. The primary benefit is to eastbound left turn traffic in the p.m. peak. There is as average reduction in delay of 27 seconds per vehicle for that movement. The bridge deck is also in need of maintenance and this is recommended to be completed at the same time as the geometric changes.

I recommend that this project be discussed at the next Capital Improvement Program committee meeting.

Let me know if you have any questions.

cc: Jeff Davidson
Karin Franklin

jccogtp/mem/dubuque & park.doc

MEMORANDUM

Date: May 8, 2006

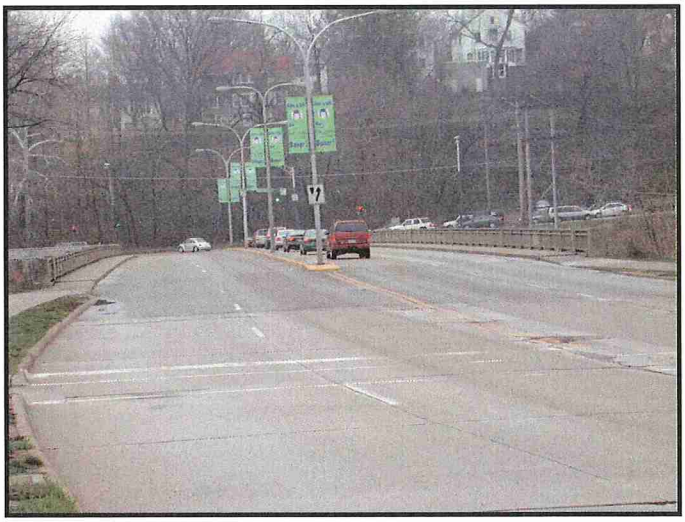
To: Anissa Williams

From: Jeff Morrow, P.E.
Anderson-Bogert Engineers, Inc.

Subject: Dubuque Street and Park Road
Intersection Study

This memorandum documents the findings of an intersection improvement study for Park Road and Dubuque Street. The study provides details about improvement alternatives to reduce delay and congestion at the intersection.

Existing Conditions… Dubuque Street is a four lane arterial roadway, with separate turn lanes at some of the major intersections, running north-south from downtown Iowa City to Interstate 80. Park Road tees into Dubuque Street and extends west, across the Iowa River, to the north edge of the University of Iowa campus. The Park Road bridge over the Iowa River is a 353' prestressed concrete girder with four 13' lanes, a 4' raised median and 5' sidewalks on both sides, see picture at right.



The Johnson County Council of Governments (JCCOG) collected traffic count data for the intersection. Figure 1 in the Appendix summarizes the traffic count data. In addition to the heavy northbound and southbound through traffic, there is a very heavy (532 vehicles per hour (vph)) eastbound to northbound PM peak left turn movement and reciprocal southbound to westbound AM peak right turn movement (645 vph).

Based on the traffic volume data provided by JCCOG, the existing intersection operates overall with 22.3 seconds of delay per vehicle during the AM peak hour. The PM peak hour delay is 37.2 seconds per vehicle. These travel delays

correspond to level of service (LOS) C and D, respectively. Reported operational levels of service, as defined by the Highway Capacity Manual, range from A (Best – characterized by uninterrupted flow) to F (Worst – characterized by complete congestion and long delays).

Specific movements operate at very poor LOS such as the eastbound left turn movement which operates at LOS D in the AM peak and LOS E in the PM peak, see picture at right.

During the PM peak the queue length is unstable and has been observed to back up to the Hancher Auditorium driveway.

The southbound right turn movement is mixed with the through movement and operates at LOS C in the AM peak hour and LOS D in the PM peak hour. In the AM Peak, 40% of the traffic traveling southbound on Dubuque Street is turning right at Park Road.

The northbound left turn has an AM peak hour delay of 41.2 seconds per vehicle and a PM peak hour delay of 62.4 seconds.

Detailed results of the existing intersection capacity analyses may be viewed in Tables 1, 2, and 3 for AM Peak, Noon Peak, and PM Peak hours, respectively, in the Appendix of this memo.

Existing Bridge Conditions… The existing Park Road Bridge was built in 1959 and has a sufficiency rating of 80 on the Iowa Structural Inventory and Appraisal sheet (SI&A). The sufficiency rating is on a scale of 0 to 100, with 0-50 qualifying for federal-aid replacement funds, 51-80 qualifying for federal-aid rehabilitation funds, and above 80 as generally in good condition or in need of minor maintenance.

The last inspection was completed in June of 2005. The lowest condition rating is a 5 for the deck. A rating of a 5 according to the Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges means the deck is in fair condition and (the concrete) may have cracking and spalling. The SI&A for the 2003 inspection notes the curb has exposed rebar in some places (see picture at right).

Proposed Improvements ... To alleviate the eastbound left turn congestion and the southbound right turn congestion, two improvements were analyzed:

1. Reallocate one of the westbound lanes on Park Road, by removal of the existing median and light poles, to an eastbound left turn lane, to allow for a dual eastbound left turn movement (Refer to Figure 2, Sheet 1 of 3). Note that the bridge lighting would only be from the ends of the bridge after the median modification.
2. Widen southbound Dubuque Street to provide a separate southbound right turn lane (Refer to Figure 2, Sheet 2 of 3).

The modifications to change the Park Road Bridge from 2 eastbound and 2 westbound lanes to 3 eastbound and 1 westbound lane would involve the removal and rebuilding of 370' of a 4' wide median, removal of existing bridge light poles in the median, and the addition of another left turn signal head. The position of the new median would move to the north 12' of the old location. The new median would be doweled onto the bridge deck in the new location. These modifications are estimated to cost $185,000, (Refer to Table 5 in the attached Appendix for a cost breakdown).

The rebuilding of the median 12' to the north of the existing median may not be necessary to convert the bridge. If the median was not rebuilt the bridge could be more easily converted back to 2 eastbound and 2 westbound lanes in the future.

However, the median does play an important role in transforming the bridge to 3 eastbound and 1 westbound lanes. The traffic along this corridor is familiar with a median in the current location and lane modification will take traffic time to adjust. The adjusted median will provide a physical guide for traffic to the proper lanes.

The Park Road Bridge is crowned in the middle with a 2% transverse slope. Adjustment of the median to the north could cause water to run along the median and across the westbound lane at either end of the bridge. Different drainage design alternatives will need to be evaluated to determine the best configuration for the median.

The addition of a dual left turn lane can be constructed with minor modifications (pavement markings) on the Dubuque Street northbound receiving lanes. This can be seen in the Appendix, Figure 4.

The primary benefit of the conversion of the westbound lane on Park Road to an eastbound left turn lane can be seen in Table 3 for the PM Peak hour conditions. As can be seen in Table 3, eastbound left turn delay is reduced from a LOS E to a LOS D. Also, the northbound left turn movement benefits from the improved intersection capacity and receives a reduction in delay of 27 seconds per vehicle and LOS upgrade from poor E to an acceptable C. The overall intersection delay

improves from 37.2 seconds per vehicle, LOS D to 22.6 seconds per vehicle and LOS C.

Most of the operational benefit of the eastbound dual left turn lanes is realized in the PM Peak. The existing and proposed queue lengths in Table 1, AM Peak, in the Appendix are the same for the northbound left and through and the southbound through. The queues do not change because the pedestrian phase on the eastbound approach extends the green time to allow a pedestrian to cross. In other words, the length of the eastbound phase is dictated by pedestrian traffic, not vehicular traffic during the AM Peak.

Therefore, the northbound and southbound queue lengths do not change in the AM Peak before and after the improvement because the proportions of the signal cycle do not change.

The widening improvements to add a 300' right turn lane to the southbound lanes on Dubuque Street will involve 12' pavement widening, a retaining wall, and traffic signal relocation. The estimated cost for this improvement is nearly $200,000. During the AM peak hour the addition of the right turn lane significantly improves the overall operation of the intersection. The intersection improves from 19.8 seconds per vehicle of delay (under just the eastbound left improvement) to 14.3 seconds per vehicle with the addition of the right turn lane (Refer to Table 4 in the Appendix).

RECOMMENDATIONS

Based on the above analyses and discussion, the following is recommended:

- Convert the interior westbound lane of Park Road to an eastbound left turn lane by removing and rebuilding the median 12' to the north.
- Widen southbound Dubuque Street to accommodate a 300' long right turn bay.
- Perform bridge deck maintenance concurrently with median modifications. Note, the bridge deck maintenance costs are not included in this memo.
- Maximum benefit for the intersection can be realized if both proposed improvements are constructed simultaneously. However, if funds are insufficient for both, the first priority should be the eastbound dual left turn lanes on Park Road.

APPENDIX

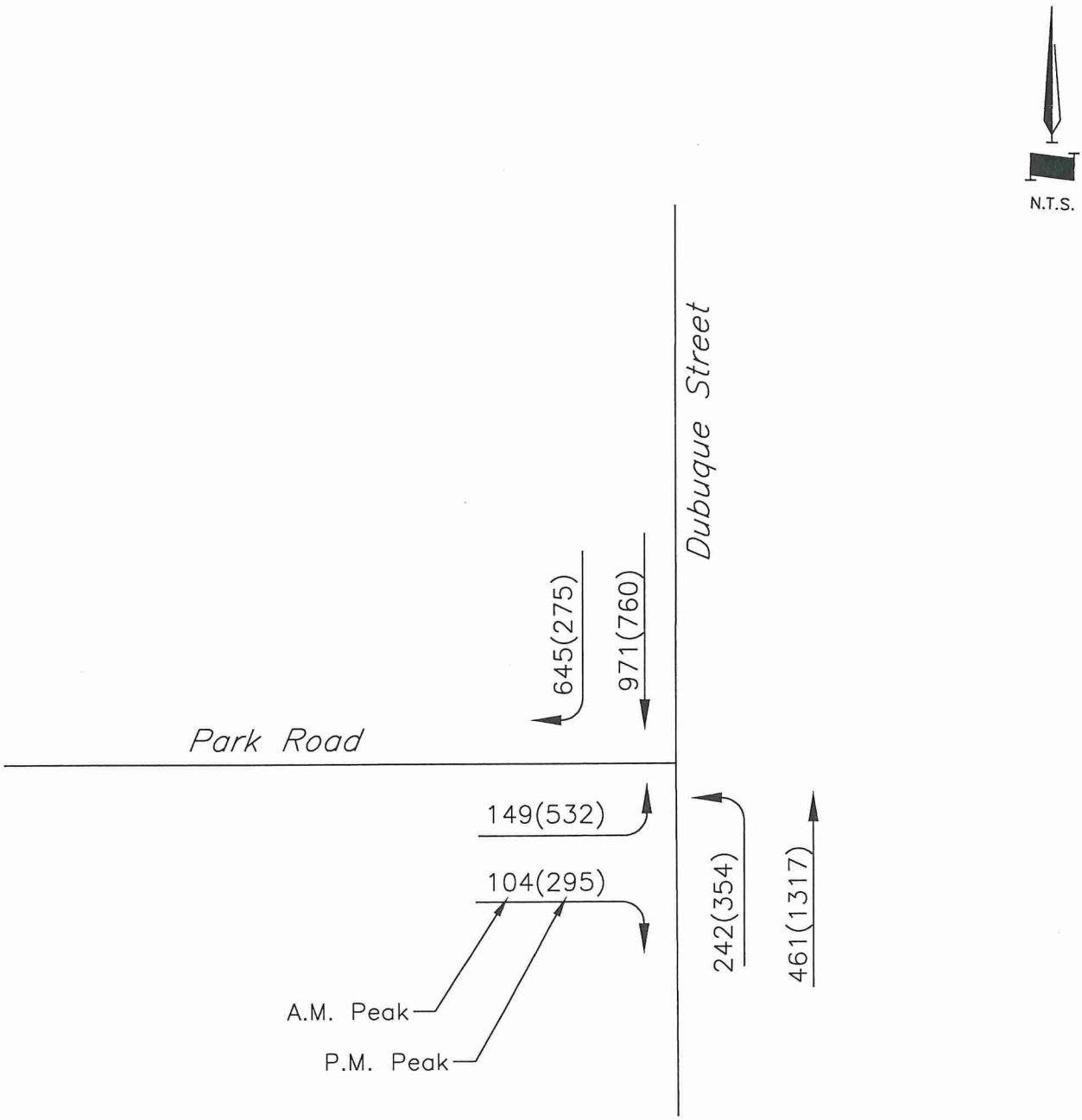
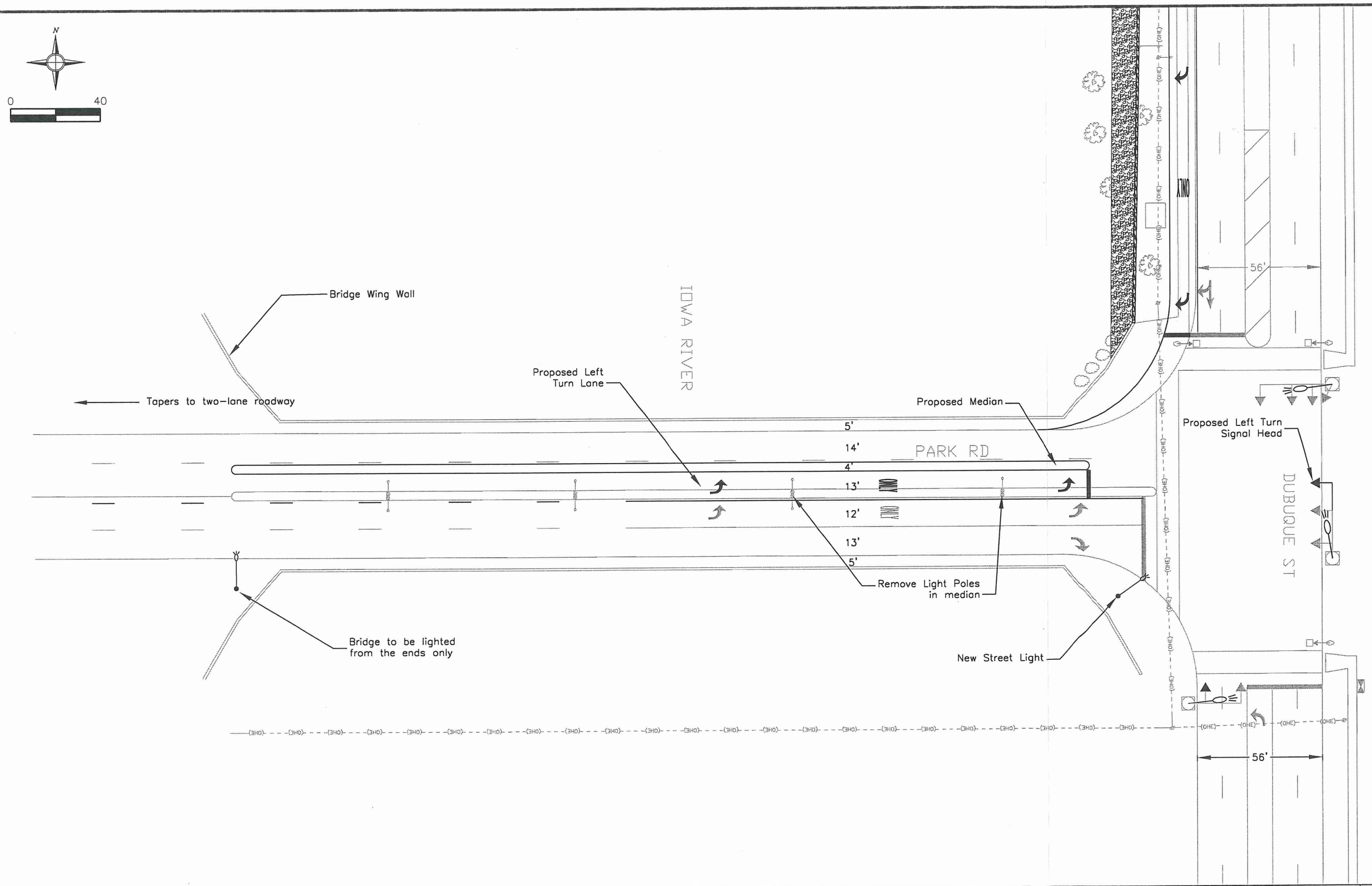


Figure 1
Existing Traffic Volumes

ANDERSON-BOGERT
Engineers & Surveyors, Inc.



NO.	REVISION DESCRIPTION	APPROVED	DATE

Client: JCCOG
Address
Iowa City, IA Zip
Phone: (###) ###-####

ANDERSON-BOGERT
Engineers & Surveyors, Inc.

Drawn By: TPM Approved By: JCM
Date: 3/15/06
Project No. 200136

Dubuque Street and Park Road Intersection

Figure 2
Proposed Park Road Improvements

SHEET NO. 1 OF 3

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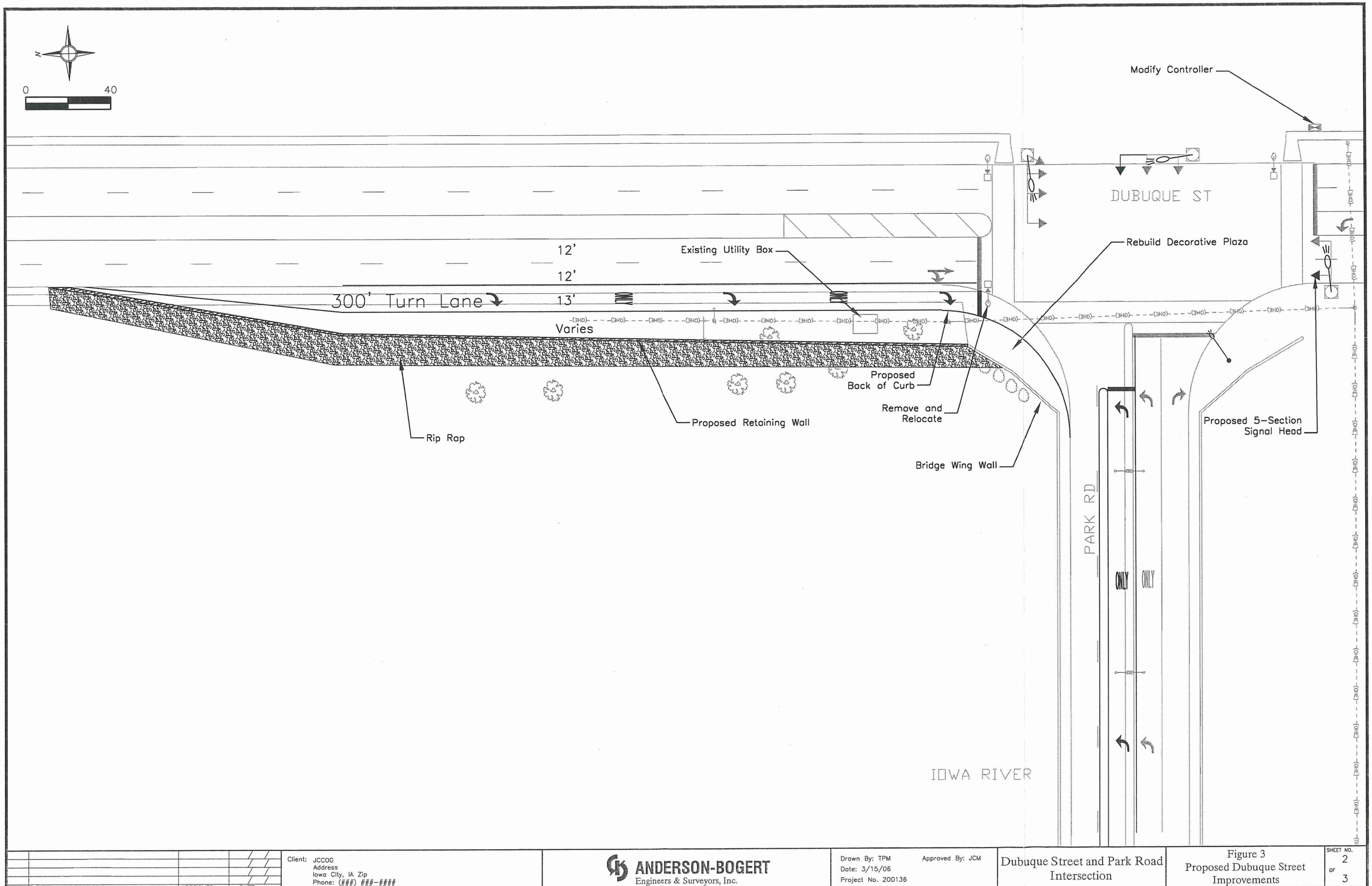

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ANDERSON-BOGERT
Engineers & Surveyors, Inc.

Drawn By: TPM
Date: 3/15/06
Project No. 200136
Approved By: JCM

Dubuque Street and Park Road Intersection

Figure 3
Proposed Dubuque Street Improvements

SHEET NO. 2 OF 3

N

0 40

Modify pavement markings

Vehicle Swept Path

IOWA RIVER

5'

BUS

4'

SU

BUS

13'

5'

ONLY

SU

BUS

56'

Vehicle Swept Path

DUBUQUE ST

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NO.	REVISION DESCRIPTION	APPROVED	DATE

Client: JCCOG
Address
Iowa City, IA Zip
Phone: (###) ###-####

ANDERSON-BOGERT
Engineers & Surveyors, Inc.

Drawn By: TPM Approved By: JCM
Date: 3/15/06
Project No. 200136

Dubuque Street and Park Road Intersection

Figure 4
Dual Left Turn

SHEET NO. 3 OF 3

TABLE 1
Dubuque Street and Park Road
AM Peak

100s Cycle	Existing					Proposed				
Movement	Lanes	Vol. (vph)	Queue (Ft)	Delay (sec/veh)	LOS	Lanes	Vol. (vph)	Queue (Ft)	Delay (sec/veh)	LOS
Eastbound										
Left	1	149	154	46.9	D	2	149	73	36.3	D
Right	1	104	44	9.2	A	1	104	44	10.1	B
Northbound										
Left	1	242	#255	41.2	D	1	242	#255	37.4	D
Thru	2	461	67	4.0	A	2	461	67	3.3	A
Southbound										
Thru	2	971	#660	23.7	C	2	971	#660	21.0	C
Right	-	645	-	-	-	-	645	-	-	-
				22.3	C				19.8	B

Note: LOS - Level of Service

* Indicates movement has continuous right of way.

\- Indicates movement shares traffic lane.

\# Indicates 95th percentile volume exceeds capacity, queue may be longer.

m Indicates Volume for 95th percentile queue is metered by upstream signal.

TABLE 2
Dubuque Street and Park Road
Noon Peak

100s Cycle	Existing					Proposed				
Movement	Lanes	Vol. (vph)	Queue (Ft)	Delay (sec/veh)	LOS	Lanes	Vol. (vph)	Queue (Ft)	Delay (sec/veh)	LOS
Eastbound										
Left	1	201	169	25.9	C	2	201	73	21.6	C
Right	1	137	44	6.4	A	1	137	44	7.2	A
Northbound										
Left	1	187	70	7.5	A	1	187	50	5.8	A
Thru	2	494	82	6.2	A	2	494	58	4.7	A
Southbound										
Thru	2	450	201	17.0	B	2	450	164	14.3	B
Right	-	172	-	-	-	-	172	-	-	-
				12.9	B				10.8	B

Note: LOS - Level of Service

* Indicates movement has continuous right of way.

\- Indicates movement shares traffic lane.

\# Indicates 95th percentile volume exceeds capacity, queue may be longer.

m Indicates Volume for 95th percentile queue is metered by upstream signal.

TABLE 3
Dubuque Street and Park Road
PM Peak

100s Cycle	Existing					Proposed				
Movement	Lanes	Vol. (vph)	Queue (Ft)	Delay (sec/veh)	LOS	Lanes	Vol. (vph)	Queue (Ft)	Delay (sec/veh)	LOS
Eastbound										
Left	1	532	#585	59.8	E	2	532	246	42.0	D
Right	1	295	57	4.5	A	1	295	71	7.5	A
Northbound										
Left	1	354	#385	62.4	E	1	354	#311	34.1	C
Thru	2	1317	421	18.4	B	2	1317	273	8.9	A
Southbound										
Thru	2	760	#508	50.3	D	2	760	405	30.3	C
Right	-	275	-	-	-	-	275	-	-	-
				37.2	D				22.6	C

Note: LOS - Level of Service

* Indicates movement has continuous right of way.

\- Indicates movement shares traffic lane.

\# Indicates 95th percentile volume exceeds capacity, queue may be longer.

m Indicates Volume for 95th percentile queue is metered by upstream signal.

TABLE 4
Dubuque Street and Park Road
Southbound Right Turn Lane

100s Cycle	Proposed AM					Proposed PM				
Movement	Lanes	Vol. (vph)	Queue (Ft)	Delay (sec/veh)	LOS	Lanes	Vol. (vph)	Queue (Ft)	Delay (sec/veh)	LOS
Eastbound										
Left	2	149	68	28.9	C	2	532	236	33.5	C
Right	1	104	42	8.7	A	1	295	67	6.6	A
Northbound										
Left	1	242	152	16.1	B	1	354	240	22.4	C
Thru	2	461	67	4.2	A	2	1317	306	10.7	B
Southbound										
Thru	2	971	337	22.0	C	2	760	313	30.2	C
Right	1	645	181	6.7	A	1	275	44	2.5	A
				14.3	B				18.5	B

Note: LOS - Level of Service

* Indicates movement has continuous right of way.

\- Indicates movement shares traffic lane.

\# Indicates 95th percentile volume exceeds capacity, queue may be longer.

m Indicates Volume for 95th percentile queue is metered by upstream signal.

TABLE 5
DUBUQUE STREET & PARK ROAD
CONCEPT STUDY
IOWA CITY - 200136
OPINION OF CONSTRUCTION COSTS TO CONVERT
WESTBOUND LANE ON PARK ROAD TO EASTBOUND OPERATION

	ITEM DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
1.	MOBILIZATION	1	LS	$10,000	$10,000
2.	CONSTRUCTION SURVEY	1	LS	$2,000	$2,000
3.	DECK REPAIR UNDER EXISTING MEDIAN	1	LS	$10,000	$10,000
4.	MEDIAN REMOVAL	370	LF	$150	$55,500
5.	PCC MEDIAN, 6"	200	SY	$50	$10,000
6.	PAINTED PAVEMENT MARKINGS, DURABLE	1	LS	$1,000	$1,000
7.	REMOVE LIGHT POLES	8	EA	$350	$2,800
8.	STREET LIGHTS	2	EA	$5,000	$10,000
9.	TRAFFIC SIGNAL MODIFICATION	1	LS	$20,000	$20,000
10.	TRAFFIC CONTROL	1	LS	$10,000	$10,000

SUBTOTAL	$132,000
CONTINGENCY (25%)	$33,000
ENGINEERING	$20,000
TOTAL	**$185,000**

TABLE 6
DUBUQUE STREET & PARK ROAD
CONCEPT STUDY
IOWA CITY - 200136
OPINION OF CONSTRUCTION COSTS TO WIDEN SOUTHBOUND DUBUQUE STREET TO ADD A SEPARATE RIGHT TURN LANE

ITEM DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
1. MOBILIZATION	1	LS	$10,000	$10,000
2. EXCAVATION, CL 10, ROADWAY	1,000	CY	$5	$5,000
3. CONSTRUCTION SURVEY	1	LS	$4,000	$4,000
4. PCC PAVEMENT, 10 IN	600	SY	$30	$18,000
5. MODULAR BLOCK WALL	1,800	SF	$25	$45,000
6. SPECIAL BACKFILL, 6"	200	TON	$15	$3,000
7. CURB REMOVAL	500	LF	$8	$4,000
8. CURB AND GUTTER	525	LF	$20	$10,500
9. SUBDRAIN, LONGITUDINAL, 4" DIA	500	LF	$5	$2,500
10. PAINTED PAVEMENT MARKINGS, DURABLE	1	LS	$1,500	$1,500
11. TRAFFIC SIGNAL MODIFICATION	1	LS	$20,000	$20,000
12. TRAFFIC CONTROL	1	LS	$10,000	$10,000
13. TOPSOIL, FURNISH, SPREAD	100	CY	$10	$1,000
14. SEEDING/EROSION CONTROL	1	LS	$2,000	$2,000

SUBTOTAL	$137,000
CONTINGENCY (25%)	$35,000
ENGINEERING	$20,000
TOTAL	**$192,000**