NOTES:
1. Luminaire is specified by Plan Note.
2. AEL Series 245L, Eaton MPH Woodbridge LED, or approved equal, grey finish.
3. Luminaire is specified by Plan Note.
4. Luminaire is specified by Plan Note.
5. All HL-10.11 poles are of round cross section with smooth walls (no flutes).
POLE TOP AND BRACKET ARM ASSEMBLIES (TYP.)

SECTION A-A

POLE TOP AND BRACKET ARM ASSEMBLIES (TYP.)

ALTERNATE HAND HOLE

HAND HOLE WITH COVER

NOTES:
1. Hand holes are not required on poles with transformer bases.
2. Hand holes shall be opposite the roadway unless such location renders them inaccessible. All light poles mounted on raised concrete median barriers shall be equipped with hand holes. Hand holes shall be located beneath the bracket arm extending over the northbound or eastbound traffic lanes.
3. Arm to pole connection using "simplex" fitting with or without reinforcing gusset is acceptable provided structural requirements of specifications are met. Clamp-on connections not permitted for steel poles. If used on aluminum poles, a manufacturer-approved method (through-bolting, etc.) shall be used to prevent rotation.
4. Circuit and light pole numbers shall be as scheduled on lighting plan sheets. Labels shall contain 3" series "B" letter and numbers as per the "Standard Alphabets on Lighting Plan Sheets" published by the Federal Highway Administration.
5. Circuit identification details are applicable to all pole designs.
6. Required engraved marking per C&MS 725. Alternately, the engraved marking may be placed on the top of the base plate.
7. Do not use lock washers.
### STEEL ANCHOR BASES

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**ON CONCRETE FOUNDATION**

**ON MEDIAN BARRIER**

### ALUMINUM ANCHOR BASES

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**ON CONCRETE FOUNDATION**

**ON MEDIAN BARRIER**

### BOTTOM OF TRANSFORMER BASE

**ON TRANSFORMER BASE**

**NOTE:**

1. For median-mounted poles, Pole Base Plate and Anchor Bolt dimensions will be modified as indicated on Standard Construction Drawing (SCD) HL-20.13.
2. For pole grounding details see SCD HL-60.11.
3. Breakaway bases shall not be used under poles in excess of manufacturer’s rated limits for base.
4. Cast aluminum transformer bases shall not be used where overhead wiring is required.
5. For poles mounted on pavements on bridge parapets, the anchor bolt shape and length will be modified as indicated in the structure plans.
6. Anchor bolts shall be headed or nutted per SCD HL-20.13. L-bolts shall not be used.
7. Attach varmint guard with stainless steel band and maximum 3" overlap. For overlapping screen with stainless steel wire mesh. Screen shall be solid sheet, welded wire mesh or expanded metal sheet, stainless steel or galvanized, with openings no larger than ⅜".
8. Aluminum cast transformer bases qualify as breakaway supports. Steel transformer bases do not.
9. Steel anchor bases shall be headed or nutted per SCD HL-20.13. L-bolts shall not be used.
10. Use strips of aluminum for plumbing, or other material if approved by the pole manufacturer. Plumbing tolerance: ± 1/2 degree. Only aluminum anchor bases may be mounted flush to the concrete without using nuts.
11. Coordinate with pole manufacturer to determine required bolt circle, bolt diameter, and bolt length. Bolt circle and diameter should match one of the combinations given in the Connector Bolt column of the table below. Minimum anchor bolt length is given in the Anchor Bolt column of the table.
NOTES:

1. Run new volt distribution cable (Voltage & AWG to match existing) from the existing junction box to the pole.

2. Use connection, unfused bolted to make connections in the junction box. Use connection, fused pull-apart for the line conductor(s), connection, unfused pull-apart for the neutral conductor, to make connections in the pole.

3. Maintain 2 bolt diameters of clearance between the bottom of the base plate and the top of the finished concrete.

4. Existing anchor bolt shall be fully cleaned of concrete before threading, with minimum pre-threading stickout of 8 bolt diameters. Existing anchor bolts shall be cut to length only after threading and cold galvanizing is applied.

5. Coupling nuts shall be of the same material as the bolt being extended or approved equal, per C&MS 725.21A, min. 2 bolt diameters long and partially threaded, both ends.

6. Coupling nuts shall engage a minimum of 2 bolt diameters of full threads on both the existing bolt and the extension.

7. Extension studs to be of the same material and strength as the existing anchor bolts.
NOTES:

1. Construction shall conform to the requirements of C&M5 502 and 503.

2. All reinforcing steel shall be epoxy coated and comply with and be placed in accordance with C&M5 509.

3. Light pole anchor bolts to be 1½" diameter x length 3", Grade 55, with a top thread length of 5 bolt diameters. Threads shall be UNC-2B, and may be either rolled or cut, and coarse threaded. The embedded end of the anchor bolt shall be headed or threaded with a heavy hex nut.

4. Anchor bolt material may be smooth steel rod that is threaded at the ends or threaded over its entire length. Hex nuts shall be ASTM A563, Grade DH, with UNC-2B threads. Anchor bolts shall be hot-dip galvanized American Standard heavy hex, Grade DH, with UNC-2B threads. Nuts shall also be galvanized per C&M5 711.02.

5. Maintain a 2'-10" minimum lap length for vertical drilled shaft rebar and U-bars.

6. The top of the concrete barrier shall be flat, smooth and durable to eliminate need for light pole shims. Grid surface, if required, to make concrete level.

7. Dowel foundation to adjacent barrier in accordance with the requirements of the standard drawings for barrier dimensions.

8. Provide continuity of equipment ground between junction box and light pole.


10. Light pole anchor bolts to be 1½" diameter x length 3", Grade 55, with a top thread length of 5 bolt diameters. Threads shall be UNC-2B, and may be either rolled or cut, and coarse threaded. The embedded end of the anchor bolt shall be headed or threaded with a heavy hex nut.

11. Anchor bolt material may be smooth steel rod that is threaded at the ends or threaded over its entire length. Hex nuts shall be ASTM A563, Grade DH, with UNC-2B threads. Anchor bolts shall be hot-dip galvanized American Standard heavy hex, Grade DH, with UNC-2B threads. Nuts shall also be galvanized per C&M5 711.02.

12. Maintain a 2'-10" minimum lap length for vertical drilled shaft rebar and U-bars.

13. The top of the concrete barrier shall be flat, smooth and durable to eliminate need for light pole shims. Grid surface, if required, to make concrete level.

14. Dowel foundation to adjacent barrier in accordance with the requirements of the standard drawings for barrier dimensions.

15. Refer to the Roadway Barrier Standard Construction Drawing for barrier dimensions.

16. Light pole anchor bolts to be 1½" diameter x length 3", Grade 55, with a top thread length of 5 bolt diameters. Threads shall be UNC-2B, and may be either rolled or cut, and coarse threaded. The embedded end of the anchor bolt shall be headed or threaded with a heavy hex nut.

17. Anchor bolt material may be smooth steel rod that is threaded at the ends or threaded over its entire length. Hex nuts shall be ASTM A563, Grade DH, with UNC-2B threads. Anchor bolts shall be hot-dip galvanized American Standard heavy hex, Grade DH, with UNC-2B threads. Nuts shall also be galvanized per C&M5 711.02.

18. Maintain a 2'-10" minimum lap length for vertical drilled shaft rebar and U-bars.

19. The top of the concrete barrier shall be flat, smooth and durable to eliminate need for light pole shims. Grid surface, if required, to make concrete level.

20. Dowel foundation to adjacent barrier in accordance with the requirements of the standard drawings for barrier dimensions.


22. Light pole anchor bolts to be 1½" diameter x length 3", Grade 55, with a top thread length of 5 bolt diameters. Threads shall be UNC-2B, and may be either rolled or cut, and coarse threaded. The embedded end of the anchor bolt shall be headed or threaded with a heavy hex nut.

23. Anchor bolt material may be smooth steel rod that is threaded at the ends or threaded over its entire length. Hex nuts shall be ASTM A563, Grade DH, with UNC-2B threads. Anchor bolts shall be hot-dip galvanized American Standard heavy hex, Grade DH, with UNC-2B threads. Nuts shall also be galvanized per C&M5 711.02.

24. Maintain a 2'-10" minimum lap length for vertical drilled shaft rebar and U-bars.

25. The top of the concrete barrier shall be flat, smooth and durable to eliminate need for light pole shims. Grid surface, if required, to make concrete level.

26. Dowel foundation to adjacent barrier in accordance with the requirements of the standard drawings for barrier dimensions.

27. Refer to the Roadway Barrier Standard Construction Drawing for barrier dimensions.

28. Light pole anchor bolts to be 1½" diameter x length 3", Grade 55, with a top thread length of 5 bolt diameters. Threads shall be UNC-2B, and may be either rolled or cut, and coarse threaded. The embedded end of the anchor bolt shall be headed or threaded with a heavy hex nut.

29. Anchor bolt material may be smooth steel rod that is threaded at the ends or threaded over its entire length. Hex nuts shall be ASTM A563, Grade DH, with UNC-2B threads. Anchor bolts shall be hot-dip galvanized American Standard heavy hex, Grade DH, with UNC-2B threads. Nuts shall also be galvanized per C&M5 711.02.
MEDIAN BARRIER POLE BASE DETAIL
(Note 1)

MEDIAN BARRIER JUNCTION BOX (TYP.)
(Note 2)

NOTES:
1. Orient pole base so that junction box and handhold are accessible from the same side of barrier.
2. See HL-30.41 for additional Median Barrier Junction Box details.
NOTES:

1. All conduit shall conform to CMS 725.04 (Galvanized RMC).
2. Grounding bushings are provided in 4" conduit to interconnect structure conduit system with structure grounding system shown on Standard Construction Drawing (SCD) HL-20.21.
3. For anchor bolt details see SCD HL-10.13.
4. Junction boxes shall conform to CMS 729.10.
5. Payment for pilaster reinforcing steel and concrete shall be included in CMS 509 and 511 items for the structure.
6. Where conduit is provided for future installation of poles, the conduit shall be capped.
7. Lubricate cover screws with anti-seize compound or grease.
8. At the pilaster, the additional barrier width affords the ability to terminate the long steel at the box. The vertical bare steel shall be moved sufficiently to install box.

1. STRUCTURE LIGHTING: LIGHT POLE PILASTERS

ELEVATION
LIGHT POLE PILASTER FOR BRIDGE WITH SIDEWALK RAILING

SECTION A-A
PILASTER JUNCTION BOX WITH STEEL PLATE COVER
(Conduit Openings Not Shown)

PLAN
LIGHT POLE PILASTER FOR BRIDGE WITH STANDARD ROADWAY RAILING

SECTION B-B

SECTION C-C
REINFORCING STEEL DETAILS

See Note 1

LIGHT POLE PILASTER FOR BRIDGE WITH SIDEWALK RAILING

LIGHT POLE PILASTER FOR BRIDGE WITH STANDARD ROADWAY RAILING

NOTES:
1. Provide the reinforcement shown if the plans do not include pilaster details.

Bar bending details

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</table>

Bar size is indicated in the bar mark. The first digit where three digits are used indicates the bar size number. For example, L501 is a No. 5 size bar which is ⅝" dia.
NOTES:

1. Foundations are designed for structures with round tapered shafts designed in accordance with the 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", as noted in SCD HL-10.31, Note 8.

2. Tower handholes shall be on downslope of tower.

3. Foundation depth based on soil analysis. Foundation diameter based on Table 1. See chart in plans for required depths. If solid rock is encountered before reaching required depth, the remaining foundation depth may be decreased by 50 percent.

4. Light tower manufacturer responsible for anchorage design, which shall incorporate at least eight anchor bolts per AASHTO LT-66 (2013). Manufacturer shall design anchor bolts using ACI 318 Appendix D and shall design any additional foundation reinforcing necessary.

Material strengths are:
- $f_y = 60,000$ psi
- $f_{c} = 4,000$ psi

Anchor bolts shall be located inside the drilled shaft reinforcing cage. Anchor bolts shall be ASTM 1554.

Anchor bolt size and spacing to fit mounting plate supplied with tower. However, bolt circle shall be equal to or less than the maximum bolt circle permitted in Table No. 1. The bolts shall be headed or have a heavy hex nut on the embedded end. Threads shall be UNCH-2A, and may be either rolled or cut, and coarse threaded. The embedded end of the anchor bolt shall be headed or threaded with a heavy hex nut.

Anchor bolt material may be smooth steel rod that is threaded at the ends or threaded over its entire length. Hex nuts shall be ASTM A563, American Standard heavy hex, Grade DH, with UNC-2B threads. Plate washers shall be A709 Grade 36 or Grade 50. Anchor bolts shall be galvanized per C&MG 710.2.

5. The length $L$ of the 1/2" diameter spiral bar in the foundation depth with a 3" clearance at each end. Four steel channels, tee or angle spacers weighing approximately 0.80 pounds per foot of spacer shall be provided for each spiral unit. They shall be equally spaced along the periphery of the coil. Spiral lap splice provided for each spiral unit. They shall be equally spaced along the periphery of the coil. Spiral lap splice length shall be 3'-0". Provide one and a half turns of spiral ends.

6. Conducts in the foundation shall conform to C&MG 625 and 755. The foundation conduct shall be of the same material as that used to protect the circuit extension beyond the foundation.

7. All reinforcing shall be epoxy coated, comply with and be placed in accordance with C&MG 599.
NOTES:

1. This foundation is intended for use with concrete barrier as detailed in Standard Construction Drawing (SCD) RM-4.3.

2. Conduits in the foundation shall conform to C&MS 625 and T&S. The foundation conduit shall be of the same material as that used to protect the circuit extension beyond the foundation.

3. See SCD HL-20.21 for additional details, reinforcing steel, and anchor bolts. The maximum anchor bolt embedment length shall be 49 inches.

4. See SCD HL-20.21 for grounding details.
NOTES:

1. Pull boxes shall conform with C&MS 625.11 and 725.07 or 725.08 or 725.09.

2. Conduit openings shall be sealed after conduit installation.

3. Aggregate used for pull boxes shall be No. 7 or 8, at least 8” deep. Cost for aggregate shall be included with the unit price bid for each pull box.

4. Install pull box drains in accordance with C&MS Item 611 as specified in the plans unless otherwise directed by the Engineer.

5. A durable label reminding the need to lubricate the threads of the cover hole draws screws with grease or anti-oxidizing compound shall be on the inside of the frame or upper wall.

6. See C&MS Item 625.11 for cover marking requirements.

7. Portland cement concrete pull box covers shall be cast iron with reinforcing ribs and matching frames by Neenah, Josam or Zurn foundries, or approved equal, or covers may be 1/2” minimum galvanized plate steel.

8. Tapered thickness Portland cement concrete pull box walls may be used; however, minimum wall thickness shall be as indicated.

9. Lifting rings or wire pulling rings may be incorporated into precast Portland cement concrete pull box walls.

10. Conduct wires for cast-in-place Portland cement concrete pull boxes shall be cast as required. Precast Portland cement concrete pull boxes may have field core drilled or sawed openings, or may have precast openings or knockouts. Knockouts shall be arranged to avoid compromising the structural integrity of the box.

11. Grounding braid, with lugs, shall be threaded copper, equivalent to No. 4 AWG. Do not use wire for the lid grounding conductor. Braid shall be bonded to the circuit grounding conductor by an approved (UL-listed) means. Braid length shall allow for complete removal of cover and placement on ground adjacent to the pull box, 48” minimum. Also, ground the pull box body using the braid or #4 AWG green wire. Pull box body ground attachment may be made on the corner angle U-nuts or on a body-mounted grounding post (if provided).

12. Provide polymer concrete, fiberglass and plastic pull boxes (725.06, 725.07, and 725.12) in the following nominal sizes based on volume. Linear dimensions shall match to & 10% and volume by & 10%.

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<th>SIZE (in.)</th>
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PORTLAND CEMENT CONCRETE PULL BOX (725.08)

INSTALLOATION WITH INDEPENDENT DRAIN

INSTALLOATION WITH CONNECTION TO ROADWAY UNDERDRAIN
NOTES:

1. Payment for protection of duct-cable and distribution cable near guardrail shall be included in the unit prices bid for the affected cable.

* Choose Crossing Point Such that Guardrail Post Alignment is Approximately Midway Between Tapered Trench Alignment and Nominal Trench Alignment.
**CONDUIT JACKED UNDER PAVEMENT**

**TRENCH SECTION**

- Concrete
- Anchor Rods 3/8" dia. or Larger x 18"
- Bind Conduit, Spacer, and Anchor Rods No. 8 AWG Galv. Wire
- 3' min. or 6" max.
- Bottom of Trench
- Coupling: Conduit Section or Bend
- Spacers

**SIDE ELEVATION**

- Concrete Encased Conduit Under Roadway
- 441 Surface Course (Flexible Pavement) or 511 Concrete Placed and Finished in Accordance with 452 (See Note 1)
- Sawcut Existing Pavement 2" min.
- 511 Concrete (See Note 1)
- Tamped Backfill
- Conduit
- 12" min. Trench
- 511 Concrete (See Note 1)
- 703.02 Sand
- 1" Widest Width

**NOTES:**

1. Replacement of disturbed flexible pavement shall consist of a CMS 511 concrete subcourse with a 441 surface course. Replacement of rigid pavement shall consist of a 511 concrete course with surfaces finished in accordance with 452.

2. Restore disturbed roadway and surfaces to a condition equal to that existing before the work started.

3. When undermining unpaved shoulders, provide 5" thick wall steel surface plates, corrugated pipe sleeves, shoring or other approved means to prevent cave-in.

4. When conduit is jacked or drilled under divided pavements, cable may be installed in a trench through the median area when specified in the plans.
CONDUIT DETAILS FOR BRIDGE WITH TYPICAL ROADWAY PARAPET

CONDUIT DETAILS FOR BRIDGE WITH TYPICAL SIDEWALK PARAPET

NOTES:

1. Sidewalk width not shown to scale.
2. Install fittings with external bonding jumpers in a location that allows visual inspection of the jumper.

CONDUIT EXPANSION FITTING
Dimensions may be altered to fit abutment design
(See Note 2)

CONDUIT DEFLECTION FITTING
(See Note 2)
The expansion/deflection fitting (NEMA 4 rating) shall consist of iron or bronze and couplings in a heavy duty neoprene sleeve held in place by stainless steel bands. A copper braid bonding jumper shall be installed inside the sleeve between the end couplings for grounding continuity.

2. At the end of the abutment, place conduit in concrete with threads only exposed, compact backfill up to level of conduit, then attach expansion/deflection fitting along with removing conduit and complete compaction of backfill.

3. If no other pulling capability is located near the end of the bridge, an internal-flange junction box meeting CMS 725.10 and a minimum length of 5 conduit diameters shall be installed. Spacing of junction boxes is determined by the bridge detailer and should be shown on those drawings. Adjacent junction boxes are placed no closer than 3 foot C-C unless shown in the Plans. If not shown in the plans, maximum spacing of junction boxes is 200 feet for lighting and 150 feet for other utilities.

4. Unless specified otherwise in the Plans, exposed conduit under bridge decks is 2-inch SCH 40 galvanized.

NOTES:

1. The expansion/deflection fitting (NEMA 4 rating) shall consist of iron or bronze and couplings in a heavy duty neoprene sleeve held in place by stainless steel bands. A copper braid bonding jumper shall be installed inside the sleeve between the end couplings for grounding continuity.

2. At the end of the abutment, place conduit in concrete with threads only exposed, compact backfill up to level of conduit, then attach expansion/deflection fitting along with removing conduit and complete compaction of backfill.

3. If no other pulling capability is located near the end of the bridge, an internal-flange junction box meeting CMS 725.10 and a minimum length of 5 conduit diameters shall be installed. Spacing of junction boxes is determined by the bridge detailer and should be shown on those drawings. Adjacent junction boxes are placed no closer than 3 foot C-C unless shown in the Plans. If not shown in the plans, maximum spacing of junction boxes is 200 feet for lighting and 150 feet for other utilities.

4. Unless specified otherwise in the Plans, exposed conduit under bridge decks is 2-inch SCH 40 galvanized.
NOTES:

1. If the barrier shape shown is continued across the bridge then the 4" conduit will continue.

TRANSITION JUNCTION BOX DETAILS

BOX FLANGE DETAIL
(Top View)

Transition Joint Space

2" Conduit in Bridge Adjunction Barrier
(Note 1)

2" Conduit from Barrier to Structure

Centered in Hole. Size for 6" Conduit to accommodate lateral and vertical displacement.
NOTES:

1. This drawing is cross-referenced by HL-20.13.

2. Construction shall conform to the requirements of C&MS Items 622 and 625.

3. Reinforcing to comply with and be placed in accordance with item 509.

4. The top of the concrete barrier shall be flat, smooth and level.

5. Refer to Roadway Barrier Standard Construction Drawing for barrier dimensions.


7. The ground rod for the junction box may be eliminated if at least 33' of underground metal conduit is connected to the box.

8. The unit price list for each "Item 625, Median Junction Box" shall be full compensation for furnishing and placing concrete, junction box, conduit, and all labor, materials, equipment and incidentals necessary to complete the work as specified.

9. Dowel junction box section to adjacent barrier with #6 bars spaced evenly on approximately 12" centers along vertical centerline. Top dowel to be approximately 6" below top of barrier and bottom dowel approximately 9" above bottom of barrier.

10. Apply anti-seize per C&MS Item 625.08.

11. Locate junction box with the least possible disturbance to the barrier reinforcing steel while maintaining a minimum of 8" clearance from the top of pavement to accommodate both future pavement overlays and possible ponding of water.

12. Construction shall conform to the requirements of C&MS Items 622 and 625.

13. Reinforcing to comply with and be placed in accordance with item 509.

14. The top of the concrete barrier shall be flat, smooth and level.

15. Refer to Roadway Barrier Standard Construction Drawing for barrier dimensions.


17. The ground rod for the junction box may be eliminated if at least 33' of underground metal conduit is connected to the box.

18. The unit price list for each "Item 625, Median Junction Box" shall be full compensation for furnishing and placing concrete, junction box, conduit, and all labor, materials, equipment and incidentals necessary to complete the work as specified.

19. Dowel junction box section to adjacent barrier with #6 bars spaced evenly on approximately 12" centers along vertical centerline. Top dowel to be approximately 6" below top of barrier and bottom dowel approximately 9" above bottom of barrier.

20. Apply anti-seize per C&MS Item 625.08.

21. Locate junction box with the least possible disturbance to the barrier reinforcing steel while maintaining a minimum of 8" clearance from the top of pavement to accommodate both future pavement overlays and possible ponding of water.
NOTES:

1. Photocell height shall be 10' unless specified otherwise in an as-per-plan Power Service, Ground-Mounted note.

2. Completed enclosures per HL-40.10 shall be suitable for use as service entrance equipment per NEC Art. 230 and labeled as such.

3. All-enclosed parts shall be guarded against accidental contact using guards supplied or approved by the electrical device manufacturer.

4. Group no more than six service disconnects, per NEC Art. 230.

5. Install a switchable, lockable meter disconnect per NEC Art. 230.92 on the Line side of meter. When such installation is prohibited by power service provider, install the disconnect on the Load Side of the meter, ahead of the Control Center enclosure.

6. Install a padlock bar that allows both power company and maintaining-agency padlocks to be applied, such that either entity may operate the switch. Pedestal shall conform to E47.00 and have a shackle diameter of 3/16 inch. If power company does not provide a padlock, install stainless steel through bolt and nylon locknut, instead. Commercial equivalent, such as GateKeeper™, or approved equal, may be installed in lieu of padlock bar shown.

7. The minimum height of any enclosure shall be 2 feet, or higher if required by the power service provider.

8. Apply ODOT seal (available from the ODOT District) to all ODOT-maintained installations. Apply equipment label complying with NFPA 70E Part 130.5.

9. All conduit used in Power Service construction shall be Rigid Metallic Conduit (RMC). Transition to other conduit materials (if called for in the Plans) at no less than 2 feet below finished grade.

10. The minimum height of any enclosure shall be 2 feet, or higher if required by the power service provider.

11. Install one of the following Surge Protective Devices, or an approved equal, per NEC Art. 285 (Type 1):

   1.) APT SPDee
   2.) Eaton CHSP-1 or SP1
   3.) Bussman SPP40
   4.) Cliptor HDMIT, Eaton, OPE30095, or approved equal.

12. Each switchgear enclosure shall be stainless steel per CMMS 725.19 F, except CT Enclosure, which may be aluminum, 14 ga. (0.064 in.) min.

Material: 416 Stainless Steel/Inconel to CSI, minimum. Length as required to be compatible with disconnect switch operating mechanism.
NOTES:

1. Photoelectric height shall be 10' unless specified otherwise in an as-per-plan Power Service, Ground-Mounted note.

2. Completed enclosure per HL-40.10 shall be suitable for use as an entrance equipment per NEC Art. 230 and labeled as such.

3. All energized parts shall be guarded against accidental contact using guards supplied or approved by the electrical device manufacturer.

4. Group no more than six service disconnects, per NEC Art. 330.

5. Install a switched, lockable meter disconnect per NEC Art. 330.92 on the Load Side of meter. When such installation is prohibited by the power service provider, install the disconnect on the Load Side of the meter, ahead of the Control Center enclosure(s).

6. Install a padlock bar that allows both power company and maintaining agency padlocks to be applied, such that either entity may operate the switch. Padlock shall conform to G31-50 and have a shackle diameter of 3/16 inch. If power company does not provide a padlock, install a stainless steel shroud through bolt and nylon socket instead.

7. The minimum height of any enclosure shall be 2 feet, or higher if required by the power service provider.

8. Apply ODOT seal (available from the ODOT District) to all ODOT-maintained installations. Apply equipment label complying with NFPA 70E Part 130.5.

9. All conduit used in Power Service construction shall be Rigid Metallic Conduit (RMC). Transition to other conduit materials (if called for in the Plans) at no less than 2 feet below finished grade.

10. Enclosure and conduit configuration shown is schematic only. Contact power service provider for construction requirements.

11. Install Vent Drain in lowest available location of all enclosures and horizontal conduit runs on the customer side of the service. Install Hoffman H20MIT, Eaton DEP303083, or approved equal.

12. Each connection enclosure shall be stainless steel per C&MS 725.19 F, except CT Enclosure, which may be aluminum, 14 ga. (.064) min.
NOTES:

1. Commercial pedestal may be installed in place of the standard ODOT enclosure shown, with permission of the Engineer. Commercial pedestal shall meet the material and wall thickness requirements of standard C&MS 725.19 ODOT enclosures and shall conform to the dimensions shown.

2. Meter base and photocell not shown. Install meter base and photocell at location shown in the Plans, per Power Company requirements. The meter base and CT cabinet (if required) are included in this item, installed similarly to pages 1 and 2 of this drawing.

3. Completely seal with a flexible clear, weatherproof silicone caulking compound.

4. Enclosure rating shall be 60, 100 or 200 Amps as called for in the Plans.

5. Enclosure Material: see Note 12, page 1.

6. Where 2" or 3" diameter conduit terminates in a foundation, the conduit elbows in the foundation shall be the same as the conduit. The ends of the conduit elbows containing distribution cables shall be closed as described in C&MS 825.12. When the terminating conduit is steel, the conduit elbows in the pole foundations shall also be steel. At the last light pole on a circuit, the vacant conduit elbow in the light pole foundation shall be stubbed out and capped.

7. Install Vent-Filters as shown, one within 2 inches of the top and one within 2 inches of the bottom, on opposite sides. Install McMaster-Carr model 1226T12 or approved equal.
FENCE GROUNDS AT TRANSMISSION LINES CROSSING

NOTES:

1. Where overhead transmission line easements 50' or more in width cross a fenced roadway right-of-way, each fence shall be grounded as shown herein.

2. Where overhead electric power line easements less than 50' in width cross a fenced roadway right-of-way, each fence shall be grounded directly below the centerline of the power line crossing.

3. Where overhead transmission lines rated 110 KV or higher are parallel to roadway fences and the transmission line easement is contiguous to the roadway right-of-way the roadway fences shall be grounded at least every 500'.

4. Fence grounds will be paid for at the unit price bid for C&MS 625, Ground Rod.

5. Apply two coats of insulating varnish over exothermic welds and exposed cable.

R/W FENCE GROUND

When specifically noted on the Plans, and in Notes 1, 2, and 3, R/W Fences Shall be Grounded as Shown Above. Also see Note 4.
NOTES:
1. There shall be a minimum of six electrodes, except on single span structures, for which there shall be a minimum of four electrodes.
2. Wet locations shall be used rather than dry locations for electrodes.
3. No point on the structure shall be more than two spans from an electrode.
4. Provide two electrodes at each abutment.
5. Provide a grounding electrode conductor within each outside column at pier.
6. Provide grounding plates for each grounding electrode conductor.
7. Do not use surface-mounted ground conductors for new construction.
8. Alternate method at abutments: Route grounding conductors through one or more 1" metal conduits to an electrode located in a pull box. Assure all metal conduits enclosing grounding conductors are bonded at each end. Connect and pull boxes are incident. Alternate method by permission of the Engineer only, or by Plan Note.
9. Install Grounding Plate at each end as shown in Detail A to assure vandal fence (typically installed after parapet construction) is complete) has an adequate bonding point.
10. See page 3 for exothermic weld details.
11. Provide to the Engineer a report (including photographic images) showing all completed exothermic welds before they are encased in concrete. Include a card in each photo that denotes the location on the structure.
1. All connections and bare copper strands of the 1/0 AWG cable exposed to concrete shall be covered with mastic to prevent contact with the concrete.

2. Installation of plane-type and plate-type electrodes in dry areas and under pavements requires the use of Soil Ground Enhancement Material, incidental to the Structure Grounding item.

3. Use UL-listed exothermic weld devices for all structure grounding connections, except for grounding plate, where a UL-listed device is optional.
NOTES:

1. All connections and bare copper strands of the 1/0 AWG cable exposed to concrete shall be covered with mastic to prevent contact with the concrete.

2. Use UL-listed exothermic weld devices for all structure grounding connections, except for grounding plate, where a UL-listed device is optional.
Always ground the anchor bolt on the roadway side, downstream, in the direction of adjacent traffic. Identify the ground stud with a light coat of red weather-resistant paint on the exposed end.

Ground one additional anchor bolt.

Weather-resistant paint on the exposed end.

Bolt with a light coat of red weather-resistant paint on the exposed end.

Identify the grounded roadway side, downstream, in the direction of adjacent traffic. Always ground this anchor bolt on the roadway side, downstream, in the direction of adjacent traffic.

Plastic conduit

Metal conduit

Plain bushing

Copper bonding jumper

Grounding stud threaded into box wall and notched inside and out. If box wall not bossed, use second nut inside to clamp jumper terminations.

Grounding type

Slip fit conduits

Exothermic weld

4"x 4" x ½" Metal plate

2" x ¼" Thread Stud with nut, exothermically welded to metal plate

5 5/8" x 3" Shear Stud exothermically welded to metal plate

Exothermic weld

Anchor plate (typ.)

1/0 AWG stranded insulated copper cable (2 planes)

2. Use UL-listed exothermic weld devices for all structure grounding connections, except for grounding plates, which may be UL-listed commercial products or the fabricated design shown below.
NOTES:

1. Provide sufficient slack in all cables to permit bringing connections outside of pole base through handhole of anchor base poles or door in transformer base pole.

2. Install ring tongue terminals on grounding conductors and connect to handhole frame on anchor base pole or basewall on transformer base pole with 1/2" diameter galvanized cap screw.

3. Fuses for connections shall be as follows:
   Any standard midget ferrule type fuse (except glass tube) may be used in this connection.
   Class T fuses rated 600 volts and 10 amperes shall be used unless otherwise specified.

Grounding Electrode Conductor

Grounding Conductor

LUMINAIRES WIRED LINE-TO-LINE
(240, 480 VOLTS L-L, TYP.)

POLE BASE CONNECTIONS,
LUMINAIRES WIRED LINE-TO-NEUTRAL
(120, 240, 277 VOLTS L-N, TYP.)
WIRING FOR TWIN-LUMINAIRE POLES

1. OFO outlet must be UL-listed for damp locations, per NEC Article 406. The "WR" label must be visible on the outlet face.

2. and L1, Odd Numbered Pole Shown. For Even Numbered Poles, Reverse L1 and L2 Terminals

POLE WIRING - LIGHT POLE WITH FESTOON OUTLET

Old Numbered Pole Shown. For Even Numbered Poles, Reverse L and L1, on Both the Lighting Circuit and the Outlet Circuit

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**NOTES:**

- **277 VOLT CONNECTIONS**
- **120 VOLT CONNECTIONS**
- **240/480 VOLT CONNECTIONS**
- **277/480 VOLT CONNECTIONS**

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**POLING OFFICE OF ROADWAY ENGINEERING**


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David L. Holstein
ENGINEERING ROADWAY OFFICE OF
TOWER WIRING DETAILS

SCD NUMBER
HL-60.21

ENGINEER STDS.

REV. DATE
07-20-2018

TRANSPORT ADMINISTRATOR
STATE OF OHIO DEPARTMENT OF

To Luminaire Mounting Ring

3/C #10 SJO Cord

Grounding Bar

3/C #10 SJO Cord

Grounding Bar

To Luminaire Mounting Ring

Terminal Block
Enclosure (NEMA 3X)

Neutral Bar, Insulated

Neutral Bar, Insulated

Terminal Block
Enclosure (NEMA 3X)

Cord Grip

Multiple, as shown

Cord Grip

Multiple, as shown

* To Other Towers When Required

120/240 VOLT CONNECTIONS
240/480 VOLT CONNECTIONS
277/480 VOLT CONNECTIONS

120 VOLT CONNECTIONS
277 VOLT CONNECTIONS

277 VOLT CONNECTIONS

120 VOLT CONNECTIONS

240/480 VOLT CONNECTIONS

277/480 VOLT CONNECTIONS

THIS DRAWING REPLACES HL-60.21 DATED 01-16-2015.

Enclosure (NEMA 3X)

Terminal Block

Disconnect Switch

Enclosure (NEMA 3X)

Terminal Block

Enclosure (NEMA 3X)

Disconnect Switch

(multiple, as shown)

Cord Grip

(multiple, as shown)

Cord Grip
277/480 Volt Connections

(LINE-TO-NEUTRAL LOADS)

277 Volt Circuit

277 Volt Circuit

277 Volt Circuit

3 Pole Contactor

277 Volt Coil

Fused 3 Pole Disconnect (Note 6)

Line Fuse

10 Amp Control Fuse (Note 10)

Neutral Bus Bar

Ground Bar

Bond to Enclosure Grounding Stud

Grounding Electrode

Phase Tape Markings:
See Note 2

277/480 Volt Connections

(LINE-TO-LINE LOADS)

480 Volt Circuit

480 Volt Circuit

480 Volt Circuit

Grounding Electrode

Bond to Enclosure Grounding Stud

2 Pole Branch Circuit Breaker

3 Pole Branch Circuit Breaker

Grounding Stud

Bond to Enclosure

Phase Tape Markings:
See Note 2

See Note 9.