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INTEGRATED CORRIDOR MANAGEMENT –
DES MOINES METRO AREA

ICM IMPLEMENTATION PLAN

REGIONAL TRAFFIC SIGNAL OPTIMIZATION

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v.2.0

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Introduction

PROJECT OVERVIEW

The Traffic Signal Optimization project focuses on traffic signal timing and operations as part of the Arterial Traffic Management strategy functional area identified within the Des Moines Metropolitan Area Integrated Corridor Management (ICM) Program. A Concept of Operations (ConOps) document was developed for the overall Regional Traffic Signal Optimization strategy and establishes the general process and management for stakeholders. In an effort to highlight the benefits of traffic signal retiming relative to corridor management and to assist in refining the ConOps process, an early pilot project will be developed and implemented with the ICM stakeholders. Completion of the pilot project will serve as a guide for future Regional Traffic Signal Optimization projects.

DOCUMENT SCOPE

This Implementation Plan document utilizes the ConOps approach to identify a candidate corridor and initiate the funding request for a pilot project. As the initial implementation, it will serve as a guide for further efforts by defining the activities that are required and the roles and responsibilities of stakeholders. Due to the fact that this Implementation Plan evaluates the process for Regional Traffic Signal Optimization efforts, it includes more narrative and detail than required by the ConOps and it is not anticipated that each future project will require the same level of documentation.

Once the pilot project is complete, the ICM stakeholders will identify lessons-learned that will minimize risk (political, schedule, cost) within the Regional Traffic Signal Optimization process. These will be presented to the ICM Technical Signal Subcommittee for consideration.

Process and Approach

The process for this Implementation Plan generally follows the Regional Traffic Signal Optimization Project-Level Concept of Operations (July 31, 2019) document which provides the overall need, goals and objectives, operational scenarios, and management structure. In general, the process will be initiated by a local agency through identification of traffic signals exhibiting operational challenges that impact ICM goals. A request for funding to analyze and develop new signal timing will be submitted to the oversight committee along with a screening evaluation.

The management and oversight structure for the ICM Program has not been formalized as of the writing of this document. For this pilot implementation, candidate corridors were identified by a working group consisting of traffic professionals from the following agencies: Iowa DOT, Des Moines Area MPO, City of Ankeny, City of West Des Moines, and City of Des Moines. The base criteria for corridor identification were:

1. the route had to be a major arterial/collector on the Des Moines ICM network,
2. the route had to include more than one agency, and
3. the route had to experience recurring congestion.

Each of these corridors were then compared based on evaluation criteria developed using input from the working group. Data sources for the evaluation criteria were all readily available from either Iowa DOT or Des Moines Area MPO websites with the exception of the travel time reliability which requires access to Inrix data, or other probe data. For future evaluations, it is anticipated that agencies can obtain the reliability data through requests to Iowa DOT which currently has a data agreement in place with Inrix.

A preliminary scoring methodology was developed based on providing relatively equal weight across the following three categories: route functionality, traffic operations, and traffic safety. Additional points were provided for routes that are multi-jurisdictional. The scoring for most criteria is a relative score between corridor values and does not rely on defined metrics/thresholds. Traffic safety data for individual corridors were compared to the Iowa Statewide average rates which, for 2013-2016, are approximately: 160 crashes/100 MVMT, 1.1 fatalities/100 MVMT, and 1.3 pedestrian crashes/100 MVMT. **Figure 1** shows the summary of the evaluation.

Figure 1 – Candidate Corridor Evaluation

	Score Weighting	Douglas Avenue			Hickman Road			University Avenue			Merle Hay Road		
Route Characteristics													
Start Intersection		128th St			128th St			86th St			62nd Ave		
End Intersection		Merle Hay Rd			Merle Hay Rd			Hubbell Ave			Hickman Rd		
Length (mi)		5			5			8.25			4		
Jurisdictional Ownership	**2**	Des Moines Urbandale Iowa DOT		1	Clive Des Moines Urbandale Windsor Heights Iowa DOT		2	Des Moines Windsor Heights Clive Iowa DOT		2	Des Moines Johnston Urbandale Iowa DOT		2
Route Function													
Functional Classification	**1**	Principal Arterial		1	Principal Arterial		1	Minor Arterial		0	Principal Arterial		1
Transit Route	**1**	No		0	Yes		1	Yes		1	Yes		1
Commercial Industrial Network (Freight)	**1**	No		0	No		0	No		0	Yes		1
Traffic Characteristics													
Daily Traffic Volume (veh/day)	**1**	22,500		1	25,000		1	14,000		0	23,000		1
Freight Percent		unk			2.0%			unk			2.1%		
Travel Time Reliability (Inrix)[1]	**2**	20%		1	27.0%		2	15%		0	22.0%		1
Traffic Safety (2014-2017)		Total Corridor	Rate (#/100M VMT)		Total Corridor	Rate (#/100M VMT)		Total Corridor	Rate (#/100M VMT)		Total Corridor	Rate (#/100M VMT)	
Total Crashes	**1**	655	399	1	874	479	1	1698	1007	1	918	683	1
Fatalities	**1**	0	0	0	1	0.5	0	4	2.4	1	2	1.5	1
Pedestrian Crashes	**1**	1	0.6	0	2	1.1	0	8	4.7	1	1	0.7	0
Rear-end, Left-turn	**1**	379	231	0	594	325	1	811	481	1	552	411	1
Ran Traffic Signal		67	41		58	32		130	77	0	76	57	
TOTAL SCORE				**5**			**9**			**7**			**10**

[1] Inrix reliability is the buffer index for 90th % peak hour travel, averaged for both directions.

As shown, Merle Hay Road received the most points of the candidate corridors evaluated and scored in each category. Although Hickman Road scored a close second, there is funding in place to implement adaptive signal control in this corridor, negating the need for signal optimization efforts at this time.

The scoring categories and weighting will be reviewed by the working group and other ICM stakeholders to determine if any changes are needed. Once reviewed, it is anticipated that the above evaluation criteria will form the majority of the submittal documentation for future Regional Traffic Signal Optimization requests.

Project initiation will require an inventory of the traffic signals along the selected route to determine any potential limitations in coordination or retiming. Working with the respective agencies along the selected corridor, information was collected regarding major items of concern such as controller hardware, vehicle detection, and available network connectivity. For Merle Hay Road, there are 17 traffic signals from 62nd Avenue to Hickman Road owned by the City of Johnston, Iowa DOT, and City of Des Moines. Each jurisdiction operates their respective traffic signals with the exception of the I-35/80 interchange traffic signals which the City of Des Moines operates under agreement with Iowa DOT. The full inventory will be used as input once the project is initiated. For future Regional Traffic Signal Optimization requests, this inventory should be developed before project initiation to determine if there are detection or other equipment needs that should be replaced prior to retiming.

The traffic signal timing for the pilot corridor will be developed through consultant services and funded by Iowa DOT. The consultant will work with the agencies and develop needs and objectives for the corridor operations as well as identify any maintenance and/or equipment needs. The City of Des Moines has ICAAP funding approved for traffic signal timing which includes Merle Hay Road within their boundaries. This data will be available and shared for the addition of the City of Johnston traffic signals. In future requests under this ICM strategy, agencies may similarly elect to use consultant services for all efforts or may elect to perform some aspects internal and utilize consultants on a more limited basis. Such elections will be reflected in the request and the amount of funding requested.

Timeframe

The timeframe for this Implementation Plan is relatively short as there are no infrastructure improvements requiring right-of-way, utility, or construction. The traffic signal optimization largely consists of labor hours associated with data collection, analysis, implementation, and evaluation. Use of outside resources (consultant) will require administrative time for contracting purposes but could be accelerated with the use of existing on-call contracts. It is anticipated that the pilot project along Merle Hay Road should be completed within 6 months once a consultant is given notice-to-proceed. If detection or equipment upgrades are desired by the agencies, these improvements could be completed concurrently with the consultant efforts and remain within the 6-month schedule.

Audience

For the specific pilot project, this Implementation Plan is written for a narrow audience – those jurisdictions who own and operate the traffic signals along Merle Hay Road. This includes the City of Johnston, Iowa DOT, and City of Des Moines.

For the broader intent of this document – to provide guidance to future Regional Traffic Signal Optimization projects and the overall process – the audience is the current traffic signal working group and the future Technical Signal Subcommittee for the Des Moines Metropolitan Area ICM Program.

Regional Traffic Signal Optimization

Description	This pilot project will evaluate traffic operations along Merle Hay Road and develop an optimized timing plan to serve regional traffic across multiple jurisdictions. The scope includes data collection, intersection analysis, implementation, and analysis.			
Lead Agency	• Iowa DOT			
Supporting Agency	• City of Johnston • City of Des Moines			
Location	• Merle Hay Road: 62nd Avenue to Hickman Road			
Technology & Infrastructure Elements	• There are no new infrastructure elements proposed. • Technology improvements may be completed by the City of Johnston or the City of Des Moines to upgrade their traffic signal equipment prior to the timing implementation. However, these upgrades are not directly included in this project scope.			
Operational Responsibilities	• Operational responsibilities will remain the same as existing unless new intergovernmental agreements are developed. Currently, operation of traffic signals along Merle Hay Road are handled by the City of Johnston and the City of Des Moines with input from Iowa DOT on the I-35/80 interchange.			
Funding Needs	• $51,000 for outside services. Includes data collection, intersection analysis, implementation of timing plans, and evaluation. The cost does not include new traffic signal equipment such as controllers or vehicle detection.			
ROM Cost Estimate	**Planning & Design**	**Implementation**	**O&M (annual)**	**Total (10 Year Cost)**
	$29,000-$42,500	**$22,000-$32,500**	**$0**	**$51,000-$75,000**
Funding Opportunities	• To Be Determined			
Project Dependencies	• Data Needs: Traffic signal equipment inventory			
Required Agreements	• Intergovernmental agreements already exist between Iowa DOT and the City of Des Moines for operation of the I-35/80 interchange.			
Other/Notes	• City of Des Moines is currently initiating re-timing of the signals south of the I-35/80 interchange. Existing conditions data should be collected from the period of time prior to the retiming project and project data should be gathered for use in developing timing plans to the north of the interchange that coordinate with the signals to the south.			