The following Standard Development Report (SDR) is made in accordance with the Institute of Transportation Engineers (ITE) procedures for the Advanced Transportation Controller standards.
1 LATEST VERSION OF THE DRAFT PROPOSED STANDARD

Appendix I contains User Comment Draft (UCD) ATC 5301 StdUCD v01.10.01.05, also known as the Advanced Transportation Controller (ATC) Cabinet (ATCC) Standard. This title uses a new document identifier “ATC 5301” where “ATC” reflects its publication by the ATC Joint Committee and “5301” is a numerical identifier assigned to this standard. The previously approved version of this standard was ITS Cabinet v01.02.17b.

2 SUMMARY STATUS

As part of the ATC standards maintenance efforts, ATC 5301 StdUCD v01.10.01.05 is being distributed to the members of ITE and other standard development organizations (SDOs) for formal review. This is based on the recommendation of the ATC Joint Committee (JC). Comments from potential users of the standard are solicited. The standard contains the detailed design and requirements for ATC transportation field cabinet systems and devices. Following this comment period, the comments received will be adjudicated by the ATC Cabinet Working Group (WG) and the ATC 5301 will be updated accordingly. The standard will then be moved through the Recommended and Approved stages of the standards development process to publication. Inquiries, comments or proposed changes to this standard should be submitted to:

ITS Standards Manager
Institute of Transportation Engineers
1627 I (Eye) Street, NW, Suite 600
Washington, DC 20006
Voice: (202) 785-0060
Fax: (202) 785-0609
Email: standards@ite.org

Comments are requested using the fields described in Appendix III.

3 STATUS REPORT

In November 2006, ITS Cabinet v01.02.17b was published as an Approved Standard of the ATC JC. A USDOT funded effort to develop ITS Cabinet v02 began in June of 2008 which was based on a systems engineering process. The development took longer than expected and the project was put on hold in January 2011 while more funding was sought to continue the work. The result of this part of the work was a Working Group Draft (WGD) document with formal user needs identified and high level requirements developed. Subsequently, some manufacturers used this document as a basis for experimenting with designs, building prototypes and deploying various systems in the field with agencies willing to innovate with the industry.

This current project began in late 2015 with the goal of finishing the standard. The systems engineering has continued refining the requirements and developing the design content for the standard. The detailed designs from the manufacturers and the lessons learned from the early deployments are also being incorporated into the standard. During this process, the name of the standard was changed to meet with current ATC practices to ATC 5301 Advanced Transportation Controller (ATC) Cabinet (ATCC) Standard.

The design goals for ATC 5301 are as follows:

- Focus on increasing value to end users
- Flexibility within the standard for innovative designs
- Higher density – More capability in a smaller space
• Increased technician safety
• Increased public safety
• Enhanced monitoring functionality
• Increased cabinet power efficiency
• Provide LED signal compatibility.

Features of ATC 5301 are as follows:
• Functional standard except where component interchangeability is desired
• Double the number of detector channels in the same space
• Double the number of channels per switch pack and the switch pack is physically smaller
• Eliminate arc flash hazard per NFPA 70E
• Touch safe design
• Low voltage option for 48 Vdc on field wires – Electrically safe for humans
• Most assemblies replaceable while intersection in flash
• Load current monitoring for detecting dark approaches
• Better LED compatibility issue – potential power conservation and alternative power sources.

IMPORTANT:
This UCD contains design level material only. Due to project schedule constraints, the systems engineering content normally included in ITS standards was not included in this UCD. This means that the Concept of Operations, user needs, requirements, feature selection capability, and traceability of user needs to design features are not provided. All of the aforementioned sections will be included in the Recommend Standard (RS) version of the document which will follow in development after this user comment period.

On August 11, 2017, the Cabinet WG submitted ATC 5301 StdUCD v01.10.01.02 to the ATC JC for review as a proposed User Comment Draft (pUCD) standard. The ATC JC accepted the document as a formal UCD for distribution to the SDOs following their meeting on August 14, 2017 by a vote of 10 yeas, 1 nay, and 1 abstention.

4 COMMENTS LISTING
The adjudicated user comments from the development of ATC 5301 StdUCD v01.10.01.05 are found in Appendix II.

5 COMMITTEE OBJECTIVES
The objective of this phase of the project is to collect comments, adjudicate them and make improvements to ATC 5301. The improvements will be joined with further development by the Cabinet WG and the addition of the systems engineering information identified in the Status Report section to make a Recommended Standard ATC 5301.

6 COMMITTEE MEMBERS
This standard has been developed under the oversight of the ATC Joint Committee (JC) which is made up of representatives from the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the National Electrical Manufacturers Association (NEMA). The work in developing this standard was performed by the Cabinet Working Group (WG), a technical subcommittee of the ATC JC.
Cabinet Working Group

Doug Acker, McCain
Richard Dickinson, Harris County, TX
Scott Evans, Eberle Design
Craig Gardner, Intellilght
Robin Harrison, Peek Traffic
Jeffrey Hayes, Oregon Department of Transportation
Herasmo Iniguez, Caltrans
Brent Katauskas, Mobotrex
Clyde Neel, Trafficware
Bob Rausch, TransCore
Jim Rose, Econolite
Peter Skweres, Minnesota Department of Transportation
Mohamed Talas, New York City Department of Transportation
John Thai, City of Anaheim

ATC Joint Committee

James Cheeks, District of Columbia Department of Transportation
Doug Crawford, Intellilght
Ray Deer, Peek Traffic
Kleinjan Deetlefs, Applied Information
Gary Duncan, Econolite
Scott Evans, Eberle Design
Andrew Mao, Texas Department of Transportation
Dave Miller, Siemens
Robert Rausch, TransCore
Ed Seymour, Texas Transportation Institute
Mohamed Talas, New York City Department of Transportation
John Thai, City of Anaheim
Lei Wang, Louisiana Department of Transportation and Development
Henry Wickes, Texas Department of Transportation
Mark Wilson, Florida Department of Transportation
Jon Wyatt, Parsons

7 OTHER MATERIAL OF INTEREST

*ATC 5401 Application Programming Interface (API) Standard for the Advanced Transportation Controller (ATC) v02.17, ATC JC, 1 September 2011. Available from the Institute of Transportation Engineers.*

*Recommended Standard (RS) ATC 5201 Advanced Transportation Controller (ATC) Standard v06.24, ATC JC, October 2015. Available from the Institute of Transportation Engineers.*

[NOTE: The actual date of Joint Approval for this standard is projected to be completed by September 2017. The ballot by members of AASHTO, ITE and NEMA has completed recommendation of the standard.]

*Caltrans Transportation Electrical Equipment Specifications (TEES), California Department of Transportation, 12 March 2009. Available from the California Department of Transportation.*

NEMA Standards Publication TS 2-2003 v02.06 Traffic Controller Assemblies with NTCIP Requirements. Available from the National Electrical Manufacturers Association.

8 DECLARATION REGARDING OTHER KNOWN NATIONAL AND INTERNATIONAL STANDARDS

This statement confirms that other known national and international standards have been examined with regard to harmonization and duplication of content, and no significant conflicts with other known standards have been identified.

9 ABSTRACT OF THE STANDARD

The design material contained in ATC 5301 StdUCD v01.10.01.05 is organized around two high level design functional block diagrams: one for high voltage (120 VAC) outputs and the other for low voltage (48 VDC) outputs. Both versions are designed to drive low power LED signal heads. See Figures 2 and 3 below.

The LEGEND boxes of the block diagrams are important to the reviewer’s understanding of the designs (see Figure 1). In all ATCC configurations, the standard controls signal names, electrical characteristics and communications protocols to be identical among manufacturers for simplification of training, electrical maintenance and software interoperability. The Cabinet WG captured the needs for interchangeable plug-in components. Solid boxes indicate components where size, connector and pin assignments are controlled by the standard, while solid oval and lines indicate interfaces with connectors and pin assignments controlled by standard. The Cabinet WG also considered agency requests to adapt the mechanical layout and cabling to local needs during procurement, such as rack or shelf mounting. Hatched ovals and lines indicate interfaces where connector and pin assignment are not controlled by the standard, while hatched boxes indicate functions where size, connector and pin assignment are not controlled by the standard. Several sections of the standard include example mechanical configurations, such as power supplies. In this case, other mechanical configurations are allowed provided the signal names and electrical characteristics of each signal conform to the standard.

Figure 1: Legend box used in the high level design functional block diagrams.

The sections which follow functional block diagrams provide the detailed design information for each of design elements as follows: Components, Slots, Interfaces, Protocols, Product Safety, Environmental and Testing Requirements.
TYPICAL OUTPUT FUNCTIONALITY (NOTE 1)

OUT SLOT 2

OUT SLOT 1

TYPICAL INPUT FUNCTIONALITY (NOTE 1)

SIU

IN SLOT 1

(IN NOTE 2)

IN SLOT 2

(IN NOTE 2)

IN SLOT 3

(IN NOTE 2)

IN SLOT 4

(IN NOTE 2)

IN SLOT 5

(IN NOTE 2)

IN SLOT 6

(IN NOTE 2)

24 CHANNEL DETECTOR TERMINATION FUNCTIONALITY (NOTE 1)

CDC1

SB1/SB2

INPUT 1-4

INPUT 5-8

INPUT 9-12

INPUT 13-16

INPUT 17-20

INPUT 21-24

TYPICAL OUTPUT TERMINATION FUNCTIONALITY (NOTE 1)

SIU

DUAL HV

LOAD SW 1

DUAL HV

LOAD SW 2

OUT SLOT 3

OUT SLOT 4

OUT SLOT 5

OUT SLOT 6

24 CHANNEL DETECTOR TERMINATION FUNCTIONALITY (NOTE 1)

CDC2

SB3

FTR 1

FTR 2

FTR 3

FTR 4

FTR 5

FTR 6

FTR 7

FTR 8

FIELD IN

FLASH IN

FP1

FP2

FP13

FP14

FP15

FP16

FP3

FP4

FP5

FP6

FP7

FP8

FP9

FP10

FP11

FP12

CC

Figure 2: High Level Functional Block Diagram, High Voltage Version

NOTES:
1. FUNCTIONAL ELEMENTS SHALL FIT WITHIN 19" EIA-310 DIMENSIONS. PACKAGING NOT CONTROLLED BY STANDARD.
2. INPUTS SHALL BE CONTROLLED BY THE STANDARD AS FOLLOWS:
   - INPUT DEVICES SHALL MECHANICALLY CONFORM TO NEMA TS 2 Sec. 6.5.2.2.2 (see Figure 6-5)
   - CONNECTOR TYPE SHALL CONFORM TO NEMA TS 2 PARAGRAPH 6.5.2.28.1
   - CONNECTOR PIN ASSIGNMENT SHALL CONFORM TO NEMA TS 2 TABLE 6-2
   - MAPPING OF SIGNALS FROM INPUT CONNECTORS TO SIU SHALL BE FIXED BY THE STANDARD
   - ALTERNATE MAPPING FROM INPUT CONNECTORS TO SIU SHALL BE ACCOMPLISHED BY SOFTWARE
   - TYPICAL COMPATIBLE INPUT DEVICES INCLUDE:
     - NEMA 4-CHANNEL INDUCTIVE LOOP DETECTORS
     - CALTRANS 222 (2) CHANNEL DETECTORS WITHOUT STATUS AND 224 (4) CHANNEL DETECTORS WITHOUT STATUS
     - INDUCTIVE LOOP DETECTORS WITHOUT STATUS
     - ISOLATORS
     - PREEMPTORS
   - CDC CABLE & CONNECTORS ARE OPTIONAL, BUT CONTROLLED BY STANDARD IF SUPPLIED
3. SERVICE FUNCTIONALITY
4. POWER FUNCTIONALITY
5. UTILITIES TERMINAL BLOCKS
6. MAIN BREAKERS
7. GFCI BREAKERS
8. TRANSIENT SUPPRESSOR / FILTER
9. SERVICE ENTRY
10. CLEAN AC RECEPTICLE
11. DUAL HV FLASHER
12. 120 VAC IN
13. ASSEMBLY SYMBOL ELECTRICAL MECHANICAL
   - STANDARD NON-STANDARD OPTION
   - STANDARD STANDARD
   - STANDARD NON-STANDARD OPTION
   - STANDARD STANDARD
14. TO ADDITIONAL INPUT, OUTPUT OR INPUT/OUTPUT ASSEMBLIES
15. UP TO 32 OUTPUT CHANNELS PER CMU
NOTE 1: FUNCTIONAL ELEMENTS SHALL FIT WITHIN 19" EIA-310 DIMENSIONS. PACKAGING NOT CONTROLLED BY STANDARD

2. INPUT DEVICES SHALL BE CONTROLLED BY THE STANDARD AS FOLLOWS:
- INPUT DEVICES SHALL MECHANICALLY CONFORM TO NEMA TS 2 Sec. 6.5.2.2.2 (see Figure 6-5)
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  - NEMA 4-CHANNEL INDUCTIVE LOOP DETECTORS
  - CALTRANS 222 (2) CHANNEL DETECTORS WITHOUT STATUS AND 224 (4) CHANNEL DETECTORS WITHOUT STATUS
  - INDUCTIVE LOOP DETECTORS WITHOUT STATUS
  - ISOLATORS
  - PREEMPTORS

3. CDC CABLE & CONNECTORS ARE OPTIONAL, BUT CONTROLLED BY STANDARD IF SUPPLIED

Figure 3: High Level Functional Block Diagram, Low Voltage Version
APPENDICES
Appendix I

User Comment Draft

ATC 5301 Advanced Transportation Controller (ATC) Cabinet (ATCC) Standard v01.10.01.05
Appendix II

Comments Report from the Development of
ATC 5301 Advanced Transportation Controller (ATC) Cabinet (ATCC) Standard v01.10.01.05

A color-coded comment spreadsheet from “walkthrough” sessions with the Cabinet WG in May 2017 is included with this SDR.

- Blue indicates that the comments were accepted and added to UCD;
- Orange indicates that the comments were in sections to be rewritten; and
- Yellow indicates that the comments were left open because: a) no proposed text, b) no need or requirement driving the comment, or c) the comment was a duplicate of a blue or orange comment.
Appendix III

Comment Submittal Form for
ATC 5301 Advanced Transportation Controller (ATC) Cabinet (ATCC) Standard v01.10.01.05

Comments are requested using the comment form included with this SDR. The fields of the comment form include:

- Co/Org/Indiv – Refers to the submitting company, organization or individual;
- Edit/ Subst – Refers to editorial or substantive;
- DocID ver# – Document identifier and version number;
- Sec – Refers to the section number within the document;
- Para Table Fig – Refers to the paragraph, table or figure number within the document;
- Existing Text – Refers to the existing text in the document being addressed;
- Proposed Text – Refers to the proposed text to replace the existing text; and
- Reason/Explanation – Refers to the reason or explanation why the change should be made.