RULE NO.: R161-22.05

NOTICE OF RULE ADOPTION **ADOPTION DATE: 6/14/22**

By: Richard Mendoza, Director
Public Works Department

The Director of the Department of Public Works has adopted the following rule. Notice of the proposed rule was posted on April 19, 2022. Public comment on the proposed rule was solicited in the April 19, 2022 notice. This notice is issued under Chapter 1-2 of the City Code. The adoption of a rule may be appealed to the City Manager in accordance with Section 1-2-10 of the City Code as explained below.

A copy of the complete text of the adopted rule is attached to this notice.

EFFECTIVE DATE OF ADOPTED RULE

A rule adopted by this notice is effective on June 14, 2022.

TEXT OF ADOPTED RULE

R161-22.05: Notice of Adoption to Sections 838S in the Standard Specification Manual contains no changes from the proposed rule. Summary of rule here:

838S currently contains both SI and metric units. With this proposed rule, remove all metric references to reduce confusion. Update the specification to accurately reflect the actual equipment currently utilized by the City of Austin. The proposed rule includes the following revisions:

- The pedestrian signal displays were changed from incandescent bulbs to LEDs.
- A "countdown" feature was added to the Flashing Hand (Don't Walk) indication.
- Signal housings were revised to remove the parabolic reflector that would be used for incandescent bulbs.
- Environmental performance requirements were added.
- Modular requirements were added, allowing the displays to be replaced without replacing the entire signal head.
- ASTM requirements were added to the lens and module construction.
- Display requirements were added to address photometric and chromacity.
- Electrical specifications were added to address maximum power consumption, voltage ranges, surge protection, FCC requirements, transient voltages, power factors, harmonic distortion, power supplies, etc.
- Module function requirements.
- Pedestrian head housing design.

Moreover, pay Items were simplified. Previously, a separate line item was paid for each different type of pole they were mounted on.

SUMMARY OF COMMENTS

The Department of Public Works did not receive comments regarding Rule R161-22.05. No changes have been made from the proposed rule.

AUTHORITY FOR ADOPTION OF RULE

The authority and procedure for adoption of a rule to assist in the implementation, administration, or enforcement of a provision of the City Code is provided in Chapter 1-2 of the City Code. The authority to regulate construction is established in Section 25-6-267 and Section 25-6-268 of the City Code

APPEAL OF ADOPTED RULE TO CITY MANAGER

A person may appeal the adoption of a rule to the City Manager. **AN APPEAL MUST BE FILED WITH THE CITY CLERK NOT LATER THAN THE 30TH DAY AFTER THE DATE THIS NOTICE OF RULE ADOPTION IS POSTED. THE POSTING DATE IS NOTED ON THE FIRST PAGE OF THIS NOTICE.** If the 30th day is a Saturday, Sunday, or official city holiday, an appeal may be filed on the next day which is not a Saturday, Sunday, or official city holiday.

An adopted rule may be appealed by filing a written statement with the City Clerk. A person who appeals a rule must (1) provide the person's name, mailing address, and telephone number; (2) identify the rule being appealed; and (3) include a statement of specific reasons why the rule should be modified or withdrawn.

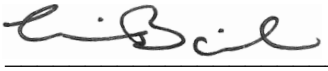
Notice that an appeal was filed will be posted by the city clerk. A copy of the appeal will be provided to the City Council. An adopted rule will not be enforced pending the City Manager's decision. The City Manager may affirm, modify, or withdraw an adopted rule. If the City Manager does not act on an appeal on or before the 60th day after the date the notice of rule adoption is posted, the rule is withdrawn. Notice of the City Manager's decision on an appeal will be posted by the city clerk and provided to the City Council.

On or before the 16th day after the city clerk posts notice of the City Manager's decision, the City Manager may reconsider the decision on an appeal. Not later than the 31st day after giving written notice of an intent to reconsider, the City manager shall make a decision.

CERTIFICATION BY CITY ATTORNEY

By signing this Notice of Rule Adoption R161-22.05, the City Attorney certifies that the City Attorney has reviewed the rule and finds that adoption of the rule is a valid exercise of the Director's administrative authority.

REVIEWED AND APPROVED



for

Date: 5/24/22

Richard Mendoza, Director
Department

Anne Morgan

Digitally signed by Anne Morgan
DN: cn=Anne Morgan, o=City of Austin, ou=Law Department, email=anne.morgan@austintexas.gov, c=US
Date: 2022.06.06 12:28:52 -05'00'

Date: 6/6/2022

Anne L. Morgan
City Attorney

ITEM NO. 838S PEDESTRIAN SIGNAL INSTALLATION 9-26-12

838S.1 Description

This item shall govern furnishing and installation of pedestrian signal heads in accordance with the specifications contained herein, the Drawings, Standard Detail Nos. 839S-1, "Pedestrian and Vehicular Signals Installation Details", manufacturer recommendations and/or written instructions from the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text and accompanying tables, the inch-pound units are given preference followed by SI units shown within parentheses.

838S.2 Submittals

The submittal requirements of this specification item may include:

A. Wire size, characteristics and designation for each wire application (i.e. pedestrian signal and/or pedestrian push button),

B. Type, number of sections, lens configuration and manufacturer for each pedestrian signal item specified on the Drawings,

C. Type, number of sections and manufacturer for each pedestrian signal item specified on the Drawings,

D. Catalog cut and Manufacturer installation recommendations for signal heads and louvers

838S.3 Materials

A. General

All pedestrian signal heads installed on a job shall be by the same manufacturer. The pedestrian signal shall be designed to meet or exceed the requirements of the current State of California Standard Specifications for Type A pedestrian signals and shall be designed to fit the same mounting brackets as employed by State of CALIFORNIA Type B and C Neon Pedestrian Signals. The construction design shall be compatible with clamshell mounting hardware.

The general construction shall include a single-piece cast aluminum housing, a single-piece double parabolic reflector, a two symbol two color message lens, a single-piece cast aluminum swing down door frame, a blankout eggcrate type sun visor, two traffic signal lamps conforming to Section 831S.3 (F), "Lamps" of this specification item and appropriate sockets and other hardware. The design shall optimize performance per unit of energy consumed and shall accommodate 60, 67, 69, and 116 watt (J/s) lamps.

Optically, the pedestrian signal shall be capable of displaying, brightly and uniformly, the alternate messages "HAND" in Portland orange and "WALKING PERSON" in Lunar white while being subject to strong ambient light conditions. Under the same strong ambient light conditions, the messages shall "Blankout" when the signal is not energized.

The signal shall be furnished complete with two installed A21 traffic signal lamps. In order to facilitate installation and maintenance, the signal shall be designed so that all components are readily accessible from the front by merely opening the signal door.

B. Dimensions

The maximum overall dimension of the signal shall be 18 ½ inches (470 mm) wide, 18 ¾ inches (476 mm) high, and 9 inches (229 mm) deep including eggcrate type visor and hinges. The distance between the mounting surfaces of the upper (non-shurlock) and the lower (shurlock) openings shall be 15 ¾ inches (400 mm).

C. Optical System

The optical system shall consist of the following:

1. Two symbol two-color message lens,

2. Double parabolic reflector,

3. Lamps and lamp sockets and

4. Eggcrate type sun visor

The optical system shall be designed to minimize the return of the outside rays entering the unit from above horizontal (known as sun phantom). The optical unit shall be so designed and assembled that erroneous messages cannot be displayed by lamp burnout or by light spill over.

D. Two Symbol Message Lens

Messages shall be Lunar white and Portland orange as defined in the current version of Institute of Transportation Engineers standard "Adjustable Face Pedestrian Signal Head Standard".

Two lens materials may be used, as follows:

1) STANDARD - 0.187 inch (4.75 mm) tempered glass with the outside surface textured to eliminate message "HOT SPOTS".

2) OPTIONAL - 0.250 inch (6.35 mm) polycarbonate plastic with C-64 or C-66 pattern texture on the outside surface to eliminate message "HOT SPOTS".

The lens shall be located at least 1.75 inches (44.5 mm) away from the closest glass envelope extremity of the ANSI Designation A21 traffic signal lamp.

The left side of the symbol lens when illuminated shall display the "HAND" symbol in Portland orange. The right side of the symbol lens when illuminated shall display the "WALKING PERSON" symbol in lunar white.

The inside face of each symbol section shall be painted in the message areas with an appropriate transparent color to produce a Portland orange "HAND" symbol and a lunar white "WALKING PERSON" symbol when illuminated by a traffic signal lamp operating at rated voltage. All other areas shall be painted black.

The inside of the lens shall be fitted with a one-piece sponge neoprene gasket fitted around the perimeter such that a weatherproof seal is afforded whenever the reflector, lens, doorframe, and case are properly mated.

E. Double Parabolic Reflector

A single-piece double parabolic reflector shall be vacuum formed from 0.250-inch (6.35 mm) minimum thickness textured polycarbonate plastic sheet. The texture shall be on the lamp side of the reflector and shall conform to C-64 or C-66 pattern or equivalent for light uniformity.

The lamp side of the reflector shall be reflectorized by vacuum deposition of an aluminum coating, which shall in turn be protected by a hard wear resistant coating.

The two sections of the reflector shall be divided by a full depth 0.040 aluminum divider, that properly mates with the symbol lens, to effectively prevent light spillage from one section to the other.

F. Lamps

~~The pedestrian signal shall be completely equipped with traffic signal lamps and sockets (one set for each of the two sections of the double parabolic reflector). Each lamp shall conform to the following specification.~~

~~1. The light bulb shall be:~~

~~68 watt (J/s), 120-125 volt At- or A-19 HI-BEAM TRAFFIC, KRYPTON, 15500-16500 User Hours.~~

~~2. All Traffic Signal Lamps shall be:~~

~~Duro-Test Watt-Savers or equivalent, but must meet these standards:~~

~~a) Lamps shall have projection-type Copperflex-tungsten filaments supported by two impurity- free high-tensile-strength Molybdenum supports and five extra hook support points to protect against vibration, voltage, and environmental shock. The filament shall be wound on a precision molybdenum mandrel. Bidder must be willing to have filament subjected to the filament stretch test.~~

~~b) The filament shall be of the "V" shaped projection construction for greatest beam candlepower and to eliminate center dead spot.~~

~~c) Life rating shall be guaranteed by the lamp manufacturer for two years from the date of installation. A confidential manufacturing code date shall be etched on the stem support of each lamp to justify user hour life rating.~~

~~d) Each lamp shall be identified with information etched into the glass lamp with manufacturers name, wattage, voltage, average rated user hour life, lot identification, rated lumens, and date of manufacture.~~

~~e) The lamp filament support shall be a solid glass stem and shall be equipped with a polished aluminum deflector disc for greater candlepower concentration and to help protect the socket and wiring from bulb heat.~~

~~f) Lamps shall have built-in fuse wire in base of lamp to prevent damage to socket and electrical controls.~~

~~g) Lamps shall have a corrosion proof brass medium base adhered to glass envelope with dual use silicone adhesive. Bulb glass shall be grooved to give added mechanical grip, prevent vibration shake out, breakage, and socket weld.~~

~~h) Lamps shall meet or exceed rated initial lumens and minimum initial lumens requirements as specified in the Institute of Transportation Engineers standard "Traffic Signal Lamps", latest edition.~~

~~i) Beam Candlepower specifications shall be supported by a report from a nationally recognized independent testing laboratory and certified by such laboratory personnel.~~

~~j) Lamp fill gas shall be no less than 90% krypton gas concentration ("volume per volume" of total fill gas in the lamp) for increased lumen output at stated wattage.~~

~~k) Gas analysis for krypton fill shall be supported by a report from a nationally recognized independent testing laboratory.~~

~~l) Lamps shall have the ATC shape to allow for extra room for heat dissipation away from the filament. Super life-A and ATC shape shall have user rated hours etched onto the bulb at a position below the etched name of the manufacturer.~~

~~3. The Contractor shall provide traffic signal lamps that conform to all of the criteria of this specification. Any traffic signal lamps that are delivered but do not meet the above requirements will be returned at contractor's own expense.~~

G. Lamp Sockets

Each lamp socket shall be accurately positioned in the center and pre-focused in its respective section of the reflector when the above-described lamps are installed.

The mounting shall be made to a die cast aluminum case in order to efficiently conduct heat away from the respective socket.

The lamp socket may be made of molded Bakelite, molded phenolic, or ceramic and shall be provided with a brass screw shell with lamp grip. An optional socket rotating mechanism with a minimum of 8 spring-loaded detents shall be available to allow positioning of the opening of the lamp filament upwards.

Each lamp socket shall be provided with one colored lead (non-white and non-green) from the socket and one white lead from the shell. Leads shall be 18 AWG and shall be wired to respective terminals of a three terminal pair screw type terminal block. The two white wires shall be connected to a common terminal. The terminal block shall be located inside the pedestrian signal housing.

H. Eggcrate Visor

Each signal shall be provided with an eggcrate type visor designed to eliminate sun phantom. The eggcrate type sun shield shall be installed parallel to the face of the "HAND/WALKING PERSON" message. The eggcrate visor assembly shall be held in place by the use of stainless steel screws.

The eggcrate assembly shall consist of a minimum of 20 straight horizontal louvers and 21 zigzag pattern louvers.

Each alternate formed louver shall be reversed in order to form cells 1 inch (25 mm) square but rotated 45 degrees from the horizontal to provide diamond shaped cells when assembled. Each diamond shall be bisected by a straight louver inserted between each pair of formed zig-zag louvers. Where the apex of each formed louver comes in contact with the interspersed straight louver, the entire length of the joint shall be chemically welded.

The basic material used in construction of the eggcrate shall be nominally 0.030 inch (0.762 mm) thick and shall be 100% impregnated black polycarbonate plastic processed with a flat finish on both sides. Additional members may be employed outside the two legend areas but are not required unless dictated by structural strength of the particular assembly technique employed.

The assembly shall be enclosed in a mounting frame constructed of 0.040-inch (1.02 mm) minimum thickness of aluminum. This frame shall be 1 ½ inches (38 mm) deep and shall contain mounting holes for installation directly in the pedestrian signal doorframe.

I. Case

The case shall be a one-piece corrosion resistant aluminum alloy die casting complete with integrally cast top, bottom, sides, and back. Four integrally cast hinge lug pairs, two at the top and two at the bottom of each case, shall be provided for operation of a swing down door.

The case, when properly mated to other pedestrian signal components and mounting hardware, shall provide a dustproof and weatherproof enclosure with easy access to and replacement of all components.

Three versions of the case may be used dependent upon the specific job application. The first version shall be supplied with clamshell mounting hardware installed (ordered concurrently) for installation of "pole left of message". The second version shall be the same except intended installation shall be "pole right of message". The third version shall contain upper and lower openings as described below suitable for either post top or bracket mounting. The first and second versions need not include upper and lower openings but when provided shall be adequately plugged.

The openings included in the third version at the top and bottom of the case shall accommodate standard 1 ½ inch (38 mm) pipe brackets. The bottom opening of the signal case shall have a shurlock boss integrally cast into the case. The dimensions of the shurlock boss shall be as follows: Outside diameter 2.625 inches (66.7 mm); inside diameter 1.969 inches (50mm); number of teeth 72; angle of teeth 90 degrees; and depth of teeth 5/64 inch (2 mm). The teeth shall be clean and sharp and provide full engagement. The radial angular grooves of the shurlock boss, when used with shurlock fittings, shall provide positive positioning of the entire signal to eliminate rotation or misalignment of the signal.

J. Door Frame

The door frame shall be a one-piece corrosion resistant aluminum alloy die casting, complete with two hinge lugs cast at the bottom and two latch slots cast at the top of each door. The door shall be attached to the case by means of two Type 304 stainless steel spring pins. Two stainless steel hinged bolts with captive stainless steel wing nuts and washers shall be attached to the case with the use of stainless steel spring pins. Hence, latching or unlatching of the door shall require no tools.

K. Paint

Prior to final assembly; the case, doorframe and eggcrate visor (aluminum portion only) shall be thoroughly cleaned and a chromate conversion coating applied inside and out per Military Specification Mil-C-5541. A synthetic enamel conforming to Military Specification TTE-529 shall then be electrostatically applied. The color and gloss of the case and doorframe shall be selected by the purchaser. The color of the eggcrate visor shall be flat black. The finish shall be oven cured for a minimum of 20 minutes at 350°F (177°C).

L. Warranty

The entire pedestrian signal including eggcrate visor, message lens, single piece double parabolic reflector, lamp sockets, case, and door shall be warranted against defects in work performed and/or materials for two (2) years from the date of original shipment.

838S.4 Installation

The Contractor shall be responsible for the installation of the pedestrian signal heads in the field as shown on the drawings. This work shall include providing and installing the pedestrian heads, wiring, and mounting the hardware at the job site. Drilling wire feed holes and mounting the pedestrian signal head will also be the Contractor's responsibility.

All wire feeding through the pole structure shall be wrapped once with plastic electrical tape and wrapped again with electrical friction tape extending 12 inches (300 mm) on each side of the pole opening for a total of 24 inches (600 mm). The contractor shall adhere to the City of Austin's color code when splicing all conductors. Cabling for each signal (number of conductors, wire gauge, etc) shall be in accordance with the Drawings.

All pedestrian signal heads not yet in operation shall be covered with burlap until placed into service.

838S.5 Measurement

This item will be measured by each pedestrian signal installed in place.

Procuring, installing and connecting mounting hardware and cable from the pedestrian heads to the controller are considered ancillary to this item and will not be measured or paid for separately.

838S.6 Payment

The work performed and material furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit bid price for "Pedestrian Signals" per each. The unit bid price shall

include full compensation for: a) furnishing and installing all materials, b) drilling wire feed holes (as needed), c) mounting the pedestrian signal heads on the mast arms and signal poles, d) covering the pedestrian signal heads with Contractor-supplied burlap (if required), e) correctly cabling the signal head per the drawings and f) adjusting the pedestrian signal head for proper visibility, as indicated on the Drawings and for furnishing all labor, tools, equipment and incidentals necessary to complete the Work.

Payment will be made under:

Pay Item No. 831S-PSMP	Pedestrian Signal Installation: Metal Pole	per Each
Pay Item No. 831S-PSWP	Pedestrian Signal Installation: Wooden Pole	per Each
Pay Item No. 831S-PSSA	Pedestrian Signal Installation: Stand Alone	per Each
Pay Item No. 831S-PSSP	Pedestrian Signal Installation: Solar Powered	per Each

END

SPECIFIC CROSS REFERENCE MATERIALS	
Standard Specification Item No. 838S, "Pedestrian Signal Installation"	
City of Austin Standard (Details)	
Designation	Description
Number 839S-1	Pedestrian and Vehicular Signal Details
U.S. Corps of Engineers	
Military Specification Mil-C-5541	
Military Specification TTE-529	

RELATED CROSS REFERENCE MATERIALS	
Standard Specification Item No. 838S, "Pedestrian Signal Installation"	
City of Austin Standard Specifications	
Designation	Description
Item No. 104S	Removing Concrete
Item No. 111S	Excavation
Item No. 401S	Structural Excavation Backfill
Item No. 403S	Concrete for Structures
Item No. 405	Concrete Admixtures
Item No. 406S	Reinforcing Steel
Item No. 410S	Concrete Structures
Item No. 420	Drilled Shaft Foundations
City of Austin Standard (Details)	
Designation	Description
Detail 831S-1	Traffic Signal Drilled Shaft Foundation Details
National Electrical Code (NEC)	

ITEM 838 PEDESTRIAN SIGNAL INSTALLATION 6-14-22

838.1 Description

This item governs furnishing and installation of pedestrian signal heads with LED "walking person" and "hand" icon pedestrian signal modules with countdown, in accordance with specifications contained herein, the Drawings, Detail Sheet No. 839S-1 "Pedestrian and Vehicular Signals Installation Details," manufacturer recommendations and/or written instructions from the Engineer or designated representative.

This specification includes the following size (nominal overall message bearing surface): 16 x 18 in (countdown only). This specification refers to definitions and practices described in "Pedestrian Traffic Control Signal Indications" published in the Equipment and Materials Standards of the Institute of Transportation Engineers, (referred to as "PTCSI") and in the Manual on Uniform Traffic Control Devices (MUTCD), 2003 edition.

838.2 Submittals

The submittal requirements of this specification item may include:

A. Wire size, characteristics and designation for each wire application (i.e. pedestrian signal and/or pedestrian push button),

B. Type, number of sections, lens configuration and manufacturer for each pedestrian signal item specified on the Drawings,

C. Type, number of sections and manufacturer for each pedestrian signal item specified on the Drawings,

D. Catalog cut and Manufacturer installation recommendations for signal heads and louvers

838.3 Materials

A. Physical and Mechanical Requirements

a. General

Modules must fit into existing pedestrian signal housings built for the PTCSI sizes stated in Section 1 of the "walking person" and "hand" icon pedestrian signal indication Standard without modification to the housing. See PTCSI 4.2.1 for housing sizes.

All LEDs used must be rated for 100,000 hours of continuous operation over a temperature range of -40°F to +165°F. The modules must be rated for a minimum life of 60 months. Modules must meet all parameters of this specification throughout this 60-month period.

b. Module Requirements

The module must be capable of replacing the optical unit. The module lens may be a replaceable part without the need to replace the complete module. The walking person and hand icons (16"x18" size only) must be full (not outlines). The countdown digits must be made up of two rows of LEDs. Each digit must be a

minimum of seven inches in height. The configurations of the walking person icon and hand icon are illustrated in Figure 1 and Figure 2 respectively.

Figure 1.

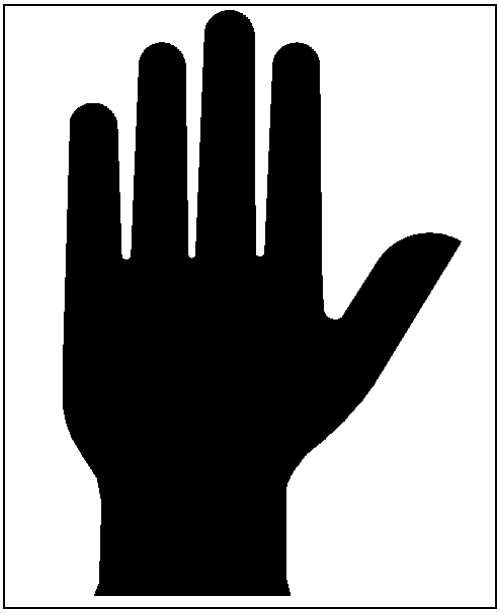


Figure 2.

Dimensions for Figure 1 and Figure 2

For each nominal message bearing surface (module) size, use the corresponding H (height) and W (width):

Bearing Surface	Module Size	Icon Height	Icon Width	Countdown Height	Countdown Width
H	(16 x 18 in)	Min 7 in	7 in	Min 9 in	6.5 in

Note: The units must not have any attachments or options that will allow the mode to be changed from counting the clearance cycle, to the full walk/don't walk cycle.

c. Environmental Requirements

The module must be rated for use in the ambient operating temperature range, measured at the exposed rear of the module, of –40 to +165°F. The pedestrian module must be designed to meet NEMA 250 Hose down Test. The test is to be conducted on a stand-alone unit. No protective housing may be used. The module lens must be UV stabilized.

d. Construction

The module must be a single, self-contained device, not requiring on-site assembly for installation into existing traffic signal housing. The power supply must be designed to fit and mount inside the pedestrian signal module. The assembly and manufacturing process for the module must be designed to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration from high winds and other sources.

e. Signal LENS

i. The lens of the LED pedestrian and countdown signal modules must be polycarbonate UV stabilized and a minimum of ¼" thick.
ii. The exterior of the lens of the LED pedestrian and countdown signal module must be smooth and frosted to prevent sun phantom.

f. Materials

Materials used for the lens and LED module construction must conform to ASTM specifications where applicable. Enclosures containing the power supply and electronic components of the LED module must be made of UL94VO flame retardant materials. The lens of the LED module is excluded from this requirement.

g. Module Identification

Each module must be identified on the backside with the manufacturer's name, model numbers and serial number. The following operating characteristics must be identified: nominal voltage, power consumption, wattage and Volt-Ampere.

B. Photometric Requirements

a. Luminance, Uniformity & Distribution

For a minimum period of 60 months, the maintained minimum luminance values for the modules under the operating conditions defined in Sections 2.3.1 and 4.2.1, must not be less than the values shown Reference 1 and Reference 2 for the walking person and hand icons respectively, when measured perpendicular to the surface of the module at nine (nine) separate points on the icon. These values may decrease up to 50% of these table values beyond 15o from the perpendicular in either to the left or right on a horizontal plane.

Reference 1. Maintained Minimum Luminance value for the Walking Person icon of the Module (candelas/foot square): **486.7 cd/ft2**

Reference 2. Maintained Minimum Luminance value for the Hand icon of the Module (candelas/meter square): **344.4 cd/ft2**

The uniformity of the walking person and hand icons' illumination shall meet a ratio of not more than 1 to 5 between the minimum and maximum luminance measurements (in Cd/ft2).

b. Chromacity

The standard colors for the LED Pedestrian Signal Module shall be White for the walking person and Portland Orange for the hand icon and countdown digits.

C. Electrical

a. General

The modules shall be operationally compatible with traffic signal controllers, cabinets and accessories manufactured to the California Department of Transportation (Caltrans) Traffic Signal Control Equipment Specifications, January 1989 Edition.

Maximum power consumption requirements for each indication are as follows (in Watts):

Icon	25 C	74 C
Hand	10.0W	12.0W
Walking Person	9.0W	12.0W
Countdown 2 digit	8.0W	11.0W

All wiring and terminal blocks must meet the requirements of Section 13.02 of the VTCSH Standard. Three secured, color coded, 36 in long 600 V, 16 AWG minimum, jacketed wires, conforming to the National Electrical Code, rated for service at +221°F, are to be provided for electrical connection.

Each LED signal module must be designed so that there is no noticeable light output when connected to rated voltage through an impedance of 15 kΩ (either resistive or capacitive). The signal module must be designed so that, under normal operation, an AC voltage of no greater than 10 volts RMS must be developed across the unit when it is connected in series with any value of impedance greater than 15 kΩ and for any applied AC voltage between 95- and 135-volts RMS that is connected across this series combination. In addition, the signal module must be designed so that the voltage across the module reduces in value to less than 10 volts RMS within 100 msec when the module is switched off by any solid-state switch or switch pack having an impedance of 15 kΩ or greater.

b. Voltage Range

LED modules must operate from a 60 + 3 Hertz ac line power over a voltage range from 80 to 135 VAC RMS. The current draw must be sufficient to ensure compatibility and proper triggering and operation of load current switches and conflict monitors. Nominal operating voltage for all measurements must be 120 + 3 Volts rms. Fluctuations in line voltage over the range of 80Vac to 135Vac must not affect luminous intensity by more than +/- 10 %. The LED circuitry must prevent flickering at less than 100 Hz over the voltage range stated above. The modules must be designed and constructed so that the failure of a single LED will not result in the loss of additional LEDs.

Low Voltage Turn Off: There should be no illumination of the module when the applied voltage is less than 35 VAC RMS. To test for this condition the each icon must first be fully illuminated at the nominal operating voltage. The applied voltage must then be reduced to the point where there is no illumination. This point must be greater than 35 VAC RMS.

Turn-On and Turn-Off Time: Each icon of the module must reach 90% of their full illumination (turn-on) within 100 ms of the application of the nominal operating

voltage. The modules must not be illuminated (turn-off) after 100 ms of the removal of the nominal operating voltage.

For abnormal conditions when nominal voltage is applied to the unit across the two-phase wires (rather than being applied to the phase wire and the neutral wire) the pedestrian signal unit must default to the hand symbol.

c. Transient Voltage Protection

The module's on-board circuitry must include voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.6, NEMA Standard TS-2, 1998, or the latest version.

d. Electronic Noise

The modules and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, Sub Part B, Section 15 regulations concerning the emission of electronic noise.

e. Power Factor (PF) and AC Harmonics

The modules must provide a power factor of 0.90 or greater when operated at nominal operating voltage, and 77ºF.

Total harmonic distortion induced into an AC power line by the module, operated at nominal operating voltage, at 77ºF may not exceed 20%.

f. Power Supplies

The unit must be a three (3) power supplies design. One power supply for each hand and man display and one power supply for the countdown display. Each power supply must be independent from each other. The power supplies must perform as stated above.

D. Module Functions

a. Cycle

The module must operate in one mode: Clearance Cycle Countdown Mode Only. The module will start counting when the flashing clearance signal turns on and will countdown to "0" and turn off when the steady "Don't Walk" signal turns on. Module will not have user accessible switches or controls for modification of cycle.

b. Learning Cycle

At power on, the module enters a single automatic learning cycle. During the automatic learning cycle, the countdown display must remain dark.

c. Cycle Modification

The unit re-programs itself if it detects any increase or decrease of Pedestrian Timing. The counting unit will go blank once a change is detected and then take one complete pedestrian cycle (with no counter during this cycle) to adjust its buffer timer.

d. Recycling

The module must allow for consecutive cycles without displaying the steady Hand icon ("Don't Walk").

e. Preemption

The module must recognize preemption events and temporarily modify the crossing cycle accordingly. If the controller preempts during the walking man, the countdown will follow the controller's directions and will adjust from walking man to flashing hand. It will start to count down during the flashing hand. If the controller preempts during the flashing hand, the countdown will continue to count down without interruption. The next cycle, following the preemption event, must use the correct, initially programmed values.

f. “Don’t Walk” Steady

If the controller output displays Don’t Walk steady condition and the unit has not arrived to zero or if both the hand and man are dark for some reason, the unit suspends any timing, and the digits will go dark.

E. Enclosure Design Requirements

a. Housing Case and Door

The maximum overall dimension of the signal must be 18 ½ inches wide, 18 ¾ inches high and 9 inches deep including eggcrate type visor and hinges. The distance between the mounting surfaces of the upper (non-shurlock) and the lower (shurlock) openings must be 15 ¾ inches.

The signal head must be a one-piece assembly constructed of die cast aluminum alloy. Openings in the top and bottom of the signal head (centered) must accommodate a standard 1 1/2 in. bracket arm. (Example: Pelco PN 3215)

The electrical system of the signal head must be designed to operate from 100 to 135-volt single phase, 60 Hz alternating current power.

The signal head must contain one (1) four-point terminal with the two common points wired together by the supplier. The terminal block must accommodate AWG 12 field wires.

The assembly must provide a dust proof and weatherproof enclosure and must provide easy access to all components.

All gaskets must be continuous neoprene gaskets.

Aluminum doors must be a one-piece corrosion resistant, aluminum alloy casting with two hinged lugs cast at the bottom and two latch slots cast at the top of each door.

Two stainless steel wing screws or wing nuts must be used to open and close the door.

Each signal head must be furnished with a flush "egg-crate" type visor with diagonal and horizontal louvers (such as I.D.C. Z-crate or the McCain Vantage visor) to eliminate sun phantom.

Clamshell type heads are not allowed.

b. Environmental

The Pedestrian Signal Head and all components must be rated for use in the ambient operating temperature range of -40 degrees F to +165 degrees F.

c. Mounting Attachments

The case when properly mated to other pedestrian signal components and mounting hardware must provide a dust proof and weatherproof enclosure and must provide for easy access to and replacement of all components.

The case must contain upper and lower openings as described below suitable for bracket mounting.

The openings included at the top and bottom (centered) of the case must accommodate standard 1 ½ inch pipe brackets. The bottom opening of the signal case must have a shurlock boss integrally cast into the case. The dimensions of the shurlock boss must be as follows: Outside diameter 2.625 inches; inside diameter 1.969 inches; number of teeth 72; angle of teeth 90 degrees; and depth of teeth 5/64 inch. The teeth must be clean and sharp and provide full engagement. The radial angular grooves of the shurlock boss when used with shurlock fittings must provide positive positioning of the entire signal to eliminate rotation or misalignment of the signal.

d. Paint / Painting

All exposed metal surfaces of the assembled pedestrian traffic signal head with mounting attachments must be given two (2) coats of high-grade yellow enamel as used by the manufacturer of the signal equipment. Door assembly must be painted black. Each coat must be separately baked. Powder coating is acceptable.

F. Quality Control

a. General

The LED signal manufacturer's quality management system must be ISO 9001 Registered.

b. Warranty

LED signal modules must be replaced or repaired if it fails to function as intended due to workmanship or material defects within the first 60 months from date of delivery.

838.4 Installation

The Contractor is responsible for the installation of the pedestrian signal heads in the field as shown on the drawings. This work must include providing and installing the pedestrian heads, wiring, and mounting the hardware at the job site. Drilling wire feed holes and mounting the pedestrian signal head will also be the Contractor's responsibility. Procuring, installing and connecting mounting hardware is ancillary to this item.

All wire feeding through the pole structure must be wrapped once with plastic electrical tape and wrapped again with electrical friction tape extending 12 inches on each side of the pole opening for a total of 24 inches. The contractor must adhere to the City of Austin's color code when splicing all conductors. Cabling for each signal (number of conductors, wire gauge, etc) must be in accordance with the Drawings.

All pedestrian signal heads not yet in operation must be covered with burlap until placed into service.

838.5 Measurement

This item will be measured by either “Furnish,” “Install,” or “Furnish and Install” for each pedestrian signal head.

A. “Furnish” will be measured by each pedestrian signal provided to the City of Austin.

B. “Install” will be measured by each City of Austin provided pedestrian signal installed in place.

C. “Furnish and Install” will be measured by each pedestrian signal installed in place.

Procuring, installing and connecting mounting hardware and cable from the pedestrian heads to the controller are ancillary to this item and will not be measured or paid for separately.

838.6 Payment

The work performed and material furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit bid price for "Pedestrian Signals" per each. The unit bid price must include full compensation for: a) furnishing and installing all materials, b) drilling wire feed holes (as needed), c) mounting the pedestrian signal heads on the mast arms and signal poles, d) covering the pedestrian signal heads with Contractor-supplied burlap (if required), e) correctly cabling the signal head per the drawings, f) adjusting the pedestrian signal head for proper visibility, as indicated on the Drawings and g) for furnishing all labor, tools, equipment and incidentals necessary to complete the Work, including procuring, installing and connecting mounting hardware and cable from the pedestrian heads to the controller.

Payment will be made under:

Pay Item No. 838-PSM-F: Furnish Pedestrian Signal: Countdown Type……. per Each

Pay Item No. 838-PSM-I: Install City of Austin Supplied Pedestrian Signal Installation: Countdown Type……. per Each

Pay Item No. 838-PSM: Furnish and Install Pedestrian Signal Installation: Countdown Type……. per Each