**Minnesota Statewide Regional ITS Architecture**

**and Systems Engineering Checklist for CLASS A-1:**

**STANDARD ITS APPLICATION - TRAFFIC SIGNALS**

**FHWA Final Rule 940 and FTA National ITS Architecture Policy**

For all ITS projects or projects with an ITS component, a Systems Engineering Checklist shall be completed and submitted with the Project Submittal Form. For questions regarding the completion of this checklist contact Rashmi Brewer, P.E. – MnDOT Office of Connected & Automated Vehicles (CAV-X) at 651-304-7572 or e-mail at Rashmi.Brewer@state.mn.us.

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*(Enter project name or type)*

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| **SECTION 1 – Project Information** |
| **1.1 CONTACT PERSON (e.g. PROJECT MANAGER)**

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| --- | --- |
| Name/Title:       | Agency:       |
| Signature:        | Date:       |
| Email:       | Phone:       |

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| **1.2 PROJECT LIMITS, SIGNAL SYSTEM ID AND DESCRIPTION** *(List all. Attach additional sheet if needed)*     Status: [ ]  New [ ]  Replace | **1.3 PROJECT NUMBER**1.3A Federal Project Number:      1.3B State/Local Project or Permit Number:       |
| **1.4 PROJECT SCHEDULE**

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| Letting Date:      Anticipated Start Date:        |

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| **1.5 NATURE OF WORK** *(Check all that apply)*

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| [ ]  Scoping | [ ]  Design | [ ]  Software/Integration | [ ]  Construction |
| [ ]  Operations & Management | [ ]  Evaluations | [ ]  Planning | [ ]  Equipment Replacement  |
| [ ]  Research & Development | [ ]  Others (Please Specify)       |

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| **1.6 PROJECT FEATURES AND ITS APPLICATIONS** *(Check all that apply)*Traffic Signal Features for Project Site(s):

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| [ ]  Basic Traffic Signal | [ ]  Flashing Yellow Arrow | [ ]  Advanced Warning Flasher |
| [ ]  Railroad Preemption | [ ]  Emergency Vehicle Preemption\* | [ ]  Transit Signal Priority\* |
| [ ]  Pedestrian Countdown Signal | [ ]  Accessible Pedestrian Signal | [ ]  Vehicle Presence Detection |
| [ ]  Enforcement Lights (e.g. Blue Lights) | [ ]  Traffic Signal Interconnect |  |

*Note: High Resolution (e.g. Smart Signal) is not covered by this standard application. Please use Class B-2: Arterial Traffic Management or Class C: Large Scale/Complex ITS Projects Checklist.**\* This checklist applies to emergency vehicle preemption (EVP) and transit signal priority (TSP) that is controlled at an intersection level without traffic control center oversight. For systems with traffic control center oversight, please use Class B-2: Arterial Traffic Management Checklist.* |
| **1.7 SYSTEMS ENGINEERING DOCUMENTATION**A programmatic Systems Engineering analysis has been developed for this application. A Concept of Operations and a Functional Requirements document are available as references and **shall be reviewed for consistency** at <http://www.dot.state.mn.us/its/projects/2016-2020/cavreadiness.html>. [ ]  Standard Traffic Signal Systems Engineering documents (i.e. Concept of Operations and Functional Requirements) have been reviewed, and the project is consistent with these documents.Or,[ ]  If the project is not entirely consistent with the standard Systems Engineering documents, a project specific concept of operations and/or functional requirements will be developed using the standard Systems Engineering documents as a base. Contact the MnDOT Office of Connected & Automated Vehicles (CAV-X) contact person listed at top of page 1 for guidance and assistance. |
| **1.8 RELATIONSHIP TO OTHER PROJECTS AND PHASES**Please list any construction and tied projects.**Project Title Project Number**

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| **SECTION 2 – Regional Architecture Assessment** |
| **2.1 PROJECT IS INCLUDED IN THE MINNESOTA STATEWIDE REGIONAL ARCHITECTURE** (*Refer to ITS Initiatives and Project Concepts for Implementation, Sections 4.3 and 4.4 of the Implementation Volume,* ***Minnesota Statewide Regional ITS Architecture,*** *2018,* [*http://www.dot.state.mn.us/its/projects/2016-2020/itsarchitecture/implementation-volume.pdf*](http://www.dot.state.mn.us/its/projects/2016-2020/itsarchitecture/implementation-volume.pdf)*)*[ ]  Yes [ ]  NoIf “No”, please list additional ITS devices, features, and/or functions that are not listed in **1.6** and send a copy of the complete checklist via email to the MnDOT Office of Connected & Automated Vehicles (CAV-X) contact person listed at top of page 1.     If “Yes”, Project ID (from *Sections 4.3 and 4.4 of the Implementation Volume*):      Is the project consistent with the description in the Architecture? [ ]  Yes [ ]  NoIf “No”, please summarize the differences below and send a copy of the complete checklist via email to the MnDOT Office of Connected & Automated Vehicles (CAV-X) contact person listed at top of page 1.      |
| **2.2 TRAFFIC SIGNAL DATA COLLECTION AND SHARING**Please use the table below to provide the following information:1. Operational data obtained from the system
2. Frequency of obtaining the data (e.g. every 5 minutes, daily, weekly, monthly, etc.)
3. Purpose(s) of obtaining the data,
4. Is the data archived, and
5. Who do you share the data with? (e.g. MnDOT RTMC, U of M Traffic Observatory, etc.)

The list below is not a complete list. Please add additional data and rows to the list as appropriate.

| **Data Obtained** | **Frequency of Obtaining Data** | **Purposes** *(Check all that apply)* | **Is Data Archived?** | **Data Sharing Partners** |
| --- | --- | --- | --- | --- |
| Controller Status (for example, mode of operation, timing plan changes, timing verification, faults, malfunctions, failures, conflicts, maintenance calls, event logs, alarms) | [ ]  ≤ 5 min[ ]  Hourly[ ]  Daily[ ]  Weekly[ ]  Monthly[ ]  Other | [ ]  Monitoring and Control[ ]  Operational Analysis[ ]  Planning Analysis[ ]  Performance Reporting[ ]  Other (please specify):       | [ ]  Yes[ ]  No |       |
| Timing Plan Data (for example, cycle length, phasing, splits, offsets, Ped. times) | [ ]  ≤ 5 min[ ]  Hourly[ ]  Daily[ ]  Weekly[ ]  Monthly[ ]  Other | [ ]  Monitoring and Control[ ]  Operational Analysis[ ]  Planning Analysis[ ]  Performance Reporting[ ]  Other (please specify):       | [ ]  Yes[ ]  No |       |
| Detector Data (other than presence detection. For example, traffic counts, vehicle classifications) | [ ]  ≤ 5 min[ ]  Hourly[ ]  Daily[ ]  Weekly[ ]  Monthly[ ]  Other  | [ ]  Monitoring and Control[ ]  Operational Analysis[ ]  Planning Analysis[ ]  Performance Reporting[ ]  Other (please specify):       | [ ]  Yes[ ]  No |       |
|       | [ ]  ≤ 5 min[ ]  Hourly[ ]  Daily[ ]  Weekly[ ]  Monthly[ ]  Other | [ ]  Monitoring and Control[ ]  Operational Analysis[ ]  Planning Analysis[ ]  Performance Reporting[ ]  Other (please specify):       | [ ]  Yes[ ]  No |       |
|       | [ ]  ≤ 5 min[ ]  Hourly[ ]  Daily[ ]  Weekly[ ]  Monthly[ ]  Other | [ ]  Monitoring and Control[ ]  Operational Analysis[ ]  Planning Analysis[ ]  Performance Reporting[ ]  Other (please specify):       | [ ]  Yes[ ]  No |       |
|       | [ ]  ≤ 5 min[ ]  Hourly[ ]  Daily[ ]  Weekly[ ]  Monthly[ ]  Other | [ ]  Monitoring and Control[ ]  Operational Analysis[ ]  Planning Analysis[ ]  Performance Reporting[ ]  Other (please specify):       | [ ]  Yes[ ]  No |       |

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| **2.3 ITS STANDARDS** *(For information only)*Applicable ITS Standards for traffic signal projects may include: * ITE TMDD 3.1: Traffic Management Data Dictionary (TMDD) and Message Sets for External Traffic Management Center Communications (MS/ETMCC)
* NTCIP Center-to-Field Group
* NTCIP 1201: Global Object Definitions
* NTCIP 1202: Object Definitions for Actuated Traffic Signal Controller (ASC) Units
* NTCIP 1206: Object Definitions for Data Collection and Monitoring (DCM) Devices
* NTCIP 1209: Data Element Definitions for Transportation Sensor Systems (TSS)
* NTCIP 1210: Field Management Stations (FMS) - Part 1: Object Definitions for Signal System Masters
* NTCIP 1211: Object Definitions for Signal Control and Prioritization (SCP)
* ASTM E2468-05: Object Definitions for Signal Control and Prioritization (SCP)
* ASTM E2665-08: Standard Specifications for Archiving ITS-Generated Traffic Monitoring Data
* IEEE 1570-2002: Standard for the Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection

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General information on ITS Standards can be found at <http://www.standards.its.dot.gov/>.\*Minnesota Standards are listed in Section 10 of Volume 13 of the *Minnesota Statewide Regional ITS Architecture 2018* as generated by RAD-IT. |
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| **SECTION 3 – Procurement**  |
| **3.1 Procurement Methods** *(Check all that apply)*[ ]  Construction Contract[ ]  Professional Technical Services Contract/Agreement [ ]  Joint Powers Contract/Agreement [ ]  Interagency Contract/Agreement [ ]  Work Order Contract/Agreement [ ]  Commodities Contract[ ]  Purchase Order (State/Local Furnish)[ ]  Other      Comments:       |

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| **SECTION 4 – Operations and Management Commitment** |
| **4.1 ESTIMATED ANNUAL operations and Management COSTS***(O&M cost for each traffic signal is approximately $1,700 to $2,100 per year (in 2015 dollars). Source: USDOT ITS Joint Program Office Costs Database, https://www.itscosts.its.dot.gov/its/benecost.nsf/CostHome)*       |
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| **Section 5 - Approval** |
| **Approval (Refer to page 7 of the HPDP ITS Systems Engineering Requirement for a list of approval agencies)**I certify that to the best of my knowledge all of the information on this checklist is accurate. I acknowledge that I am aware of the requirements set forth in the HPDP – ITS Systems Engineering for this project.

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| --- | --- |
| Name/Title:       | Agency:       |
| Signature:       | Date:        |
| Email:       | Phone:        |

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