FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-092-1(030)	2021	25	50

TRAFFIC COUNTING SYSTEM NOTES

1. The location of new loop sensors shall be staked out in the field by the Contractor and approved by the Engineer prior to installation.
2. The Contractor shall inform the Engineer at least three days prior to saw cutting pavement and installing loop sensors.
3. Pull loop sensor lead cables into conduit where indicated. Cables shall be tested for acceptance before and after installation into conduit.
4. The Contractor shall restore all affected areas to their original condition. This item of work shall not be paid for separately, but shall be considered incidental to work of other paid items.
5. The Contractor shall verify the location of the existing utilities and underground structures whether or not shown on the plans.
6. The Contractor shall assume that underground utilities not shown on the plans may exist. The Contractor shall be responsible for contacting the different utility companies for information and toning.
7. The Contractor shall be held liable for any damages incurred to the existing utilities and underground structures as a result of his operations. All damaged portions shall be replaced in accordance with the standards and specifications of the affected utility company at no cost to the State.
8. Changes to the contract plans and specifications will not be permitted, unless approved by the Engineer in writing.
9. All cables are to be terminated within the TCS controller cabinet and shall have a minimum 12" additional slack.
10. Highway crossing conduit shall be provided with 36" cover per Standard Plan TE-36..
11. Saw cuts shall be made by wet cutting only.
12. Clean away collected dust, dirt, and refuse after saw cutting is done. The saw cuts shall be cleared by water applied by pressure washer. Residual water within the saw cuts shall be vacuumed by use of a wet/dry vacuum. The saw cuts shall then be dried by air compressor.
13. After saw cuts are dried, any remaining debris stuck within the cut shall be removed. The saw cuts must be completely clean and dry before inserting the sensors and filling the voids with Loop Sealant.
14. The collected slurry shall be disposed of appropriately (i.e., either placed in a Filter Fabric Lined Filtration Box or in a Filter Fabric Lined Dug Up Retention/Percolation Basin, and after Filtration/Percolation, the Filter Fabric and the retained sediments, disposed of appropriately).
15. Poles for solar panel assemblies and excavation warning signs shall be no more than 20 feet from EVC cabinets.

LOOP SENSOR LAYOUT NOTES

1. Loop sensors shall consist of four turns of 1C #14 cable (meeting IMSA Spec 51-3 or equivalent) embedded in a 3/8" wide by 4" deep saw cut, except as noted. Loop sensors shall be provided a minimum 2" cover.
2. After laying the loop sensor cable in four (4) turns within the 4" deep cut, press 1"-long pieces of backer rod in each foot of the loop and the loop lead saw cut, to anchor the cables in the bottom of the cut before applying the Loop Sealant. Backer rod shall be embedded at least 2" below the top of pavement. The backer rod shall be placed into the saw cut with a blunt object, such as a wooden paint stir stick. No sharp objects (such as a screw driver) shall be used to place the backer rod into the saw cuts.
3. Loop sensor and lead cable shall be one continuous wire. Lead cables from the same loop shall be twisted in pairs, five twists per foot, from the edge of paved shoulder to the pull box. Do not twist one loop pair with another loop pair.
4. Continuity of loop sensors and lead cables shall be tested and warrantied for one year from the date of acceptance by the Engineer.
5. Loop sensor lead cables shall be spliced only at the closest pull box to the loops. Splice points of cables shall be suspended near the top of the pull box with a j-hook.
6. Splices shall be made by use of a splice kit.
7. Stagger loop sensors on roadways with lanes that are less than 12 feet in width, as shown on contract plans or by direction of the Engineer.
8. The Contractor shall label the loop sensor leads clearly to identify traffic direction, lane number, and sequence of loop sensors in each lane per direction.
9. The left-most lane in the direction of traffic flow is designated as Lane 1, and the next lane to its right as Lane 2, and so on as indicated on plans.

ORIGINAL PLAN
NOTE BOOK
No.

SURVEY PLOTTED BY
DRAWN BY
TRACED BY
DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC COUNTING SYSTEM NOTES

NIMITZ HIGHWAY & ALA MOANA BOULEVARD RESURFACING
SAND ISLAND ACCESS ROAD TO VICINITY OF PIIKOI STREET
FEDERAL-AID PROJECT NO. NH-092-1(030)

Date: November, 2020

SHEET No. 1 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-092-1(030)	2021	26	50

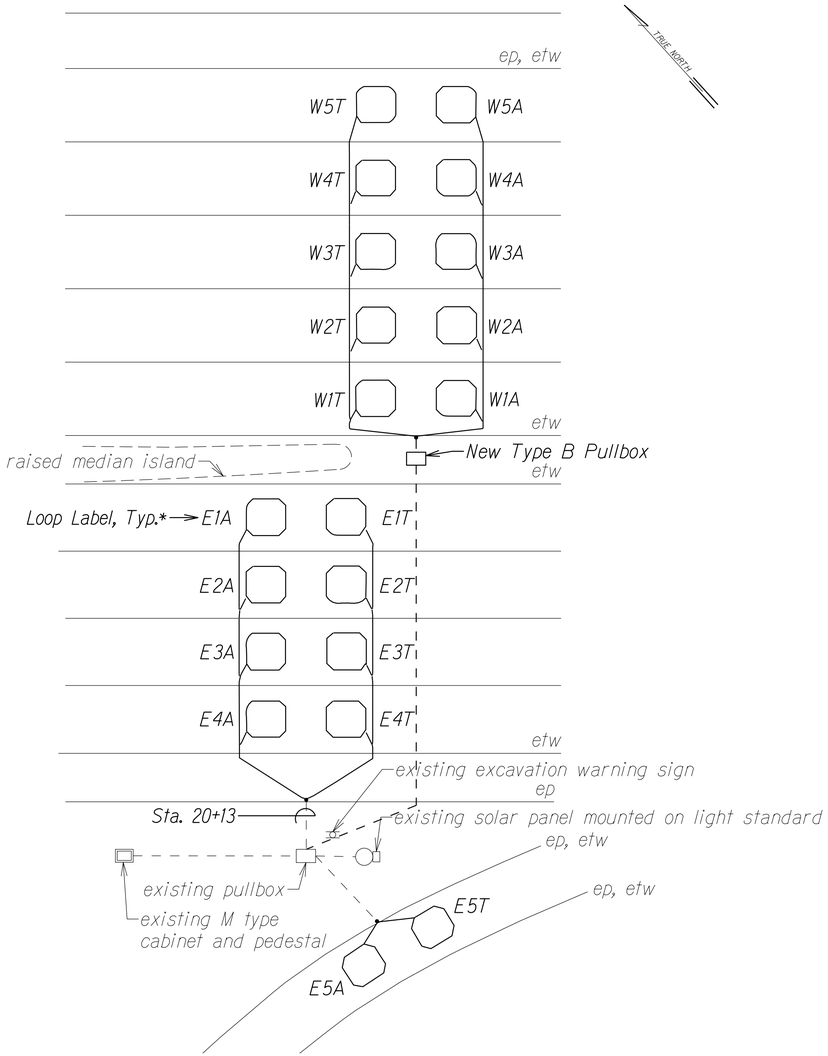
BOUNDARY LABEL LEGEND

etw = Edge of travelway
ep = Edge of pavement
es = Edge of shoulder
eos = Edge of sidewalk
r/w = Right of Way

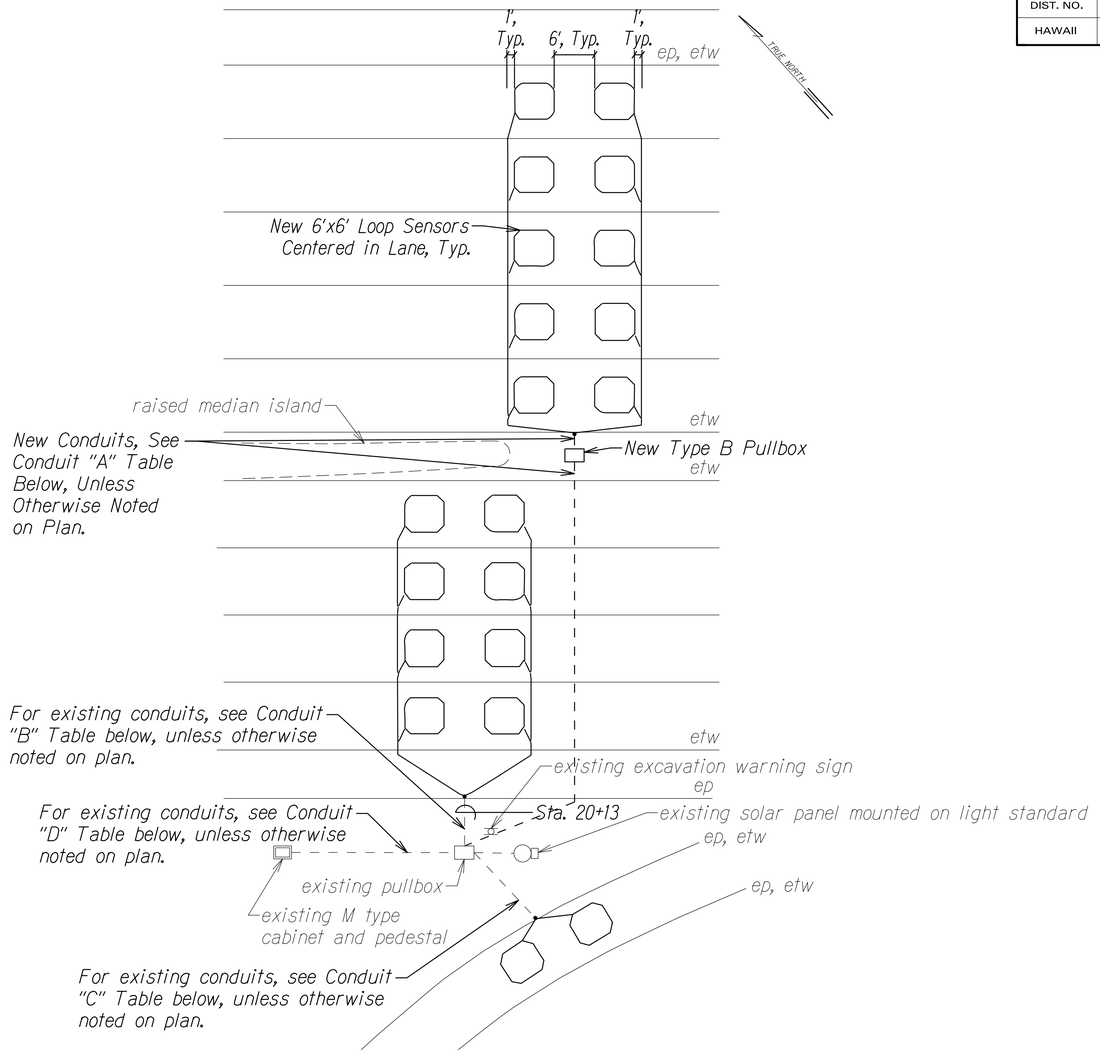
LOOP LABEL LEGEND

E = East
W = West
A = Approaching
T = Trailing

E 2 T
- T — Indicates approaching or trailing loop
- 2 — Indicates lane number
- E — Indicates directions*



LABELING OF LOOPS
Not to Scale



Conduit "A" Table:

Conduit* #-Size	2C #14 Loop Sensor Cable
2 - 2"	10

Conduit "B" Table:

Conduit* #-Size	2C #14 Loop Sensor Cable
Existing	18

Conduit "C" Table:

Conduit* #-Size	2C #14 Loop Sensor Cable
Existing	2

Conduit "D" Table:

Conduit* #-Size	2C #14 Loop Sensor Cable
Existing	8

*Conduits under pavement and at utility crossings shall be concrete encased.

TRAFFIC COUNTING SYSTEM LAYOUT DETAIL
VICINITY OF SAND ISLAND ACCESS ROAD, TCS 228
Not to Scale

*NOTES:

1. All dimensions and callouts are typical unless otherwise noted on plan.
2. Contractor shall coordinate service agreements and connections to electrical and communication service. Contractor shall also contact the appropriate State Dept. of Transportation Representative for service agreement. (Highway Planning, Contact, Goro Sulijoadikusumo, P.E., at 587-1839).

ORIGINAL PLAN
SURVEY PLOTTED BY
DRAWN BY
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DESIGNED BY
QUANTITIES BY
CHECKED BY
DATE
NOTE BOOK
No.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC COUNTING SYSTEM LAYOUT

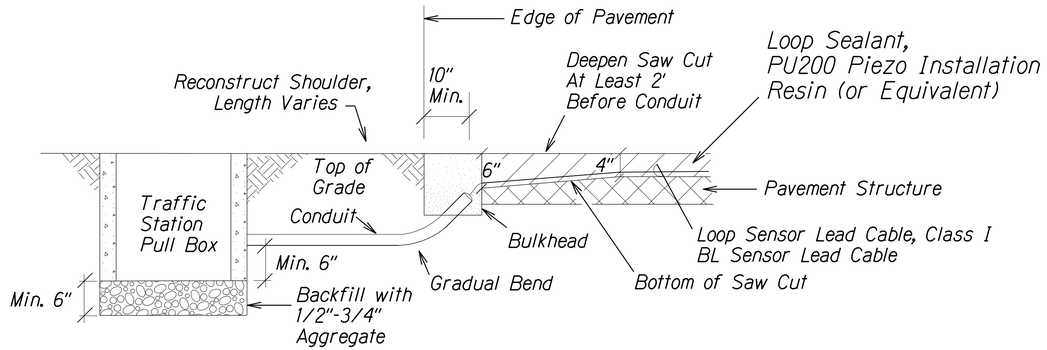
TCS 228, @ STA. 20+13

NIMITZ HIGHWAY & ALA MOANA BOULEVARD RESURFACING
SAND ISLAND ACCESS ROAD TO VICINITY OF PIIKOI STREET
FEDERAL-AID PROJECT NO. NH-092-1(030)

Scale: Not to Scale Date: November, 2020

SHEET No. 2 OF 6 SHEETS

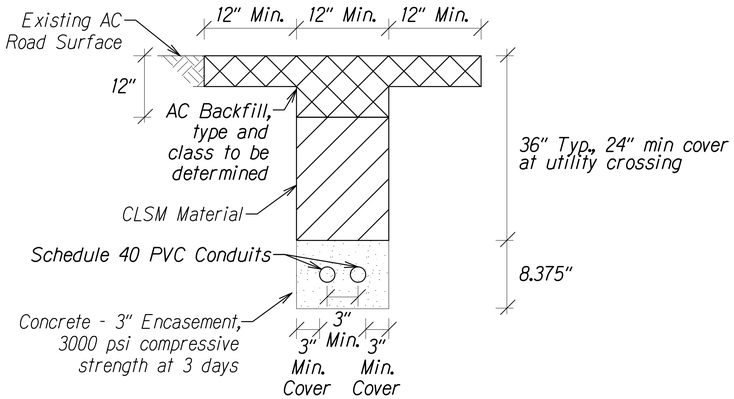
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-092-1(030)	2021	27	50



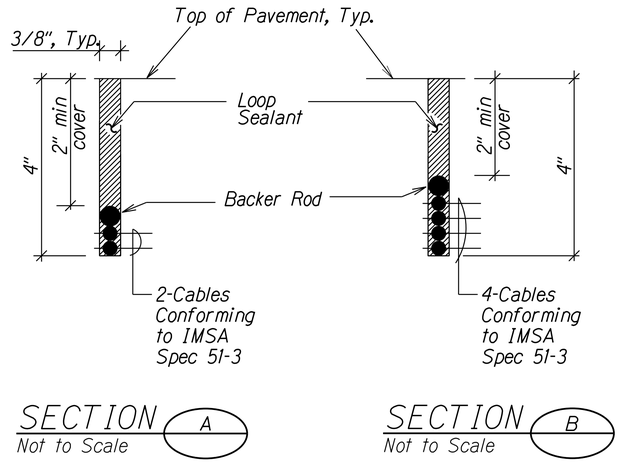
EDGE OF ROADWAY DETAILS
Not to Scale

NOTES ON CONSTRUCTION AT END OF SAW CUT:

1. Seal roadway end of conduit with duct seal compound after installation of conductor.
2. Install bulkhead across saw cut to keep sealant in saw cut as it is placed..
3. Place Loop Sealant, PU200 Piezo Installation Resin (or Equivalent) in saw cut.
4. Place sand to cover exposed lead cables and protect and separate them from backfill.
5. Backfill over sand with new A.C. cold mix.
6. Reconstruct shoulder, curb, and gutter as required.
7. Conduit should be installed at least 10 inches from the edge of pavement. If the depth of pavement is 4 inches or less at the edge, conduit should be installed at least 12 inches from the edge of pavement.

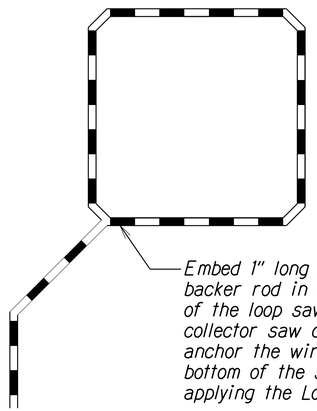


TYPICAL BACKFILL SECTION WITH CONCRETE ENCASED DUCTS
Not to Scale

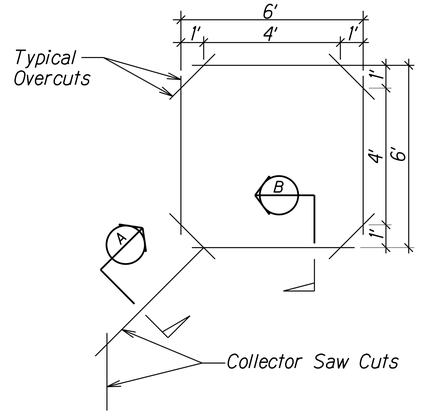


TYPICAL SECTIONS LOOP SENSORS
Not to Scale

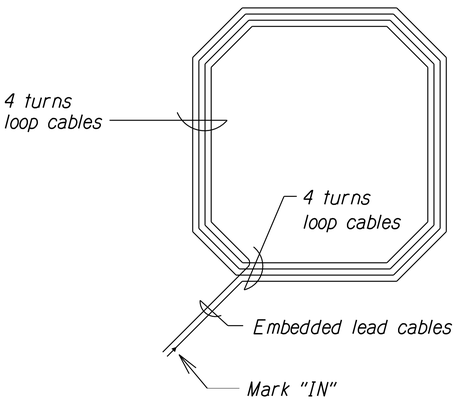
LOOP SENSOR SAW CUT NOTES:
Length of overcuts shall be kept to a minimum.
All overcuts shall bebackfilled with Loop Sealant.
Saw cuts containing 10 or more cables shall be 4 1/2" deep.



TYPICAL LOOP SENSOR BACKER ROD PLACEMENT DIAGRAM
Not to Scale



TYPICAL LOOP SENSOR SAW CUT DETAIL
Not to Scale



PLAN

TYPICAL LOOP SENSOR WIRING DIAGRAM
Not to Scale

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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NOTE BOOK	TRACED BY	
	DESIGNED BY	
	QUANTITIES BY	
N.	CHECKED BY	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC COUNTING SYSTEM SENSOR DETAILS

NIMITZ HIGHWAY & ALA MOANA BOULEVARD RESURFACING
SAND ISLAND ACCESS ROAD TO VICINITY OF PIIKOI STREET
FEDERAL-AID PROJECT NO. NH-092-1(030)

Scale: Not to Scale Date: November, 2020

SHEET No. 3 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-092-1(030)	2021	28	50

ENHANCED VEHICLE CLASSIFICATION (EVC) SYSTEM NOTES

1. The location of new loop sensors and piezo sensors shall be staked out in the field by the Contractor and approved by the Engineer prior to installation.
2. The Contractor shall inform the Engineer at least three days prior to saw cutting pavement and installing loop sensors and piezo sensors.
3. Pull loop sensor cables and piezo sensor lead cables into conduit where indicated. Cables shall be tested for acceptance before and after installation into conduit.
4. Piezo lead cables shall be continuous with no splices.
5. The Contractor shall restore all affected areas to their original condition. This item of work shall not be paid for separately, but shall be considered incidental to work of other paid items.
6. The Contractor shall verify the location of the existing utilities and underground structures whether or not shown on the plans.
7. The Contractor shall assume that underground utilities not shown on the plans may exist. The Contractor shall be responsible for contacting the different utility companies for information and toning.
8. The Contractor shall be held liable for any damages incurred to the existing utilities and underground structures as a result of his operations. All damaged portions shall be replaced in accordance with the standards and specifications of the affected utility company at no cost to the State.
9. Changes to the contract plans and specifications will not be permitted, unless approved by the Engineer in writing.
10. All cables are to be terminated within the EVC cabinet and shall have a minimum 12" additional slack.
11. Highway crossing conduit shall be provided with 36" cover per Standard Plan TE-36..
12. Saw cuts shall be made by wet cutting only.
13. Clean away collected dust, dirt, and refuse after saw cutting is done. The saw cuts shall be cleared by water applied by pressure washer. Residual water within the saw cuts shall be vacuumed by use of a wet/dry vacuum. The saw cuts shall then be dried by air compressor.
14. After saw cuts are dried, any remaining debris stuck within the cut shall be removed. The saw cuts must be completely clean and dry before inserting the sensors and filling the voids with Loop Sealant (for loop sensors) or PU200 Piezo Installation Resin or equivalent (for piezo sensors).
15. The collected slurry shall be disposed of appropriately (i.e., either placed in a Filter Fabric Lined Filtration Box or in a Filter Fabric Lined Dug Up Retention/Percolation Basin, and after Filtration/Percolation, the Filter Fabric and the retained sediments, disposed of appropriately).
16. Poles for solar panel assemblies and excavation warning signs shall be no more than 20 feet from EVC cabinets.

LOOP SENSOR LAYOUT NOTES

1. Loop sensors shall consist of four turns of 1C #14 cable (meeting IMSA Spec 51-3 or equivalent) embedded in a 3/8" wide by 4" deep saw cut, except as noted. Loop sensors shall be provided a minimum 2" cover.
2. After laying the loop sensor cable in four (4) turns within the 4" deep cut, press 1"-long pieces of backer rod in each foot of the loop and the loop lead saw cut, to anchor the wire in the bottom of the cut before applying the Loop Sealant. Backer rod shall be embedded at least 2" below the top of pavement. The backer rod shall be placed into the saw cut with a blunt object, such as a wooden paint stir stick. No sharp objects (such as a screw driver) shall be used to place the backer rod into the saw cuts.
3. Loop sensor and lead cable shall be one continuous wire. Lead wires from the same loop shall be twisted in pairs, five twists per foot, from the edge of paved shoulder to the pull box. Do not twist one loop pair with another loop pair.
4. Continuity of loop sensors and lead-in wires shall be tested and warrantied for one year from the date of acceptance by the Engineer.
5. Loop sensor lead cables shall be spliced only at the closest pull box to the loop. Splice points of cables shall be suspended near the top of the pull box with a j-hook.
6. Splices shall be made by use of a splice kit.
7. Stagger loop sensors on roadways with lanes that are less than 12 feet in width, as shown on contract plans or by direction of the Engineer.
8. The Contractor shall label the loop and piezo sensor leads clearly to identify traffic direction, lane number, and sequence of loop and piezo sensors in each lane per direction.
9. The left-most lane in the direction of traffic flow is designated as Lane 1, and the next lane to its right as Lane 2, and so on as indicated on plans.

ORIGINAL PLANS
NOTE BOOK
No.
SURVEY PLOTTED BY
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EVC TRAFFIC COUNTING SYSTEM NOTES

NIMITZ HIGHWAY & ALA MOANA BOULEVARD RESURFACING
SAND ISLAND ACCESS ROAD TO VICINITY OF PIIKOI STREET
FEDERAL-AID PROJECT NO. NH-092-1(030)

Date: November, 2020

SHEET No. 4 OF 6 SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-092-1(030)	2021	29	50

BOUNDARY LABEL LEGEND

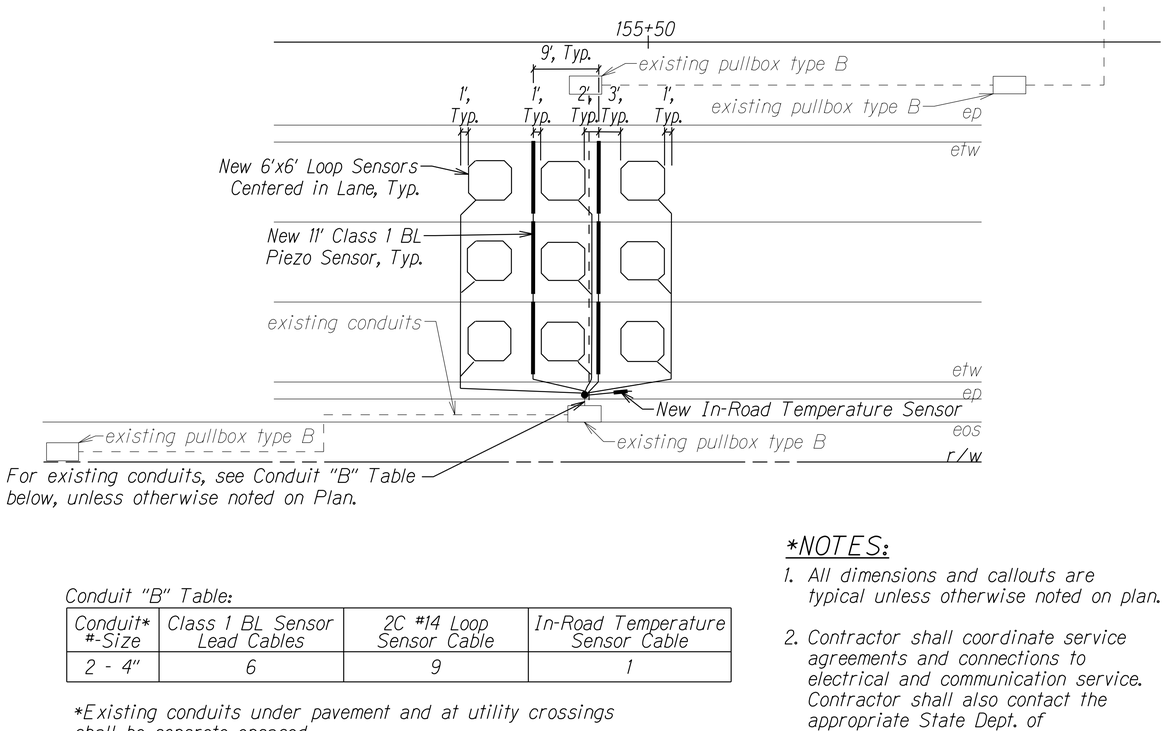
etw = Edge of travelway
ep = Edge of pavement
es = Edge of shoulder
eos = Edge of sidewalk
r/w = Right of Way

LOOP LABEL LEGEND

E = East
W = West
A = Approaching
C = Center
T = Trailing

E 2 T
- T — Indicates approaching, center, or trailing loop
- 2 — Indicates lane number
- E — Indicates directions*

LABELING OF LOOPS AND PIEZOS
Not to Scale



Conduit "B" Table:

Conduit* #-Size	Class 1 BL Sensor Lead Cables	2C #14 Loop Sensor Cable	In-Road Temperature Sensor Cable
2 - 4"	6	9	1

*Existing conduits under pavement and at utility crossings shall be concrete encased.

*NOTES:

1. All dimensions and callouts are typical unless otherwise noted on plan.
2. Contractor shall coordinate service agreements and connections to electrical and communication service. Contractor shall also contact the appropriate State Dept. of Transportation Representative for service agreement. (Highway Planning, Contact, Goro Sulijoadikusumo, P.E., at 587-1839).

EVC TRAFFIC COUNTING SYSTEM LAYOUT DETAIL
BETWEEN HALEKAUWILA STREET & ALOHA TOWER DRIVE, TCS 438
Not to Scale

ORIGINAL PLAN
SURVEY PLOTTED BY ..... DATE
DRAWN BY .....
TRACED BY .....
NOTE BOOK DESIGNED BY .....
QUANTITIES BY .....
CHECKED BY .....
NO. .....

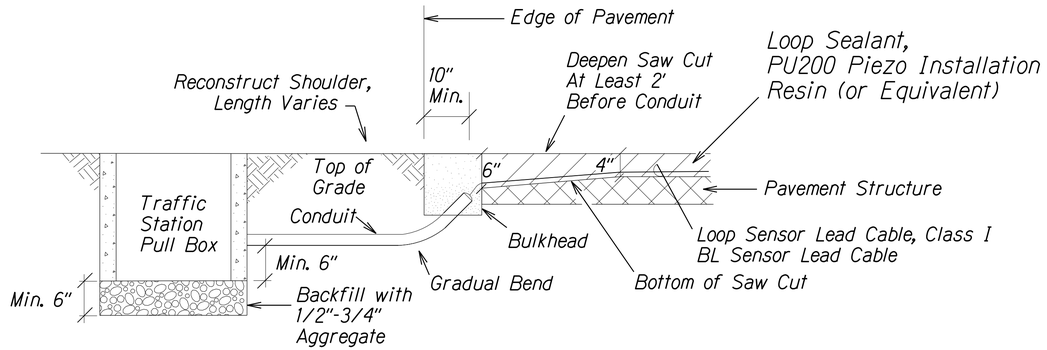
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

TRAFFIC COUNTING SYSTEM LAYOUT
TCS 438, ℄ STA. 155+50
NIMITZ HIGHWAY & ALA MOANA BOULEVARD RESURFACING
SAND ISLAND ACCESS ROAD TO VICINITY OF PIIKOI STREET
FEDERAL-AID PROJECT NO. NH-092-1(030)

Scale: Not to Scale Date: November, 2020

SHEET No. 5 OF 6 SHEETS

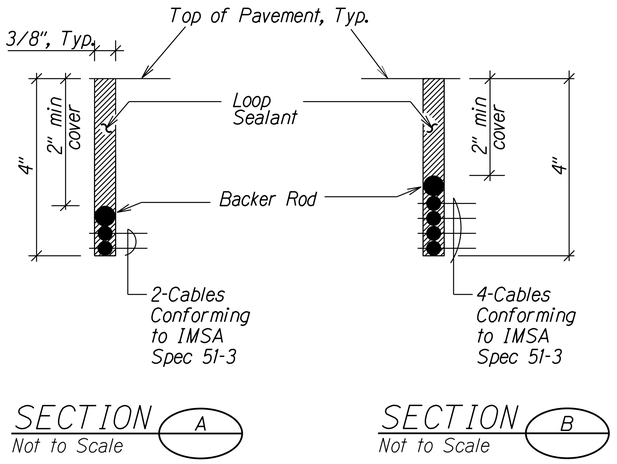
FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-092-1(030)	2021	30	50



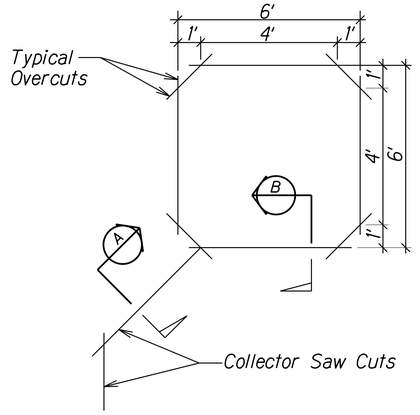
EDGE OF ROADWAY DETAILS
Not to Scale

NOTES ON CONSTRUCTION AT END OF SAW CUT:

1. Seal roadway end of conduit with duct seal compound after installation of conductor.
2. Install bulkhead across saw cut to keep sealant in saw cut as it is placed..
3. Place Loop Sealant, PU200 Piezo Installation Resin (or Equivalent) in saw cut.
4. Place sand to cover exposed lead cables and protect and separate them from backfill.
5. Backfill over sand with new A.C. cold mix.
6. Reconstruct shoulder, curb, and gutter as required.
7. Conduit should be installed at least 10 inches from the edge of pavement. If the depth of pavement is 4 inches or less at the edge, conduit should be installed at least 12 inches from the edge of pavement.

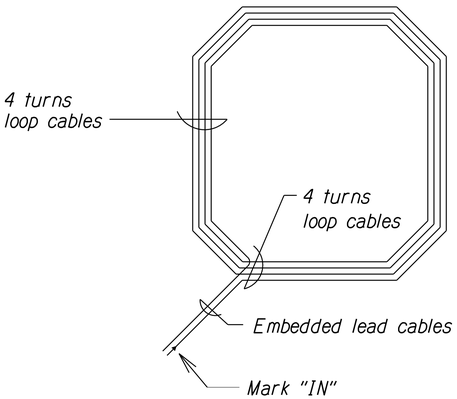


TYPICAL SECTIONS LOOP SENSORS
Not to Scale

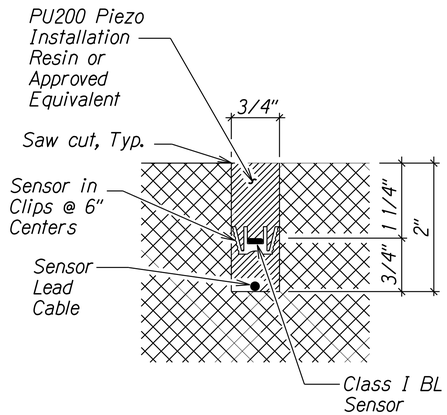


TYPICAL LOOP SENSOR SAW CUT DETAIL
Not to Scale

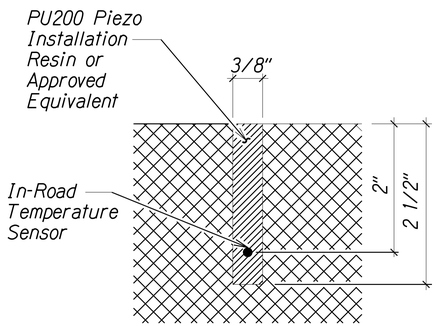
LOOP SENSOR SAW CUT NOTES:
Length of overcuts shall be kept to a minimum. All overcuts shall be backfilled with Loop Sealant.



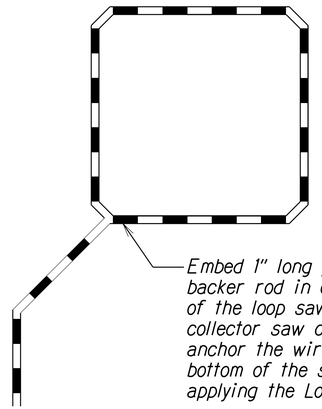
PLAN
TYPICAL LOOP SENSOR WIRING DIAGRAM
Not to Scale



PIEZO SENSOR SAW CUT SECTION DETAIL
Not to Scale



TEMPERATURE SENSOR SAW CUT SECTION DETAIL
Not to Scale



TYPICAL LOOP SENSOR BACKER ROD PLACEMENT DIAGRAM
Not to Scale

ORIGINAL PLAN	SURVEY PLOTTED BY	DATE
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NOTE BOOK	TRACED BY	
	DESIGNED BY	
	QUANTITIES BY	
NO.	CHECKED BY	

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EVC TRAFFIC COUNTING SYSTEM SENSOR DETAILS

NIMITZ HIGHWAY & ALA MOANA BOULEVARD RESURFACING
SAND ISLAND ACCESS ROAD TO VICINITY OF PIIKOI STREET
FEDERAL-AID PROJECT NO. NH-092-1(030)

Scale: Not to Scale Date: November, 2020

SHEET No. 6 OF 6 SHEETS