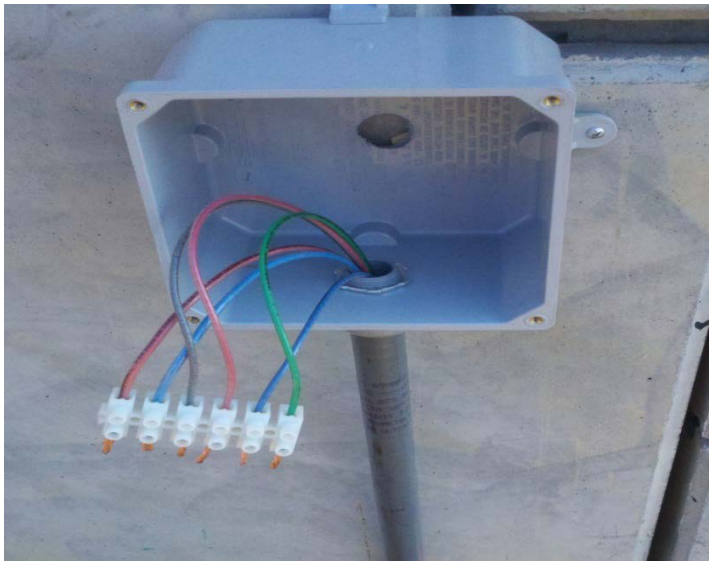
Materials & Tests Unit

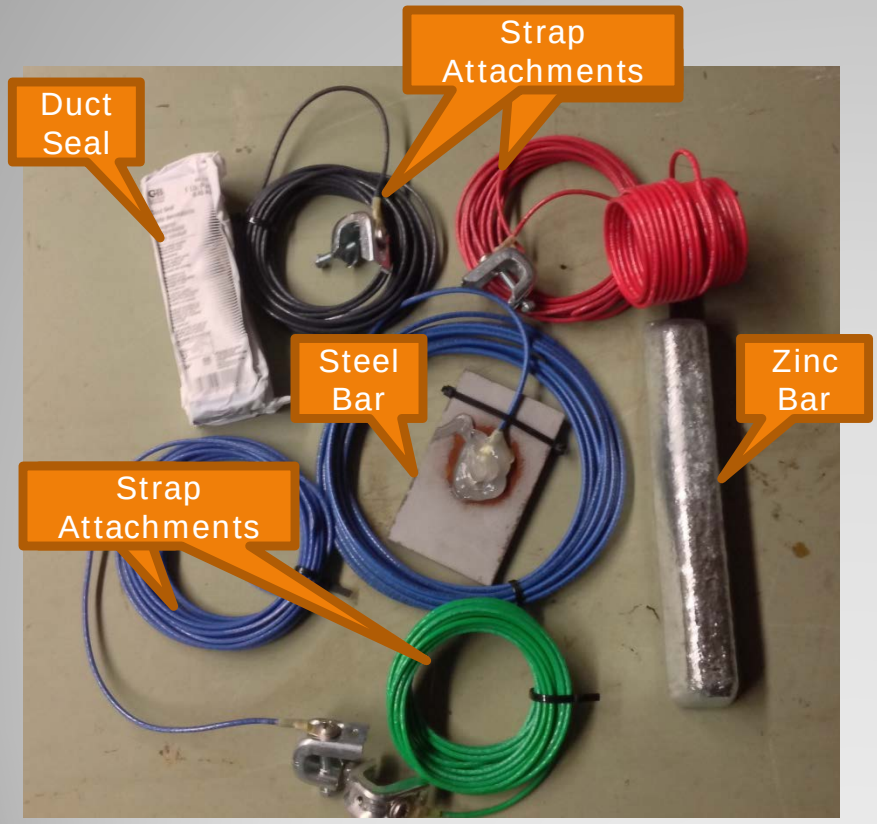
MSE Wall Corrosion Monitoring Kit Installation Guide



Revision #2,
16 February 2016

- The Materials and Tests Unit Chemical lab annually monitors and maintains corrosion data on 100 plus MSE walls throughout the state.
- These installations provides crucial data and research on the effects of backfill material and corrosion reaction to the supporting straps.
- This guide will cover installation of the corrosion monitoring kit for both the Reinforced Earth Type, SINE Wall type and the Vista wall type MSE wall.

Corrosion Monitoring Kit Contents



- Steel Reference Bar
  - Blue, 10 Gauge Strand Wire with approximately 15 feet of wire.
- Zinc Reference Bar
  - Red, 10 Gauge Solid Wire with approximately 15 feet of wire.
- 4 each strap attachments
  - Black, Red, Blue Green 12 Gauge Wires with approximately 15 feet of wire.
- 1 Block of Duct Seal
- 1 each installation instructions

Installation Considerations

- In most cases, one corrosion monitoring kit per bridge structure; unless the Engineer and or Geo-Technical Unit requests an additional monitoring kit to be installed.
- For projects that utilizes the same quarry for 78 or 57 stone one corrosion monitoring kit will be installed per project.
- If one or more additional quarries are utilized to obtain backfill material an additional monitoring kit will be placed per structure.

Installation Considerations

- For projects that utilize screened backfill one corrosion monitoring kit will be placed on either side of the bridge structure.
- For the use of screened backfill there are additional sampling and testing requirements.
- https://connect.ncdot.gov/resources/Materials/MaterialsResources/Mechanically Stabilized Earth Wall Fine Aggregate Sampling and Testing Procedures.pdf

Installation Considerations

Once the Contractor installs the kit and drills **ONE** 7/8” hole in the wall panel for all 6 wires; contact the M&T Corrosion Engineer at 919-329-4090 for installing the wall box.

DO NOT DRILL MORE THAN ONE 7/8” HOLE!

Installation Considerations

- The kit should not be installed on straps or cages that will be in contact with the steel piles.
- This will interfere with the annual readings.

Installation Considerations

- The kit should be installed at least 6 feet from the inside panel.
- The reference bar and lead wires are supplied with 10-15 feet of additional wire.

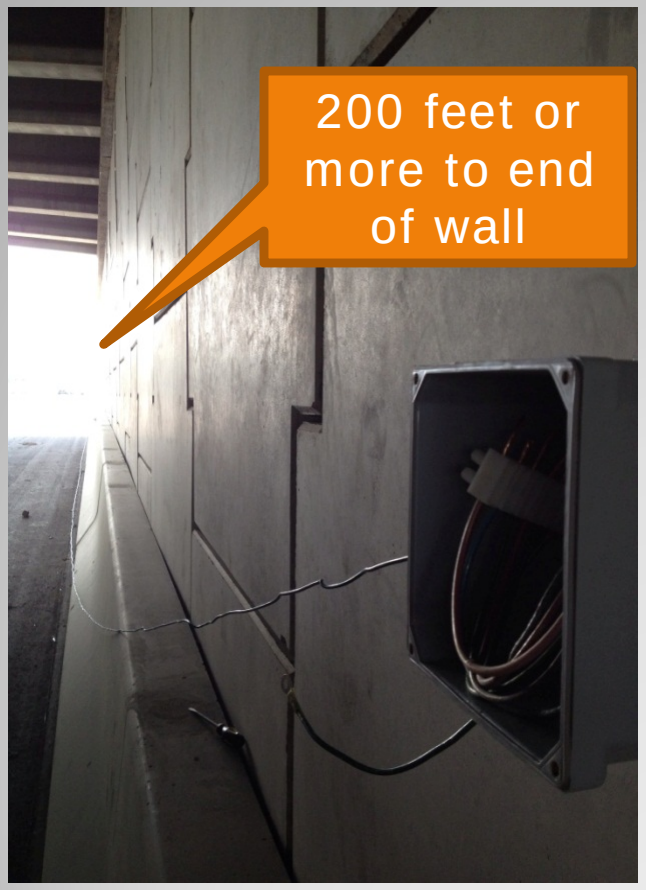
Installation Consideration

- Ideal locations for long walls are no more than 75 feet to the end of the wall.

Installation Consideration

- An alternative location is along the wing wall side of the MSE wall.

Installation Consideration



- Not an ideal location for a corrosion monitor kit.
- When taking annual readings the technician will be exposed to traffic volume while unrolling a spool of wire to obtain a soil ground for testing.

Installation Considerations

- Before installing take into consideration the final grade and any jersey barriers that may be installed.
- The kit should be installed at the lowest or near lowest area.
- The <u>single</u> hole for the wires coming from the wall should be 4-5 feet above final grade.

Installation Considerations

- Try to avoid extremely low or high placements of the corrosion monitoring kits.
- These can be corrected, however additional labor, money and equipment are needed to adequately install monitoring box.

RECO & SINE Wall Installation

RECO Wall Installation

- Utilizes straps that are bolted to panels and are backfilled with various stone sizes and or screened backfill.

SINE Wall Installation

- Utilizes “sine wave” style straps that are bolted to panels and are backfilled with various stone sizes and or screened backfill.

RECO & SINE Wall Installation

- For the use of screened backfill there are additional sampling and testing requirements.
- https://connect.ncdot.gov/resources/Materials/MaterialsResources/Mechanically Stabilized Earth Wall Fine Aggregate Sampling and Testing Procedures.pdf

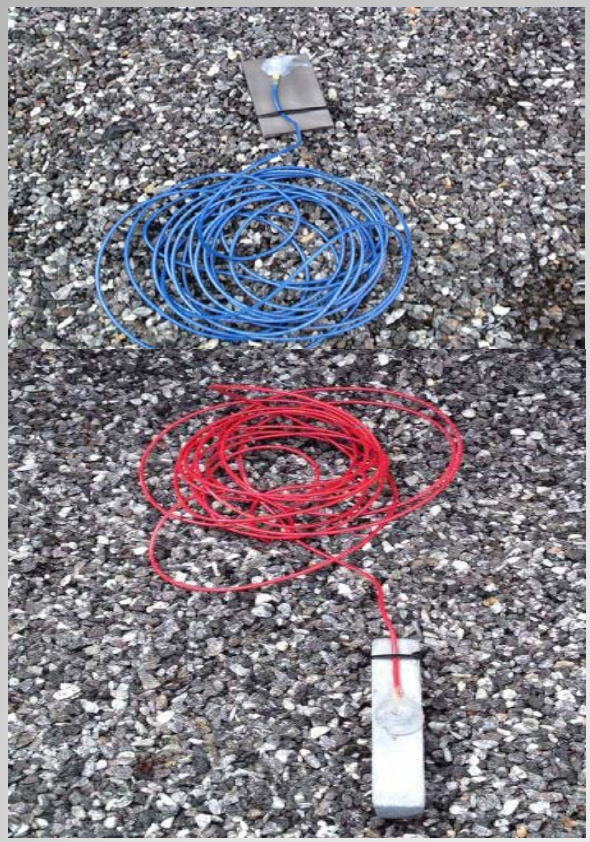
RECO Wall Installation

- Prior to installing the corrosion monitoring kit the Project Inspector will need to provide:
  - Type and size of backfill
  - Length & thickness of straps in which the corrosion monitoring kit is attached.
- This information is crucial to calculating the corrosion formula will need to be given to the M&T representative when performing the box installation.

SINE Wall Installation

- Prior to installing the corrosion monitoring kit the Project Inspector will need to provide:
  - Type and size of backfill
  - Length & thickness of straps in which the corrosion monitoring kit is attached.
- This information is crucial to calculating the corrosion formula will need to be given to the M&T representative when performing the box installation.

RECO & SINE Wall Installation

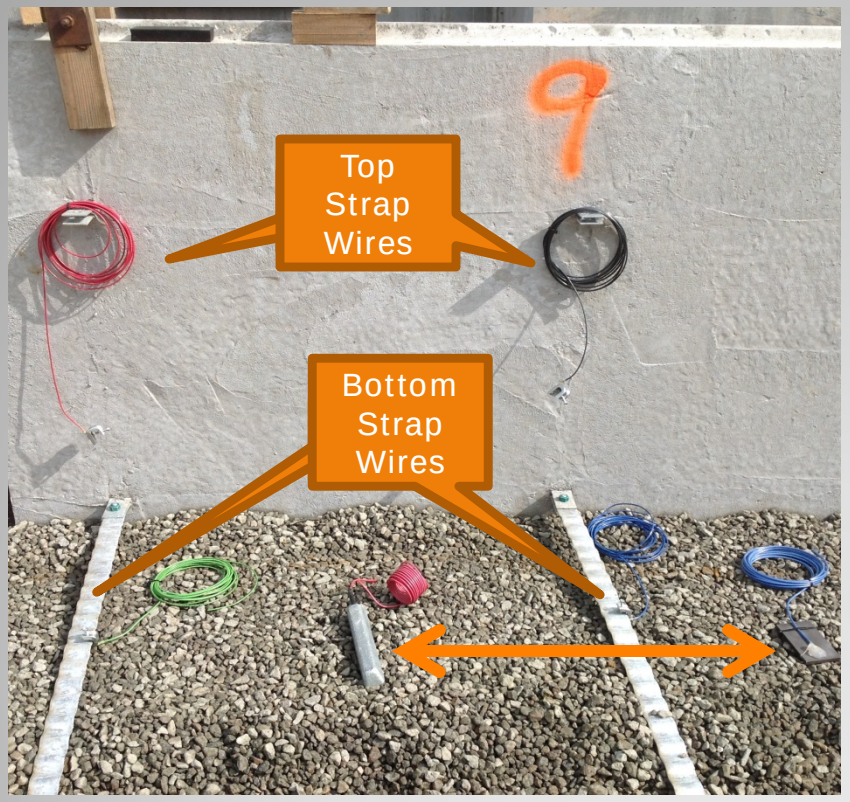


- The zinc and steel should be approximately 3-6 feet apart, 6 feet from the inside face of the wall and not touching the straps or other steel components.
- Both reference bars lay directly on the aggregate or screened backfill.

RECO & SINE Wall Installation

- The wire connector is slid on the strap and tightened down.
- Once tightened the C-clamp is <u>completely</u> covered in duct seal.
- Consolidate wires with electrical tape before feeding through panel hole.
- Any wire with damaged insulation shall have <u>five</u> wraps of electrical tape on and around damaged area.

RECO & SINE Wall Installation



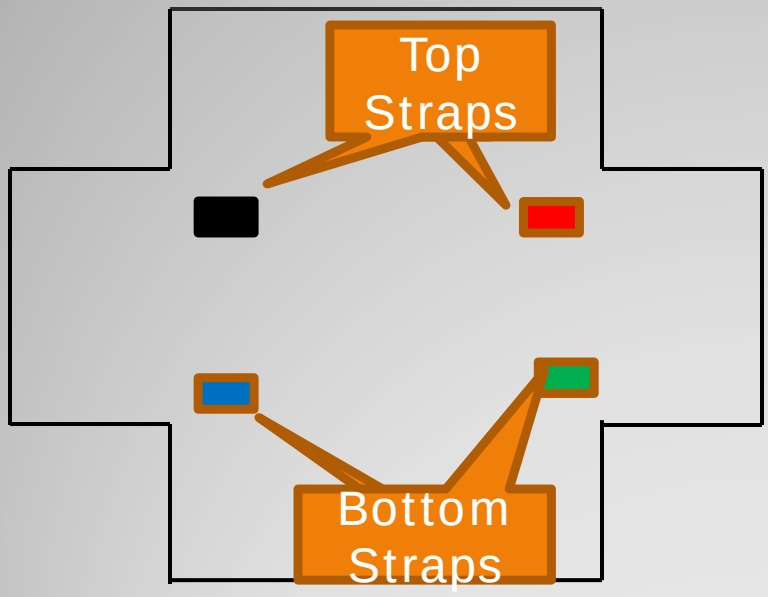
Reference Bars are not in contact with wire panels & approx. 3 feet apart

- Each C- clamp designated for top and bottom strap can attach to each strap as shown in this diagram.

- Black
  - Top Strap
- Red
  - Top Strap
- Blue
  - Bottom Strap
- Green
  - Bottom Strap

RECO & SINE Wall Installation

Wiring Diagram



- Each C-clamp attaches to a separate strap as shown in this diagram.

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  - Top Strap
- Red
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- Blue
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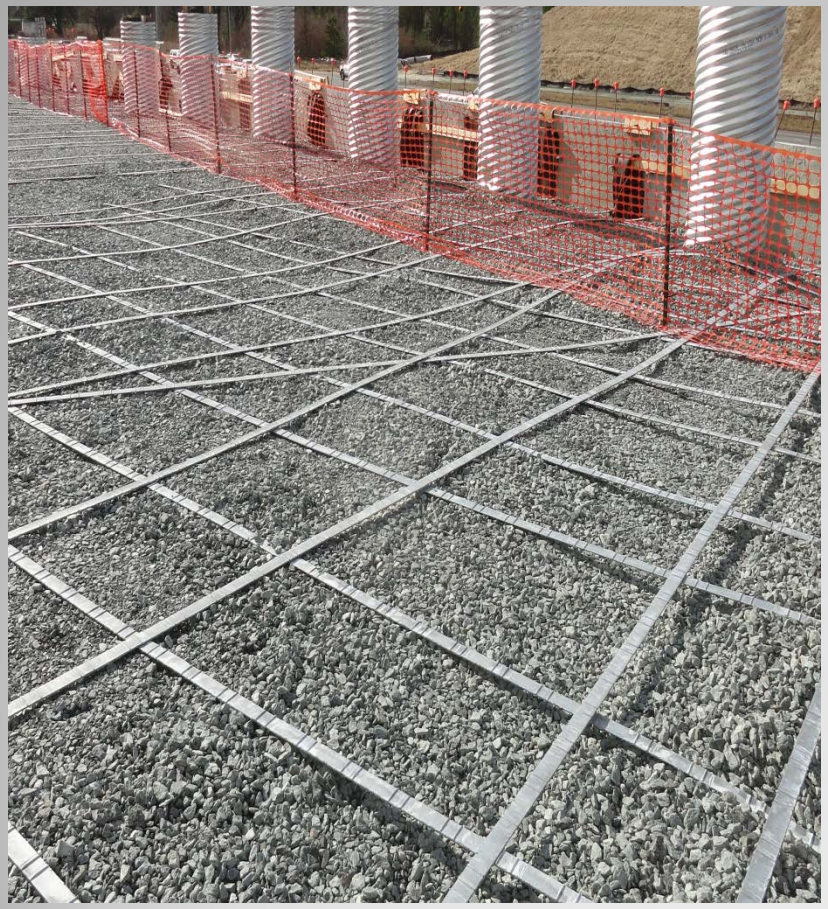
RECO & SINE Wall Installation



- Any damage to the galvanizing shall be repaired with two coats of an organic zinc rich paint on the approved list.
- Both the Contractor and Project Inspector shall assure that the zinc dust is agitated prior to application. No partial kits are permitted.
- The Materials and Tests Unit maintains a list of approved paint suppliers:
- https://connect.ncdot.gov/resources/Materials/MaterialsResources/Approved%20Paint%20Suppliers.pdf

VISTA Wall Installation

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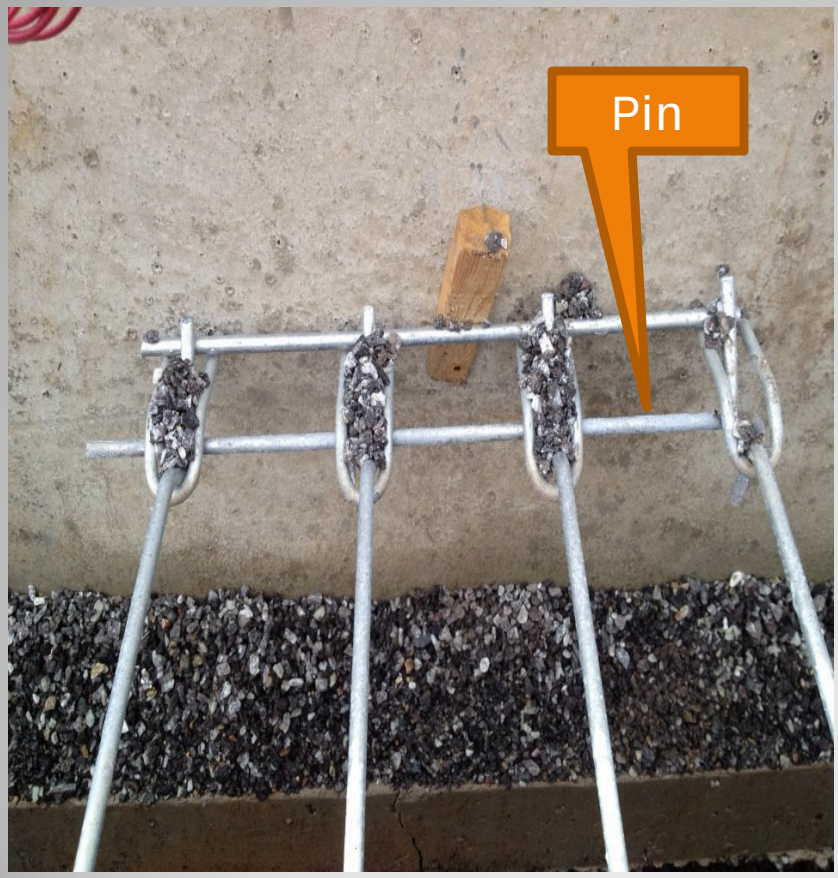

- Utilizes welded wire grids that attach to the panels with a pin and are backfilled with various stone sizes and or screened backfill.
- For the use of screened backfill there are additional sampling and testing requirements.
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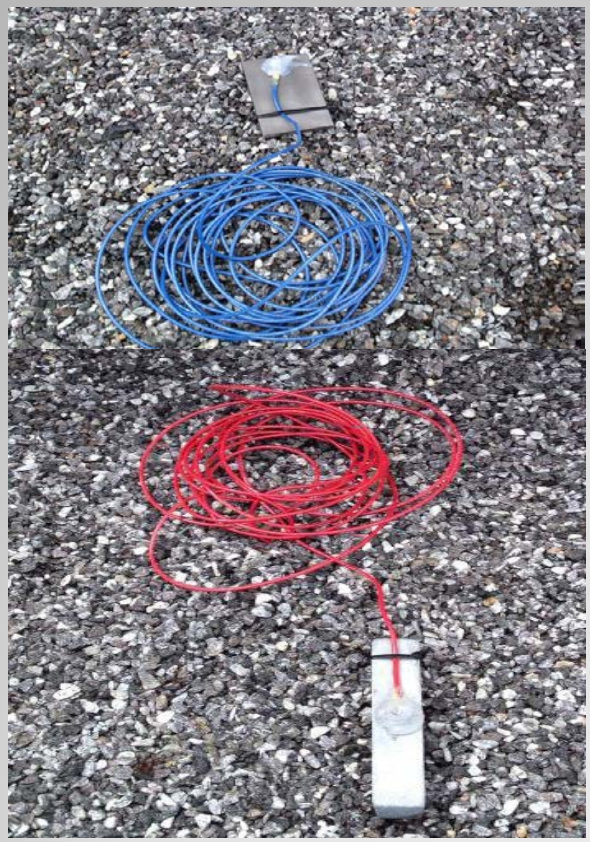
VISTA Wall Installation

- Prior to installing the corrosion monitoring kit the Project Inspector will need to provide:
  - Type and size of backfill
  - Length, width & thickness of wire cage in which the corrosion monitoring kit is attached.
- This information is crucial to calculating the corrosion formula will need to be given to the M&T representative when performing the box installation.

VISTA Wall Installation



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- Both reference bar lay directly on the aggregate or screened backfill.

VISTA Wall Installation

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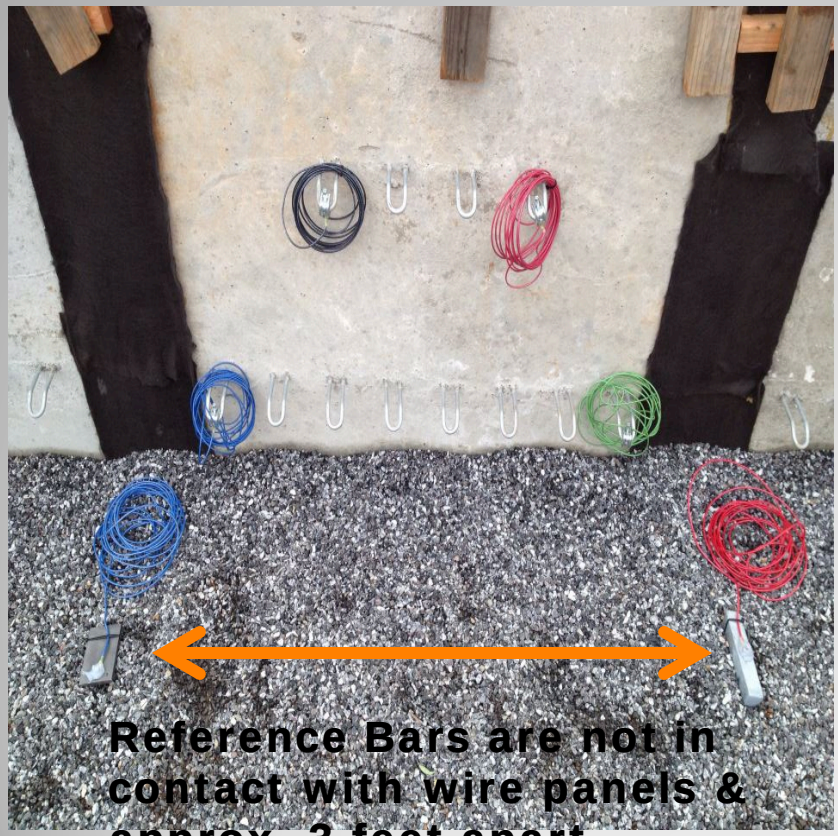
VISTA Wall Installation



- Each C- clamp designated for top and bottom strap can attach to the same grid as shown in this diagram.

- Black
  - Top Strap
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- Blue
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- Green
  - Bottom Strap

VISTA Wall Installation

Reference Bars are not in contact with wire panels & approx. 3 feet apart

- Each C- clamp can attach to separate grids as shown in this diagram.

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M&T Contact Information For MSE Wall Installation

- Structural Materials Engineer
  - Brian Hunter, PE
  - (919) 329-4092
  - bhunter@ncdot.gov
- Asphalt Material Analysis Engineer
  - Kelly Croft
  - (919) 329-4093
  - kcroft@ncdot.gov
- Chemical Testing Engineer
  - Sharon Freeman, EI
  - (919) 329-4094
  - sdfreeman@ncdot.gov
- Coatings and Corrosion Engineer
  - Aaron Dacey
  - (919) 329-4102 Office
  - ahdacey@ncdot.gov