

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
ACCESSIBLE PEDESTRIAN SIGNAL SYSTEM

SIG:EMS

1 of 6

APPR:HLO:NJB:05-01-20
FHWA:APPR:05-06-20

a. Description. This work consists of either furnishing and installing an accessible pedestrian signal system and push button station(s), or removing a system and station(s) at locations as shown on the plans.

The following terminology is used in this special provision.

1. Accessible pedestrian signal system, or system hereafter, refers to central control unit (CCU) and multiple push button stations.

2. CCU, refers to the unit installed in an existing traffic signal controller cabinet, frame, and all required mounting hardware and the configurator. The CCU is the power supply and signaling interface, between the intersection traffic signal controller and the push button stations. Configurator refers to a handheld, password secure, infrared device capable of setting and resetting all push button stations on the intersection from a single push button station (global updating). Each CCU will control multiple push button stations. A complete system includes one CCU.

3. Push button station (PBS), refers to a Public Rights of Way Accessibility Guidelines (PROWAG) compliant push button station including signs when specified, installed at crosswalk termini, and all required mounting hardware. A system can include 2 to 12 PBS (maximum of 3 per phase).

b. Materials. Provide a Polara Navigator system including CCU and PBS, or approved equal, meeting the requirements of this subsection. Provide all hardware and other appurtenant materials in accordance with sections 918 and 921 of the Standard Specifications for Construction and this special provision.

1. The system must:

A. Provide various audible features including but not limited to locator tones. All locator tones must emanate from push button stations and be synchronized;

B. Have multiple language capability, selectable by user, and able to play an emergency preemption message;

C. Be able to self-test and report any faults to the traffic controller;

D. Provide the following audible feature, each with a minimum and maximum volume independently settable using the configurator:

- (1) One locating tone;
 - (2) Five walk sound choices (field selectable);
 - (3) Three pedestrian - clearance sound choices (field selectable) one of which must be an audible countdown;
 - (4) Direction of travel (as standard feature with extended push); and
 - (5) Information message (custom feature with extended push).
- E. Automatically adjust audible features to ambient noise levels over a 60 decibel (dB) range; and
- F. Mute sounds on all crosswalks except the activated crosswalk (selectable feature).
2. The CCU must meet the following requirements:
- A. Be compatible with solid-state pre-timed or actuated traffic signal control equipment and cabinet environments;
 - B. Be capable of controlling up to and including 12 PBSs and controlling up to and including 4 pedestrian phases;
 - C. Receive timing from the walk and don't walk signals;
 - D. Have additional advanced configurations available by using general purpose inputs and outputs;
 - E. Ensure full optical isolation of all inputs and outputs and include transient voltage protection as follows:
 - (1) General Purpose Inputs. 10 to 36 Volts (V) Alternating Current/Direct Current (AC/DC) peak with a 10 milli Ampere (mA) maximum.
 - (2) General Purpose Outputs and Pedestrian Outputs. 36V AC/DC peak, 0.3 Ampere (A) solid state fused contact closure.
 - (3) Fault Output. Normally open and closed relay contacts, 125V AC/DC, 1A maximum.
 - (4) Pedestrian Hand/Walking Person (Walk/Don't Walk) Inputs. 80-150V AC/DC, 5mA maximum.
 - (5) A, B, C, D PBS Power Outputs. Nominal 22V DC, short circuit protected, auto recovering.
 - (6) Environment Operation and Storage Range. -30 degrees Fahrenheit (F) to 165 degrees F (-35 degrees Celsius (C) to 74 degrees C), 0 to 100 percent Humidity, Non-condensing.

(7) Line Power. 25 Watt (W) to 75W typical, 120W peak with 8 PBSs.

F. Include a 50-pin connector and cable that plugs into the CCU for termination to the traffic signal controller terminal facilities. Ensure the connector is a Positronic MD50F20Z0X or equivalent, provided with 20-24 gauge wire, which complies with the requirements of *UL 1061*.

3. The PBS must meet the following requirements:

A. Design each PBS in accordance with the following:

(1) Produce sounds emanating from the back of the unit via an 8 ohms 15W, weather-proof speaker protected by a vandal resistant screen;

(2) Require only two wires coming from the traffic control cabinet for each phase/crosswalk;

(3) Include push buttons which are audibly locatable and equipped with tactile arrows pointing in the same direction as the associated crosswalk;

(4) PROWAG compliant, cast aluminum, nickel plated, powder coated with raised tactile arrow on button;

(5) Include solid-state switch rated to 20 million activations (minimum); and

(6) Include a two inch button with a tactile raised directional arrow on the button that can be changed to one of four directions to coincide with the direction of travel of the associated crosswalk.

B. The PBS must include the following standard features:

(1) The arrow/button must vibrate during the walk period, following a button push;

(2) Confirm a button push via a "vibratactile" bounce and a red light emitting diode (LED), clearly visible in direct sunlight, which latches ON when the button is pushed;

(3) Indicate the direction of travel with extended button push;

(4) Transmit a standard locating tone, custom sound, or verbal countdown during pedestrian clearance;

(5) Ensure sounds automatically adjust to ambient over 60 dB range;

(6) Allow sounds to have minimum and maximum volume set independently;

(7) Synchronize all sounds;

(8) Extended button push can turn on, boost volumes, and/or mute all sounds except those on activated crosswalk; and

(9) Include message to clear the intersection when preemption is activated.

C. Ensure the PBS is capable of custom message and sound options for the following features:

- (1) Custom locating tone;
- (2) Custom clearance sound;
- (3) Custom walk sounds/message;
- (4) Informational message;
- (5) Multiple languages (up to three, selected by user); and
- (6) Street name in Braille on the sign.

D. Ensure the PBS is fabricated in accordance with the following:

- (1) Available in three standard colors: Black, Green, and Yellow. The default color is yellow unless specified otherwise;
- (2) Have an operational temperature range of -40 degrees F to 165 degrees F (-40 degrees C to 60 degrees C);
- (3) Ensure the housing material is cast aluminum;
- (4) Chemically filmed and powder coated;
- (5) Face plate constructed of powder coated aluminum with ink marking; and
- (6) Have pre-drilled mounting holes to hold a 9 inch by 12 inch, R10-3b, 3d, or 3e pedestrian sign.

E. PBS LED display operational requirements:

- (1) Light when the button is pushed and remain lit until the next walk phase.
- (2) Luminous intensity greater than 1200 maximum continuous discharge (mcd), sunlight visible, ultra bright red, with a 160 degree viewing angle.

F. PBS audio operational requirements:

- (1) Audio amplifier power output of 10W Root Mean Square (RMS) into 8 ohms.
- (2) Volume control automatic adjustment range of 28dB (maximum).
- (3) Microphone ambient noise frequency range of approximately 170 Hertz (Hz) to 2.3 Kilo Hertz (kHz).
- (4) Button tone provides a brief "tick" to confirm each button push.

- (5) Audible locating tone operates during the pedestrian-clearance and don't walk interval at an 880Hz plus harmonic, 0.1 second duration, 1 second interval.
- (6) Audible "chirp" operates only during walk intervals at 2700Hz to 1700Hz, 0.2 second duration, 1 second interval.
- (7) Audible "cuckoo" operates only during walk intervals at 1250Hz to 1000Hz, 0.6 second duration, 1.8 second interval.
4. Ensure the configurator meets the following requirements:
- A. Be a handheld, password protected, remote that configures the CCU or an individual PBS;
 - B. Communicate via infrared technology with the CCU and the PBS with an interactive operation to select various configuration options at the intersection(s), by standing adjacent to either the CCU or a PBS;
 - C. Feature a liquid crystal display (LCD) display, with two 16-character lines, with backlight and adjustable contrast;
 - D. Be powered by four AA 1.5V cell batteries, include a low battery warning, and have an auto or manual shut-off switch; and
 - E. Have an operating temperature range of 32 degrees F to 122 degrees F (0 degrees C to 50 degrees C).
5. Warranty. Provide a manufacturer's warranty, transferable to the MDOT, that the supplied materials will be free from all defects in materials and workmanship for a 2-year period from the date of shipment. Furnish the warranty and other applicable documents from the manufacturer, and a copy of the invoice showing date of shipment, to the Engineer at the time of delivery.
- c. Construction.** Complete this work in accordance with sections 819 and 820 of the Standard Specifications for Construction, typical signal construction details, and this special provision.
1. Furnish and Install. Furnish and install a system at an intersection as shown on the plans and in accordance with the *MMUTCD*. Ensure that the arrow on the PBS button(s) point in the direction of pedestrian travel for the associated crosswalk.
 2. Remove. Remove an accessible pedestrian signal system or a push button station and store, as directed by the Engineer, or dispose of all removed materials.
 - A. Where removal of an accessible pedestrian signal system is specified on the plans, remove the CCU, hardware, cable, connectors, and other appurtenant material required to complete the work.
 - B. Where removal of a PBS is specified on the plans, remove the PBS, sign, associated assembly, hardware, cable, connectors, and other appurtenant material required to complete the work.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

Pay Item	Pay Unit
Pedestrian Signal System, Accessible.....	Each
Push Button Station.....	Each
Push Button Station and Sign.....	Each
Pedestrian Signal System, Accessible, Rem	Each
Push Button Station, Rem	Each

1. **Pedestrian Signal System, Accessible** includes installing the accessible pedestrian signal system at an intersection, including a CCU, configurator, hardware, fittings, conduit(s), wiring, grounding and ground rod(s), and all appurtenant material required to complete the work.

2. **Push Button Station** and **Push Button Station and Sign** includes installing the push button station, sign (when specified), associated assembly, brackets, hardware, fittings, conduit(s), cable to controller, wiring, grounding, ground rod(s), and all other appurtenant material required to complete the work.

3. **Pedestrian Signal System, Accessible, Rem**, includes removing an accessible pedestrian signal system at an intersection including a CCU, configurator, hardware, fittings, hardware, cable, connectors, conduit(s), grounding, and other material required to complete the work. **Pedestrian Signal System, Accessible, Rem** also includes storage or disposal of removed material.

4. **Push Button Station, Rem**, includes removing a push button station, sign, associated assembly, brackets, hardware, fittings, cable, connectors, conduit(s), ground, and other material required to complete the work. **Push Button Station, Rem** also includes storage or disposal of removed material.