Transportation System Management and Operations - Traffic Infrastructure Process

Project Justification - Benefits Analysis

Introduction:

The project justification tool has been developed to assess and quantify potential monetary benefits per project type. The project justification tool uses readily available project specific data from the user and industry research to estimate potential project benefits. Project types include: new signal installation, signal replacement, signal rehab, signal retrofit, signal retiming, LED replacement, intersection communication, software, ITS device replacement, and ITS device deployment.

Several types of project benefits are considered for each project type: safety, mobility, productivity, and energy and environment. These estimated project benefits are then compared to the estimated total project cost. This methodology provides a clear and transparent manner in which to justify a specific project, reducing concerns of inefficient use of funding resources.

User Instruction:

Select the appropriate tab based on your project type. Provide project specific responses for each of the questions as appropriate. It should be noted that this analysis is a generalized, estimated approach to considering potential monetary benefits. It is expected that some responses will be estimates based on the users knowledge of the project and location.

User Resources:

The 'Data Needs' tab may be referenced to determine where each of the data requests may be obtained. Data sources include the Needs Analysis Tool, readily available information from the User, User estimated values, and asset management/maintenance information. For any questions or concerns, contact Mark Lloyd (mark.lloyd@dot.wi.gov) or Natalie Mengelkoch (natalie.mengelkoch@kimley-horn.com).

Project Justification - Data Needs

Anticipated Data Source	Data Request	Project Type											
		1	2	3	4	5	6	7	8	9	10	11	12
		New Signal	Signal Replacement	Signal Rehab	Signal Retrofit	Signal Retiming	LED Replacement	Intersection Communication	Software	ITS Device Replacement	DMS	Camera	Other
User Response	Project Specific Description	X	X	X	X	X	X	X	X	X	X	X	X
	ITS Warrant Information										X	X	
	Signal Warrant Information												
	Urban/Rural	X	X		X								
Estimated	Estimations of Events per Year										X	X	
	Estimate of Average Event Duration										X	X	
	Estimate of Average Travel Time Savings										X	X	
	Estimated Peak Period Travel Time Reduction	X											
Asset Management / Maintenance Reports	Maintenance Tickets and Cost		X	X	X			X		X			
Needs Analysis Tool	Crash Data by Type	X	X		X	X		X			X	X	
	Average Vehicles Entering Intersection	X	X		X	X		X					
	Average Daily Traffic Volumes Per Area										X	X	
	Relative Need - Level of Service Preset		X		X	X							

Transportation System Management and Operations

Project Justification - New Signal Installation

Procurement and installation of controllers, bases and signals.

Region:	
Proposed Project Name:	
Requested By:	

1 What is the anticipated cost of the project?

2 Which traffic signal warrants are met at this intersection?

W1, Eight-Hour Veh Volume	
W2, Four-Hour Veh Volume	
W3, Peak Hour	
W4, Pedestrian Volume	
W5, School Crossing	
W6, Coordinated Signal System	
W7, Crash Experience	
W8, Roadway Network	
W9, Near Grade Crossing	

3 Using each of the following Needs Analysis Tool presets, provide the anticipated level of need in the vicinity of the proposed project:

Default TIP	
Safety	
Mobility (Present)	
Mobility (Future)	
Service	
Freight Performance	

4 Indicate the type of benefit(s) that are expected as a result of this project?

Safety	
Mobility (Reduction of Travel Time Delay or Variability / Increased Throughput)	

Safety Benefits

S1. Is this intersection located in an Urban or Rural area (Urban is defined as an incorporated area with a population of 5,000 or greater)?

S2. How many crashes, by type, occurred in the past year at this intersection?

	Fatal Crashes
	Incapacitating Injury Crashes
	Non-incapacitating Injury Crashes
	Possible Injury Crashes
	Property Damage Only Crashes

S3. What is the average number of vehicles entering the intersection per year?

	Million Entering Vehicles

Estimated Safety Benefit: #DIV/0!

Mobility Benefits

M1. Is it anticipated that the proposed project will reduce travel time delay?

M2. What is the estimated ADT for all vehicles entering the intersection (the Needs Analysis Tool can be used to add the bi-directional traffic along the intersecting roadways)?

vehicles per day

M3. What is the anticipated average peak period travel time reduction per vehicle?

seconds per vehicle

Estimated Annual Mobility Benefit: $0

Energy and Environment Benefits

Estimated Annual Energy and Environment Benefit: $0

Estimated Annual Benefit: #DIV/0!

Estimated Benefit/Cost Ratio: #DIV/0!

Transportation System Management and Operations

Project Justification - Signal Replacement

Replacement of signals including geometric improvements and upgrades for construction.

Region:	
Proposed Project Name:	
Requested By:	

1 What is the anticipated cost of the project?

2 What is the primary purpose of the project?

3 What is the primary improvement type?

If other, provide a brief description of improvement type.

4 Using each of the following Needs Analysis Tool presets, provide the anticipated level of need in the vicinity of the proposed project:

Default TIP	
Safety	
Mobility (Present)	
Mobility (Future)	
Service	
Freight Performance	

5 Indicate the type of benefit(s) that are expected as a result of this project?

Safety	
Mobility (Reduction of Travel Time Delay or Variability / Increased Throughput)	
Productivity (Improved Maintenance)	

Safety Benefits

S1. Is this intersection located in an Urban or Rural area (Urban is defined as an incorporated area with a population of 5,000 or greater)?

S2. How many crashes, by type, occurred in the past year at this intersection?

	Fatal Crashes
	Incapacitating Injury Crashes
	Non-incapacitating Injury Crashes
	Possible Injury Crashes
	Property Damage Only Crashes

S3. What is the average number of vehicles entering the intersection per year?

Million Entering Vehicles

Estimated Safety Benefit: #DIV/0!

Mobility Benefits

M1. What is the estimated ADT for all vehicles entering the intersection (the Needs Analysis Tool can be used to add the bi-directional traffic along the intersecting roadways)?

vehicles per day

M2. What is the average Relative Need at this intersection according to the Needs Analysis Tool - Service preset?

Estimated Annual Mobility Benefit: $0

Productivity Benefits

P1. It is assumed that productivity benefits will be realized through reduced maintenance efforts. Estimate for how long maintenance efforts have been increasing at this intersection.

P2. How many Cartegraph tickets have been required at this location over the length of time indicated above in P1?

tickets

P3. What was the total cost of these tickets?

Estimated Annual Productivity Benefit: $0

Energy and Environment Benefits

Estimated Annual Energy and Environment Benefit: $0

Estimated Annual Benefit: #DIV/0!

Estimated Benefit/Cost Ratio: #DIV/0!

Transportation System Management and Operations

Project Justification - Signal Rehabilitation

Upgrade, install or replace detection, controllers, battery backup, etc.

Region:	
Proposed Project Name:	
Requested By:	

1 What is the anticipated cost of the project?

2 Using each of the following Needs Analysis Tool presets, provide the anticipated level of need in the vicinity of the proposed project:

Default TIP	
Safety	
Mobility (Present)	
Mobility (Future)	
Service	
Freight Performance	

3 Indicate whether there is expected to be a Productivity benefit as a result of this project.

Productivity (Improved Maintenance)

4 Indicate number of intersections this request accounts for:

Productivity Benefits

P1. It is assumed that productivity benefits will be realized through reduced maintenance efforts. Estimate for how long maintenance efforts have been increasing at the proposed device replacement location(s).

P2. How many Cartegraph tickets have been required at this location over the length of time indicated above in P1 (if request is for multiple intersections, include cumulative total here)?

tickets

P3. What was the total cost of these tickets?

Estimated Annual Productivity Benefit: #N/A

Estimated Annual Benefit:	#N/A
Estimated Benefit/Cost Ratio:	#N/A

Transportation System Management and Operations

Project Justification - Signal Retrofit

Procure and install monotubes, procure and install flashing yellow arrows, safety improvements not requiring major construction and adaptive signal systems.

Region:	
Proposed Project Name:	
Requested By:	

1 What is the anticipated cost of the project?

2 What is the primary improvement type?

3 If minor safety improvements or other, provide a brief description of the proposed improvements.

4 Using each of the following Needs Analysis Tool presets, provide the anticipated level of need in the vicinity of the proposed project:

Default TIP	
Safety	
Mobility (Present)	
Mobility (Future)	
Service	
Freight Performance	

5 Indicate the type of benefit(s) that are expected as a result of this project?

Safety	
Mobility (Reduction of Travel Time Delay or Variability / Increased Throughput)	
Productivity (Improved Maintenance)	

Safety Benefits

S1. Is it anticipated that the proposed improvements will increase safety such that an average crash rate at this intersection will be expected?

S2. How many crashes, by type, occurred in the past year at this intersection?

	Fatal Crashes
	Incapacitating Injury Crashes
	Non-incapacitating Injury Crashes
	Possible Injury Crashes
	Property Damage Only Crashes

S3. What is the average number of vehicles entering the intersection per year?

	Million Entering Vehicles

S4. Is this intersection located in an Urban or Rural area (Urban is defined as an incorporated area with a population of 5,000 or greater)?

Estimated Safety Benefit: N/A

Mobility Benefits

M1. What is the estimated ADT for all vehicles entering the intersection (the Needs Analysis Tool can be used to add the bi-directional traffic along the intersecting roadways)?

vehicles per day

M2. What is the average Relative Need at this intersection according to the Needs Analysis Tool - Service preset?

Estimated Annual Mobility Benefit: $0

Productivity Benefits

P1. It is assumed that productivity benefits will be realized through reduced maintenance efforts. Estimate for how long maintenance efforts have been increasing at this intersection.

P2. How many Cartegraph tickets have been required at this location over the length of time indicated above in P1?

tickets

P3. What was the total cost of these tickets?

Estimated Annual Productivity Benefit: $0

Energy and Environment Benefits

E1. Energy and Environment benefits are determined based on average travel time reduction.

Estimated Annual Energy and Environment Benefit: $0

Estimated Annual Benefit: $0

Estimated Benefit/Cost Ratio: #DIV/0!

Transportation System Management and Operations

Project Justification - Signal Retiming

Data collection, evaluation, prepare signal timing plan, develop and implement corridor coordination plan

Region:	
Proposed Project Name:	
Requested By:	

1 What is the anticipated cost of the project?

2 Using each of the following Needs Analysis Tool presets, provide the anticipated level of need in the vicinity of the proposed project:

Default TIP	
Safety	
Mobility (Present)	
Mobility (Future)	
Service	
Freight Performance	

3 Indicate the type of benefit(s) that are expected as a result of this project?

Safety	
Mobility (Reduction of Travel Time Delay or Variability / Increased Throughput)	

Safety Benefits

S1. Is the proposed signal retiming project expected to reduce the number of crashes at this intersection?

S2. How many crashes, by type, occurred in the past year at this intersection(s)?

	Fatal Crashes
	Incapacitating Injury Crashes
	Non-incapacitating Injury Crashes
	Possible Injury Crashes
	Property Damage Only Crashes

Estimated Safety Benefit: $0

Mobility Benefits

M1. What is the estimated ADT for all vehicles entering the intersection (the Needs Analysis Tool can be used to add the bi-directional traffic along the intersecting roadways)?

vehicles per day

M2. What is the average Relative Need at this intersection according to the Needs Analysis Tool - Service preset?

Estimated Annual Mobility Benefit: $0

Energy and Environment Benefits

Estimated Annual Energy and Environment Benefit:	$0

Estimated Annual Benefit:	$0
Estimated Benefit/Cost Ratio:	#DIV/0!

Transportation System Management and Operations

Project Justification - LED Signal Replacement

Procure and install all materials for annual LED signal 7 year replacement cycle.

Region:	Northwest
Proposed Project Name:	LED Replacement FY 16
Requested By:	David Fenske

1 What is the anticipated cost of the project? $22,500

2 Indicate the type of benefit(s) that are expected as a result of this project?

Productivity (Improved Maintenance)	YES
Energy and Environment	YES

Productivity Benefits

P1. How many intersections are proposed to be replaced with LED lamps? 18

P2. How many signal heads are proposed to be replaced with LED lamps? 294

Estimated Annual Productivity Benefit: $108,000

Energy and Environment Benefits

Estimated Annual Energy and Environment Benefit: $76,395

Estimated Annual Benefit:	$184,400
Estimated Benefit/Cost Ratio:	8.20

Transportation System Management and Operations

Project Justification - Intersection Communication Expansion

Design-build and integrate fiber optic links between existing fiber infrastructure and signal systems, or procure and install cellular Ethernet modems.

Region:	Northeast
Proposed Project Name:	NE Communication 2016 Installation
Requested By:	Robert Schuumans

1	What is the anticipated cost of the project?	$50,000
2	Indicate the proposed expansion type.	Signal Communications

3 Using each of the following Needs Analysis Tool presets, provide the anticipated level of need in the vicinity of the proposed project:

Default TIP	MEDIUM
Safety	MEDIUM
Mobility (Present)	MEDIUM
Mobility (Future)	HIGH
Service	HIGH
Freight Performance	HIGH

4 Note: it is recommended that each intersection communication location be considered separately. However, if multiple locations are included, be sure to provide the cumulative responses to the questions below.
Indicate number of intersections this request accounts for: 1

5 Indicate the type of benefit(s) that are expected as a result of this project?

Safety	YES
Mobility (Reduction of Travel Time Delay or Variability / Increased Throughput)	YES
Productivity (Improved Maintenance)	YES

Safety Benefits

S1. Indicate the total number of collisions, by type, at the proposed coordinated location. If this is an addition to an existing system, indicate those collisions only along the new section of coordinated corridor.

0	Fatal Crashes
3	Incapacitating Injury Crashes
10	Non-incapacitating Injury Crashes
4	Possible Injury Crashes
22	Property Damage Only Crashes

Estimated Safety Benefit: $76,000

Mobility Benefits

M1. What is the estimated AADT for all vehicles entering the intersection (the Needs Analysis Tool can be used to add the bi-directional traffic along the intersecting roadways)?

20,000 vehicles per day

M2. What is the average Relative Need at this intersection according to the Needs Analysis Tool - Service preset?

HIGH

Estimated Annual Mobility Benefit: $72,000

Productivity Benefits

P1. It is assumed that productivity benefits will be realized through reduced maintenance efforts. Estimate for how long maintenance efforts have been increasing at this intersection(s).

1 year

P2. How many Cartegraph tickets have been required at this location(s) over the length of time indicated above in P1?

200 tickets

P3. Based on the nature of the Cartegraph tickets, estimate the percent ticket reduction that will occur after the proposed intersection(s) can be communicated with remotely.

31 - 50 percent ticket reduction

Estimated Annual Productivity Benefit: $184,700

Energy and Environment Benefits

E1. Energy and Environment benefits are determined based on average travel time reduction.

Estimated Annual Energy and Environment Benefit: $27,000

Estimated Annual Benefit: $359,700

Estimated Benefit/Cost Ratio: 7.19

Transportation System Management and Operations

Project Justification - Software Upgrade

Upgrade, install or replace software.

Region:	
Proposed Project Name:	
Requested By:	

1 What is the anticipated cost of the project?

2 What is the primary purpose of the project?

3 Briefly describe the anticipated benefit of the proposed software upgrade.

4 Indicate the type of benefit(s) that are expected as a result of this project?

Safety	
Mobility (Reduction of Travel Time Delay or Variability / Increased Throughput)	
Productivity (Improved Maintenance)	
Energy and Environment	

Safety Benefits

S1. Briefly describe the anticipated **safety** benefit of the proposed software upgrade.

S2. Provide a cost estimation of **safety** benefit to be realized with the proposed software. This should only include benefit related directly to the software and not with any associated hardware.

S3. Describe your methodology and assumptions in developing your estimation in S2. Provide any references and formulas used.

Estimated Annual Safety Benefit: $0

Mobility Benefits

M1. Briefly describe the anticipated **mobility** benefit of the proposed software upgrade.

M2. Provide a cost estimation of **mobility** benefit to be realized with the proposed software. This should only include benefit related directly to the software and not with any associated hardware.

M3. Describe your methodology and assumptions in developing your estimation in M2. Provide any references

Estimated Annual Mobility Benefit: $0

Productivity Benefits

P1. Briefly describe the anticipated **productivity** benefit of the proposed software upgrade.

remote software updates

P2. What is the estimated Staff hours saved per month due to the deployment of the proposed software project?

	IT hours per month
	Electrical Tech hours per month
	Civil Engineer hours per month
	Operator hours per month

Estimated Annual Productivity Benefit: $0

Energy and Environment Benefits

E1. Briefly describe the anticipated **energy and environment** benefit of the proposed software upgrade.

E2. Provide a cost estimation of **energy and environment** benefit to be realized with the proposed software. This should only include benefit related directly to the software and not with any associated hardware.

E3. Describe your methodology and assumptions in developing your estimation in E2. Provide any references and formulas used.

Estimated Annual Energy and Environment Benefit:	$0

Estimated Annual Benefit:	$0
Estimated Benefit/Cost Ratio:	#DIV/0!

Transportation System Management and Operations

Project Justification - ITS Device Lifecycle Replacement

Upgrade, install or replace detection, controllers, battery backup, etc.

Region:	BTO
Proposed Project Name:	CCTV Camera Lifecycle Replacement
Requested By:	Don Schell

1 What is the anticipated cost of the project? $265,000

2 Provide the anticipated level of need in the vicinity of the proposed project using the following Needs Analysis Tool presets:

Default TIP	MEDIUM
Safety	MEDIUM
Mobility (Present)	MEDIUM
Mobility (Future)	HIGH
Service	LOW
Freight Performance	HIGH

3 Indicate whether there is expected to be a Productivity benefit as a result of this project.

Productivity (Improved Maintenance): YES

4 Indicate number of locations this request accounts for: 20

Productivity Benefits

P1. It is assumed that productivity benefits will be realized through reduced maintenance efforts. Estimate for how long maintenance efforts have been increasing at the proposed device replacement location(s).

1 year

P2. How many Cartegraph tickets have been required at this location(s) over the length of time indicated above in P1? (if request is for multiple intersections, include cumulative total here)

164 tickets

P3. What was the total cost of these tickets? $204,946

Estimated Annual Productivity Benefit: $198,678

Estimated Annual Benefit:	$198,700
Estimated Benefit/Cost Ratio:	0.75

Transportation System Management and Operations

Project Justification - ITS DMS Warrants

New DMS deployment.

Region:	BTO
Proposed Project Name:	DMS Deployment in Stevens Point
Requested By:	Mark Lloyd

1 What is the anticipated cost of the project (total design, construction, and communication cost)? $100,000

2 Please complete the Warrant Analysis below to determine which warrant best aligns to the project. The summary of your results is listed here:

W1, Weather Conditions	NOT WARRANTED
W2, Traffic Conditions	WARRANTED
W3, Traffic Control	NOT WARRANTED
W4, Special Events	NOT WARRANTED
W5, Parking Availability	NOT WARRANTED
W6, Public Transportation	NOT WARRANTED

DMS Warrant Analysis:

DMS Warrant #1 - To Inform Travelers of Weather Conditions

Consideration		Response
1	If the location is prone to weather situations that travelers would not otherwise be forewarned about (e.g. spots where fog regularly forms, bridges that ice early, mountain passes with weather that differs from approaches).	NO
2	If there is available road weather information for the area downstream of the candidate DMS location.	NO
3	If there is the capability (either manually by staff members or automated through a condition reporting system) to create event specific descriptions of weather conditions to be displayed on the DMS.	NO
4	If there is a need to disseminate event specific descriptions (rather than simply activating a flashing warning sign that says "Weather Alert When Flashing").	NO
5	If there are options for either alternate routes or services, that might be described on the DMS, where travelers may wait out conditions.	NO
6	If flashing beacon signs have been tried and not proven to generate responses from travelers.	NO
7	If weather events contribute to a significant number of crashes or road closures which have major impacts to travelers.	NO

DMS Warrant #1 is: NOT WARRANTED

DMS Warrant #2 - To Inform Travelers of Traffic Conditions

Consideration		Response
1	If the target area is monitored by CCTV cameras, traffic detectors, or another method of monitoring the conditions, or has travel times for the downstream stretch of road.	YES
2	Events occurring in the area unexpectedly impact or impede traffic (e.g. close a lane, encounter slow traffic in one or more lanes, or events on the shoulder) an average of at least two times per month.	NO
3	If there are acceptable alternate routes with capacity to accept vehicles that may deviate based upon the information.	NO
4	If the location is a stretch of road where no alternate route are possible and travelers would benefit from information describing the cause and/or extent of delays in order to relieve driver anxiety or confusion.	YES
5	If there are horizontal or vertical curves that create safety issues when traffic is stopped unexpectedly.	NO
6	The route being considered for the DMS has on average at least 2 hours per day of peak period travel where traffic flow exceeds 1,100 veh/hr/lane.	YES
7	The route being considered for the DMS has on average experienced conditions considered Level of Service C.	NO
8	The route being considered for the DMS experiences average annual daily traffic (AADT) of 16,800 for a 2 lane road; 33,600 for a 4 lane road; 50,400 for a 6 lane road, 67,200 for an 8 lane road.	NO

DMS Warrant #2 is: WARRANTED

DMS Warrant #3 - Changing Traffic Control or Conditions (Work

Consideration		Response
1	The candidate location is upstream of an area with construction or maintenance activities that are expected to cause at least 15 minutes of delay to the mainline traffic.	NO
2	If the candidate location is upstream of traffic control or construction/maintenance activities that are expected to change more frequently than once every 60 days.	NO
3	If the posted work zone speed limit is greater than 45 MPH.	NO

DMS Warrant #3 is: NOT WARRANTED

DMS Warrant #4 - Special Events

Consideration		Response
1	If the location contains a venue that houses ticketed events (typically with rapid and tight arrival patterns for a specified start time).	NO
2	If the event venue typically houses at least two weekday (M-F) ticketed event per week (including seasonal sporting events that only occur during the season).	NO
3	If the event venue typically houses at least 10 events per year attracting 30,000 visitors or more.	NO
4	If the setting of the venue is such that mainline traffic (not attending the event) is impacted by the conditions.	NO
5	If there are alternate parking or traffic options that could be displayed on signs to direct visitors to more preferred options.	NO

DMS Warrant #4 is: NOT WARRANTED

3 Using each of the following Needs Analysis Tool presets, provide the anticipated level of need in the vicinity of the proposed project:

Default TIP	MEDIUM
Safety	MEDIUM
Mobility (Present)	MEDIUM
Mobility (Future)	HIGH
Service	LOW
Freight Performance	HIGH

4 Estimate the average number of traffic/weather/special events that occur per year that will be positively affected by use of the proposed DMS.

50 events per year

5 Estimate the average duration (minutes) of traffic events (due to weather or incidents) that occur and will be positively affected by use of the proposed DMS.

120 minutes

6 Estimate the average travel time savings from adjusting one's route based on direction given on the proposed DMS.

5 minutes

7 Provide the current AADT along the corridor where the proposed DMS will be deployed (the Needs Analysis Tool may be used to obtain the value).

40,000 veh per day

Estimated Annual Mobility Benefit:	$61,000
Estimated Annual Energy and Environment Benefit:	$23,000
Estimated Annual Benefit:	$84,000
Estimated Benefit/Cost Ratio:	0.84

Transportation System Management and Operations

Project Justification - ITS Camera Warrants

New Camera deployment.

Region:	
Proposed Project Name:	
Requested By:	

1 What is the anticipated cost of the project?

2 Please complete the warrant analysis below. If more than one camera is being requested, it is recommended that each location is considered separately because there may be different responses to the questions below. However, if multiple camera locations are included in this analysis, respond to each question collectively. Based on your responses , the following CCTV Camera Warrants have been met:

W1, Signal Control	NOT WARRANTED
W2, Traffic Incident	NOT WARRANTED
W3, Weather Verification	NOT WARRANTED
W4, Traveler Information	NOT WARRANTED
W5, Field Device Verification	NOT WARRANTED
W6, Work Zone	PARTIALLY WARRANTED

CCTV Camera Warrant Analysis:

CCTV Warrant #1 - Traffic Observation for Signal Control Changes

Consideration		Response
1	There are typically periods of time at least twice per week of 'loaded' cycles (i.e. where the vehicles in the queue do not all dissipate in one green cycle) that last 15 minutes or longer.	NO
2	The signalized intersection has sufficient cross street traffic such that visual observation is needed determining if alternate signal timings are appropriate to benefit the primary direction of flow (i.e. in order to verify that the secondary street is not backing up).	NO
3	The operations personnel have the ability to activate special event timing plans remotely.	NO

CCTV Warrant #1 is: NOT WARRANTED

CCTV Warrant #2 - Traffic Incident or Event Verification

Consideration		Response
1	The candidate location encounters incidents as frequently as twice per month for arterial streets or once per month for freeways.	NO
2	The incidents and events that occur on freeways typically cause delay to travelers of at least 15 minutes while the incident is active and has not been cleared.	NO
3	The incidents and events that occur on arterials typically impact travel such that the signal progression is no longer occurring and vehicles in queues are unable to clear intersections during the cycle's allotted green time.	NO
4	Incident location verification is needed by 911 dispatchers (e.g. large complex interchange where drivers don't know where they are, closely spaced interchanges).	NO
5	The location encounters at least 2 hours per day of peak period travel where traffic flow exceeds 1,100 veh/hr/lane.	NO
6	The location encounters conditions considered Level of Service C.	NO
7	The location encounters average annual daily traffic (AADT) of 16,800 for a 2 lane road; 33,600 for a 4 lane road; 50,400 for a 6 lane road, 67,200 for an 8 lane road.	NO

CCTV Warrant #2 is: NOT WARRANTED

CCTV Warrant #3 - Weather Verification

Consideration		Response
1	The location typically encounters at least 10 weather events each season.	NO
2	Weather events have a significant impact to travelers at this location (due to such circumstances as either: local terrain, lack of alternate routes, winding or steep routes), and it is a location that travelers are frequently concerned about.	NO
3	If there are no nearby weather sensors reporting real-time conditions.	NO
4	If there are no regular manual observations and reports of visibility, precipitation, or pavement temperatures.	NO
5	If nearby weather sensors would be enhanced through the capability of visual observation.	NO

CCTV Warrant #3 is: NOT WARRANTED

CCTV Warrant #4 - Traveler Information

Consideration		Response
1	The location visible by the camera image has a history of congestion on a regular basis (i.e. each commuter day is a candidate for congestion).	NO
2	The location is prone to weather situations that travelers would not otherwise be forewarned about (e.g. spots where fog regularly forms, bridges that ice early, mountain passes with weather that differs from approaches).	NO
3	The location is in a remote area that receives considerable traffic volume due to commercial vehicle traffic or recreational traffic.	NO
4	The majority of travelers to the area have Internet access in proximity to the area where camera images are of value to travelers prior to departure.	NO

CCTV Warrant #4 is: NOT WARRANTED

CCTV Warrant #5 - Field Device Verification

Consideration		Response
1	The proper operations of the device can be remotely monitored by a camera.	NO
2	The failure of the device presents a safety hazard.	NO
3	The camera operation would avoid unnecessary trips to verify functionality of the field device.	NO

CCTV Warrant #5 is: NOT WARRANTED

CCTV Warrant #6 - Intelligent Work Zone

Consideration		Response
1	The alignment or traffic control that is visible by a camera image is expected to change periodically during the construction period.	NO
2	The construction zone encounters periods of queues or delays for at least 30 minutes each day.	NO
3	The construction zone is in a location where there is not a convenient alternate route for the majority of traffic to deviate from the typical route.	YES

CCTV Warrant #6 is: PARTIALLY WARRANTED

3 Using each of the following Needs Analysis Tool presets, provide the anticipated level of need in the vicinity of the proposed project:

Default TIP	
Safety	
Mobility (Present)	
Mobility (Future)	
Service	
Freight Performance	

Safety Benefits

S1. How many crashes, by type, occurred in the past year at this intersection or corridor?

	Fatal Crashes
	Incapacitating Injury Crashes
	Non-incapacitating Injury Crashes
	Possible Injury Crashes
	Property Damage Only Crashes

Estimated Safety Benefit: $0

Mobility Benefits

M1 (W1). What is the estimated AADT for all vehicles entering the intersection?

vehicles per day

M2 (W1). What is the average Relative Need at this intersection according to the Needs Analysis Tool - Service preset?

M1 (W2, W3, W4, W6). Estimate the average number of traffic events that occur per year within site distance of the proposed camera(s).

events per year

M2 (W2, W3, W4, W6). Estimate the average duration (minutes) of the traffic events that occur within site distance of the proposed camera.

minutes

M3 (W2, W3, W4, W6). Provide the current AADT along the corridor where the proposed camera will be deployed (the Needs Analysis Tool may be used to obtain the value).

veh per day

Estimated Annual Mobility Benefit: $0

Productivity Benefits

P1. It is assumed that productivity benefits will be realized through reduced maintenance efforts. Estimate for how long maintenance efforts have been increasing at the proposed device replacement location(s).

P2. How many Cartegraph tickets have been required at this location over the length of time indicated above in P1? (if request is for multiple intersections, include cumulative total here)

tickets

P3. What was the total cost of these tickets?

P4. What is the total number of replacement locations?

Estimated Annual Productivity Benefit: $0

Energy and Environment Benefits

Estimated Annual Energy and Environment Benefit: $0

Estimated Annual Benefit: $0

Estimated Benefit/Cost Ratio: #DIV/0!

Transportation System Management and Operations

Project Justification - Other

Region:	
Proposed Project Name:	
Proposed Project Benefit Analyst:	

1 What is the expected design and construction cost (total project cost)?

2 Provide the anticipated level of need in the vicinity of the proposed project using the following Needs Analysis Tool presets:

Default TIP	
Safety	
Mobility (Present)	
Mobility (Future)	
Service	
Freight Performance	

3 Indicate the type of benefit(s) that are expected as a result of this project?

Safety	YES
Mobility (Reduction of Travel Time Delay or Variability / Increased Throughput)	YES
Productivity (Improved Maintenance)	YES
Energy and Environment	YES

Safety Benefits

S1. Describe the anticipated Safety benefits of the proposed project.

Mobility Benefits

M1. Describe the anticipated Mobility benefits of the proposed project.

Productivity Benefits

P1. Describe the anticipated Productivity benefits of the proposed project.

Energy and Environment Benefits

E1. Describe the anticipated Energy and Environment benefits of the proposed project.