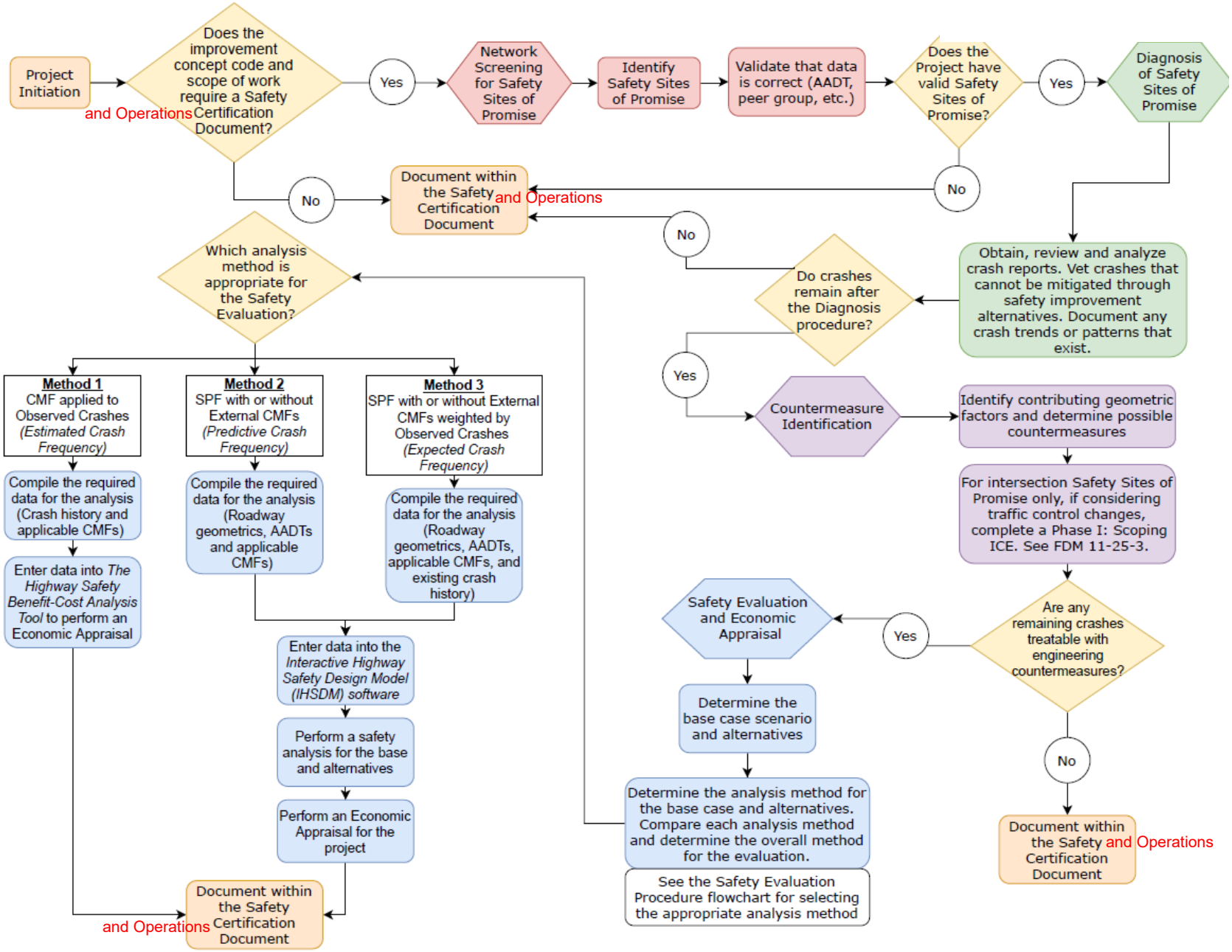
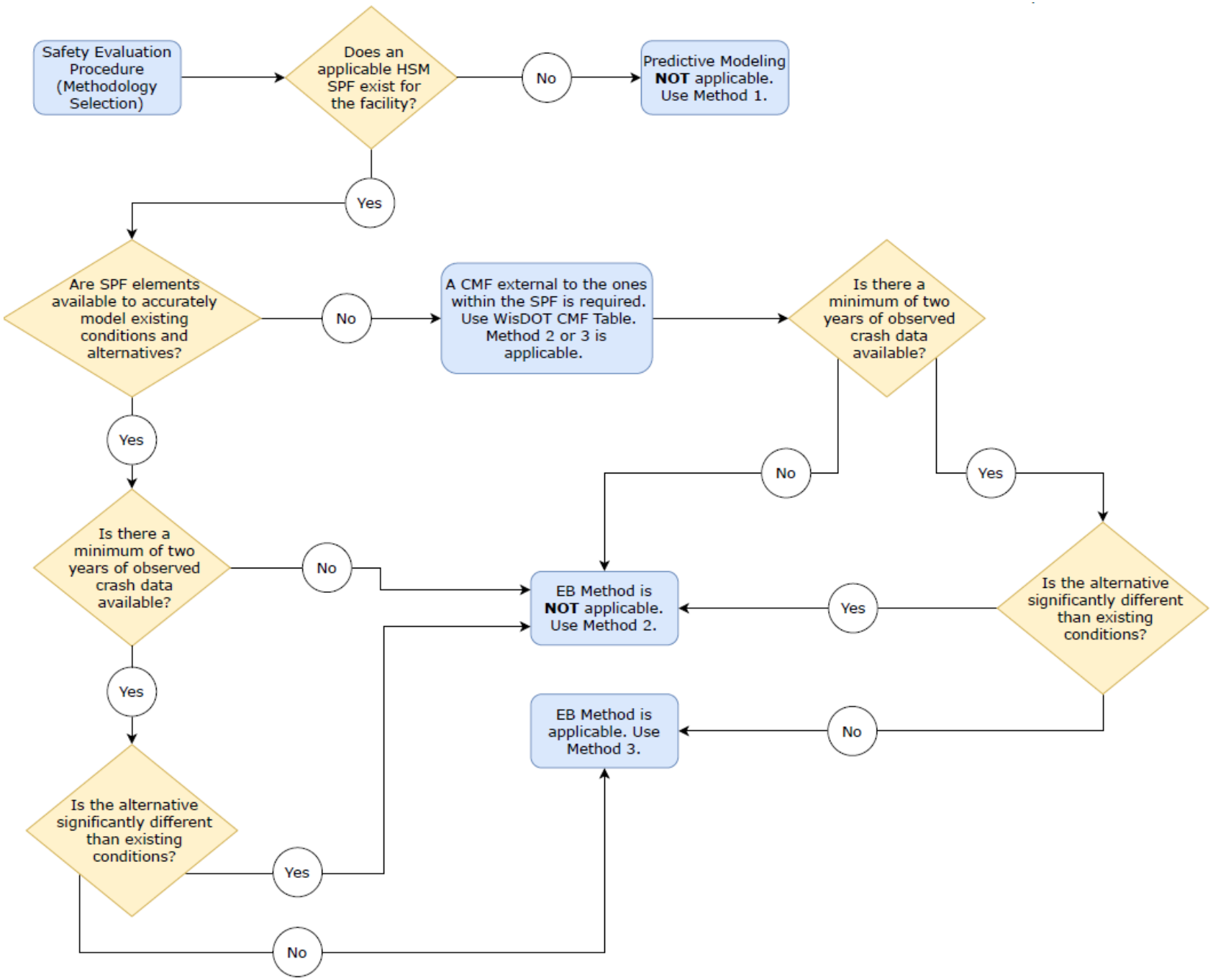

Project Initiation
Does the improvement concept code and scope of work require a Safety Certification Document?
and Operations
Yes
Network Screening for Safety Sites of Promise
Identify Safety Sites of Promise
Validate that data is correct (AADT, peer group, etc.)
Does the Project have valid Safety Sites of Promise?
Yes
Diagnosis of Safety Sites of Promise
No
Document within the Safety Certification Document
and Operations
No
Obtain, review and analyze crash reports. Vet crashes that cannot be mitigated through safety improvement alternatives. Document any crash trends or patterns that exist.
Do crashes remain after the Diagnosis procedure?
No
Which analysis method is appropriate for the Safety Evaluation?
Yes
Countermeasure Identification
Identify contributing geometric factors and determine possible countermeasures
For intersection Safety Sites of Promise only, if considering traffic control changes, complete a Phase I: Scoping ICE. See FDM 11-25-3.
Are any remaining crashes treatable with engineering countermeasures?
Yes
Safety Evaluation and Economic Appraisal
Determine the base case scenario and alternatives
Determine the analysis method for the base case and alternatives. Compare each analysis method and determine the overall method for the evaluation.
See the Safety Evaluation Procedure flowchart for selecting the appropriate analysis method
No
Document within the Safety Certification Document
and Operations
Method 1
CMF applied to Observed Crashes (Estimated Crash Frequency)
Method 2
SPF with or without External CMFs (Predictive Crash Frequency)
Method 3
SPF with or without External CMFs weighted by Observed Crashes (Expected Crash Frequency)
Compile the required data for the analysis (Crash history and applicable CMFs)
Compile the required data for the analysis (Roadway geometrics, AADTs and applicable CMFs)
Compile the required data for the analysis (Roadway geometrics, AADTs, applicable CMFs, and existing crash history)
Enter data into The Highway Safety Benefit-Cost Analysis Tool to perform an Economic Appraisal
Enter data into the Interactive Highway Safety Design Model (IHSDM) software
Perform a safety analysis for the base and alternatives
Perform an Economic Appraisal for the project
Document within the Safety Certification Document
and Operations


Safety Evaluation Procedure (Methodology Selection)
Does an applicable HSM SPF exist for the facility?
No
Predictive Modeling **NOT** applicable. Use Method 1.
Yes
Are SPF elements available to accurately model existing conditions and alternatives?
No
A CMF external to the ones within the SPF is required. Use WisDOT CMF Table. Method 2 or 3 is applicable.
Is there a minimum of two years of observed crash data available?
Yes
No
Yes
Is there a minimum of two years of observed crash data available?
No
EB Method is **NOT** applicable. Use Method 2.
Yes
Is the alternative significantly different than existing conditions?
Yes
EB Method is applicable. Use Method 3.
No
Is the alternative significantly different than existing conditions?
Yes
No

Location Type	Target Crash Type	Contributing or Geometric Factor	Potential Safety Countermeasure(s)
Intersection: All	All	Driveway within functional area	Restrict access
Intersection: All	Pedestrian	Marked crosswalk	Install advanced stop/yield markings, install high visibility crosswalks, install other pedestrian enhancements
Intersection: All	Right-Turn Rear End	Approach angle	"Square up" right turn lane, convert to free-flow right turn
Intersection: Minor Stop	Rear End/Right Angle	Limited intersection sight distance	Clear sight triangles
Intersection: Minor Stop	Rear End/Right Angle	Nighttime/Inattentive driving	Install LED blinker stop signs, install intersection lighting
Intersection: Minor Stop	Rear End/Right Angle	Occluded vehicles, right turn lane alignment	Offset mainline right turn lane
Intersection: Minor Stop	Rear End/Right Angle	Speed-related, failure to stop	Install/adjust advanced warning signs, install transverse rumble strips, install Through Route Activated Warning System (TRAWS)
Intersection: Minor Stop	Right Angle	Inadequate gaps in traffic	Use alternative intersection design or change traffic control (RCUT, J-Turn, MUT, Roundabout, Traffic Signals, etc.)
Intersection: Minor Stop	Right Angle	Intersection skew angle	Improve intersection skew, use alternative intersection designs or change traffic control (Roundabout, Traffic Signals, etc.)
Intersection: Minor Stop	Rear End	Geometric design, poor visibility, inattentive driving	Install bypass lane, install left turn lane
Intersection: Signalized	Left Turn	Occluded vehicles, left turn lane alignment	Positively offset left turn lanes
Intersection: Signalized	Left Turn	Occluded vehicles, vertical crest curve	Use more restrictive turn phasing
Intersection: Signalized	Left Turn	Split phasing	Install Flashing Yellow Arrow (FYA)
Intersection: Signalized	Pedestrian	Marked crosswalk	Install pedestrian countdown timers, install pedestrian push buttons, start with a leading pedestrian phase
Intersection: Signalized	Rear End	Limited queue storage	Add exclusive turn lane, extend turn lane length
Intersection: Signalized	Rear End/Right Angle	Poor signal timing	Adjust signal timing plan
Intersection: Signalized	Rear End/Right Angle	Poor signal visibility	Install a signal head per lane, install retroreflective signal backplates
Intersection: Signalized	Right Turn	Limited intersection sight distance	Don't allow right turns on red

Location Type	Target Crash Type	Contributing or Geometric Factor	Potential Safety Countermeasure(s)
Intersection: Roundabout	Rear-end, Sideswipe/Same Direction	Failure to yield	Update signing, update pavement markings, paint splitter island curbing, restrict sight lines/landscaping adjustments, upgrade lighting, public educational campaign, reconfigure roundabout lanes
Intersection: Roundabout	Run-Off-Road: All Types	Speed-related, weather-related	Update signing, update pavement markings, paint splitter island curbing, add transverse rumble strips, install High Friction Surface Treatment (HFST), restrict sight lines/landscaping adjustments, relocate fixed objects, upgrade lighting, install dynamic speed display signs, public educational campaign, Reconfigure roundabout lanes
Segment	Run-Off-Road: All Types	Inattentive driving, narrow lane width, narrow shoulder width	Install shoulder rumble strips, widen travel lanes, widen paved shoulder
Segment	Run-Off-Road: All Types	Polished pavement	Install High Friction Surface Treatment (HFST)
Segment	Run-Off-Road: All Types	Poor delineation	Install wet reflective pavement markings/edge lines
Segment	Run-Off-Road: Fixed Object	Object in clear zone	Remove fixed object, shield fixed object
Segment	Run-Off-Road: Head-On & Sideswipe/Opposite Direction	Inadequate median width	Install median barrier
Segment	Run-Off-Road: Head-On & Sideswipe/Opposite Direction	Inattentive driving	Install centerline rumble strips
Segment	Run-Off-Road	Horizontal curvature	Install/adjust advanced warning signage, install/adjust curve signage (night arrow, chevrons, delineators), increase sign sizes, widen paved shoulders, install shoulder rumble strips, maintain clear zone, install High Friction Surface Treatment (HFST), realign horizontal curve
Segment	Run-Off-Road: Nighttime	Poor sign visibility or signage	Install retroreflective sign sheeting, install post mounted retroreflectors, install advanced warning signs, install chevrons

Location Type	Target Crash Type	Contributing or Geometric Factor	Potential Safety Countermeasure(s)
Segment	Run-Off-Road: Nighttime	Poor visibility	Install or improve roadway lighting
Segment: All	Run-Off-Road: Weather-Related	Pavement design, geometric design	Improve pavement drainage, install High Friction Surface Treatment (HFST)
Segment: Bridge	Fixed Object	Low vertical clearance	Bridge height warning system
Segment: Rural	Run-Off-Road: Overturn	Non-traversable side slopes or ditch	Flatten side slopes, round ditches
Segment: Rural	Run-Off-Road: Overturn	Pavement edge drop-off	Install Safety Edge, pave shoulder
Segment: Urban	Rear End	High driveway density with high traffic volumes	Reduce access points, install a Two-Way Left Turn Lane (TWLTL)
Segment: Urban	Pedestrian	Cross-section	Install pedestrian refuge island
Segment: Urban	Pedestrian	Mid-block crossing	Install/adjust advanced warning signs, install advanced stop/yield markings, install high visibility crosswalks, install Pedestrian Hybrid Beacon (PHB), install Rapid Rectangular Flashing Beacons (RRFB), curb bump-outs, etc.

NOTE: Before implementing the treatments in this table, site specific context and engineering judgement need to be considered to ensure the project needs are met. Consider potential impacts of implementing a treatment and how it may interact with the roadway facility and/or users.

A working copy of this form is available on the Traffic Operations Manual Library website:
https://wisconsindot.gov/Pages/doing-bus/local-gov/traffic-ops/manuals-and-standards/manuals.aspx

Safety Certification Worksheet

Analyst: _____ Design ID: _____

Agency: _____ Highway: _____

Date of Analysis: _____ Project Title: _____

Meta Manager Version: _____ Project Subtitle: _____

Meta Manager Crash Years: _____ Worksheet ID: (if using WisTransPortal SCM tool) _____

Network Screening for Safety Sites of Promise									Diagnosis of Safety Sites of Promise			Countermeasure Identification	
See FDM 11-38-10.2 for guidance									See 11-38-10.3 for guidance			See FDM 11-38-10.4 for guidance	
Segments: Meta-Manager													
PDP_ID	From RP	RP Description	To RP	Length (PDP_Mile)	Crash Rate Flag (RATEFLAG) (Insert value if ≥ 1.0)	KAB Crash Rate Flag (MMGR_KAB_CRSH_RT_FL) (Insert value if ≥ 1.0)	Pedestrian Flag (MMGR_PED_CRSH_TOT) (Insert value if ≥ 1.0)	Bicycle Flag (MMGR_BIKE_CRSH_TOT) (Insert value if ≥ 1.0)	Number of Crashes Reviewed	Number of Remaining Crashes	Summarize the contributing factors for ALL REMAINING crashes in the flagged segment.	Which geometric features contribute to the type and severity of the crashes?	Possible countermeasures for the Safety Evaluation and Economic Appraisal Procedure
Intersections: Intersection Network Screening													
INT_ID	Intersection Name (IX_NAME)				LOSS (TOTAL)	PSI (TOTAL)	LOSS (KABC)	PSI (KABC)	Number of Crashes Reviewed	Number of Remaining Crashes	Summarize the contributing factors for ALL REMAINING crashes in the flagged intersection.	Which geometric features contribute to the type and severity of the crashes?	Possible countermeasures for the Safety Evaluation and Economic Appraisal Procedure

A working copy of this form is available on the Traffic Operations Manual Library website:
https://wisconsindot.gov/Pages/doing-bus/local-gov/traffic-ops/manuals-and-standards/manuals.aspx

SAFETY & OPERATIONS CERTIFICATION DOCUMENT

BUREAU OF TRAFFIC OPERATIONS

To: ___ Region Planning Chief: <Chief Name>

Bureau of Traffic Operations – Traffic Engineering & Safety Section

From: <Analyst Name>

___ Region

Date: <MM/DD/YYYY>

RE: Design ID:

Construction ID:

Highway:

Project Title:

Project Subtitle:

County

Scheduled Construction Year:

Improvement Concept Code:

Having considered the safety performance of the existing corridor and any proposed improvements, we believe this document reflects the intent of the policy and guidelines described in section 11-38 of the Wisconsin Facilities Development Manual.

If applicable, having considered the operational performance of the existing corridor and any proposed improvements, we believe this document reflects the intent of the policy and guidelines described in section 11-52 of the Wisconsin Facilities Development Manual.

Preparer:

_____ _____

Region Analyst Date

Approval:

_____ _____

Bureau of Traffic Operations Date

Traffic Engineering and Safety Section

_____ _____

Region Supervisor Date

1. Certification Processes Completed

1.1. According to FDM 11-1-10 Attachment 10.1, does the improvement concept code and scope of work require the Safety Certification Process to be completed? Yes ☐ No ☐

If yes is selected and alternatives are evaluated as indicated in Section 5, send to BTO at DOTBTOSafetyEngineering@dot.wi.gov

1.2. Was the Operations Certification Process (FDM 11-52-15) completed for proposed improvements within this project? Yes ☐ No ☐

If yes, send to BTO at DOTTrafficAnalysisModeling@dot.wi.gov

If "No" is selected for both 1.1 and 1.2, the Safety & Operations Certification Document can be completed and signed without approval from the Bureau of Traffic Operations (BTO). If 1.1 is marked "Yes" and alternatives are not evaluated as indicated in Section 5, the document can be completed and signed without approval from BTO.

2. Network Screening

2.1. Safety Sites of Promise

2.1.1. Did the project have Safety Sites of Promise from the network screening? Yes ☐ No ☐

List Safety Sites of Promise:

List the Sites of Promise (i.e., "flagged locations") within the project area. Include the Meta-Manager segment PDP ID or Intersection ID as well as other contextual information (i.e., street names) to describe the location.

Attachments: *Project location/overview map, Meta-Manager spreadsheet segment screenshot, Intersection Network Screening spreadsheet screenshot, Overview Map of Safety Sites of Promise Locations*

2.2 Operational Sites of Promise (If Applicable)

2.2.1 Did the project identify Operational Sites of Promise from the network screening? Yes ☐ No ☐ N/A ☐

2.2.2 Did the project identify Operational Sites of Promise based on local knowledge? Yes ☐ No ☐ N/A ☐

List Operational Sites of Promise:

List the Sites of Promise (i.e., locations that were reviewed for Operations) within the project area. Include the Intersection ID as well as other contextual information (i.e., street names) to describe the location.

Attachments: *Project location/overview map*

2.3 Additional Sites

2.3.1 Were additional sites evaluated? Yes ☐ No ☐

List sites:

*List any additional sites that were evaluated for Safety that were **not** identified as Sites of Promise (i.e., "flagged locations"). Include the Intersection ID as well as other contextual information (i.e., street names) to describe the location.*

***Attachments:** Project location/overview map*

3. Diagnosis

3.1. Diagnosis of Crashes

3.1.1. Did relevant crashes remain after crash vetting? Yes ☐ No ☐

3.1.2. If yes, list each site and discuss the crashes and contributing factors (including geometric conditions) for the remaining crash(es) or note that no crashes remained after the vetting process.

Determine and describe the remaining crashes after the crash vetting process. Identify contributing factors and if crashes are correctible by an engineering solution. Describe any trends that may have occurred. Include information such as design speed, curve radius, weather factors, roadway cross section, signage, etc. If no crashes remained, list the site and state no crashes passed through the vetting process.

***Attachments:** Crash diagrams, Vetting comments.*

3.2 Diagnosis of Operational Issues (If Applicable)

3.2.1. Provide a narrative of existing operational concerns and geometric deficiencies contributing to the delay or queuing.

Describe existing conditions of each location and the contributing factors causing the deficiencies.

4. Countermeasure/Alternative Identification

4.1 Were alternatives analyzed in this project? Yes ☐ No ☐

For intersections only, a Phase I: Scoping Intersection Control Evaluation (ICE) is required if traffic control changes are considered. See FDM 11-25-3 for more information.

4.2. Provide a brief description of the alternative(s) and the contributing factors that are being targeted:

Location:

Reason for improvement (check all that apply):	Safety ☐	Operations ☐
Alternative(s)	**General Description**	**How improvements address safety/operational issues**
Alternative Name:		
Alternative Name:		

For each location, create a new location table. Then list the alternatives and describe the contributing factors that would be mitigated with each alternative. Indicate if the improvement is for Safety, Operations, or both.

Attachments: *Safety Certification Worksheet, Alternative concept drawings*

Bureau of Traffic Operations (BTO) approval is ***required*** *for all projects that consider alternatives as part of the Safety & Operations Certification Document.*

5. Analysis Results and Economic Appraisal

Analysis Location:	*List the analysis location or limits of the proposed treatment with the largest impact*
Safety Analysis Method:	*List which method is used (Method 1, 2, or 3)*
External CMF Value:	*List the CMF value if using an external CMF. External CMFs are any CMFs used outside of the IHSDM software.*
External CMF Source:	*List the external CMF source, such as from the WisDOT CMF table. See Traffic Engineering, Operations and Safety Manual (TEOpS) 12-3-1.*
Unique Safety Analysis Notes:	*List any noteworthy comments about the analysis or IHSDM inputs.*

		Base	Alt. 1	Alt. 2	Alt. 3
Alternative Name					
Safety Certification Process (See FDM 11-38)	Fatal & Injury Crashes				
	Property Damage Only Crashes				
	Total Crashes				
	Crash Cost Value				
	Project Cost				
	Net Safety Benefit				
	Net Cost				
	Safety B/C				
Operations Certification Process (See FDM 11-52-15)	Delay Cost Over Project Life				
	Net Operational Benefit				
	Operations B/C				
	Safety & Operations B/C				
	STN-Only Operational Benefit (intersections only)				
	STN-Only B/C (intersections only)				

In some cases, an alternative may be less expensive than the base case. For these cases, use the lowest cost alternative as the base case when performing the Economic Appraisal. When evaluating alternatives such as High Friction Surface Treatment or signal-related work, where resurfacing costs would be the same across all proposed alternatives, the base case cost can be $0.

Attachments: *Cost Estimates, IHSDM Crash Prediction Evaluation Reports, Highway Safety Benefit-Cost Analysis tool results (Method 1 only), IHSDM Economic Analysis Report, Operations Certification Summary (if applicable)*

6. Other Information

6.1. Describe other information relevant to the project such as community considerations, unique features, potential funding sources, etc.

ATTACHMENTS

Include all attachments in the final Safety & Operations Certification Document and submit as a single PDF.

A. Project Information
    a. Project Location/Overview Map
B. Network Screening Documentation
    a. Meta-Manager spreadsheet
    b. Intersection Network Screening spreadsheet
    c. Overview Map of Safety Sites of Promise Locations (optional)
C. Diagnosis Documentation
    a. WisTransPortal crash data spreadsheet with vetting comments
    b. Crash Diagram(s)
D. Countermeasure/Alternative Identification
    a. Safety Certification Worksheet
    b. Layout/Schematic for each alternative
E. Analysis Results and Economic Appraisal
    a. Cost estimate for each alternative
    b. IHSDM Crash Prediction Evaluation Report for each alternative
    c. IHSDM Economic Analysis Report
    d. Highway Safety Benefit-Cost Analysis Tool results (if applicable)
F. Operations Certification Summary (if applicable)
    a. Turning movement counts
    b. Diagram of traffic volumes for each analysis period
    c. AWSC warrants
    d. Signal warrants
    e. Software reports for operation analysis
    f. DT 1887
    g. Exhibit highlighting queues vs. available storage for each analysis period
    h. OCP Benefit-Cost Tool printouts

A working copy of this form is available on the Traffic Operations Manual Library website:
https://wisconsindot.gov/Pages/doing-bus/local-gov/traffic-ops/manuals-and-standards/manuals.aspx

Safety & Operations Certification Document

Bureau of Traffic Operations

To: ___ Region Planning Chief: <Chief Name>

Bureau of Traffic Operations – Traffic Engineering & Safety Section

From: <Analyst Name>

___ Region

Date: <MM/DD/YYYY>

RE: Amendment of the Safety & Operations Certification Document
Original Approval Date: <MM/DD/YYYY>
Design ID:
Construction ID:
Highway:
Project Title:
Project Subtitle:
County
Scheduled Construction Year:
Improvement Concept Code:

This amendment includes analysis of locations or improvements that were not included within the original Safety and Operations Certification Document. Any analysis within this document may have used different configuration files or values when compared to the original analysis. The original information produced shall be used for comparison purposes only.

Having considered the safety performance of the existing corridor and any proposed improvements, we believe this document reflects the intent of the policy and guidelines described in section 11-38 of the Wisconsin Facilities Development Manual.

If applicable, having considered the operational performance of the existing corridor and any proposed improvements, we believe this document reflects the intent of the policy and guidelines described in section 11-52 of the Wisconsin Facilities Development Manual.

Preparer:

_____ _____
Region Analyst Date

Approval:

_____ _____
Bureau of Traffic Operations Date
Traffic Engineering and Safety Section

_____ _____
Region Supervisor Date

Purpose of Amendment

A1. Provide a narrative for the reason of the amendment to the original Safety & Operations Certification Document.
Describe the purpose of the amendment such as project limit adjustments or additional alternatives that were reviewed and any additional information.

Diagnosis

A2. For <u>new</u> Sites of Promise or additional sites, describe the crashes or operational deficiencies. If the location was described in the original Safety & Operations Certification Document, skip to Section A3.
Sites of Promise:

List <u>new</u> Sites of Promise (i.e., "flagged locations") or additional sites evaluated within the project area. Include the Meta-Manager segment PDP ID or Intersection ID as well as other contextual information (i.e., street names) to describe the location. Determine and describe the safety or operational issues. Identify contributing factors and if they are correctible by an engineering solution. Describe any crash trends that may have occurred.

Attachments: *Project location/overview map, Meta-Manager spreadsheet segment screenshot, Intersection Network Screening spreadsheet screenshot, Crash Diagrams, Vetting comments.*

The Safety Certification Worksheet does not need to be updated with the amendment.

Countermeasure/Alternative Identification, Analysis Results and Economic Appraisal

A3. Provide a brief description of the alternative(s) and the contributing factors that are being targeted. Include information within A3.1 from the original document for comparison purposes only. If the location was not identified within the original document, list all alternatives and the contributing factors that are being targeted by the alternative.

Location:

Reason for improvement (check all that apply): Safety ☐ Operations ☐

Alternative(s)	General Description	How improvements address safety/operational issues
Alternative Name:		
Alternative Name:		

For each location, create a new location table. Then list the alternatives and describe the contributing factors that would be mitigated with each alternative. Indicate if the improvement is for Safety, Operations, or both.

Attachments: *Alternative concept drawings*

Bureau of Traffic Operations (BTO) approval is ***required*** *for all projects that consider alternatives as part of the Safety & Operations Certification Document.*

A3.1. Analysis Results

Analysis Location:	*List the analysis location or limits of the proposed treatment with the largest impact*
Safety Analysis Method:	*List which method is used (Method 1, 2, or 3)*
External CMF Value:	*List the CMF value if using an external CMF. External CMFs are any CMFs used outside of the IHSDM software.*
External CMF Source:	*List the external CMF source, such as from the WisDOT CMF table. See Traffic Engineering, Operations and Safety Manual (TEOpS) 12-3-1.*
Unique Safety Analysis Notes:	*List any noteworthy comments about the analysis or IHSDM inputs.*

		Base	Alt. 1	Alt. 2	Alt. 3
Alternative Name					
Safety Certification Process (See FDM 11-38)	Fatal & Injury Crashes				
	Property Damage Only Crashes				
	Total Crashes				
	Crash Cost Value				
	Project Cost				
	Net Safety Benefit				
	Net Cost				
	Safety B/C				
Operations Certification Process (See FDM 11-52-15)	Delay Cost Over Project Life				
	Net Operational Benefit				
	Operations B/C				
	Safety & Operations B/C				
	STN-Only Operational Benefit (intersections only)				
	STN-Only B/C (intersections only)				

In some cases, an alternative may be less expensive than the base case. For these cases, use the lowest cost alternative as the base case when performing the Economic Appraisal. When evaluating alternatives such as High Friction Surface Treatment or signal-related work, where resurfacing costs would be the same across all possible alternatives, the base case cost can be $0.

Attachments: *Cost Estimates, IHSDM Crash Prediction Evaluation Reports, Highway Safety Benefit-Cost Analysis tool results (Method 1 only), IHSDM Economic Analysis Report, Operations Certification Summary (if applicable)*

A3.2. Describe other information relevant to the project such as community considerations, unique features, potential funding sources, etc.

ATTACHMENTS

Include attachments that were not included within the original analysis that are pertinent to the amended Safety & Operations Certification Document analysis

A. Project Information
    a. Project Location/Overview Map
B. Diagnosis Documentation
    a. WisTransPortal crash data spreadsheet with vetting comments
    b. Crash Diagram(s)
C. Countermeasure/Alternative Identification
    a. Layout/Schematic for each alternative
D. Analysis Results and Economic Appraisal
    a. Cost estimate for each alternative
    b. IHSDM Crash Prediction Evaluation Report for each alternative
    c. IHSDM Economic Analysis Report
    d. Highway Safety Benefit-Cost Analysis Tool results
E. Operations Certification Summary (if applicable)
    a. Turning movement counts
    b. Diagram of traffic volumes for each analysis period
    c. AWSC warrants
    d. Signal warrants
    e. Software reports for operation analysis
    f. DT 1887
    g. Exhibit highlighting queues vs. available storage for each analysis period
    h. OCP Benefit-Cost Tool printouts
F. Original Safety & Operations Certification Document