WisDOT Signals, Lighting & ITS Installation and Inspection Training

Ch. 1 Introduction

David Karnes

Welcome – Who are we and why are we here?

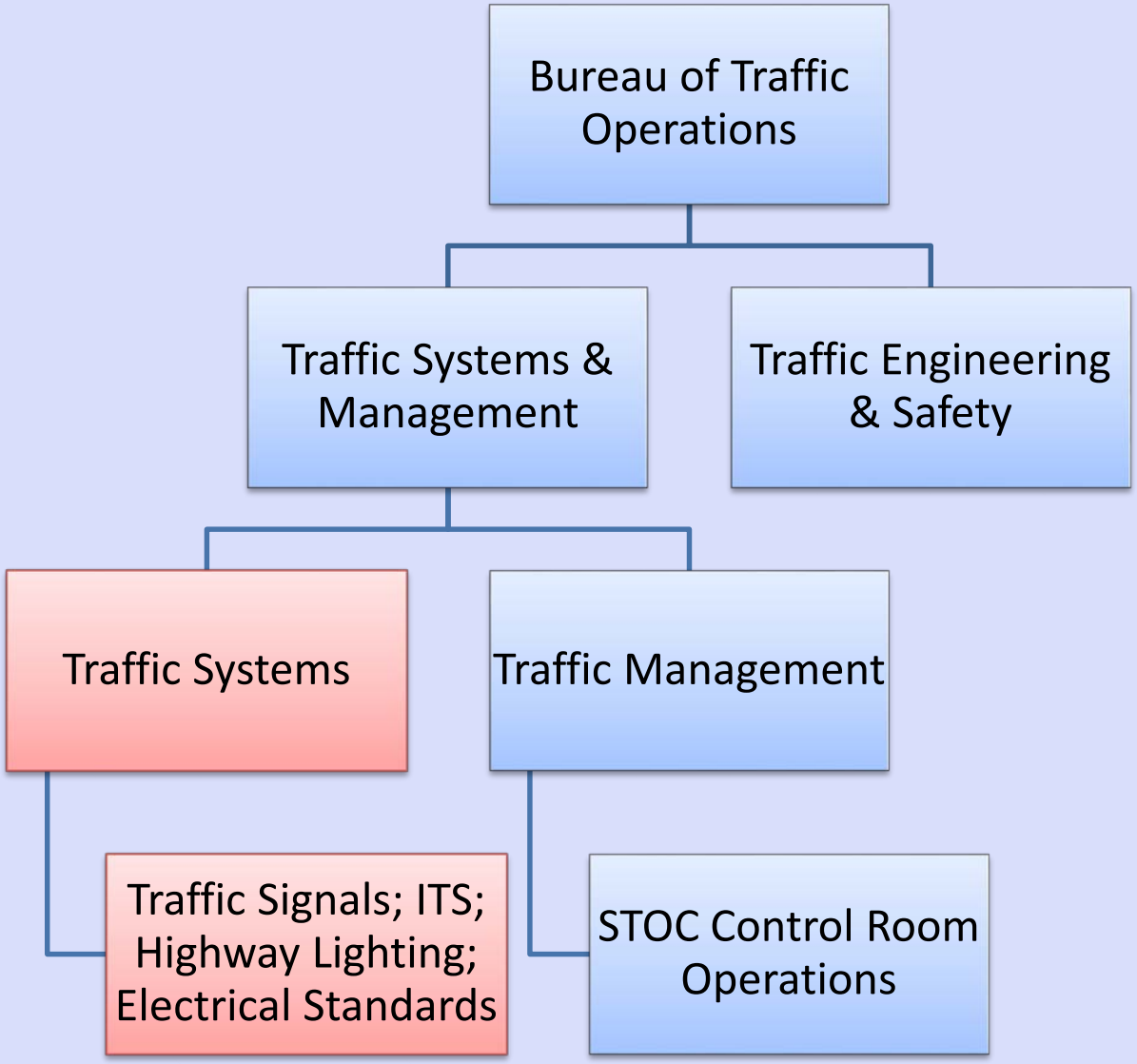
Introductions

-Name

-Who you work for

-What you'd like to get out of the training

Welcome – Who are we and why are we here?



BTO Traffic Systems Unit

David Karnes, PE	Traffic Systems Unit Supervisor
Ahmet Demirbilek	State Electrical and Lighting Engineer
John Mittelstadt	Electrical Field Systems Specialist
Don Schell, PE	Traffic Systems Engineer
Joanna Bush, PE	State Traffic Signal Systems Engineer
Dean Beekman, PE	ITS Engineer

Training Objectives

- Review of WisDOT electrical requirements installation of traffic signals, ITS and lighting components above and underground, final inspection of electrical systems, activating and commissioning traffic operations electrical systems and as-built plans.

- Focus on standard specifications, details and policies

NEITHER THE TRAINING HANDOUT NOR THE TRAINING IS INTENDED AS SUBSTITUTES FOR ACTUAL CONTRACT DOCUMENTS.

Agenda

Topic / Chapter for Discussion	From	To	Time
Chapter 1 - *Wisconsin DOT Highway Electrical System Introduction Dave K.*	9:00 AM	9:30 AM	30
Chapter 2 - *Highway Electrical System Components-1 Conduit and Pull Boxes – Ahmet (John)*	9:30 AM	10:00 AM	30
Break	10:00 AM	10:15 AM	
Chapter 2 - *Highway Electrical System Components-2 Bases and Construction – Ahmet (John)*	10:15 AM	11:00 AM	45
Chapter 3 - *Highway Electrical System Components-3 Electrical Wiring – Don*	11:00 AM	12:00 PM	60
Lunch	12:00 PM	1:00 PM	
Chapter 4 - *Signal Structures Joanna*	1:00 PM	2:15 PM	75
Chapter 5 - *Lighting Ahmet*	2:15 PM	2:35 PM	20
Stretch Break	2:35 PM	2:40 PM	
Chapter 6 - *ITS (Intelligent Transportation Systems) Dean*	2:40 PM	3:20 PM	40
Wrap Up-Good/Bad Installation Round Ahmet	3:20 PM	3:30 PM	10
Open Discussion Q/A Session, Course Evaluation	3:30 PM	4:00 PM	

References and Acronyms

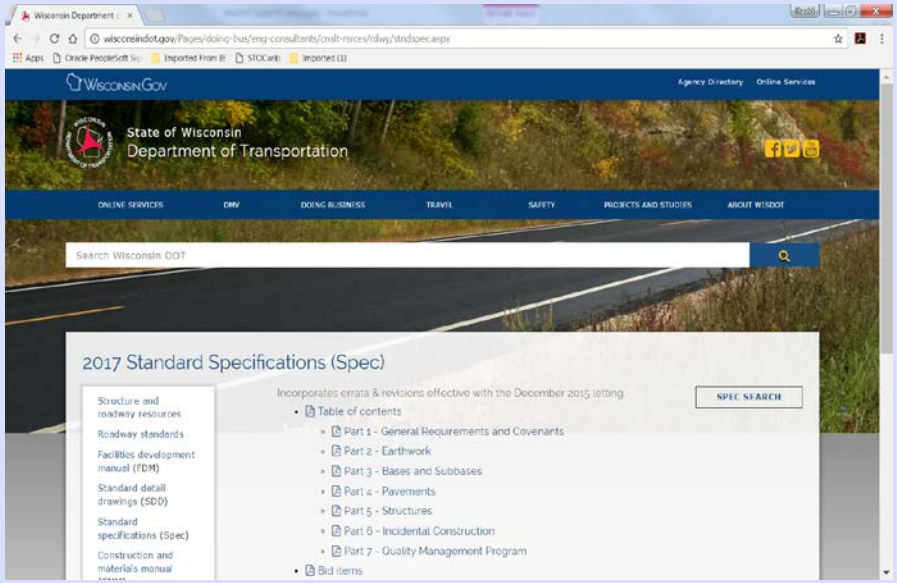
- **AASHTO** American Association of State Highway and Transportation Officials
- **ANSI** American National Standards Institute, Inc.
- **ASTM** American Society for Testing and Materials
- **ATMS** Advanced Traffic Management Systems
- **ATSSA** American Traffic Safety Services Association
- **EIA/TIA** Electronic Industry Association/Telecommunications Industry Association
- **FOA** Fiber Optic Association
- **FTMS** Freeway Traffic Management System
- **IES** Illuminating Engineering Society
- **ITE** Institute of Transportation Engineers

References and Acronyms

- **ITS** Intelligent Transportation Systems
- **MUTCD** The Wisconsin Manual on Uniform Traffic Control Devices for Streets and Highways (based on the Federal manual)
- **NEC** National Electrical Code
- **NEMA** National Electrical Manufacturers Association
- **NRTL** National Recognized Testing Laboratory
- **UL** Underwriters Laboratory
- **WEC** Wisconsin Electrical Code
- **WSEC** Wisconsin State Electrical Code, consisting of chapter SPS 316 of the Wisconsin administrative code combined with the NEC.

WisDOT Standard Specifications

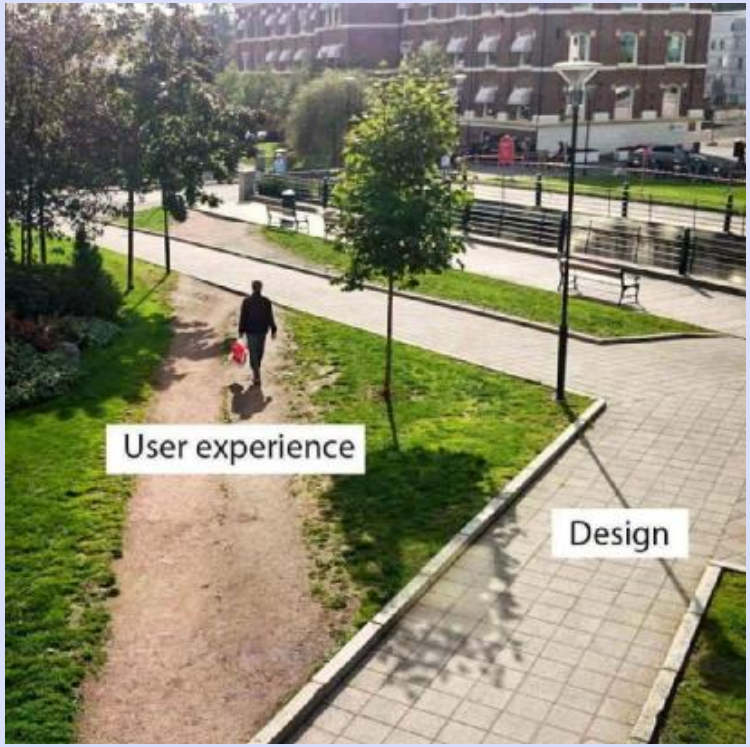
- Updated annually
- Projects are bid to the specifications applicable at that time.
- Available online http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/rdwy/fdm.aspx
- Personnel involved with the inspection and installation of WisDOT highway systems should be familiar with this standard.



104.3 Contractor Notification and 104.4 Requests for Information

- **Requests for Information (RFI)** Either the department or the contractor may request information that the other party must provide in order for the requesting party to fulfill its contract obligations. The requesting party shall submit requests for information (RFI) on department form DT2502

- Use your resources:
  - Regional Engineers and Electricians
  - BTO we're here to help!



105.4 Coordination of the Contract Documents

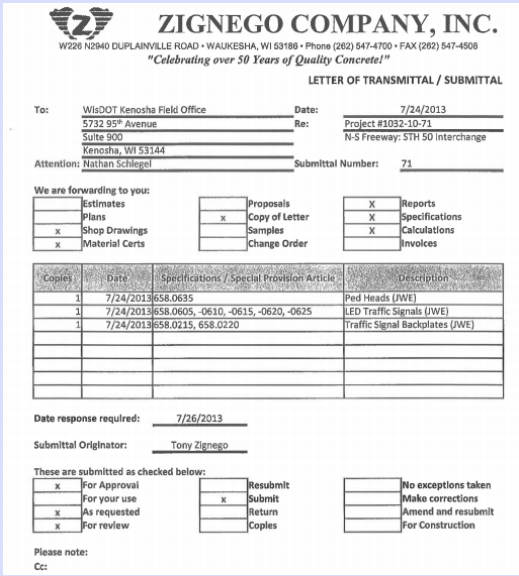
- Contractor has a right to request engineer interpret or provide information relative to the contract.
- If there is a discrepancy between documents the governing order is:
    1. Addenda
    2. Special Provisions
    3. Plans
    4. Additional Special Provisions
    5. Standard Specifications

106 Control of Materials

- All materials should conform to the contract
- All materials are subject to the engineer's approval before incorporation into the work
- The engineer may inspect or test all materials at any time during their preparation, storage, and use.
- If the engineer requests, provide samples of material and access to facilities that the engineer needs to assess the acceptability of all materials.

651.2 Materials and Shop Drawings

- Submit material list, drawings, and all product information to the engineer within 10 business days after notice of award



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LETTER OF TRANSMITTAL / SUBMITTAL

To: WisDOT Kenosha Field Office
5732 95th Avenue
Suite 900
Kenosha, WI 53144

Date: 7/24/2013

Re: Project #1032-10-71
N-S Freeway: STH 50 Interchange

Attention: Nathan Schlegel

Submittal Number: 71

We are forwarding to you:

	Estimates		Proposals	X	Reports
	Plans	x	Copy of Letter	X	Specifications
x	Shop Drawings		Samples	X	Calculations
x	Material Certs		Change Order		Invoices

Copies	Date	Specifications / Special Provision Article	Description
1	7/24/2013	658.0635	Ped Heads (JWE)
1	7/24/2013	658.0605, -0610, -0615, -0620, -0625	LED Traffic Signals (JWE)
1	7/24/2013	658.0215, 658.0220	Traffic Signal Backplates (JWE)

Date response required: 7/26/2013

Submittal Originator: Tony Zignego

These are submitted as checked below:

x	For Approval		Resubmit		No exceptions taken
	For your use	x	Submit		Make corrections
x	As requested		Return		Amend and resubmit
x	For review		Copies		For Construction

Please note:

Cc:

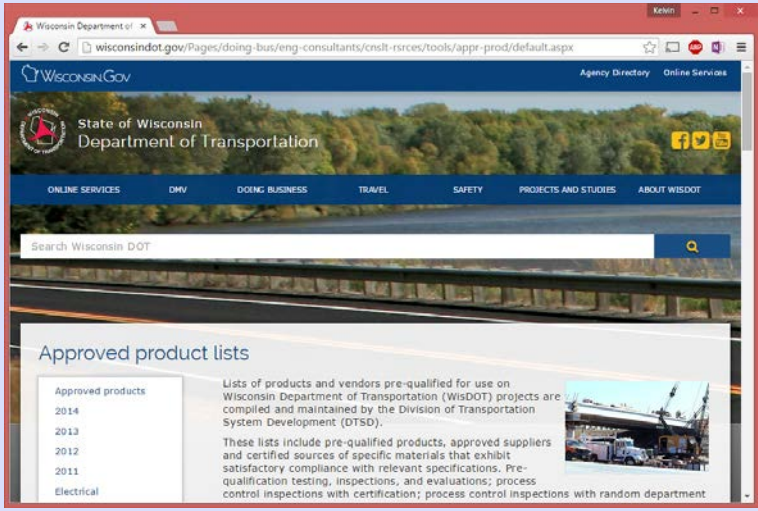
Part 6 – Section 651. 2

http://wisconsindot.gov/rdwy/stndspec/ss-06-51.pdf

Qualified Product List

- List of products and vendors pre-qualified for use on WisDOT projects
- All materials are subject to inspection, testing, certification of compliance or certified report of test to the appropriate specifications or material properties, and are subject to rejection at any time if found to be out of compliance

The QPL web site update regularly



http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/tools/appr-prod/default.aspx

Approved Product Li ×

wwwdev2/business/engrserv/electric/sec655.htm

WISCONSIN DEPARTMENT OF TRANSPORTATION

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- Approved product lists
- 2013 approved product list
- Electrical
- Section 652
- Section 653
- Section 655
- Section 657
- Section 658
- Section 659
- Section 661
- Miscellaneous

Section 655 Electrical wiring

Item number	Description	Product name	Manufacturer/ vendor	Date approved
655.0700	Loop detector lead in cable		Belden Electronics	Dec. 2, 2013
			Power & Telephone Supply Co. (Clifford)	Dec. 2, 2013
		8782A	Advanced Digital Cable Inc.	Dec. 2, 2013
655-0800	Loop detector wire		Belden Electronics	Dec. 2, 2013
			Power & Telephone Supply Co. (Clifford)	Dec. 2, 2013
			Advanced Digital Cable Inc.	Dec. 2, 2013
		3 STROBECOM	TOMAR Electronics, Inc.	Dec. 2, 2013
		com Model 138	Global Traffic Technologies	Dec. 2, 2013

LOOP LEAD-IN CABLE

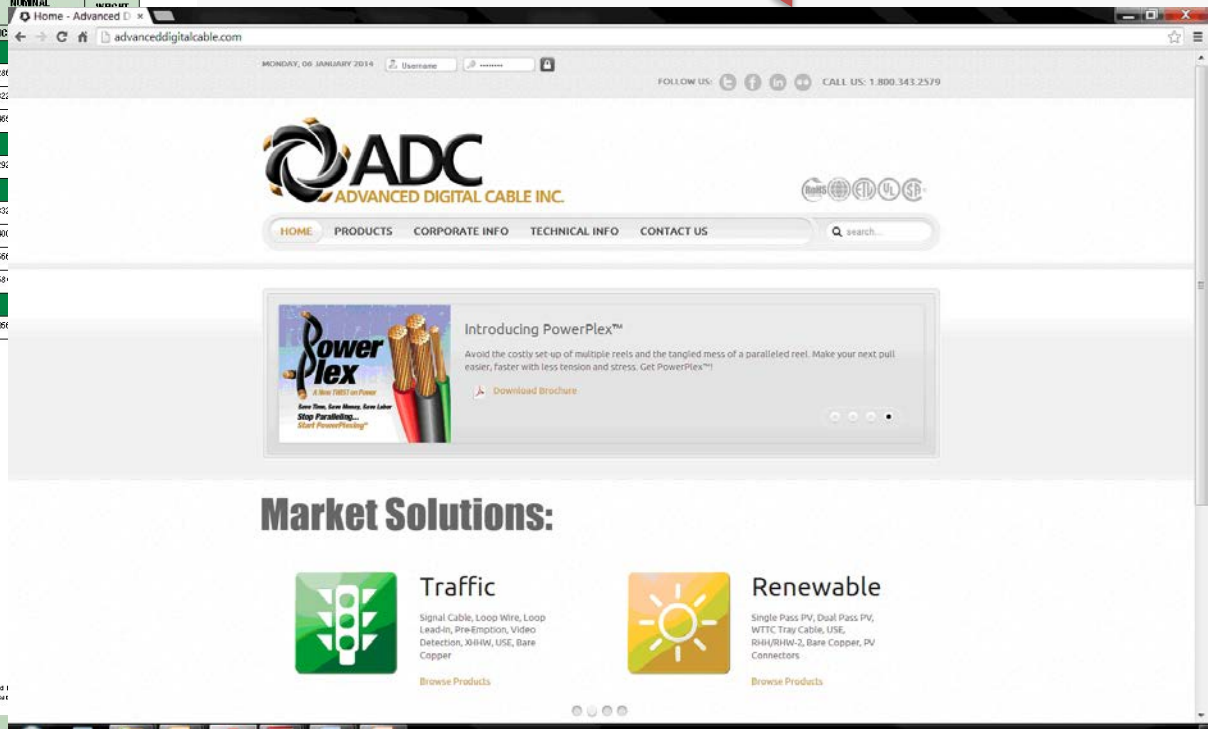
IMSA Specification 50-2 Loop Lead-In Cable

Specifications			Color Code	Put-Ups
Conductor - Stranded Tinned Copper Insulation - 18 AWG - .030" PE 16 AWG - .030" PE 14 AWG - .030" PE 12 AWG - .030" PE		Shielding - Aluminum Jacket - Polyethylene Voltage Rating - 600V Temp. Rating - 75°C	Clear/Black (1 Pair Types) See Color Code Tables on Page 15 for Multi-Pair Cables	Standard Reels 1,000', 2,500', 5,000' Other lengths available. Please consult your factory representative for availability.

PART NO.	AWG	NO. OF PAIRS	OUTER JKT THICKNESS		NOMINAL	
			INCH	mm	INCH	
18 AWG						
8740	18	1	.030	762	.28	
8742A	18	2	.030	762	.32	
8743A	18	3	.030	762	.46	
16 AWG						
8750	16	1	.030	762	.29	
14 AWG						
8780	14	1	.030	762	.33	
8782A	14	2	.030	762	.40	
8783A	14	3	.030	762	.56	
8784A	14	4	.030	762	.58	
12 AWG						
8790	12	1	.030	762	.35	

Cable Identification

Indent print on jacket
"ADVANCED DIGITAL CABLE
YYYY IMSA 50-2 600V"
replace YYYY with year of manufacture



ADC ADVANCED DIGITAL CABLE INC.

Phone: (800) 343 2579 • Fax: (828) 389 3922 • www.adcable.com

Buy America Compliance

All iron and steel products supplied must be in compliance with "Buy America" provisions.

Certification documentation is required and shall state the iron and steel used in the product was:

- Melted and manufactured in the United States
- Coated, galvanized or painted in the United States
- All fabrication, such as rolling, bending, forming, drilling, machining, extruding etc. was done in the United States

- http://www.fhwa.dot.gov/federal-aidessentials/catmod.cfm?id=28

670.3.3.2 Department-Furnished Equipment and Materials

(1) Have the **field system integrator** inspect department-furnished equipment and materials to ensure that they conform to contract requirements and function properly. Notify the department within 3 days if the inspection identifies defective equipment or materials. The department will replace whatever is defective.

(2) Do not take possession of defective equipment or materials. **Once possession is taken, the contractor is responsible for replacing defective equipment and materials.**

Construction and Materials Manual (CMM)

- Used by WisDOT for material review and inspection guidance
- Ch. 6 Miscellaneous Construction Section 55 Electrical Constructions contains
  - Inspection information
  - Material acceptance information

http://wisconsindot.gov/rdwy/cmm/cm-08-50e001.pdf

651.3 Construction - Electrical Codes

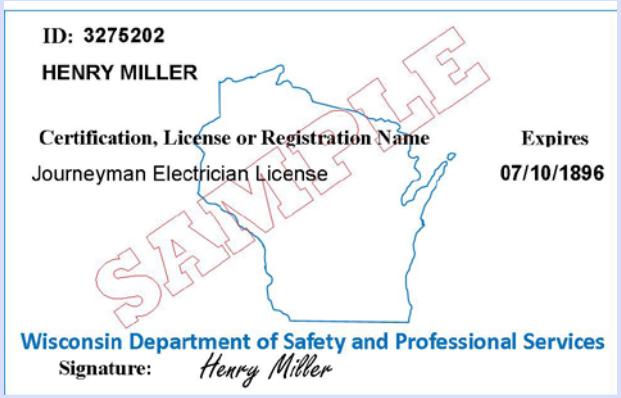
- Perform all work according to the Wisconsin State Electrical Code and the MUTCD
  - Volume 2 – SPS 316 Wisconsin Electrical Code
- National Electrical Code

https://docs.legis.wisconsin.gov/code/admin_code/sps/safety_and_buildings_and_environment/301_319/316

http://wisconsindot.gov/Pages/doing-bus/local-gov/traffic-ops/manuals-and-standards/wmutcd/wmutcd.aspx

651.3.2 Personnel Qualifications for Electrical Work

- All electrical work must be completed using a:
  - Journey Worker Electrician or, an
  - Apprentice Electrician under supervision of a Journey Worker Electrician



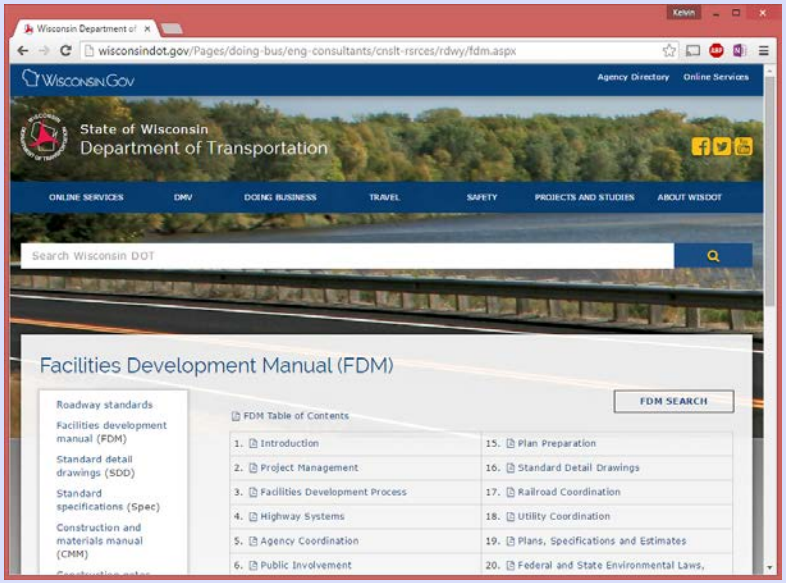
Part 6 – Section 651.3.2 Personnel Qualifications
http://wisconsindot.gov/rdwy/stndspec/ss-06-51.pdf

651.3.2 Electrical Work – Defined

- The department defines electrical work as electrical and related construction required under the contract, performed as specified in the standard specifications, contract special provisions, standard detail drawings, and plan details applicable to electrical construction.

Standard Detail Drawings (SDD)

Applicable SDDs are attached to every plan. They are also available in Chapter 16 of the FDM



http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/rdwy/fdm.aspx

Documents for Field Personnel

- Standard Specifications
- Special Provisions
- Complete Plan Sets (including construction details and standard detail drawings)
- Construction and Materials Manual
- Electrical Qualified Products List

- Wisconsin State Electrical Code
- National Electrical Code
- MUTCD and Wisconsin MUTCD