

BL Piezo Installation Summary

Prior to installation, please read the instructions completely and ensure that all required tools and equipment are available.

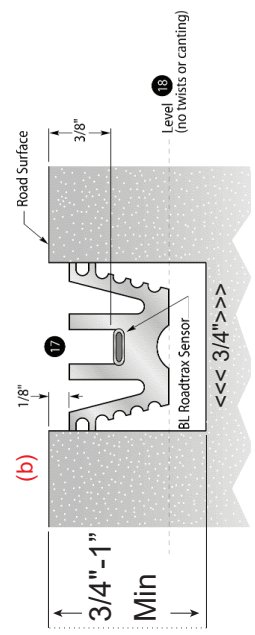
- Safety Equipment (as per local regulations)
- BL Sensors with Installation Brackets (Note: Normal and wide installation brackets are included in the box)
- Encapsulation Material (Global Resin PU200)
- Loop Sealant (NO hot tar)
- PVC or Polyethylene Tubing (home run cables)
- Straight Edge (8' [2.5 m] minimum)
- 20' (6 m) Tape Measure
- Pavement Crayons & Pavement Paint
- 1/8" (3 mm) Diameter Cord approximately 20' (6m) in length
- 35hp Wet-Cutting Pavement Saw (self-propelled)
- Diamond Blade (3/4" [20 mm] wide or equivalent)
- Diamond blade (1/4" [7 mm] minimum, for Cutting Home Run Slots)
- 2 each mixing paddles
- Hammer & Masonry Chisels
- Power Washer > 500 gal. Water
- Large Capacity Air Compressor (min 150 CFM)
- Street Broom
- Wire Brush
- Steel Wool/Emery Pad
- Alcohol with Lint-Free Cloth
- 2" (50 mm) Duct Tape
- Foam Backer Rod
- Latex Gloves
- Electrical Power or Generator
- Low Speed Mixing Drill

1) Ensure that the road is safely closed, as per local regulations.

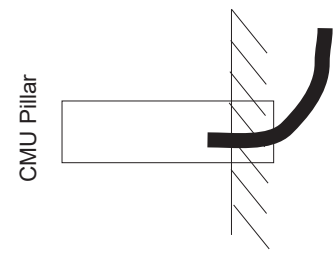
2) Using pavement crayons, paint, tape measure and cord, carefully mark the layout of the sensor installation. Ensure sensors are emplaced exactly perpendicular to the flow of traffic and that all lines are straight. Verify that the passive cable length is enough to reach the cabinet.

- 3" (80 mm) or 4" (100 mm) wide Putty Knife or Small Masonry Trowel
- Angle Grinder with Masonry Wheel or Belt Sander
- Wire Strippers
- Needle Nose Pliers

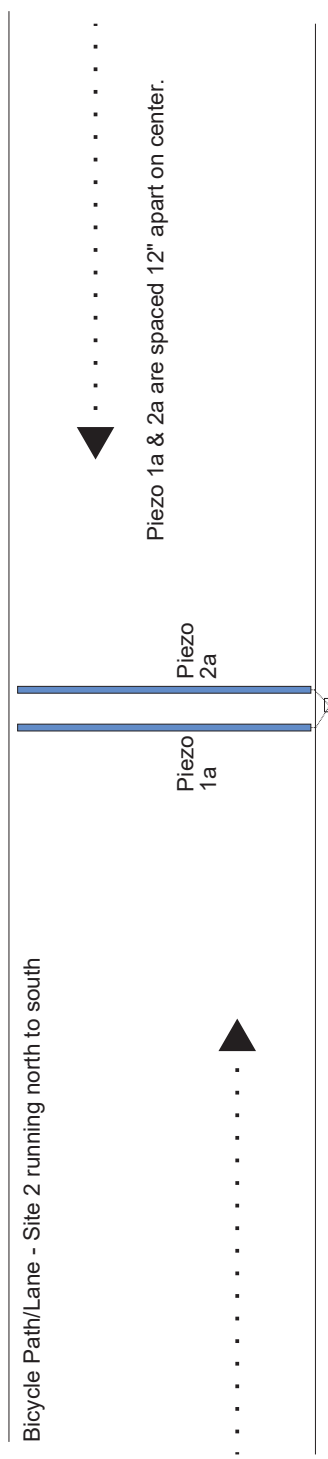
168"
 (a) **to**
36"



(c) **Leadin Slot**
1/4" wide



- Notes:
- a) This represents the length of the piezo perpendicular to the lane
 - b) This represents the slot dimensions with a side view
 - c) The depth of the lead in slot can be 1"



| | | | | | | | |
|---|---|-------------------------------------|-------------|------------------|-------|-----|--|
| Roadsys, LLC 334 East Lake Rd #125 Palm Harbor, FL 34685 | Project: TDC Piezo Sensor Bicycle Installation | Location: Bike Path/Lanes | Drawing No. | 12042013-03 | | | |
| | | | Checked By | J Schmidt | Sheet | 1 | |
| | | | Drawn By | J Schmidt | Issue | 1 | |
| | | | Date | December 4, 2013 | Scale | NTS | |



3) **Sensors must be cut 12" [1 foot center to center] apart.** Using a 3/4" (20 mm) Diamond Blade, cut slot for sensor. Slot must be 3/4" (20 mm) wide ($\pm 1/16"$ or ± 2 mm) by 1" (25 mm) minimum deep. Cut slot 8" (200 mm) [4" on each end] longer than sensor length (including lead attachment). Drop blade an extra 1/2" (12 mm) down on both ends. Repeat for all sensors.

4) **Sensors must be cut 12" [1 foot center to center] apart.** Cut home run slots for BL sensors. Center the home run slot on the sensor slot. Home run slots are typically cut the depth of the loop home run slots. The minimum width of the slot needs to be 1/4" (6 mm). Cut it wider if you are using conduit or tubing.

5) Power wash and sweep all slots. All slots must be very clean.

6) Dry all slots with compressed air. All slots and the pavement 1' (300 mm) on either side must be completely dry.



7) Place duct tape along length of both sides of the sensor slot. Tape must be 1/8" (3 mm) away from the slot. Repeat for all sensors.

8) Remove BL sensor from box. Visually inspect sensor to ensure it is straight with-out any twists or curls. Check passive cable for bare wire. Check lead attachment for cracks or gaps. Again, verify that there is sufficient passive cable to reach the cabinet.

9) Test sensor.

10) Place sensor on tape next to the slot. From this point forward, handle the sensor with latex (or equivalent) gloves.

11) Clean sensor with steel wool or emery pad (Scotch Brite™). Wipe down with alcohol and clean lint-free cloth.

12) Place installation brackets on sensor every 6" (150 mm) for the length of the sensor, use the 3/4" (20 mm) (small) brackets.

13) Bend the end of the sensor downward at a 30° angle. Bend the lead attachment end down at a 15° angle and then 15° back up until level (forming a lazy Z).

14) Emplace sensor in the slot in the pavement. The end of the sensor should be at least 2" (50 mm) from the end of the slot, and the tip should not touch the bottom of the slot. The lead attachment should also not touch the bottom or the sides of the slot.



15) Starting at the lead attachment end, position the sensor so that it is 3/8" (9 mm) below the surface of the road using the depth gauge. At this point, the installation bracket is 1/8" (3 mm) below the surface of the road.

16) Visually inspect the length of the sensor to ensure it is at uniform depth along its length and it is level (not twisted, canted or bent).

17) Run the passive wire the length of the home run slot. 3" (75 mm) from the lead attachment, place foam backer rod under and over passive cable (inside the slot). This will keep the grout from running out into the deeper home run slot. If the pas-sive cable is put in a conduit, also allow 3" (75 mm) between the lead attachment and the beginning of the conduit.

18) Repeat steps 9-18 for all BL sensors to be installed.

19) Using low speed mixing drill (450 rpm) and a mixing paddle, pre-mix the grout for 2 minutes or until smooth.

20) Add hardener to grout and mix according to manufacturer's instructions.





21) Immediately pour grout into slot using a small bead. Using a small bead allows the installer to watch the grout flow under the sensor, eliminating air pockets. Start at the end and pour towards the lead attachment. Repeat until slot is completely full of grout. **DO NOT FILL SLOT IN ONE PASS.**

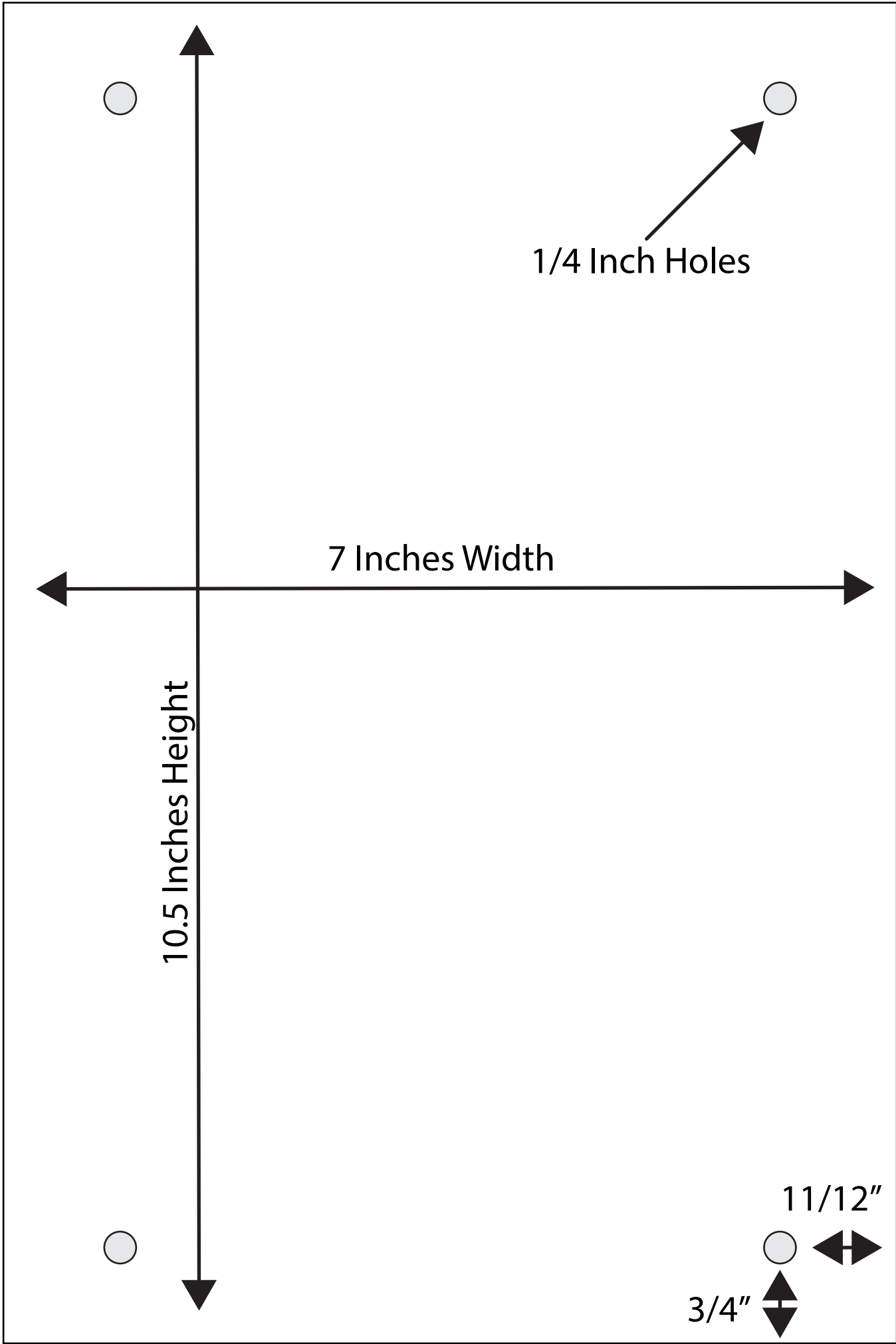
22) Using putty knife or trowel, lightly spread (feather) the grout smooth along the length of the slot. Resin should be slightly higher than tape as it will shrink while curing.

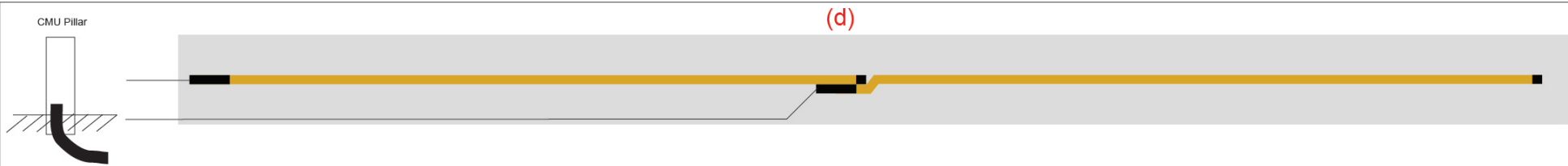
23) Remove tape as soon as grout begins to set (2-5 minutes, depending on grout type and ambient temperature).

24) Remove backer rod from the slot. Fill in home run cable and inductive loops with loop sealant.

25) Once grout is cured, use an angle grinder or a belt sander to grind/sand the top of the grout flush with the surface.

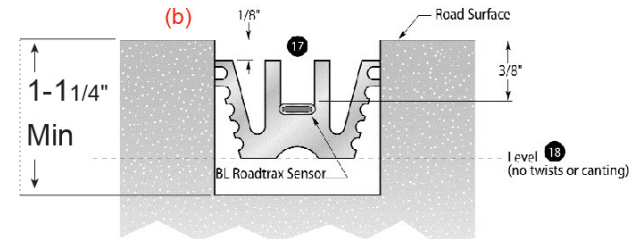
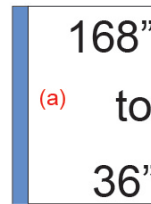






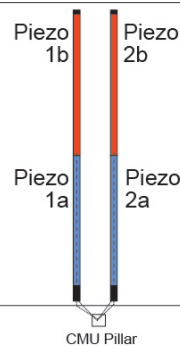
Notes:

- a) This represents the length of the piezo perpendicular to the lane
- b) This represents the slot dimensions with an end view
- c) The depth of the lead in slot can be 1"
- d) This represents the slot side view horizontally cut, viewing the sensors as they overlap in the middle
- e) The two pillars at either end of the project will be connected to the corresponding cycle information display with an ethernet cable and AC power so a 6V 500ma wall charger can be used inside the pillar to sustain batteries.



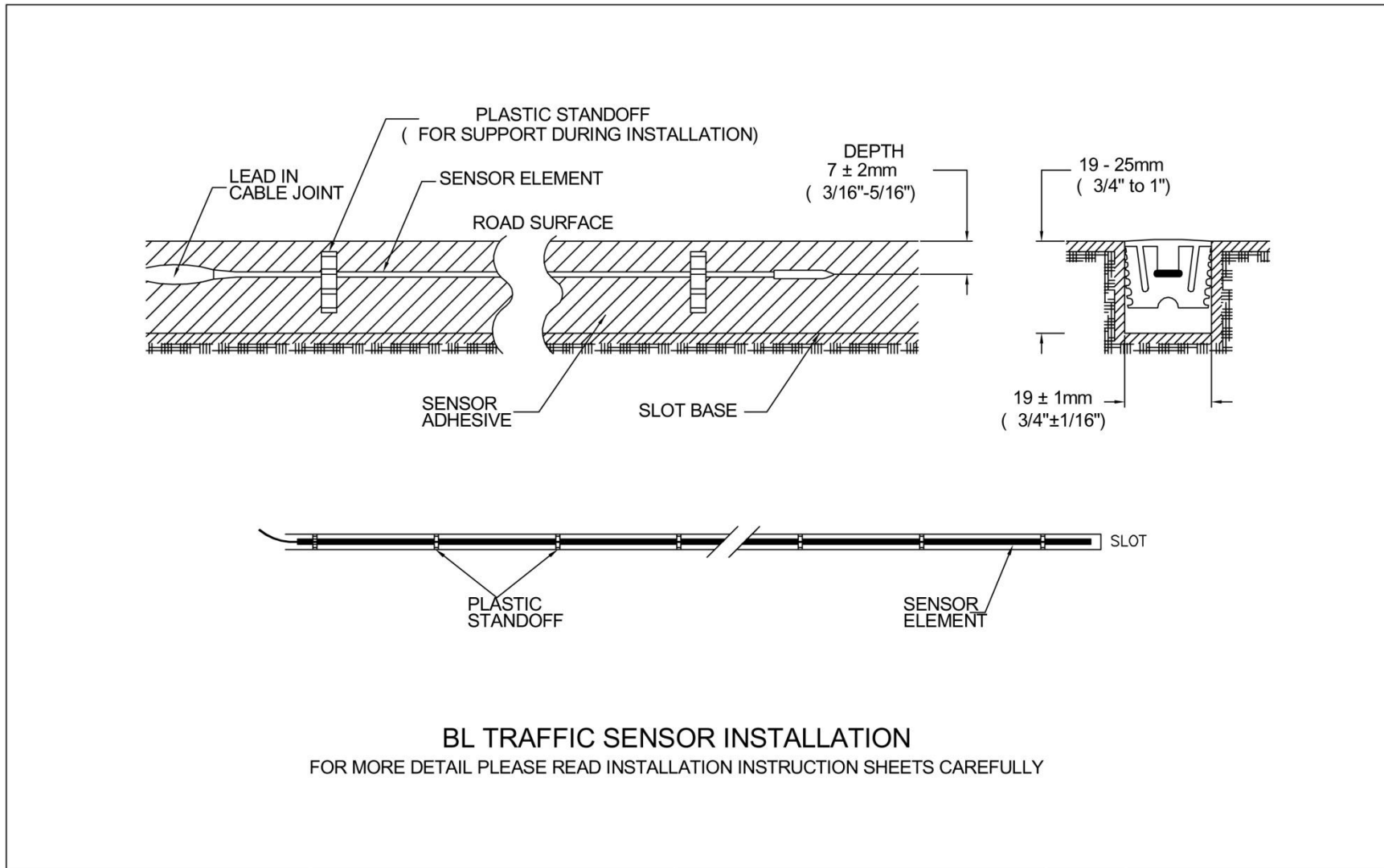
Bicycle Path/Lane

Typically piezo set (1b & 2b) are not used. In the event of heavy bike traffic flow the sensors are added to the array to help discriminate in congestion.



Piezo 1a & 2a are spaced 12" apart on center.
Piezo 1b & 2b are spaced 12" apart on center.
Piezo 2b & 1b have lead in end in middle of lane.
Piezo 2a & 1a have lead in end at edge of lane.
 Piezo 1a & 1b overlap active area by 0"-.25" vertically.
Piezo 2a & 2b overlap active area by 0"-.25" vertically.

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|--|--|------------------------------|-------------------------|---------------|-------|-----|
| Roadsys, LLC 334 East Lake Rd #125 Palm Harbor, FL 34685 | Project: TDC Piezo Sensor Bicycle Installation | Location: Bike Path/Lanes | Drawing No. 12042013-02 | | | |
| | | | Checked By | J Schmidt | Sheet | 1 |
| | | | Drawn By | J Schmidt | Issue | 1 |
| | | | Date | June 29, 2018 | Scale | NTS |



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|---|--|--------|------------|-------------|---------|--------|
| TDC SYSTEMS LTD WESTON-SUPER-MARE ENGLAND | TITLE | CLIENT | DRAWING No | 11050-10 | | |
| | HI-TRAC SERIES BL SENSOR INSTALLATION | | CHECKED BY | M. PHILLIPS | SHEET | |
| | | | DRAWN BY | M. ROSSITER | CAD REF | |
| | | | DATE | 14/06/2010 | SCALE | N.T.S. |