INTELLIGENT TRANSPORTATION SYSTEM PLAN

Dubuque
All-America City
2007

THE CITY OF
DUBUQUE
Masterpiece on the Mississippi

ECIA

Iowa Department
of Transportation

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Purpose

The purpose of the Intelligent Transportation System Plan for the City of Dubuque area is to provide a strategy for the application and integration of new and/or enhanced opportunities for the implementation of intelligent transportation system (ITS) applications within the City of Dubuque as well as its surrounding areas, with a focus on improving safety and efficiency of the traffic flow of the transportation network. This ITS plan will guide the deployment and operation of advanced traffic management technology in an integrated citywide fashion while preserving regional and statewide relationships, to create a sustainable advanced traffic management system.

The ITS objectives are as follows:

- To identify highway traffic congestion on the primary highway in the City of Dubuque that can be improved by the development and installation of ITS.
- To develop an ITS system for traffic surveillance, the monitoring of the video detectors, and the tweaking of the traffic signals and interconnect system between the traffic signals from remote locations (city hall, laptop computers, cell phones, etc.).
- To prioritize the ITS projects in an order that would meet the needs of the traveling public and keep the projects small enough to meet the funding constraints of the Iowa DOT and City of Dubuque.
- To avoid duplication of effort and equipment between the projects.
- To methodize a process from the existing infrastructure to the future ITS.
- To develop both short-term and long-term strategies for the implementation of the ITS
- To demonstrate the benefits of ITS to the traveling public.

With ITS, advanced technology is used to coordinate signals and improved traffic progression, reduce incident clearance times, improve real-time traveler information, improve progression and enhance special event traffic management. It guides the deployment, management and operation of advanced traffic management technology within the area while serving as an educational tool.

ITS, if properly deployed and operated reduces congestion related to high traffic volumes, incidents and special events that reduce the overall quality of life to the Dubuque community.

Local Efforts

The City of Dubuque is and has been committed to continuing to improve traffic flow within the City as well as incorporating appropriate ITS type assets where necessary. Given this, the City of Dubuque has begun construction of a fiber optic backbone along the Iowa Highway 32 (Northwest Arterial) and through other parts of the downtown area. Since signal operations are so sensitive to queues and safety, a long term signal communications loop would minimize the impact of losing signal communications.

The City of Dubuque has undertaken an aggressive program to install fiber optic conduit and advanced ITS components into all new or reconstructed traffic signal controllers throughout the City of Dubuque. The need for monitoring traffic and adapting signal plans to changing conditions has led the City to install four-inch multi-ducted conduit under all new roadways to accommodate future fiber optic communications cable.

The City of Dubuque has invested in a robust Traffic Operations System that uses advanced communication technologies along with state of the art traffic control equipment that allows management of the operations via a Traffic Operations Center (TOC) located at City Hall. Using these new communication technologies changes the whole concept of a Traffic Operations Center in that there is no longer a need to have personnel centralized at the TOC, but instead allows management of the system from any PC connected to the internet.

Investments in maintaining traffic flow along major corridors have occurred. The City of Dubuque has developed new traffic signal standards that include: emergency generator connection ports and battery back-up systems for when power failures occur throughout the City as well as network gear and monitoring equipment that ties signals back to the IP-based traffic operations center.

Transportation Related Grants Awarded to the City of Dubuque for years 2005-2009

Year	Description	ICAAP Funds*	TSF Funds**	City Funds	Total Project Cost
2005	Devon to Menards			$183,678	$183,678
2006	Traffic Control System/ Locust Connector	$330,090		$82,521	$421,611
2007	IA 32 (NW Arterial) Capacity Improvements	$448,086		$162,022	$610,108
2008	IA 32 (NW Arterial) Capacity Improvements		$500,000	$690,000	$1,190,000
	US 151/61 Capacity Improvements	$400,000		$471,500	$871,500
2009	Pennsylvania Ave Safety Improvements		$500,000	$25,000	$525,000
		$1,178,176	**$1,000,000**	**$1,614,721**	**$3,792,897**

*ICAAP: Iowa Clean Air Attainment Program **TSF: Transportation Safety Fund

Local Efforts (contd.)

Other ITS Related Projects in last 5 years funded by the City of Dubuque	
Description	**Investment**
Fiber Optic Conduit Installation	$1,875,000
Purchase of ACTRA City Wide Traffic Software	$150,000
Fiber Optic Network and Equipment	$275,000
PTZ Cameras and Sensors	$125,000
Video Detection installations	$250,000
Traffic Signal Intersections Upgrade	$2,125,000
Battery Backup Installation Program	$140,000
LED Signal Upgrades	$275,000
Pre-Emption Upgrades and Software	$175,000
Traffic Operations Center	$225,000
	$5,615,000

Equipment

ITS technology will provide the continuous collection of traffic volume data, intersection reports, failure/malfunction notifications, video monitoring, overall control for signal timing and ability to redirect traffic. The proposed equipment will focus on implementing technology so that the corridor can be continuously monitored and managed.

Large Dynamic Message Sign (DMS) Board

DMS is an effective way of informing motorists in advance of a situation by:

- Notifying motorists of issues or events occurring within the City of Dubuque.
- Being integrated and accessible by the Iowa Department of Transportation
- Communicating a wide range of alerts to the public, such as:
    - Traffic Alerts
    - Incidents
    - Planned Construction Activities
    - Weather Alerts and Road Closures
    - Special Events (which generate excess traffic flow)
    - Maintenance Crew Activities
    - AMBER Alerts
    - National Security Information

Small Dynamic Message Sign (DMS) Board

The small board will provide some of the same functions as the larger DMS board, however the small board will primarily serve to divert traffic at locations along the primary roadway.

Smart Sensor

Smart Sensor measures up to eight lanes of traffic simultaneously using microwave technology and records the following:

- Vehicle Volume
- Vehicle Occupancy
- Vehicle Speed
- Vehicle Classification
- Could Be Used by Iowa Department of Transportation for Traffic Counts
- Provides an Accurate Traffic Count versus Manual Traffic Count
- Daily Timing Patterns (for signal progression)

Information gathered from the smart sensors is used to create daily traffic patterns which are programmed into the traffic signals.

Equipment (contd.)

Traffic Cameras

Traffic Cameras provide the following:

- Smooth Out Traffic Congestion (which can lead to costly and deadly accidents)
- Give Real-Time Road Up-Dates
- Gather Data on Traffic Snarls and Patterns (used for daily management of the system)
- Used during traffic timing studies to confirm the smooth platooning of traffic

City of Dubuque Fiber Optics Loop

A fiber optics loop provides that both ends will be connected to the traffic center. The loop would be bidirectionally redundant for the benefit that if a network switch or a section of fiber failed, communications to all other points in the system would still be operational.

Video Detection Cameras

These cameras are used to detect the presence of vehicles at a stop light. Video detection cameras replace loops of wire that are normally cut into the road. This form of detection is much more dynamic.

Fiber Optic Communications

The City of Dubuque has been aggressively installing fiber optics throughout the city for future traffic signal communications and to aid other city entities. Our standards include:

- Hybrid single-mode/multi-mode fiber optic cable in dedicated conduit paths
- 4 inch polyethylene duct with 4-1 inch duct inside
- Pre-cast concrete vaults with cast iron manhole lids at approximately 500 foot spacing

These fiber optic lines are installed along roadways and are terminated at traffic control devices along the route (traffic signals, smart sensors, video detection, PTZ cameras, DMS boards, etc.). Once tied into the optics, these devices are all connected and interact with equipment back at the TOC. The cost to install fiber varies from location to location; urban installations are typically more costly than rural installations.

Gigabyte Network Backbone

This equipment consists of fiber optics, switching gear and other standard networking equipment used to communicate with traffic control/ITS equipment. This form of communication replaces older, slower proprietary equipment that was the standard years ago. This fiber network backbone uses a recognized standard communications protocol just like the network found in most IT departments. Using this form of communication also allows for a scalable system that is easily expanded or modified.

Wireless Communications

The ultimate goal of the ITS network is to be able to connect information to laptop computers located in City of Dubuque vehicles or cell phones located on city personnel to inform of events that require immediate attention. Many devices in the field use wireless technologies to communicate with the traffic network

Justification

Priority 1: U.S. 20 From Cousins Road To Julien Dubuque Bridge

This is one of the fastest growing corridors within the State of Iowa, therefore ITS would be used to monitor the traffic through surveillance cameras, video detectors and the ability to adjust traffic signals and the interconnect system between the traffic signals and remote locations (city hall, laptop computers, cell phones, etc.).

Priority 2: U.S. 61/151 From South Grandview Avenue To North of Jones Street

Will maintain smooth travel on U.S. 61/151 and U.S. 52 during construction of the future Southwest Arterial and U.S. 20/Julien Dubuque Bridge.

Priority 3: U.S. 52 From 4th Street To 32nd Street

The ITS infrastructure would monitor the highway traffic congestion through the downtown and fiber optics would replace an old wire interconnect between the traffic signals. This priority will help achieve the goal of establishing a fiver optic loop.

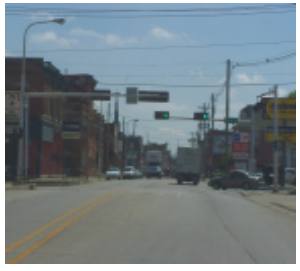
Priority 4: U.S. 61 and U.S. 151 Interchange

With future construction projects: U.S. 61/151/52 bridge over Catfish Creek, Iowa Highway 32 (Southwest Arterial) and U.S. 20/Julien Dubuque Bridge, these signals would be in place to notify motorists of construction detours and delays associated with these projects. Due to the close proximity of U.S. 61/151 interchange to Iowa Highway 32 (Southwest Arterial) large DMS boards will be required on both U.S. 61 and U.S. 52 interchanges.

Priority 5: IA 32 and U.S. 52 From John F. Kennedy Road To 32nd Street

This priority will complete the fiber optics loop within the City of Dubuque, which will keep traffic signals and the traffic signal interconnect systems functioning at all times in the event that the fiber optics cable is severed. The loop allows for traffic system data to pass through the fiber optics cable in either direction.



Justification (contd.)

Priority 6: U.S. 52 From 4th Street To 32nd Street

Due to the traffic signal light poles showing considerable ruts and section loss along with the traffic signal interconnect operating with a metallic wire system; the traffic signals in this corridor are in desperate need of updating.

Priority 7: U.S. 61/151 Wisconsin Bridge

DMS boards will notify motorists of detours and delays with during the construction of: U.S. 61/151/52 bridge over Catfish Creek and U.S. 20/Julien Dubuque Bridge.

Priority 8: U.S. 20 Julien Dubuque Bridge

DMS board will notify motorists of detours and delays during the construction of the U.S. 20/Julien Dubuque Bridge.

Priority 9: Southwest Arterial

This SW Arterial connects two rapidly growing areas with a link that will help complete the regional transportation network. The ITS improvements along this route will notify motorists of detours or delays and guide them to alternate corridors to help minimize congestion. This route also extends the City's fiber optic network to the south side of Dubuque where it can be tied into the 151/61 corridor. This communication line will also be connected to many traffic signals and sensors that will allow remote management of the corridor from the City of Dubuque's Traffic Operation Center located at City Hall.

Priority 1: U.S. 20 From Cousins Road To Julien Dubuque Bridge

Equipment:

Large DMS Board will be located between

- Cousins Road & Seippel Road (before the future Iowa Highway 32 (Southwest Arterial))

Small DMS Boards will be located between:

- Iowa Highway 32 (Northwest Arterial) and Old Highway Road
  - Allowing for traffic to be diverted from U.S. 20 onto Iowa Highway 32 (Northwest Arterial)
- John F. Kennedy Road and University Avenue Extension
  - Allowing for traffic to be diverted from U.S. 20 onto University Avenue Extension
- Grandview Avenue and Hill Street
  - Allowing for traffic to be diverted from U.S. 20 onto Hill Street
- Northwest Arterial & Crescent Ridge*
  - Will divert outbound traffic from U.S. 20 onto the Northwest Arterial

*Funded by Iowa DOT and is scheduled for installation in 2010.

Smart Sensors will be located between:

- Old Highway Road and Iowa Highway 32 (Northwest Arterial)
- John F. Kennedy Road and Wacker Drive
- University Avenue Ext. and Devon Drive
- Hill Street and Locust Street

Cameras will be located at the following intersections:

- Between Hill Street and Locust Street

Fiber and Conduit will be installed from:

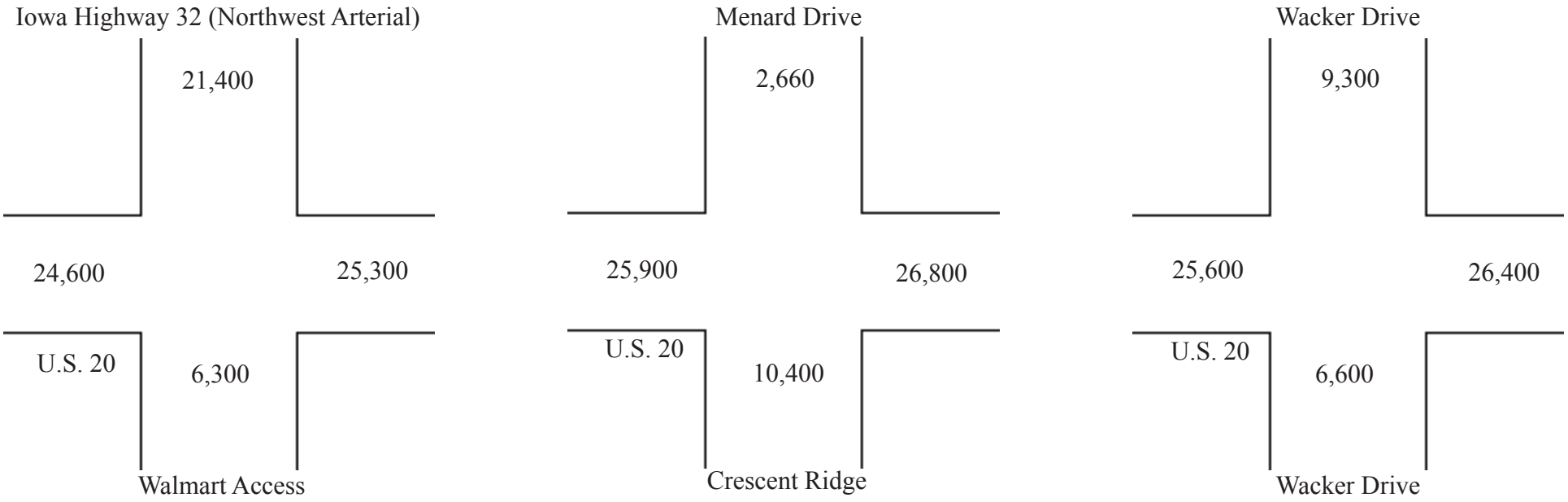
- Menards intersection to Cousins Rd

Priority 1: U.S. 20 From Cousins Road To Julien Dubuque Bridge

Benefits

- Ability to alert traffic during the construction of U.S. 20/Julien Dubuque Bridge.
- Traffic center will be alerted of slow movements on U.S. 20, especially at the intersection of U.S. 20 and the Locust Connector. Allowing for traffic to be diverted accordingly.
- Motorists will be notified of delays and detours along U.S. 20.
- City staff will be notified of back-ups on U.S. 20

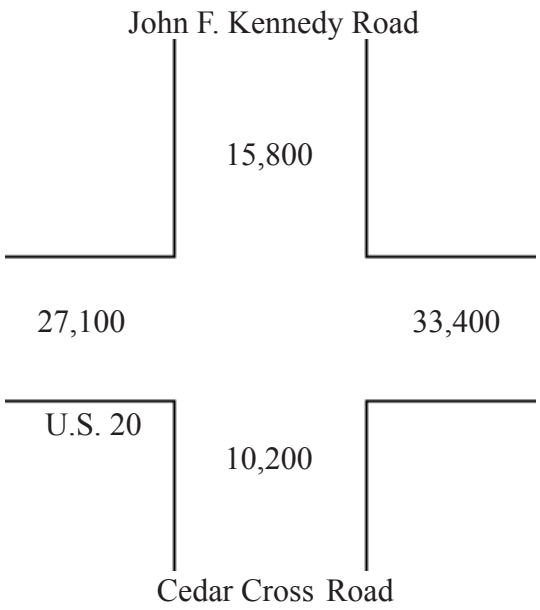
Vehicle Volume:

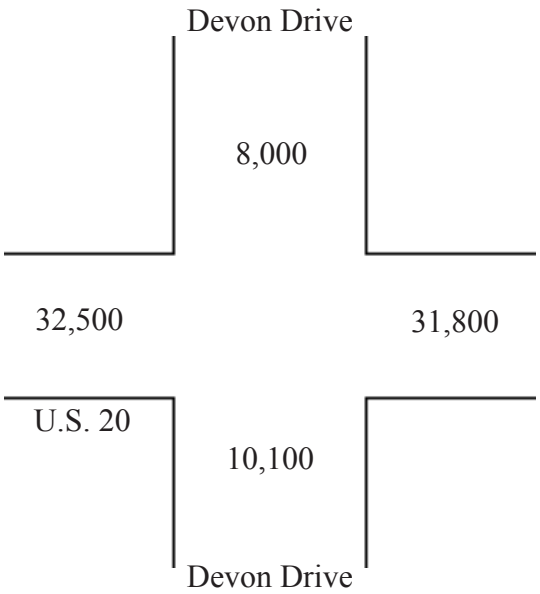


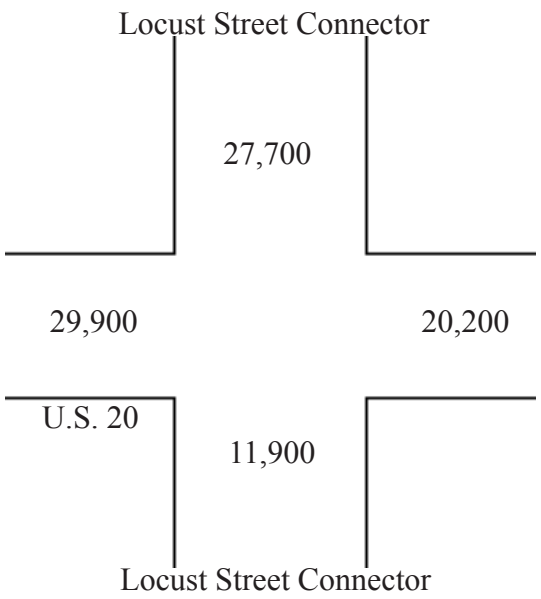
Source: Iowa DOT 2005 Traffic Counts

Priority 1: U.S. 20 From Cousins Road To Julien Dubuque Bridge

Vehicle Volume(continued)







Source: Iowa DOT 2005 Traffic Counts

Priority 1: U.S. 20 From Cousins Road To Julien Dubuque Bridge

Crash Data 2004-2006:

U.S. 20 at Iowa Highway 32 (Northwest Arterial)

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	2
Possible/Unknown	4
Property Damage Only	17
Total Crashes	23

U.S. 20 at Crescent Ridge

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	1
Possible/Unknown	4
Property Damage Only	6
Total Crashes	11

U.S. 20 at Wacker Drive

Crash Summary	
Fatal	1
Major Injury	2
Minor Injury	3
Possible/Unknown	14
Property Damage Only	30
Total Crashes	50

U.S. 20 at JFK/Cedar Cross

Crash Summary	
Fatal	1
Major Injury	-
Minor Injury	-
Possible/Unknown	4
Property Damage Only	15
Total Crashes	20

U.S. 20 at Devon Drive

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	-
Possible/Unknown	2
Property Damage Only	18
Total Crashes	20

Hill Street Westbound On Ramp

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	-
Possible/Unknown	6
Property Damage Only	11
Total Crashes	17

U.S. 20 between Hill Street & Locust Connector

Crash Summary	
Fatal	-
Major Injury	1
Minor Injury	1
Possible/Unknown	8
Property Damage Only	17
Total Crashes	27

U.S. 20 at Locust Connector

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	4
Possible/Unknown	4
Property Damage Only	22
Total Crashes	30

Source: CMAT

Priority 1: U.S. 20 From Cousins Road To Julien Dubuque Bridge

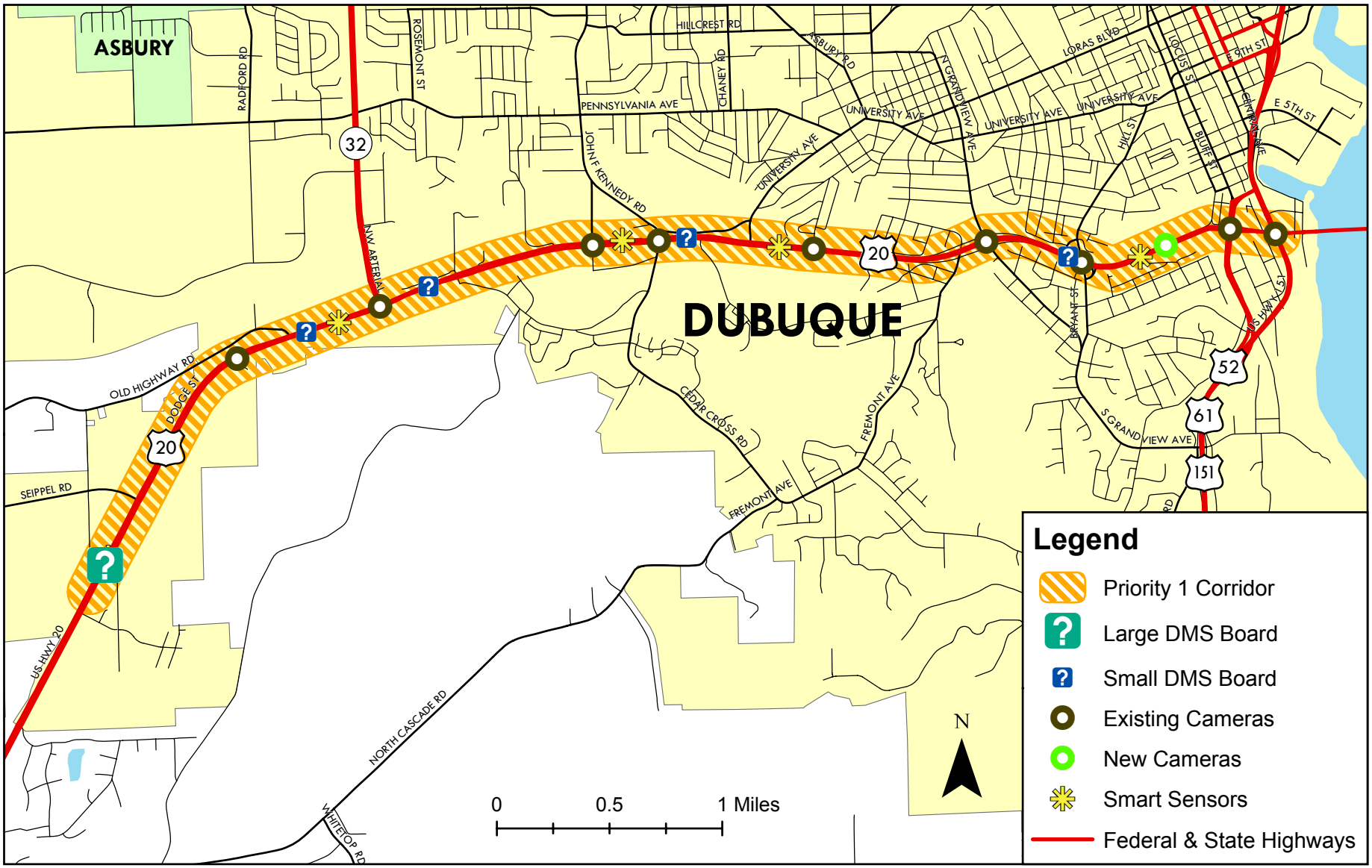
Cost Breakdown:

Priority 1 Total ITS Infrastructure Costs		
Item	**Units**	**Total Cost**
Large DMS Board	1	$225,000
Small DMS Board	3*	$225,000
Smart Sensors	4	$48,000
Camera	1	$12,000
Fiber	1	$158,400
Engineering & Administration Cost	15%**	$100,260
Total Priority 1 Cost		**$768,660**

**Engineering and administration costs for City of Dubuque portion

*Small DMS Board on U.S. between Iowa Highway 32 (Northwest Arterial) and Crescent Ridge is funded by IADOT and is scheduled for installation in 2010

Priority 1: U.S. 20 From Cousins Road To Julien Dubuque Bridge



Priority 2: U.S. 61/151 From S. Grandview Ave to North of Jones Street

Equipment:

Small DMS Boards will be located between:

- South Grandview Avenue and Locust Street Exit
  - Allows for traffic to be diverted on to U.S. 20
- Kerper Boulevard and 11th Street
  - Allows for traffic to be diverted on to U.S. 20

Smart Sensors will be located:

- Between South Grandview Avenue and Locust Street Exit
- Between U.S. 20 and Locust Street Connector
- Between the base of U.S. 20/Julien Dubuque Bridge

Cameras will be located at the following intersections:

- South Grandview Avenue Exit
- Locust Street Exit
- U.S. 20/Julien Dubuque Bridge

Fiber and Conduit will be install from:

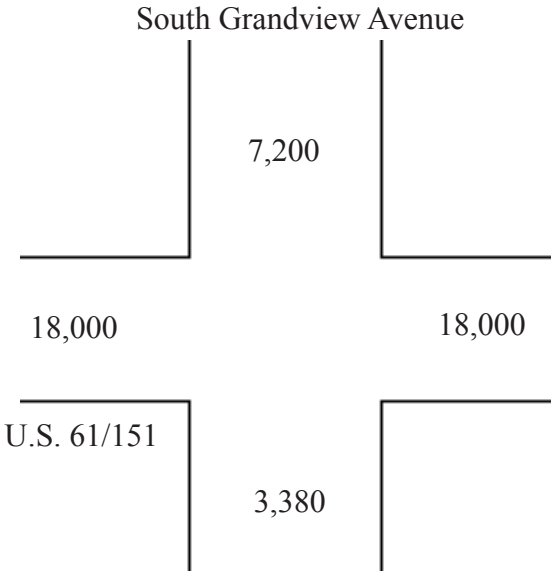
- Locust Street Exit to U.S. 20/Julien Dubuque Bridge

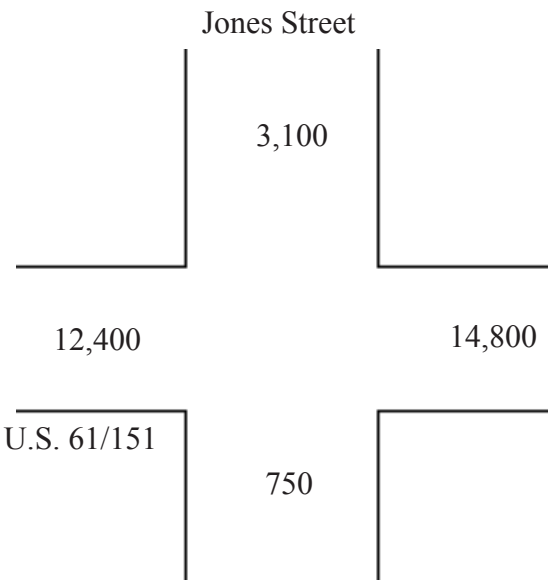
Benefits:

- The small southbound DMS board on U.S. 61/151 will allow for traffic to be diverted northbound on U.S. 52.
- The small DMS boards will notify motorists of delays and detours during the construction of U.S. 61/151/52 Catfish Creek Bridge and the U.S. 20 Julien Dubuque Bridge.
- Cameras near U.S. 20/Julien Dubuque Bridge can also be used to monitor the bridge for homeland security.
- Smart sensors will notify city staff of slow moving traffic on U.S. 61/151/52 and U.S. 20 corridors.

Priority 2: U.S. 61/151 From S. Grandview Ave to North of Jones Street

Vehicle Volume:





Source: Iowa DOT 2005 Traffic Counts

Crash Data 2004-2006:

U.S. 61/151 at South Grandview Avenue

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	-
Possible/Unknown	3
Property Damage Only	12
Total Crashes	15

U.S. 61/151 at Jones Street

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	-
Possible/Unknown	-
Property Damage Only	4
Total Crashes	4

Source: CMAT

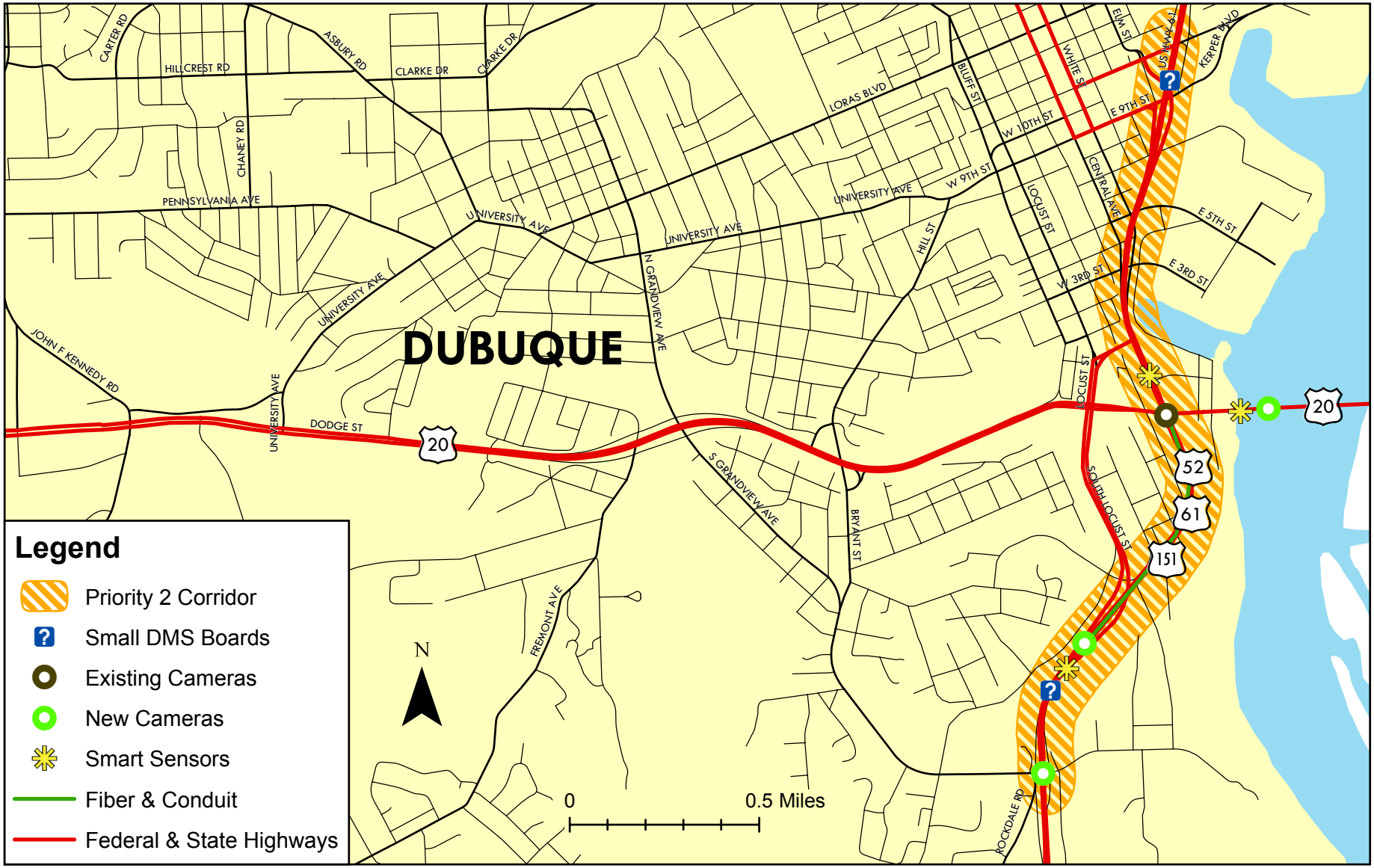
Priority 2: U.S. 61/151 From S. Grandview Ave to North of Jones Street

Cost Breakdown:

Priority 2 Total ITS Infrastructure Costs		
Item	**Units**	**Total Cost**
Small DMS Board	2	$150,000
Smart Sensors	3	$36,000
Camera	3	$36,000
Fiber & Conduit	1.75	$277,200
Termination	3	$10,500
Engineering & Administration Cost	15%**	$76,455
Total Priority 2 Cost		**$586,155**

*Engineering and administration costs for the City of Dubuque portion.

Priority 2: U.S. 61/151 From S. Grandveiw Ave to North of Jones Street



Priority 3: U.S. 52 From 4th Street to 32nd Street

Equipment:

Smart Sensors will be located between:

- 32nd Street and 30th Street
- 13th Street and 14th Street on U.S. 52 Southbound

Cameras will be located at the following intersections:

- 32nd Street
- 22nd Street
- 14th Street
- 11th Street
- 9th Street

Fiber:

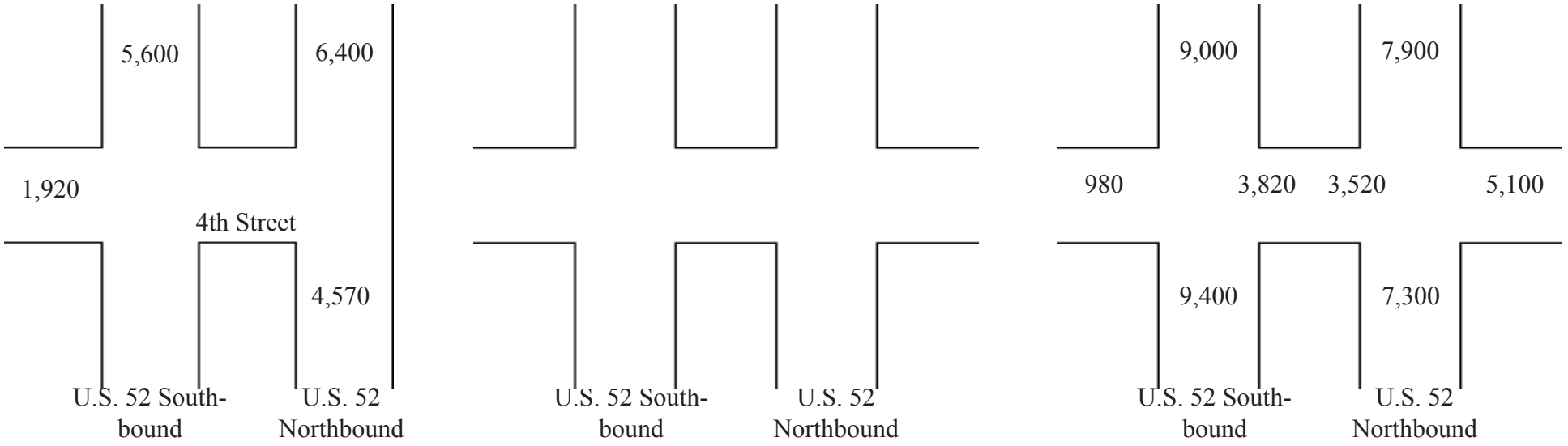
- Will be installed from 13th Street to 32nd Street
  - •Fiber and conduit are already laid from 4th Street to 13th Street

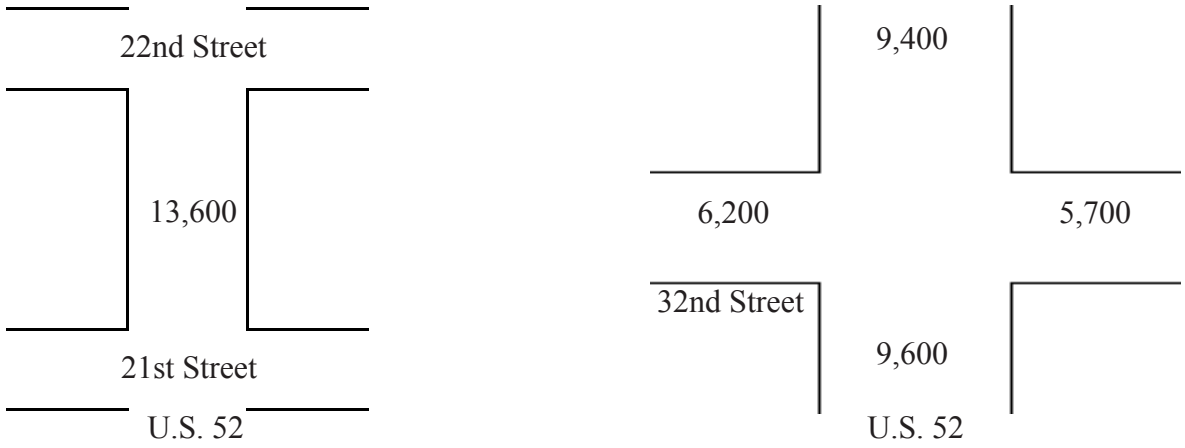
Benefits:

- Replacement of the older equipment (25-30 year old) in this corridor will allow for monitoring of timing changes to occur.
- The addition of fiber will help to complete the needed fiber optics loop around the city (fiber and conduit is already installed from 4th Street to 13th Street).
- Sixty-nine signals in the downtown area could benefit from the fiber optic network placed in this corridor.
- Cameras will allow for monitoring of traffic and the ability to tweak the traffic interconnect system.
- Smart sensors will provide up to date traffic volumes and notification of stopped traffic.
- A portion of the fiber optics loop will be completed.

Priority 3: U.S. 52 From 4th Street to 32nd Street

Vehicle Volume:





Source: Iowa DOT 2005 Traffic Counts

Priority 3: U.S. 52 From 4th Street to 32nd Street

Crash Data 2004-2006:

U.S. 52 at 4th Street

Crash Summary		
	Southbound	Northbound
Fatal	-	-
Major Injury	-	-
Minor Injury	-	-
Possible/Unknown	-	1
Property Damage Only	5	2
Total Crashes	5	3

U.S. 52 at 14th Street

Crash Summary		
	Southbound	Northbound
Fatal	-	-
Major Injury	-	1
Minor Injury	3	1
Possible/Unknown	1	4
Property Damage Only	12	14
Total Crashes	16	20

U.S. 52 at 20th Street

Crash Summary		
	Southbound	Northbound
Fatal	-	-
Major Injury	-	-
Minor Injury	-	-
Possible/Unknown	3	6
Property Damage Only	5	19
Total Crashes	8	25

U.S. 52 at 32nd Street

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	2
Possible/Unknown	2
Property Damage Only	9
Total Crashes	13

Source: CMAT

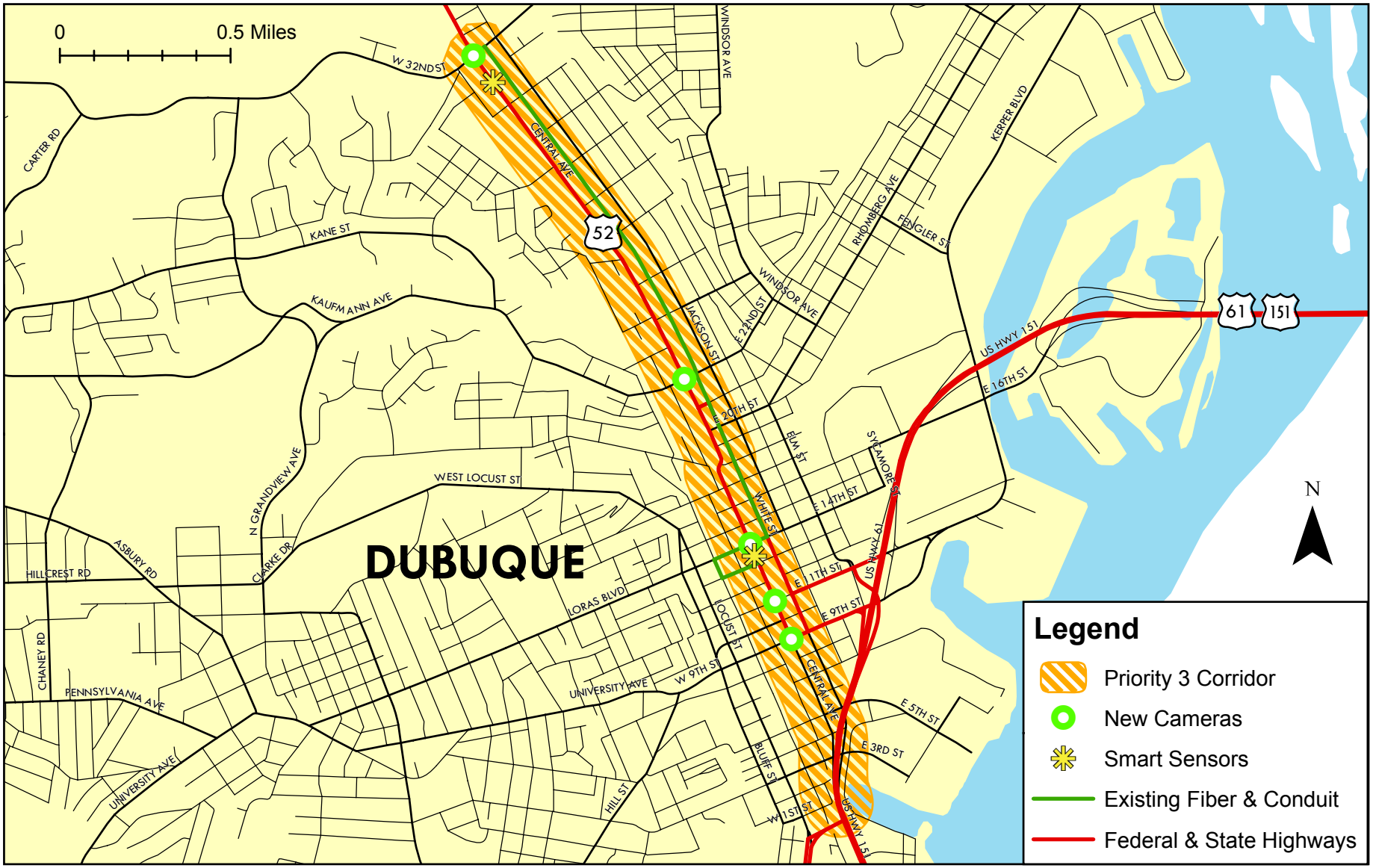
Priority 3: U.S. 52 From 4th Street to 32nd Street

Cost Breakdown:

Priority 3 Total ITS Infrastructure Costs		
Item	**Units**	**Total Cost**
Smart Sensors	2	$24,000
Cameras	5	$60,000
Fiber	2.2	$464,640
Termination	5	$17,500
Engineering & Administration Cost	15%**	$84,921
Total Priority 3 Cost		**$651,061**

*Engineering and administration costs for the City of Dubuque portion.

Priority 3: U.S. 52 From 4th Street to 32nd Street



Priority 4: U.S. 61 & U.S. 151 Interchange

Equipment:

Large DMS Boards will be located between:

- Dubuque Regional Airport & U.S. 61/151 Interchange on U.S. 61
- Hendricks Lane and Military Road on U.S. 151

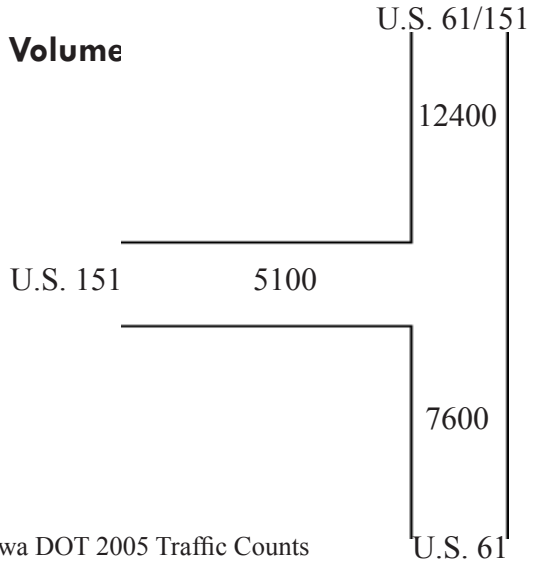
Smart Sensors will be located between:

- Dubuque Regional Airport & U.S. 61/151 Interchange on U.S. 61
- Military Road and Havenwood on U.S. 151
- Tamarack Business Park and Olde Davenport Road on U.S 61/151

Benefits:

- Large DMS boards will be used to notify motorists of delays and detours due to traffic incidents.
- Will inform motorists of delays and detours during the following construction projects: U.S. 61/151/52 Catfish Creek Bridge replacement, Iowa Highway 32 (Southwest Arterial) and U.S. 20/Julien Dubuque Bridge.

Vehicle Volume



Source: Iowa DOT 2005 Traffic Counts

Crash Data 2004-2006:

Crash Summary	
Fatal	-
Major Injury	2
Minor Injury	6
Possible/Unknown	3
Property Damage Only	29
Total Crashes	40

Source: CMAT

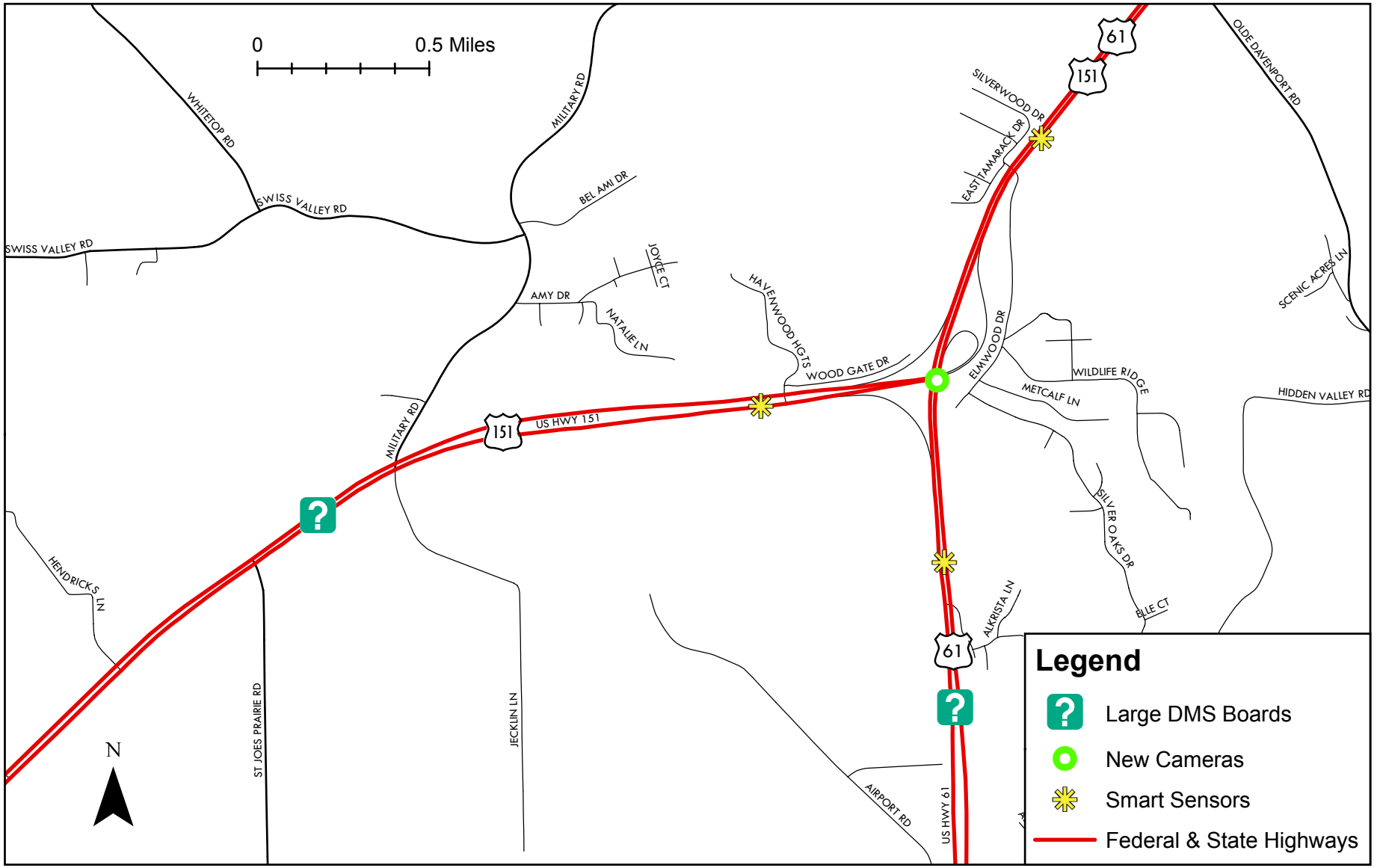
Priority 4: U.S. 61 & U.S. 151 Interchange

Cost Breakdown:

Priority 4 Total ITS Infrastructure Costs		
Item	**Units**	**Total Cost**
Large DMS Board	2	$450,000
Smart Sensors	3	$36,000
Cameras	1	$12,000
Fiber	4.4	$535,000
Engineering & Administration Cost	15%**	$154,950
Total Priority 4 Cost		**$1,187,950**

*Engineering and administration costs for the City of Dubuque portion.

Priority 4: U.S. 61 & U.S. 151 Interchange



Priority 5: IA 32 (Northwest Arterial) & U.S. 52 (JFK Road to 32nd Street)

Equipment:

Small DMS Boards will be located between:

- Sageville Road and Iowa Highway 32 (Northwest Arterial) on U.S. 52

Smart Sensors will be located between:

- John F. Kennedy Road and U.S. 52 on Iowa Highway 32 (Northwest Arterial)
- U.S. 52 between Iowa Highway 32 (Northwest Arterial) and 32nd Street

Camera will be located at the following intersection:

- U.S. 52 and Iowa Highway 32 (Northwest Arterial)
- John F. Kennedy Road and U.S. 52 on Iowa Highway 32 (Northwest Arterial)

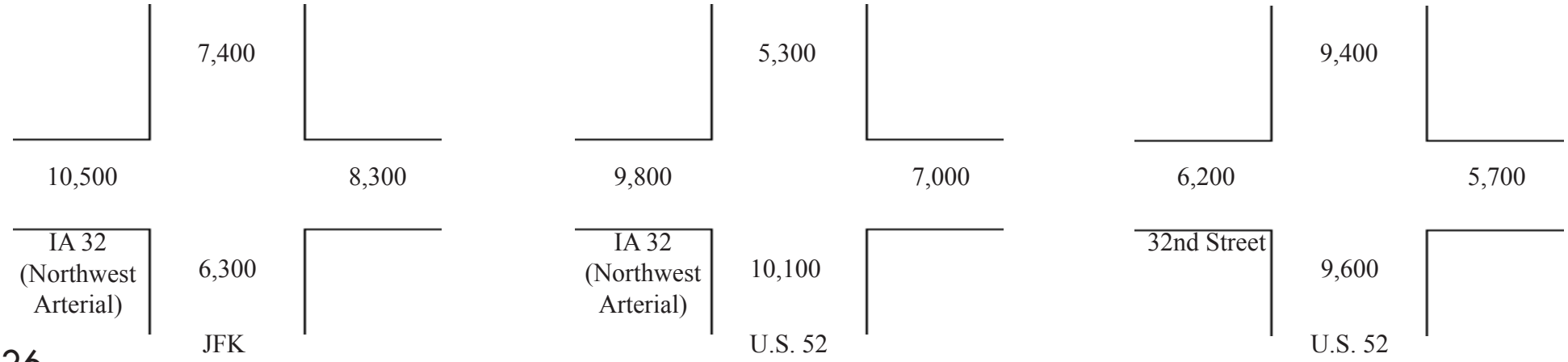
Fiber and Conduit will be installed from:

- John F. Kennedy Road to U.S. 52 on Iowa Highway 32 (Northwest Arterial)
- Iowa Highway 32 (Northwest Arterial) to 32nd Street on U.S. 52

Benefits:

- Fiber and conduit in this corridor will help to complete the needed fiber optics loop within the City of Dubuque.

Vehicle Volume:



Source: Iowa DOT 2005 Traffic Counts

Priority 5: IA 32 (Northwest Arterial) & U.S. 52 (JFK Road to 32nd Street)

Crash Data 2004-2006:

IA 32 (Northwest Arterial) at JFK

Crash Summary	
Fatal	-
Major Injury	2
Minor Injury	1
Possible/Unknown	-
Property Damage Only	8
Total Crashes	11

IA 32 (Northwest Arterial) at U.S. 52

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	2
Possible/Unknown	1
Property Damage Only	2
Total Crashes	5

U.S. 52 at 32nd Street

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	2
Possible/Unknown	2
Property Damage Only	11
Total Crashes	5

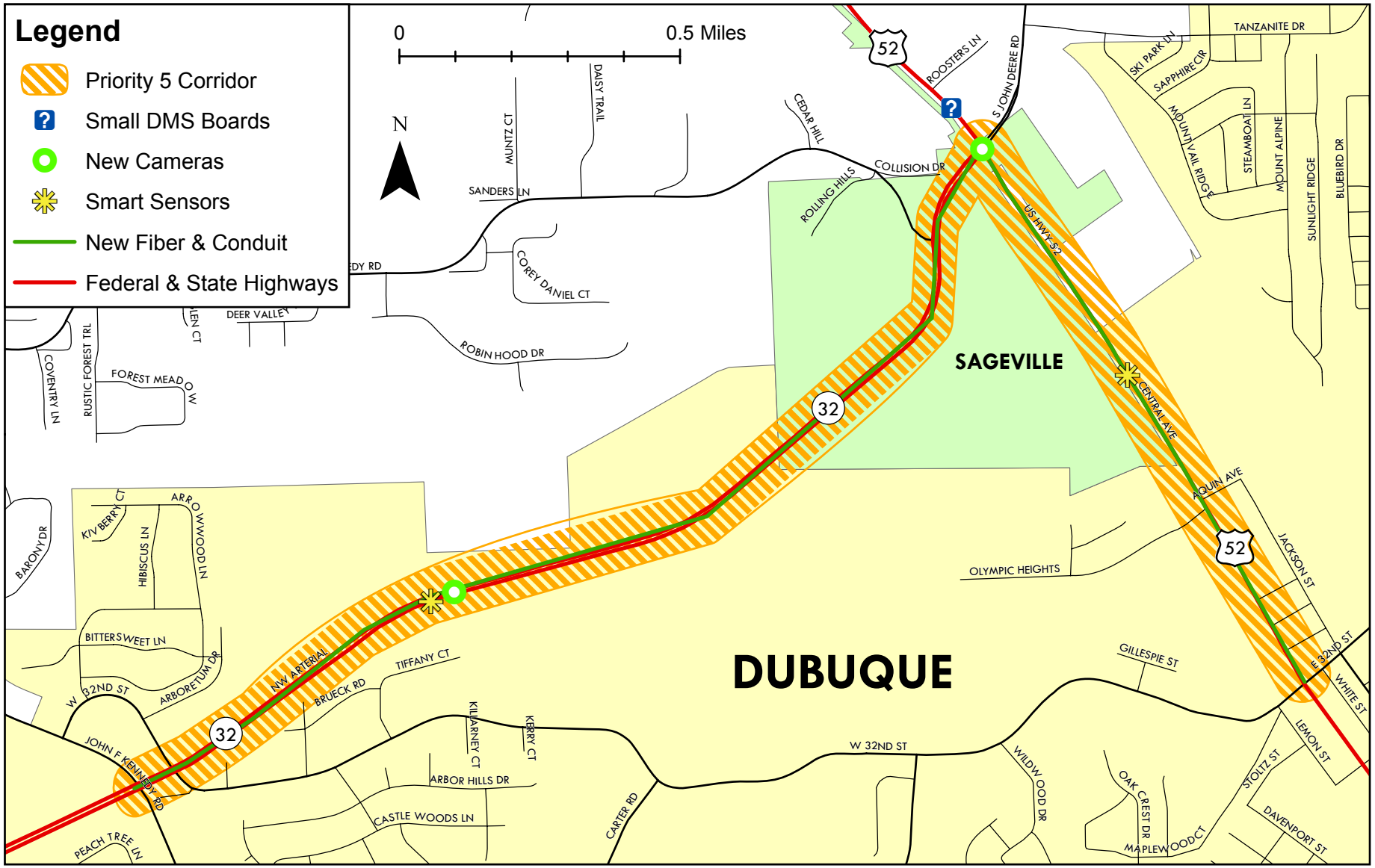
Source: CMAT

Cost Breakdown:

Priority 5 Total ITS Infrastructure Costs		
Item	**Units**	**Total Cost**
Small DMS Board	1	$75,000
Smart Sensors	2	$24,000
Cameras	2	$24,000
Fiber	3.1	$409,200
Engineering & Administration Cost	15%**	$79,830
Total Priority 5 Cost		**$612,030**

*Engineering and administration costs for the City of Dubuque portion.

Priority 5: IA 32 (Northwest Arterial) & U.S. 52 (JFK Road to 32nd Street)



Priority 6: U.S. 52 From 4th Street to 32nd Street

Equipment:

Signalization will occur from:

- 4th Street to 32nd Street along U.S. 52

Reconstruct Signals at the following locations:

- 5th Street and U.S. 52 Southbound (Recently rebuilt 2009)
- 7th Street and U.S. 52 Southbound (Recently rebuilt 2009)
- 9th Street and U.S. 52 Southbound
- 9th Street and White Street Northbound
- 14th Street and U.S. 52 Southbound
- 14th Street and White Street Northbound
- 15th Street and U.S. 52 Southbound
- 17th Street and U.S. 52 Southbound
- 17th Street and White Street Northbound
- 20th Street and U.S. 52 Southbound
- 20th Street and White Street Northbound
- 22nd Street and U.S. 52
- 32nd Street and U.S. 52

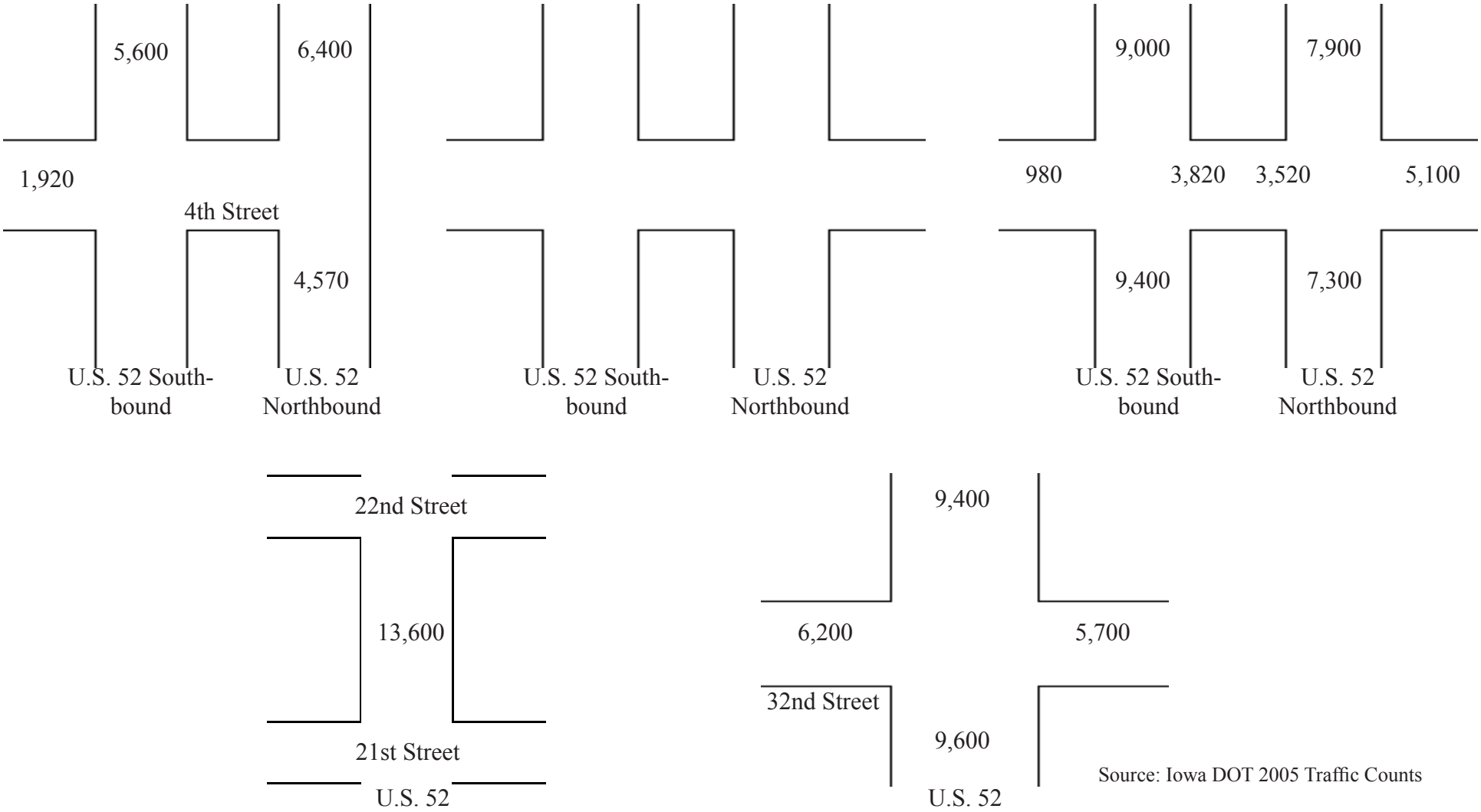
Benefits:

- Reduction in vehicle emissions
- Increased safety
- Provide traffic management, especially when road construction is occurring
- Interconnection of traffic signals will allow more efficient traffic flow
- Reduction in annual maintenance costs
- Eliminate search for replacement parts for an old system
- Fiber optic allows for dependable interconnect system
- Includes PTZ camera at each replaced signal
- Fiber optic allows for dependable interconnect system

Current signals are in excess of 30 years old, and underground infrastructure is in bad condition. This priority will install new ITS signal equipment at each intersection and will allow for remote monitoring and operations.

Priority 6: U.S. 52 From 4th Street to 32nd Street

Vehicle Volume:



Source: Iowa DOT 2005 Traffic Counts

Priority 6: U.S. 52 From 4th Street to 32nd Street

Crash Data 2004-2006:

U.S. 52 at 4th Street

Crash Summary		
	Southbound	Northbound
Fatal	-	-
Major Injury	-	-
Minor Injury	-	-
Possible/Unknown	-	1
Property Damage Only	5	2
Total Crashes	5	3

U.S. 52 at 14th Street

Crash Summary		
	Southbound	Northbound
Fatal	-	-
Major Injury	-	1
Minor Injury	3	1
Possible/Unknown	1	4
Property Damage Only	12	14
Total Crashes	16	20

U.S. 52 at 20th Street

Crash Summary		
	Southbound	Northbound
Fatal	-	-
Major Injury	-	-
Minor Injury	-	-
Possible/Unknown	3	6
Property Damage Only	5	19
Total Crashes	8	25

U.S. 52 at 32nd Street

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	2
Possible/Unknown	2
Property Damage Only	9
Total Crashes	13

Source: CMAT

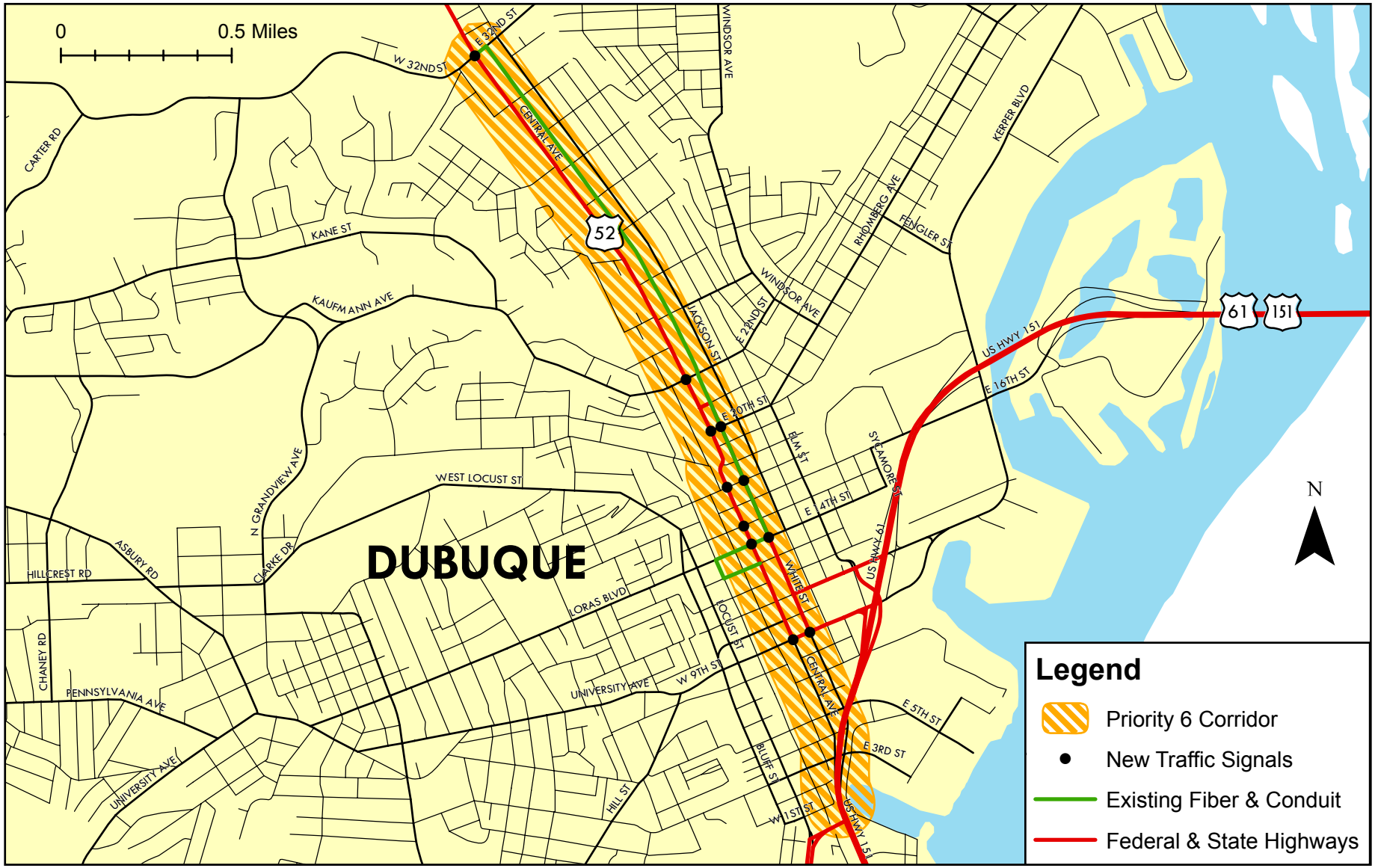
Priority 6: U.S. 52 From 4th Street to 32nd Street

Cost Breakdown:

Priority 6 Total ITS Infrastructure Costs		
Item	**Units**	**Total Cost**
Signals & Signalization	11	$1,650,000
Engineering & Administration Cost	15%**	$247,500
Total Priority 6 Cost		**$1,897,500**

*Engineering and administration costs for the City of Dubuque portion.

Priority 6: U.S. 52 From 4th Street to 32nd Street



Priority 7: U.S. 61/151 at the Wisconsin Bridge

Equipment:

Large DMS Board will be located:

- U.S. 61/151 Southbound on the Wisconsin Bridge

Smart Sensor will be located:

- U.S. 61/151 on the Wisconsin Bridge

Camera will be installed on:

- U.S. 61/151 on the Wisconsin Bridge
- 3 locations of ramps West of bridge

Fiber and Conduit will be installed from:

- The City of Dubuque facility located off 16th Street to the Wisconsin Bridge

Benefits:

- The large DMS board will warn motorists of delays occurring with the City of Dubuque.
- The large DMS board will notify motorists of construction delays during the U.S. 61/151/52 Catfish Creek Bridge and the U.S. 20/Julien Dubuque Bridge
- Motorists can be informed of bridge closures, such as in the event of a barge accident or events like July 4th celebrations.
- Camera will be used for bridge surveillance as well as for Homeland Security.

Vehicle Volume:

19600

U.S. 61/151 Source: Iowa DOT 2005 Traffic Counts

Priority 7: U.S. 61/151 at the Wisconsin Bridge

Crash Data 2004-2006

U.S. 61/151 at the Wisconsin Bridge

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	2
Possible/Unknown	1
Property Damage Only	1
Total Crashes	4

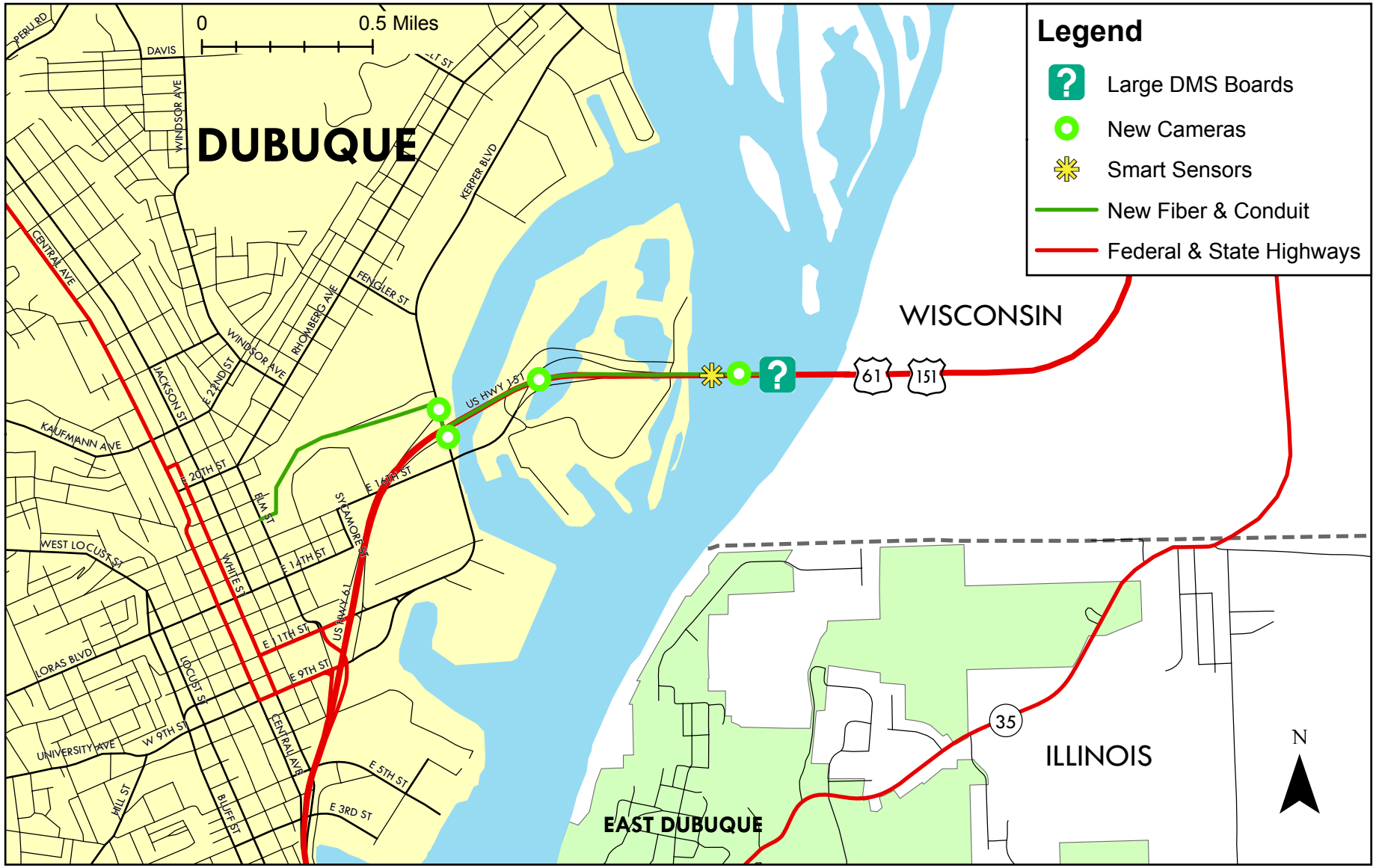
Source: CMAT

Cost Breakdown:

Priority 7 Total ITS Infrastructure Costs		
Item	**Units**	**Total Cost**
Large DMS Board	1	$225,000
Smart Sensors	1	$12,000
Cameras	4	$48,000
Fiber & Conduit	1	$158,400
Engineering & Administration Cost	15%**	$66,510
Total Priority 7 Cost		**$509,910**

*Engineering and administration costs for the City of Dubuque portion.

Priority 7: U.S. 61/151 at the Wisconsin Bridge



Priority 8: U.S. 20 at the Julien Dubuque Bridge

Equipment:

Large DMS board will be located:

- U.S. 20 on the Julien Dubuque Bridge

Benefits:

- Motorists will be warned of delays occurring within the City of Dubuque.
- Information reguarding bridge closures can be relayed, for example barge accident or July 4th event.
- The large DMS board will notify motorists of delays and detours during the U.S. 20/Julien Dubuque Bridge and Iowa Highway 32 (Southwest Arterial) construction projects.

Vehicle Volume:

20200

U.S. 20

Source: Iowa DOT 2005 Traffic Counts

Crash Data 2004-2006:

Crash Summary	
Fatal	-
Major Injury	-
Minor Injury	2
Possible/Unknown	1
Property Damage Only	3
Total Crashes	6

Source: CMAT

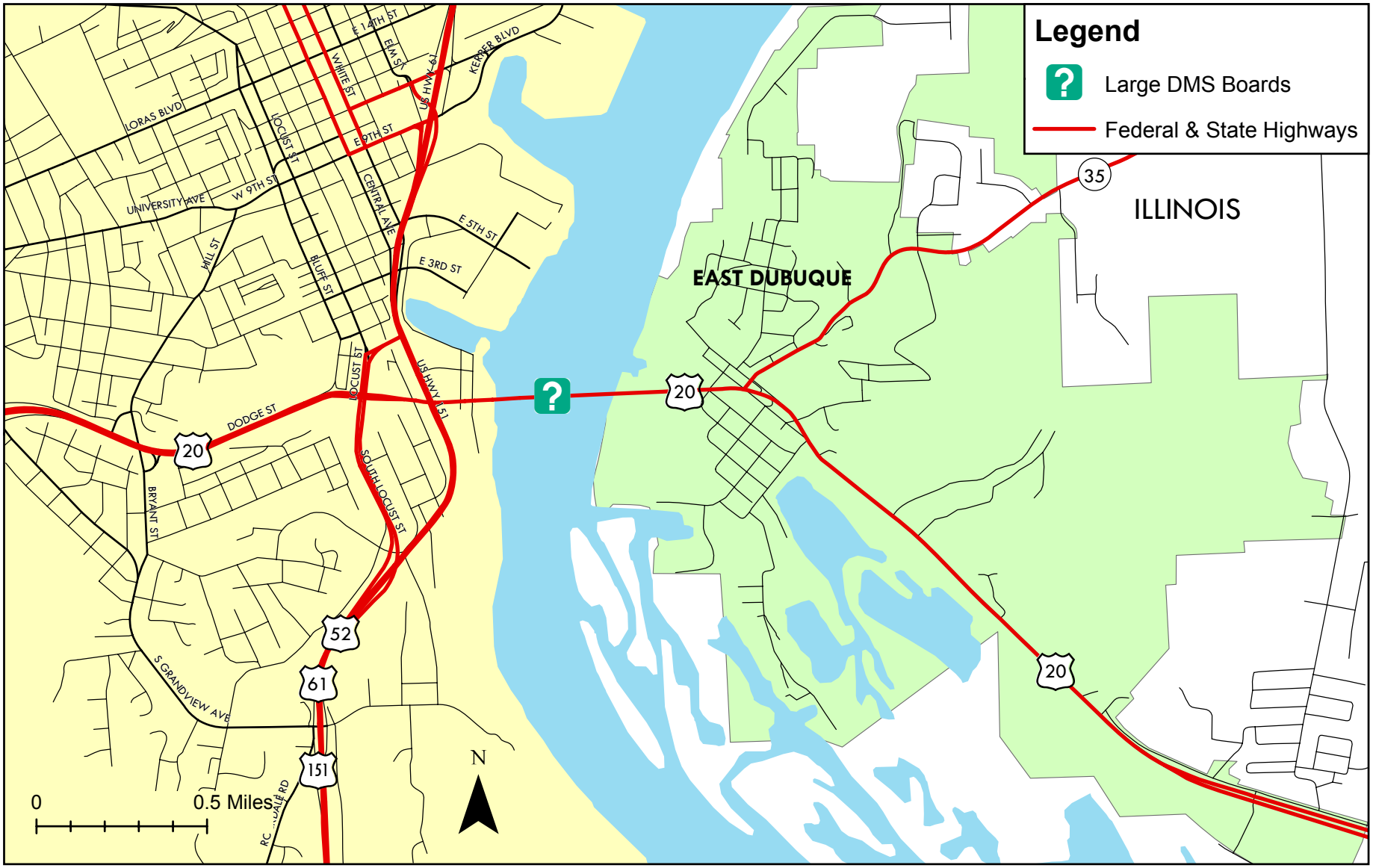
Priority 8: U.S. 20 at the Julien Dubuque Bridge

Cost Breakdown:

Priority 8 Total ITS Infrastructure Costs		
Item	**Units**	**Total Cost**
Large DMS Board	1	$225,000
Engineering & Administration Cost	15%**	$33,750
Total Priority 8 Cost		**$258,750**

*Engineering and administration costs for the City of Dubuque portion.

Priority 8: U.S. 20 at the Julien Dubuque Bridge



Priority 9: SW Arterial

Equipment:

Small DMS Message Board locations:

- US 20 westbound, east of the SW Arterial interchange
- (2) SW Arterial east of English Mill Rd, one each for eastbound and westbound traffic
- (2) SW Arterial between Military Rd and Hwy 151 interchange, one each for and eastbound and westbound traffic
- Hwy 151 southbound, north of SW Arterial interchange

Smart Sensor locations:

- SW Arterial east of English Mill Rd
- SW Arterial near Catfish Creek Bridge
- SW Arterial between Military Road and the 151 interchange

Cameras will be located at the following intersections:

- (2) US 20 and SW Arterial interchange
- SW Arterial east of English Mill Rd
- (2) SW Arterial interchange with North Cascade Rd
- SW Arterial bridges over Catfish Creek
- SW Arterial and Military Rd
- (2) SW Arterial and Hwy 151 interchange

Fiber and Conduit will be installed from:

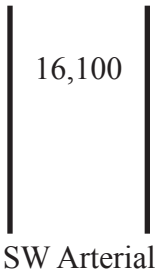
- US 20 Near the existing Menard's Entrance to Sieppel Road
- SW Arterial from US 20 to 151/61

Priority 9: SW Arterial

Benefits:

- Connects to existing fiber currently located at the US 20 Menard's Entrance. Allows existing communications to be extended to the SW Arterial extending to the 151/61 interchange. This communications backbone will have additional uses as new technologies emerge. This link allows the SW Arterial to be connected to the City of Dubuque's Traffic Operations Center.
- Cameras would allow for remote monitoring and adjustment of traffic control devices. These cameras would also be used to monitor existing conditions as they relate to weather.
- Smart Sensors will provide up to date traffic volumes and notifications of stopped or slowing traffic. This information can then be used to update the DMS message boards to alert drivers.

Estimated Vehicle Volume:



Cost Breakdown:

Priority 9 Total ITS Infrastructure Costs		
Item	**Units**	**Total Cost**
Small DMS Board	6	$450,000
Smart Sensors	3	$36,000
Cameras	9	$108,000
Fiber and Conduit	7	$1,108,800
Engineering & Administration Cost	15%**	$255,420
Total Priority 9 Cost		**$1,958,220**

*Engineering and administration costs for the City of Dubuque portion.

Priority 9: SW Arterial