

# **ELECTRICAL ITEMS**

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## OVERVIEW

Electrical Items have different documentation requirements for each unit of measure (UOM). All Electrical Items must be counted and measured. Documentation examples for a few selected Electrical Items are illustrated in this chapter. Some minor modifications may be required to show the unusual circumstances that may occur with different items, but the general format should be followed. If there are items which cannot be documented according to the following examples, contact the Construction Admin Services Section for assistance.

When material samples are taken for the Materials Division labs, refer to the [AWP Sample Records](#) document for details.

## INSPECTOR'S RESPONSIBILITIES – ELECTRICAL ITEMS

- Use the Agreement Estimate report as a reference to ensure that items and quantities are paid in the correct category (AEB).
- Use the Schedules found on the Signals and Lighting sheets (Figure 8-1), located in the Contract plans, to help identify items, quantities, descriptions and locations.

CONDUIT RUN SCHEDULE							
CON. RUN	FROM	TO	LEN. LNFT	CONDUIT			COMMENTS
				PVC	GRD	PGW	
13 01	POLE 13A	CAB-13g	30'	1	1		SOLAR CABLING INCIDENTAL TO SOLAR BID ITEMS.
13 02	CAB-13g	PULL BOX (13g)	20'	1	1	2	
13 03	PULL BOX (13g)	CHAIN-UP SIGN (14b)	30'	1	1	2	SOLAR CABLING INCIDENTAL TO SOLAR BID ITEMS.
13 04	POLE 13B	CAB-13b	30'	1	1	2	
13 05	CAB-13b	PULL BOX (13b)	20'	1	1	2	
13 06	PULL BOX (13b)	CHAIN-UP SIGN (152)	30'	1	1	2	

PULL BOX SCHEDULE						
NO.	STATION	OFFSET/RT/EX.	TYPE	LOCKING LID	BURIED	COMMENTS
13 a	PE 1031+96	79'	RT	NO. 5 PULL BOX	X	
13 b	PW 1032+22	63'	LT	NO. 5 PULL BOX	X	

POLE SCHEDULE							
NO.	STATION	OFFSET/RT/EX.	TYPE	SAFETY BASE	EX. EX.	DEVICES	COMMENTS
						SOLAR PANELS	
13 A	PE 1031+90	98'	RT	ITS 30'		2	SOLAR CABLING INCIDENTAL TO SOLAR BID ITEMS.
13 B	PW 1032+28	82'	LT	ITS 30'		2	SOLAR CABLING INCIDENTAL TO SOLAR BID ITEMS.

CABINET SCHEDULE									
CABINET LABEL/NAME	STATION	OFFSET/RT/EX.	TYPE	CABINET EQUIPMENT				COMMENTS	
				EX.	FHES	CELLULAR TELEPHONE MODEM	FLASHING BEACON CONTROLLER		
CAB-13g	PE 1031+96	98'	RT	ITS		1	1	1	FOR EASTBOUND CHAIN-UP SIGN.
CAB-13b	PW 1032+22	82'	LT	ITS		1	1	1	FOR WESTBOUND CHAIN-UP SIGN.

STREET LIGHTING LUMINAIRE SCHEDULE									
NO.	STATION	OFFSET/RT/EX.	TYPE	EX. EX.	# OF LUM'R	ARM LENGTH	LUMINAIRE		COMMENTS
							TYPE		
02 01	R1 1+54	5'	RT	7	X	1	15'	LUMINAIRE (TYPE B) (SL)	REMOVE EXISTING HPS LUMINAIRE. REPLACE WITH LED. USE EXISTING CONDUCTORS.
02 02	R1 3+77	5'	RT	7	X	1	15'	LUMINAIRE (TYPE B) (SL)	REMOVE EXISTING HPS LUMINAIRE. REPLACE WITH LED. USE EXISTING CONDUCTORS.
02 03	R1 6+01	5'	RT	7	X	1	15'	LUMINAIRE (TYPE B) (SL)	REMOVE EXISTING HPS LUMINAIRE. REPLACE WITH LED. USE EXISTING CONDUCTORS.
02 04	R4 3+01	10'	LT	7	X	1	15'	LUMINAIRE (TYPE B) (SL)	REMOVE EXISTING HPS LUMINAIRE. REPLACE WITH LED. USE EXISTING CONDUCTORS.

Figure 8-1: Examples of a Schedules Sheets- Electrical Items

- Review the following for accuracy:
  - Special Provisions
  - Supplemental Notices
  - Change Orders

**Note:** When any changes are made to an item, reference the Change Order number in the DWR item posting remarks.

- Turn in ALL electrical item calculation sheets to the Office Engineer.

## DAILY WORK REPORT (DWR) – MOBILE INSPECTOR

1. Create a DWR in Mobile Inspector daily to document the activity being monitored. Refer to the [Mobile Inspector User Guide](#) for details on using this application.
  - Report Details – daily activities
  - Item Postings – item(s) and quantity(s)
  - Equipment – type, number and hours used
  - Personnel – title and hours
2. Record the following required information in the Report Details window (Figure 8-2):
  - **Date**
  - **Weather**
  - **Low Temp** and **High Temp**
  - **Attachments:** (N/A) Send ALL photos via email.
  - **Remarks:** Select the appropriate Remark Type. Verify with the Resident Engineer on what information is required.

The screenshot shows the 'Report Details' window with the following fields and values:

- Date:** Fri, 06/07/2019
- Weather:** 01
- Low Temp:** 55
- High Temp:** 87
- Rainfall Amt:** (empty)
- Attachments:** (camera and paperclip icons)
- Remarks:** GENERAL

The Remarks field contains the following text: "CW" 10 + 55.04 to "CW" 62 + 69.89 Interconnect (Blue Diamond). Corey Seager, P.E. Asst. Chief Traffic Engineer, came out to the job site today to review the work being done per Change Order # 5.

3803 remaining

Figure 8-2: DWR Report Detail Window

3. Record the following required information in the Item Postings window:
  - **Item:** Select the appropriate Project/Catg., if item is in more than one Project/Catg. – Refer to the AEB report.
  - **Contractor:** ALWAYS the Prime Contractor (Subs are not allowed).
  - **Qty:** Based on plan, measurements and calculations
  - **Material Set:** Select appropriate value (if applicable)
  - **Location:** Line Designation
  - **Station From/To:** Refer to Contract plans.
  - **Offset Type:** Enter the LT, RT, or CL.
  - **Offset Dist.:** Enter if known.
  - **Comments:** Must show calculations when appropriate, refer to Calculation Sheet when appropriate (refer to Appendix B, Calculation Formulas, in this Manual for a Calculation Sheet example), other information relevant to item posting, and explanations when Attention Flag is checked.
  - **Attention Flag:** Use to bring attention to Resident Engineer and Office Engineer for overruns and plan errors. Must enter Attention Comments.

**NOTES for Electrical item postings:**

- If an each item has a specific location/station callout in the plans, then a separate posting will be done. It should NOT be grouped in a posting.
- If each items do NOT have a location/station callout but are grouped in a table or structure list, then they can be combined in one posting.
- Multiple items can be included in one posting as long as the individual locations are listed in the comments. The Location box will contain the stations that encompass all the locations that are being paid for.
- If there are changes to the Schedules Sheets, enter the Conduit Run, Pull Box No., Pole No., or Cabinet Label/Name, etc., in the Location box and an explanation of the changes in the Remarks box.
- Refer to Figure 8-3 through Figure 8-11 for examples of electrical item postings with different UOM.

**Figure 8-3: DWR Item Posting – Electrical EACH**

**NOTES for Electrical EACH (Pull Box) (Figure 8-3):**

- Payment for EACH items will be based on field count.
- Location: Enter the Pull Box number.
- Sig. Fig. = .01

**Figure 8-4: DWR Item Posting – Electrical EACH**

**NOTES for Electrical EACH (Pull Box) (Figure 8-4):**

- Payment for EACH items will be based on field count.
- Location: Enter the Pull Box number.
- Comments: Enter an explanation of the changes if there are changes to the Schedules Sheets.
- Sig. Fig. = .01

**New Item Posting**

**Item:** STEEL POLE, TYPE 1A

**Contractor:** Q&D CONSTRUCTION INC

**Qty:** 0.50 EACH  
 Authorized: 10.000 EACH  
 Total Posted: 3.500 EACH

**Location:** Pole 13A

**Station From:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Station To:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Measured:** [ ]

**Comments:**  
 Base only

3988 remaining

Figure 8-5: DWR Item Posting – Electrical EACH

NOTES for Electrical EACH (Pole) (Figure 8-5):

- Payment for EACH items will be based on field count.
- Location: Enter the Pole number.
- Sig. Fig. = .01

**New Item Posting**

**Item:** STEEL POLE, TYPE 1A

**Contractor:** Q&D CONSTRUCTION INC

**Qty:** 0.50 EACH  
 Authorized: 10.000 EACH  
 Total Posted: 3.500 EACH

**Location:** Pole 13A

**Station From:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Station To:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Measured:** [ ]

**Comments:**  
 Pole only,  
 Pole 13A is 100% complete.

3959 remaining

Figure 8-6: DWR Item Posting – Electrical EACH (Pole)

NOTES for Electrical EACH (Pole) (Figure 8-6):

- Payment for EACH items will be based on field count.
- Pay 50% (.5) for Base and 50% (.5) for Pole.
- Location: Enter the Pole number.
- Comments: Indicate when the item is completed (base & pole is installed).
- Sig. Fig. = .01 (when complete)

**New Item Posting**

**Item:** SIGNAL HEAD 1W1C, PO... ▾

**Contractor:** Q&D CONSTRUCTION INC ▾

**Qty:**  EACH  
 Authorized: 8.000 EACH  
 Total Posted: 0.000 EACH

**Location:** Pole 2A

**Station From:**  +

**Offset Type:**

**Offset Dist:**

**Station To:**  +

**Offset Type:**

**Offset Dist:**

**Measured:**

**Comments:**

3976 remaining

**Figure 8-7: DWR Item Posting – Electrical EACH (Signal Head)**

NOTES for Electrical EACH (Signal Head) (Figure 8-7):

- Payment for EACH items will be based on field count.
- Pay 50% (.5) for Base and 50% (.5) for Pole.
- Location: Enter the Pole number.
- Comments: Indicate when the item is completed (base & pole is installed).
- Sig. Fig. = .01 (when complete)

**New Item Posting**

**Item:** 3-INCH CONDUIT ▾

**Contractor:** Q&D CONSTRUCTION INC ▾

**Qty:**  LFT  
 Authorized: 19,907.000 LFT  
 Total Posted: 0.000 LFT

**Location:** Run No. 13 01

**Station From:**  +

**Offset Type:**

**Offset Dist:**

**Station To:**  +

**Offset Type:**

**Offset Dist:**

**Measured:**

**Comments:**

3999 remaining

**Figure 8-8: DWR Item Posting – Electrical LFT**

NOTES for Electrical LFT (Figure 8-8):

- Payment for LFT items will be based on field measurements.
- Location: Enter the Conduit Run number.
- Sig. Fig. = .01

**New Item Posting**

**Item:** 3-INCH CONDUIT

**Contractor:** Q&D CONSTRUCTION INC

**Qty:** 40.00 LFT  
 Authorized: 19,907.000 LFT  
 Total Posted: 30.000 LFT

**Location:** Run No. 13 04

**Station From:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Station To:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Measured:**

**Comments:**  
 [ ]  
3999 remaining

**Attention:**

**Attention Comments:**  
 10 Additional footage was need to connect to CAB-13b  
 30 + 10 = 40LFT  
187 remaining

Figure 8-9: DWR Item Posting – Electrical LFT

NOTES for Electrical LFT (Figure 8-9):

- Payment for LFT items will be based on field measurements.
- Location: Enter the Conduit Run number.
- Comments: Enter an explanation of the changes if there are changes to the Schedules Sheets.
- Sig. Fig. = .01

**New Item Posting**

**Item:** NO. 6 CONDUCTOR

**Contractor:** Q&D CONSTRUCTION INC

**Qty:** 60.00 LFT  
 Authorized: 12,639.000 LFT  
 Total Posted: 951.000 LFT

**Location:** Run No. 13 02

**Station From:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Station To:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Measured:**

**Comments:**  
 3 Conductors  
 20LFT x 3 = 60 LFT  
3967 remaining

Figure 8-10: DWR Item Posting – Electrical LFT

NOTES for Electrical LFT (Figure 8-10):

- Payment for LFT items will be based on field measurements.
- Location: Enter the Conduit Run number.
- Comments: If there is more than one conduit/conductor per run, show the calculation for total LFT.
- Sig. Fig. = .01



**New Item Posting**

**Item:** TRAFFIC SIGNAL SIGNS

**Contractor:** Q&D CONSTRUCTION INC

**Qty:** 16.92 SQFT

Authorized: 335.430 SQFT  
Total Posted: 0.000 SQFT

**Location:** Pole 2B

**Station From:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Station To:** [ ] + [ ]

**Offset Type:** [ ]

**Offset Dist:** [ ]

**Measured:** [ ]

**Comments:**

Sign # R3-4  
 36" x 36" = 1296sq.inch / 144 = 9.00sqft.  
 Sign # R10-12  
 30" x 38" = 1140sq.inch / 144 = 7.62sqft.  
 9.00sqft. + 7.62sqft. = 16.92

3856 remaining

**NOTES for Electrical SQFT (Figure 8-11):**

- Traffic signs placed on a Pole or Mast Arms are considered Electrical item that are associated with the Pole or Mast Arms.
- Multiple sign can be paid for in one posting, if it's on the same Pole or Mast Arm.
- Location: Enter the Conduit Run number.
- Comments: Add the Sign Number and convert the Units from square inches to square feet. L x W / 144 (converting inches to feet)
- Sig. Fig. = .01

**Figure 8-11: DWR Item Posting – Electrical SQFT**

4. Record the following required information in the New Equipment window (Figure 8-12 and Figure 8-13):
  - **Contractor:** Actual contractor performing the work (include subs).
  - **Type:** Select from the Equipment list
  - **Used:** How many of each type.
  - **Hours Used:** Total hours in use.
  - **Comments:** Details of the type of equipment (e.g., diesel, HP, model, make). Include equipment attachment information if applicable.

**New Equipment**

**Contractor:** LAS VEGAS PAVING C...

**Type:** LOADER / BACKHOE / ...

**Used:** 1

**On Site:** [ ]

**Hours Used:** 8

**Hours Idle:** [ ]

**Comments:**

Bobcat 256C, Skid Steer, Diesel, 82HP, 1350lbs with an Auger Loader, attachment, 15C w/12" bit

506 remaining

**Figure 8-12: DWR Equipment Entry**

Add Equipment	
<b>Contractor:</b>	LAS VEGAS PAVING CORPORATION
<b>Type:</b>	LOADER / BACKHOE / WHEEL LOADER / SKID STEER
<b>Used:</b>	1
<b>Hours Used:</b>	8.000
<b>Comments:</b>	Bobcat 256C, Skid Steer, Diesel, 82HP, 1350lbs with an Auger Loader, attachment, 15C w/12" bit
 	

Figure 8-13: DWR Equipment List

5. Record the following required information in the New Personnel window (Figure 8-14 and Figure 8-15):
- **Contractor:** Actual contractor performing the work (include subs).
  - **Type:** Select from the Personnel list.
  - **Number:** How many of each title.
  - **Total Hours:** Total hours worked.
  - **Comments:** Details of personnel type (e.g., foreman w/name, laborer, truck driver).



New Personnel	
<b>Contractor:</b>	LAS VEGAS PAVING C... ▼
<b>Personnel:</b>	LABORER FOREMAN ▼
<b>Employee:</b>	N/A
<b>Decision Class:</b>	Select ▼
<b>Number:</b>	<input type="text" value="1"/>
<b>Total Hours:</b>	<input type="text" value="8"/>
<b>Comments:</b>	<input type="text" value="Foreman - Cody Bellinger"/> <small>3975 remaining</small>
 	

Figure 8-14: DWR Personnel Entry







Add Personnel	
<b>Contractor:</b> LAS VEGAS PAVING CORPORATION <b>Description:</b> LABORER <b>Number:</b> 3 <b>Total Hours:</b> 8.000	 
<b>Contractor:</b> LAS VEGAS PAVING CORPORATION <b>Description:</b> OPERATING ENGINEER <b>Number:</b> 2 <b>Total Hours:</b> 8.000	 
<b>Contractor:</b> LAS VEGAS PAVING CORPORATION <b>Description:</b> LABORER FOREMAN <b>Number:</b> 1 <b>Total Hours:</b> 8.000 <b>Comments:</b> Foreman - Cody Bellinger	 

Figure 8-15: DWR Personnel List

- Complete a final review of the DWR, lock the report, and Sync Data.

**Note:** When the Sync Data process has completed, the information is uploaded into an AWP DWR, where it is reviewed and Approved for processing progress payments.

## DAILY WORK REPORT (DWR) – AWP EDITS

The Officer Engineer reviews each Inspector's DWRs for required entries and accuracy. If edits are needed on a DWR, the Inspector who created it may be required to log into the AWP program on a computer (not the iPad) and complete the edits. Refer to Chapter 5, Daily Work Reports, Section, Editing a Mobile Inspector DWR, in the [AWP User Guide With Materials](#) for details.

## OFFICE ENGINEER'S RESPONSIBILITIES – ELECTRICAL ITEMS

- Collect all Material Certifications. Scan and save them to the appropriate Contract Files\Materials\03 Cert & Test Reports\3.# directory. Each Material Certification must have the contract ID, bid item and represented quantity entered. Hand-written entries are acceptable for the contract ID, bid item and quantity.
  - Name the scanned certificate file(s) with the contract ID, Material Code Name and description- CERT (e.g., 03904 M6230001 Traffic Systems - CERT.pdf). The Material Code Name and description is found in the NDOT Power BI, AWP Reports, Certification Tracking report.
- Create an AWP Materials Cert Sample Record for each Material Certification received. Refer to the [AWP Cert Sample Record Creation](#) document and Chapter 24, Progress Payments, in this Manual for details.
- Save Electrical Item photos in the appropriate Contract Files\Contract\03 Multimedia\3.# Photos directory.
- Review Electrical Item calculation sheets for accuracy and save electronically in the appropriate Contract Files\Contract\07 Estimates\7.# Calc Sheets directory using this naming convention: DWR YYYY-MM-DD Inspectors Initials, (e.g. DWR 2016-03-19 KMM).
- Distribute executed copies of Change Orders to Inspectors.

## DAILY WORK REPORT (DWR) – AWP

When a Mobile Inspector DWR is locked by an Inspector, the information is uploaded into an AWP DWR. Refer to Chapter 5, Daily Work Reports, in the [AWP User Guide With Materials](#) for details.

- Verify the following:
  - Information in the Remarks
  - Information in the Contractor On Site tab
  - Information in the Contractor Equipment tab
  - Information in the Contractor Personnel tab
  - Items are paid correctly according to the contract documents (e.g., plans, supplemental notices, Change Orders).
  - Item quantities
  - Quantities in postings are documented to the correct Significant Figure (.01)
  - Material Set is correct.
  - Stations and Line Designations in the Locations
  - Calculations are correct.
  - Comments reference calculation sheets, if applicable.

**Note:** Length does not always equal the difference between the beginning and ending station. Sometimes there is a curve or an obstacle that will affect the distance. Always check with the Inspector before assuming the calculations are incorrect.

- Approve the DWR if everything is correct.
- If there are edits required, the Office Engineer may complete them and add a DWR Note with their name, date, and details of the correction. The DWR can then be Approved.
- If there are edits which need to be completed by the Inspector who created the DWR, the Inspector will be required to log into the AWP program on a computer (not the iPad) to complete the edits.
- Review the edited DWR and Approve.