

DESIGN MEMO 9.07

To: Designers, Contractors, and City Departments
Date: January 10, 2023
Subject: Pedestrian Hybrid Beacons
Category: Traffic

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1 Purpose

A Pedestrian Hybrid Beacon (PHB) is a type of traffic control device that facilitates pedestrian street crossings by stopping vehicular traffic with a red signal indication. PHBs remain dark to major street traffic until activated by a user trying to cross the street. PHBs may be used in a variety of applications to improve crossing safety and reduce crossing delays for pedestrians and bicyclists.

PHB operation is described in Section 4F.03 of the Ohio Manual of Uniform Traffic Control Devices.

2 Applicability

Until further notice, this direction will be used for scoping, design, and construction of PHBs within the City of Columbus right-of-way.

PHBs may be installed at any uncontrolled marked crosswalk, although they are typically installed on multi-lane roadways where a traffic signal is not warranted or desired. PHBs may be installed at midblock crossing locations or at unsignalized intersections.

Designers should follow guidance in City of Columbus Design Memo 6.41: Crosswalks to determine when a PHB may be an appropriate treatment. Guidance and standards for determining when PHBs are appropriate is provided in Section 4F.01 of the OMUTCD.

3 Standards and References

- Ohio Manual of Uniform Traffic Control Devices (OMUTCD)
- City of Columbus [ADA Rules and Regulations](#)
- City of Columbus [Traffic Signal Design Manual](#)
- City of Columbus [Design Memo 6.41: Crosswalks](#)

4 Definitions

Definitions of key terms in this memo are provided in City of Columbus Design Memo 1.00: Introduction.

5 Design Guidance

In addition to the standards specified in Section 4F.02 of the OMUTCD, the following considerations are applicable to the design and installation of PHBs.

The typical PHB design within the City of Columbus consists of one mast arm extending across all lanes of traffic with pedestrian pedestals as needed to provide locations for pedestrian signal heads and pedestrian pushbuttons.



5.1 PHB Support Placement

Supports and pedestals shall be provided and placed per the requirements in Chapter 4 of the City of Columbus *Traffic Signal Design Manual*.

Where PHBs are installed at mid-block locations, PHB supports and pedestals (including the pushbutton) should be located at the downstream end of the crosswalk.

When feasible, the PHB support or pedestal should be located to accommodate the pedestrian pushbutton position in accordance with Section 5.2. Should other design considerations prevent the PHB support or pedestal from accommodating the pushbutton, a separate pedestal support shall be used to locate the pushbutton in an acceptable location.

5.2 Pedestrian Pushbuttons

Locations of pedestrian pushbuttons for PHBs shall be in accordance with the placement requirements outlined in the City of Columbus *ADA Rules and Regulations* and shall be installed in accordance with the requirements of the City of Columbus *Traffic Signal Design Manual*.

It is preferable for pedestrians to cross the entire street in one movement unless design constraints are such that a two-stage crossing is necessary. Where a two-stage crossing is used, pedestrian pushbuttons shall be provided in the median and located in accordance with City of Columbus Design Memo 6.05: Pedestrian Islands.

5.3 Sight Distance

Pedestrian hybrid beacons should be designed such that drivers have adequate stopping sight distance to see pedestrians waiting to cross. In locations with on-street parking, parking shall be prohibited within 30 feet of a crosswalk with PHBs (both upstream and downstream) as parking is prohibited within 30 feet of flashing beacons under Columbus City Code Section 2151.01. Other sight obstructions should be removed or limited within this area. If these conditions cannot be met, curb extensions or other techniques should be used to provide adequate sight distance. Curb extensions should be designed to prohibit parking for the distances specified in this section. For more information, see City of Columbus Design Memo 6.04: Curb Extensions.

5.4 Signage

Pedestrian Crossing (W11-2), School (S1-1), or Bicycle/Pedestrian Crossing (W11-15) signs with diagonal downward arrow plaques (W16-7P) shall be provided at PHBs. This signage is typically installed on the signal support; however, it may also be installed using standard ground mounted sign supports. This signage shall be installed on both sides of the roadway. On two-way roadways, this signage shall be double-sided so that it is visible to both directions of travel on both sides of the roadway. A Pedestrian Crossing (W11-2), School (S1-1), or Bicycle/Pedestrian Crossing (W11-15) sign may also be installed in advance of a PHB with an AHEAD plaque (W16-9P).

A CROSSWALK, STOP ON RED, PROCEED ON FLASHING RED WHEN CLEAR (R10-23a) sign shall be mounted overhead on the PHB mast arm for each major street approach. The sign shall be centered between signal heads.

Pushbuttons installed at PHBs shall be accompanied by a PUSH BUTTON TO CROSS STREET WAIT FOR WALK (R10-3a) sign. This sign shall be installed in accordance with City of Columbus Standard Drawing 4230.



Signs used at PHBs are shown in **Figure 1**.

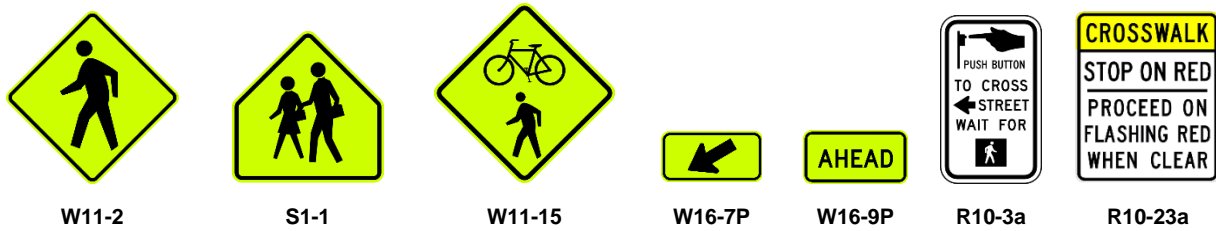


Figure 1: Signs used at PHBs

5.5 Pavement Markings

Stop lines shall be provided on each approach to the crosswalk. Locate stop lines in accordance with OMUTCD Section 4D.14. When a PHB is installed at an intersection, the stop line shall be installed across all lanes including turn lanes for the approach that encounters the crosswalk prior to the intersection. The stop line shall only be installed across the through lanes for the approach which encounters the intersection prior to the crosswalk. See City of Columbus Design Memo 9.05: Stop Lines for guidance on stop line marking placement on the intersecting side street.

Crosswalks controlled by a PHB shall have high-visibility Type II crosswalk markings. See City of Columbus Design Memo 6.41: Crosswalks for additional information on crosswalk markings.



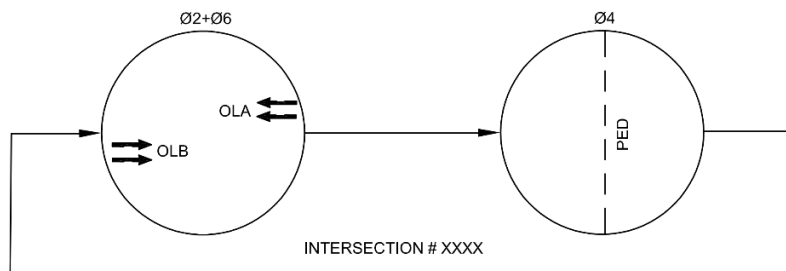
6 Timing/Phasing

6.1 Phase Assignments

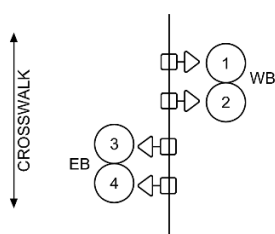
Phases shall be assigned using the following standard City of Columbus phasing:

- Vehicle movement shall be assigned to Ø2 and Ø6
- Pedestrian movement shall be assigned to Ø4

Figure 2 and **Figure 3** depict example PHB phasing and field wiring hook-up charts for east-west and north-south mainlines, respectively.



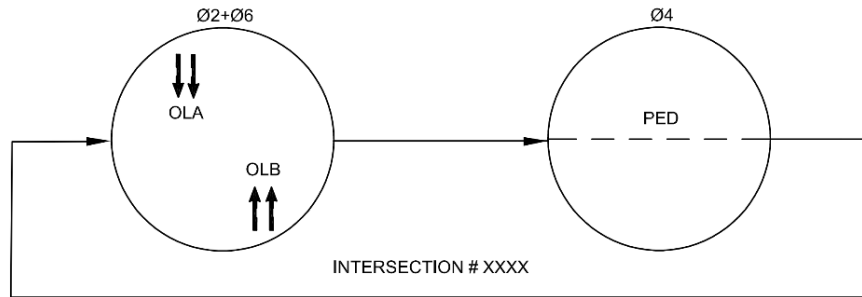
LEGEND



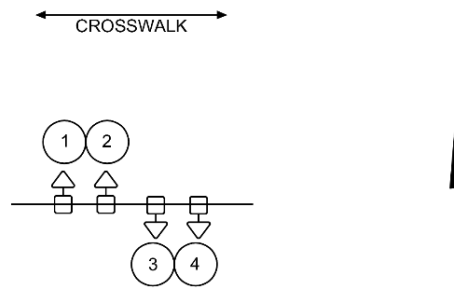
FIELD WIRING HOOK-UP CHART			
SIGNAL HEAD #	INDICATION	FIELD TERMINAL	FLASH
1, 2 (WB)	R (LEFT)	Ø2 R	Y
	R (RIGHT)	OLA R	
	Y	Ø2 Y	
3, 4 (EB)	R (LEFT)	Ø6 R	Y
	R (RIGHT)	OLB R	
	Y	Ø6 Y	
PED	WALK	G (Ø4)-W	OFF
	DON'T WALK	R (Ø4)-DW	
OLA = Ø2 OLA = LS9 OLB = Ø6 OLB = LS10			

Figure 2: Pedestrian Hybrid Beacon Phasing and Field Wiring Hook-up Chart Example East-West Mainline





LEGEND



FIELD WIRING HOOK-UP CHART			
SIGNAL HEAD #	INDICATION	FIELD TERMINAL	FLASH
1, 2 (SB)	R (LEFT)	Ø2 R	Y
	R (RIGHT)	OLA R	
	Y	Ø2 Y	
3, 4 (NB)	R (LEFT)	Ø6 R	Y
	R (RIGHT)	OLB R	
	Y	Ø6 Y	
PED	WALK	G (Ø4)-W	OFF
	DONT WALK	R (Ø4)-DW	
OLA = Ø2 OLA = LS9 OLB = Ø6 OLB = LS10			

Figure 3: Pedestrian Hybrid Beacon Phasing and Field Wiring Hook-up Chart Example North-South Mainline



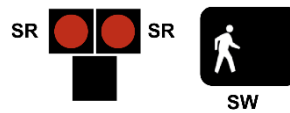
6.2 Timing and Sequencing

The standard sequence for a PHB is shown in **Figure 4**.

1. Dark Until Activated



5. Steady Red During Pedestrian Walk Interval



2. Flashing Yellow Upon Activation



6. Alternating Flashing Red During Pedestrian Change Interval



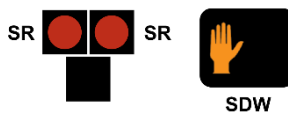
3. Steady Yellow



7. Dark Again Until Activated



4. Steady Red During Red Clearance



<u>Legend</u>	
SY	Steady yellow
FY	Flashing yellow
SR	Steady red
FR	Flashing red
SW	Steady "WALK"
SDW	Steady "DON'T WALK"
FDW	Flashing "DON'T WALK"

Figure 4: Sequence for a Pedestrian Hybrid Beacon

Timing and sequencing for PHBs shall be as follows:

6.2.1 Sequence 1 – Beacon Dark/Steady DON'T WALK

Minimum dark time for Ø2 and Ø6 shall be 10 seconds.

6.2.2 Sequence 2 – Flashing Yellow Interval/Steady DON'T WALK

Upon Activation. The flashing yellow interval for Ø2 and Ø6 should be determined by engineering judgment and shall be between 3 and 5 seconds.

6.2.3 Sequence 3 – Steady Yellow Change Interval/Steady DON'T WALK

The steady yellow change interval for Ø2 and Ø6 shall be calculated per the Yellow Clearance Interval requirements in Section 15.1.1 of City of Columbus *Traffic Signal Design Manual*. Per OMUTCD Section 4F.03, the steady yellow interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds.



6.2.4 Sequence 4 – Red Clearance Interval (All Red)/Steady DON'T WALK

The red clearance interval for Ø2 and Ø6 shall be 1 second minimum. If the PHB is located at an intersection, the red clearance interval shall be calculated per the Red Clearance Interval requirements in Section 15.1.2 of the City of Columbus *Traffic Signal Design Manual*. If the PHB is located at a mid-block location, the red clearance interval shall be calculated using the same Red Clearance Interval requirements, using the distance from the stop line to the far side of the crosswalk as the width of intersection.

6.2.5 Sequence 5 – Steady Red/Pedestrian Walk Interval

The steady red/pedestrian walk interval (Ø4 pedestrian walk interval) shall be calculated per the Pedestrian Walk Time requirements in Section 15.1.3 of the City of Columbus *Traffic Signal Design Manual*.

6.2.6 Sequence 6 – Alternating Flashing Red/Flashing DON'T WALK

The flashing red/flashing DON'T WALK interval (Ø4 pedestrian change interval) shall be sufficient to allow a pedestrian crossing in the crosswalk who left the curb or shoulder at the end of the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 3.5 feet per second to the far side detectable warning or to a median of sufficient width for pedestrians to wait if a two-stage crossing is used.

$$\text{Ped Change Interval} = \text{Ped Clearance Interval} = \frac{\text{Crossing Distance}}{\text{Walking Speed}}$$

Additionally, the total of the pedestrian walk interval (Sequence 5) and the pedestrian change interval (Sequence 6) shall be sufficient to allow a pedestrian crossing in the crosswalk who left the pedestrian detector at the beginning of the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 3 feet per second to the far side detectable warning or to the median if a two-stage crossing is used. Any additional time that is required to satisfy the conditions of this paragraph should be added to the pedestrian walk interval (Sequence 5).

6.2.7 Return/Rest

After Sequence 6, the PHB shall return/rest in Sequence 1.



6.2.8 Timing Chart

An example timing chart is illustrated in **Table 1**.

**Table 1: Pedestrian Hybrid Beacon Timing Chart
 Major Street E-W**

MOVEMENT	WB	EB	CROSSWALK
PHASE	Ø2	Ø6	Ø4
BEACONS DARK (MIN GREEN) ¹	10	10	-
FLASHING YELLOW ²	3.0	3.0	-
STEADY YELLOW ³	*	*	-
RED CLR ⁴	*	*	-
STEADY RED ⁵	*	*	-
FLASHING RED ⁶	*	*	-
WALK ⁵	-	-	*
PEDESTRIAN CHANGE ⁶	-	-	*

All other settings are set to off or zero

* = calculate value

1 = See Section 6.2.1

2 = See Section 6.2.2

3 = See Section 6.2.3

4 = See section 6.2.4

5 = See Section 6.2.5

6 = See Section 6.2.6

7 Equipment

All equipment shall be in accordance with the requirements of the City of Columbus *Traffic Signal Design Manual* and City of Columbus *Construction and Material Specifications*.

7.1 Supports and Foundations

PHB supports and foundations shall be furnished in accordance with Sections 632 and 732 of the current versions of the City of Columbus Construction and Material Specifications and applicable Standard Construction Drawings.

Supports for PHB assemblies shall also be in accordance with the City of Columbus Traffic Qualified Products List.

Approved PHB support types include the following:

- Standard Mast Arm Support – Standard mast arm supports are used to provide an overhead mounting location for PHB signal heads (City of Columbus Standard Construction Drawing 4120)
- Decorative Mast Arm Support – Decorative mast arm supports are used to provide an overhead mounting location for PHB signal heads in the Downtown District (City of Columbus Standard Construction Drawing 4121).

Mast arms shall be sized such that it extends 2 feet beyond the last proposed attachment point of the beacon display.

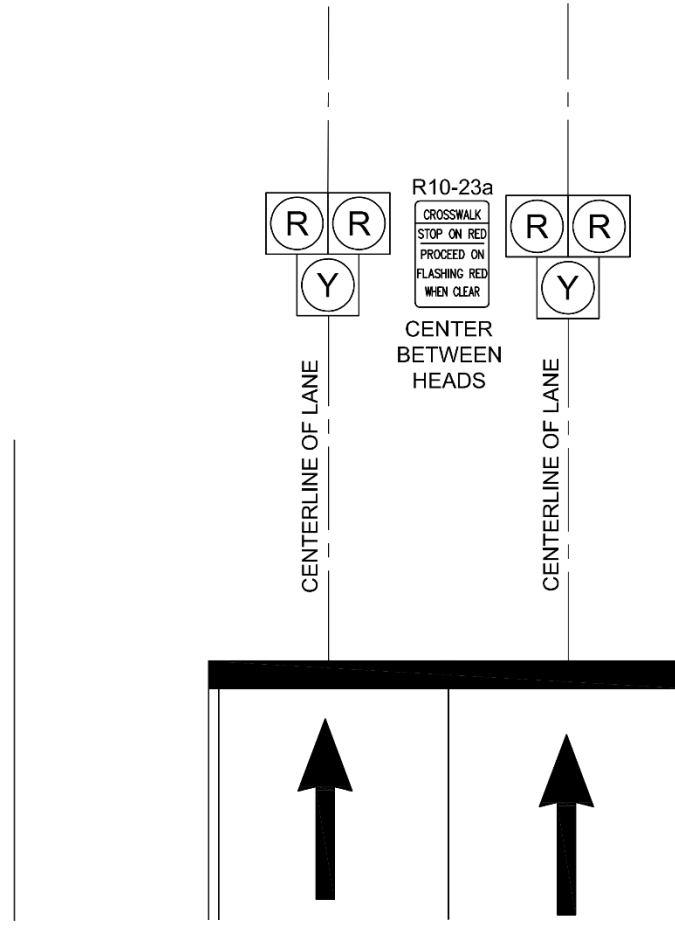
7.2 Signal Heads

PHB signal heads shall feature 12-inch diameter lenses. Signal heads shall feature louvered aluminum backplates as per City of Columbus Standard Construction Drawing 4205. Signal heads with backplates



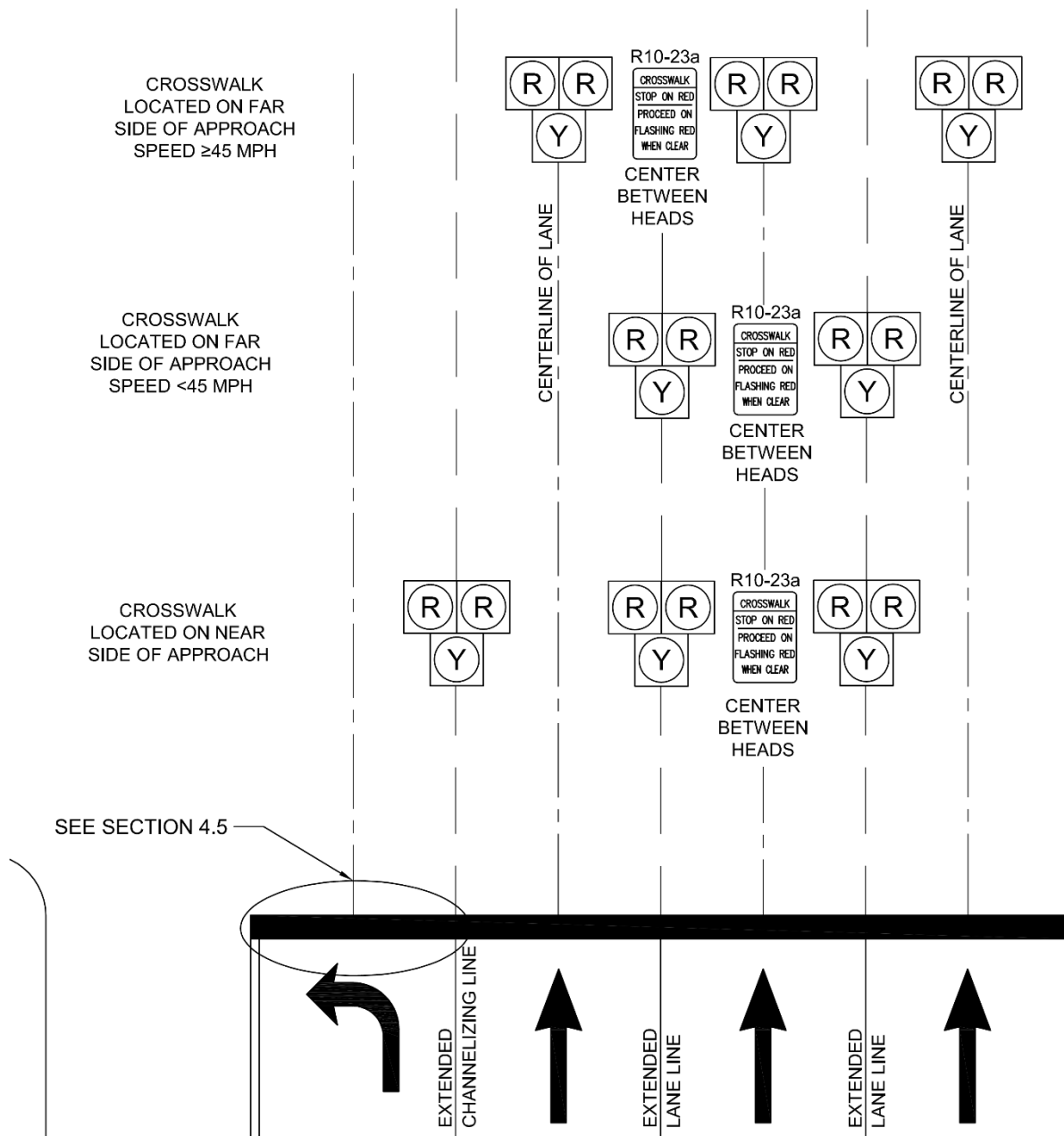
shall be rigidly mounted to the mast arm. Primary PHB signal heads shall be mounted overhead. Auxiliary/supplemental PHB signal heads may be side-mounted if necessary.

PHB head alignment scenarios are shown in **Figure 5** and **Figure 6**.



**Figure 5: Pedestrian Hybrid Beacon Head Alignment
Mid-Block Crossing
Two Approach Lanes**





**Figure 6: Pedestrian Hybrid Beacon Head Alignment
 Intersection Crossing
 Four Approach Lanes**



7.3 Wiring

All other wiring standards shall be per the requirements in Chapter 7 of the City of Columbus *Traffic Signal Design Manual*. PHBs shall be grounded and bonded per the requirements of Chapter 7. PHB signal heads shall use 7/C minimum #14 AWG signal cable.

See **Figure 7** for a sample PHB wiring diagram.

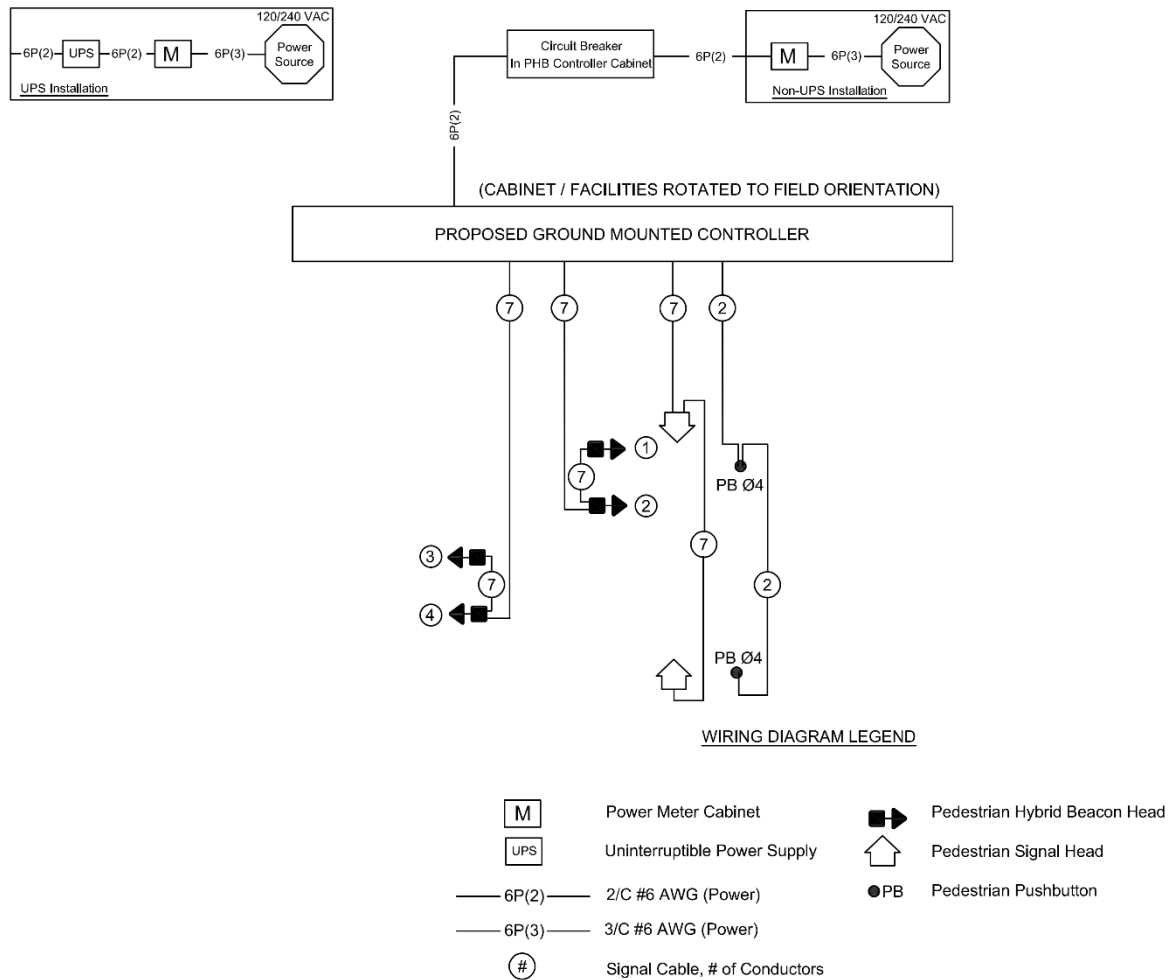


Figure 7: Pedestrian Hybrid Beacon Wiring Diagram

7.4 Controller / Cabinet and Power Meter Cabinets

PHBs shall use standard TS-2, 8-phase, 16-channel, size 6 cabinets. Power meter cabinets shall also be provided.



8 Interconnect

PHBs shall be connected to the City of Columbus Traffic Signal System per the requirements in Chapter 12 of the City of Columbus *Traffic Signal Design Manual*.

