| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | 92A-01-03 | 2003 | 36 | 69 |

## MATERIAL LIST

| Pole ⬡ | Base Type | Standard Type | Mounting Type | Notes |
|---|---|---|---|---|
| A (exist) | | | (1)MA-1W(I)** | New 3 section 12" face signal head to be installed on back of existing mast arm |
| B | C | II-20* | (1)MA-1W(E)** | |
| C (exist) | | | (1)MA-1W(I)** | New 3 section 12" face signal head to be installed on back of existing mast arm |
| D | C | II-20* | (1)MA-1W(E)** | |
| E | C | II-30* | (1)MA-1W(E)**<br>(2)MA-1W(I)**<br>(3)Opticom (Horiz)<br>(4)MA-1W(I)**<br>(5)B-1W**<br>(6)MA-1W(I)**<br>(7)Traffic Camera (Horiz.) | Existing traffic camera shall be relocated from existing mast arm and installed on new mast arm. Contractor shall provide new cables for installation. |
| F | C | II-20* | (1)MA-1W(E)**<br>(2)B-1W** | |
| G (exist) | | | (1)MA-1W(I)** | New 3 section 12" face signal head to be installed on back of existing mast arm |
| H | C | II-25* | (1)MA-1W(E)** | |
| I | C | II-35* | (1)MA-1W(E)**<br>(2)MA-1W(I)**<br>(3)MA-1W(I)**<br>(4)B-1W**<br>(5)MA-1W(I)** | |
| J | C | II-25* | (1)MA-1W(E)** | |
| K (exist) | | | (1)MA-1W(I)** | New 3 section 12" face signal head to be installed on back of existing mast arm |
| L | C | II-20* | (1)MA-1W(E)** | |

* State Furnished Standard and Mast Arm.
** State Furnished Traffic Signal Head

## CABLE AND CONDUIT SCHEDULE

| Run △ | Conduit Size | Signal Control 26C#14 | Loops/ PPB 2C#14 | EVP (shielded) 3C#20 | Inter-connect | Power 3C#6 |
|---|---|---|---|---|---|---|
| 1 | 2" exist. | 2 exist. | | | | |
| | 2" exist. | | | | 1-24C#20 exist. | |
| | 2" exist. | | 4 exist. | | | |
| | 2" exist. | | 2 exist. | | | |
| | 2" exist. | | 2 exist. | | | |
| 2 | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | 2 exist. | | | |
| | 2" exist. | | 1 exist. | | | |
| 3 | 2" exist. | 1 exist. | | | | |
| | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | 4 exist. | | | |
| | 2" exist. | | 5 exist. | | | |
| 4 | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | 3 exist. | | | |
| 5A | 2" exist. | | | 1 ***<br>4 exist. | | |
| | 2" exist. | 1 exist. | | | | |
| | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | | | 1-24C#20 exist. | |
| | 2" exist. | | 5 exist. | | | |
| | 2" exist. | | 5 exist. | | | |
| 5B | 2" exist. | | | 1 ***<br>2 exist. | | |
| | 2" exist. | 1 exist. | | | | |
| | 2" exist. | 1 exist. | 5 exist. | | | |
| | 2" exist. | | | | 1-24C#20 exist. | |
| 5C | 2" exist. | | | 1 ***<br>1 exist. | | |
| | 2" exist. | 1 exist. | | | | |
| | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | 1 exist. | | | |
| 6 | 2" exist. | | | 1 exist. | | |
| | 2" exist. | 1 exist. | | | | |
| | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | 4 exist. | | | |

*** New Cable to be placed in Existing Conduit.

## CABLE AND CONDUIT SCHEDULE

| Run △ | Conduit Size | Signal Control 26C#14 | Loops/ PPB 2C#14 | EVP (shielded) 3C#20 | Inter-connect | Power 3C#6 |
|---|---|---|---|---|---|---|
| 7 | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | 5 exist. | | | |
| 8 | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | | | 1-24C#20 exist | |
| | 2" exist. | | | | | 1 exist. |
| | 2" exist. | | 5 exist. | | | |
| 9 | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | 2 exist. | | | |
| | 2" exist. | | | | 1-24C#18 exist | |
| 10 | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | | | 1-24C#18 exist | |
| | 2" exist. | | 4 exist. | | | |
| | 2" exist. | | 1 exist. | | | |
| 11 | 2" exist. | 1 exist. | | | | |
| | 2" exist. | 1 exist. | | | | |
| | 2" exist. | | 3 exist. | | | |
| | 2" exist. | | | 1 exist | | |
| | 2" exist. | Spare | | | | |
| 12 (new) | 2" | 1 | | | | |
| | 2" | Spare | | | | |
| | 2" exist. | | 2 exist. | | | |
| | 2" exist. | | | | 1 exist. | |
| 13 | 2" exist. | | 1 ***<br>2 exist. | | | |
| 00 | Install Cables to Pole and Signal Devices as Needed | | | | | |

*** New Cable to be placed in Existing Conduit.

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

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DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

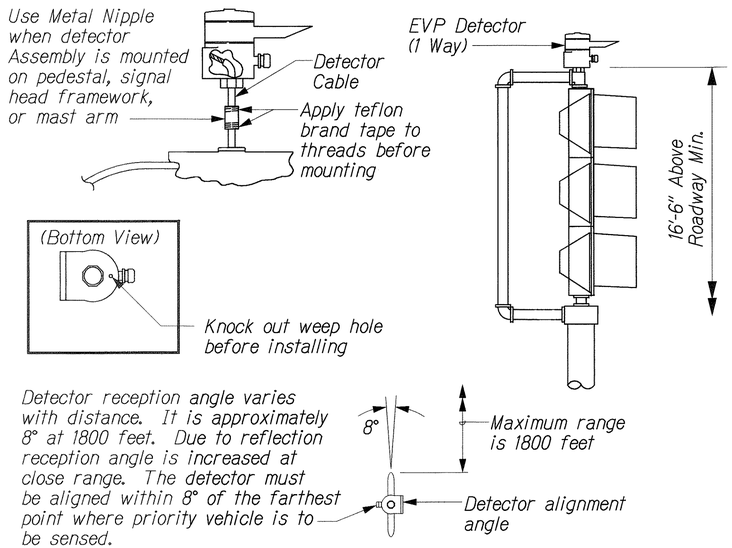
# MATERIAL LIST & CABLE AND CONDUIT SCHEDULE

NIMITZ HIGHWAY IMPROVEMENTS
KEEHI INTERCHANGE TO PACIFIC STREET
PROJECT NO. 92A-01-03

Scale: None Date: March 2, 2003

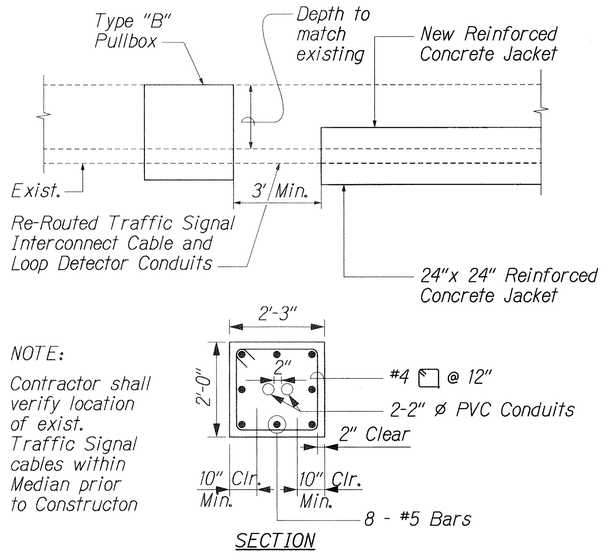
SHEET No. TS8 OF 14 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | 92A-01-03 | 2003 | 37 | 69 |



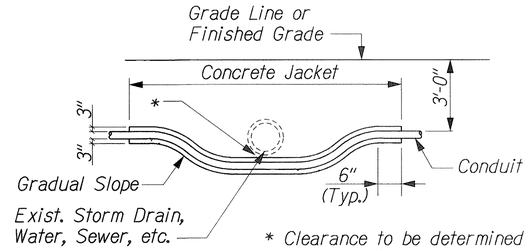

## TYPICAL TP MOUNT OF EMERGENCY VEHICLE PRE-EMPT DETECTOR

Not to Scale



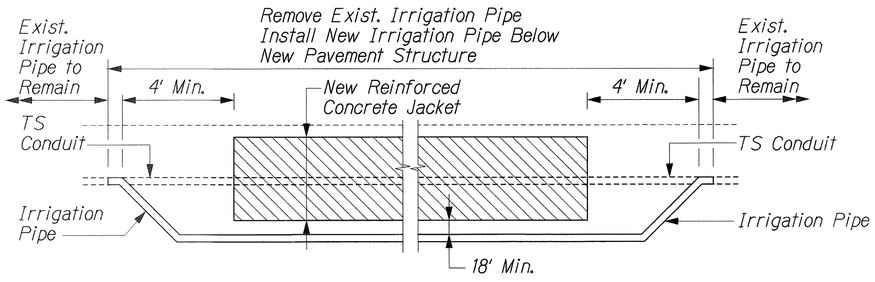

## REINFORCED CONCRETE JACKET FOR TS CONDUIT

Not to Scale



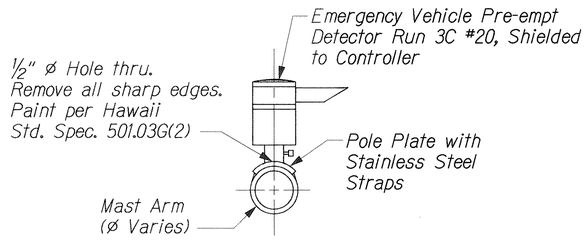

## CONDUIT BY-PASS DETAIL

Not to Scale




## LOWERING OF EXISTING IRRIGATION PIPE

Not to Scale




## TYPICAL HORIZONTAL MOUNT OF EMERGENCY VEHICLE PRE-EMPT DETECTOR

Not to Scale




## RESTORATION OF EXISTING GROUND DUE TO TRENCH EXCAVATION

Not to Scale

| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
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| | DESIGNED BY | |
| No. | QUANTITIES BY | |
| | CHECKED BY | |

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**DEPARTMENT OF TRANSPORTATION**
HIGHWAYS DIVISION

## CONDUIT DETAILS

NIMITZ HIGHWAY IMPROVEMENTS
KEEHI INTERCHANGE TO PACIFIC STREET
PROJECT NO. 92A-01-03

Scale: None Date: March 2, 2003

SHEET No. TS9 OF 14 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
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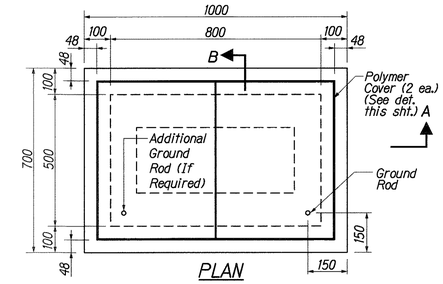
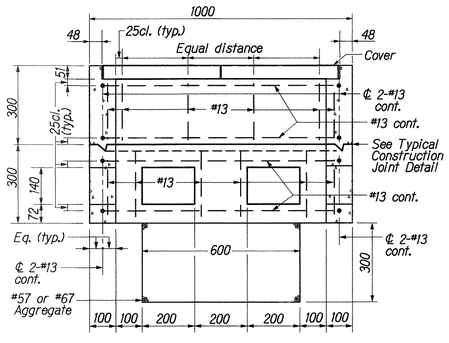
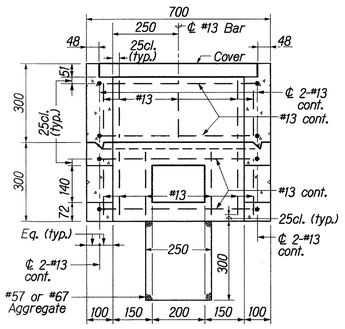



PLAN



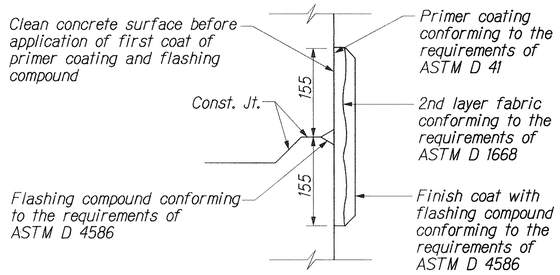

SECTION A-A




SECTION B-B

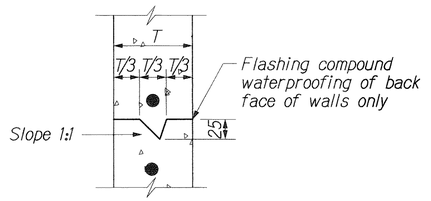
## TYPE "B" PULLBOX (Old Type "C")

Scale: 1 : 100




## TYPICAL FLASHING COMPOUND WATERPROOFING DETAILS

Not to Scale

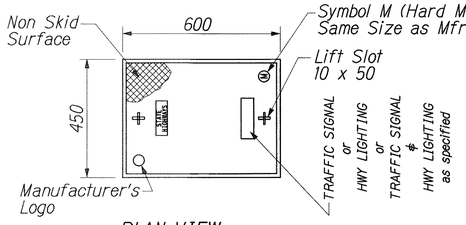



## TYPICAL CONSTRUCTION JOINT DETAIL

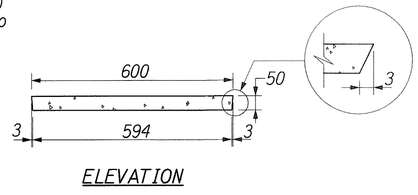
Not to Scale

## GENERAL NOTES:

1. Provide a minimum of one 16ø x 2.5m Copperweld Ground Rod in each pullbox. When directed by the Traffic Signal Inspector/Engineer, install additional Ground Rods. Cost of Ground Rods shall be incidental to the pullboxes.
2. All pre-cast concrete pullboxes shall be manufactured in two pieces.
3. The pullbox with cover shall be capable of supporting an MS 18 Loading.
4. The maximum weight of the pullbox cover shall not exceed 27 kilograms.
5. The openings for the conduits on all pullboxes shall be pre-cast concrete knockouts.
6. After installing the conduits in the openings of the pullboxes, the Contractor shall fill the excess opening in the pre-cast knockouts with concrete mortar.
7. Prior to installing the pullboxes, the Contractor shall level the bottom of the trench and achieve a minimum of 95% relative compaction of the bottom of the trench.
8. All concrete shall be Class A (25MPa, min.)
9. Rebars shall be Grade 300 and all lapped splices shall be 360mm minimum.
10. The #57 or #67 size aggregate shall conform to latest version of AASHTO M43 (ASTM D 448).
11. Type "C" Pullbox shall be installed in a location protected from vehicular traffic (i.e. raised sidewalk, behind A.C. curbs, traffic signal standard or pipe guards).




PLAN VIEW




ELEVATION

## POLYMER CONCRETE COVER

Not to Scale

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
|---|---|---|
| | DRAWN BY | |
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**DEPARTMENT OF TRANSPORTATION**
HIGHWAYS DIVISION

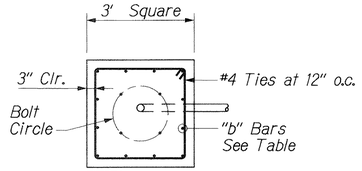
# PULLBOX & COVER DETAILS

NIMITZ HIGHWAY IMPROVEMENTS
KEEHI INTERCHANGE TO PACIFIC STREET
PROJECT NO. 92A-01-03

Scale: AS SHOWN Date: March 2, 2003

SHEET No. TS10 OF 14 SHEETS

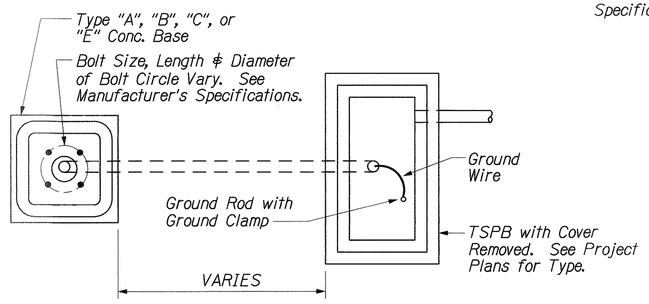
| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | 92A-01-03 | 2003 | 39 | 69 |



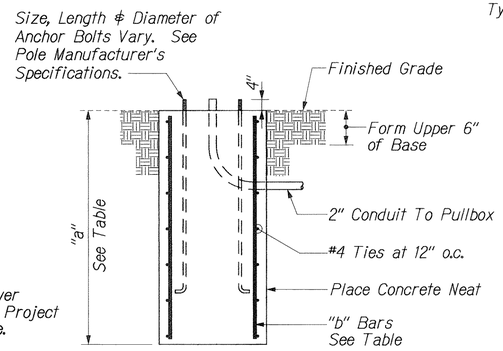

PLAN - SECTION

| TYPE "C" CONCRETE BASE | | |
|---|---|---|
| TYPE OF STANDARD | "a" | "b" Bars |
| II - 20 | 6'-0" | 12 - #3 |
| II - 25 | 6'-6" | 12 - #3 |
| II - 30 | 7'-6" | 12 - #4 |
| II - 35 | 8'-0" | 12 - #4 |

Typical Standard Designation: II - 25
Type
Mast Arm Length




PLAN



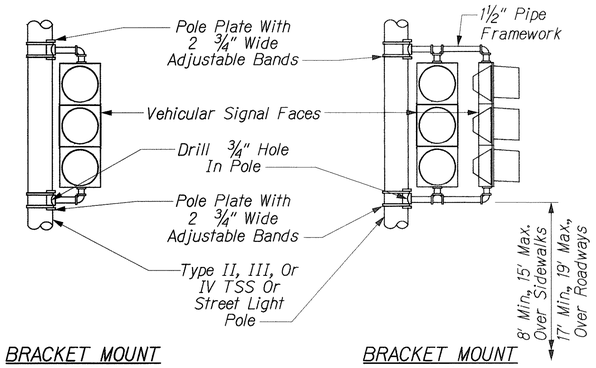

VERTICAL SECTION

NOTES:

1. Concrete shall be Class "B".
2. Type "C" concrete base shall be used for Types II and III Traffic Signal Standards.
3. Design Lateral Pressure: 1,500 PSF
4. Conduit bend is incidental to concrete base.
5. Reinforcing steel shall conform to ASTM A615, Grade 60.

## TYPE "C" CONCRETE BASE

Not to Scale

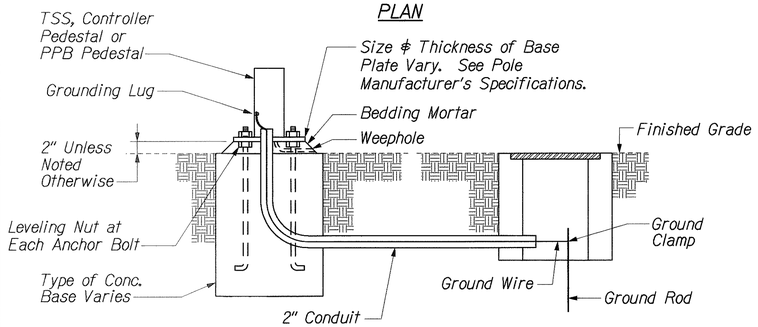



BRACKET MOUNT ONE WAY (B-1W)

BRACKET MOUNT TWO WAY (B-2W)

NOTES:

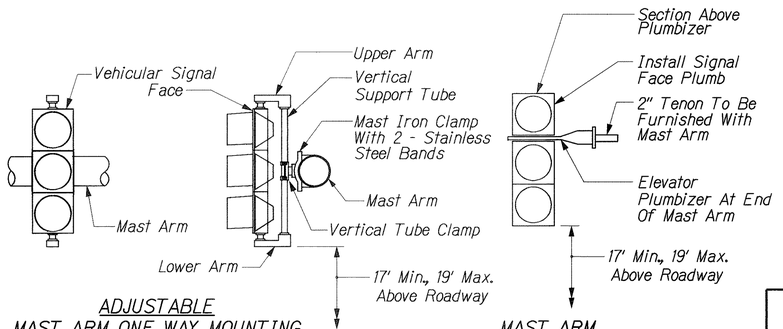
1. Stainless Steel Bands Shall Be ½" Wide X .050" Thick, Minimum. Tensile Strength Shall Be 100,000 PSI Minimum.
2. Upper Arm, Lower Arm And Vertical Support Tube Shall Be Of 356 Cast Aluminum.
3. All Wiring Shall Be Concealed.
4. Vertical Tube Clamp Shall Be Of Malleable Iron, Grade 32510.
5. All Aluminum Parts Shall Have An Alodine 1200 Finish.




SECTION

## TYPICAL STANDARD AND PEDESTAL INSTALLATION

Not to Scale




ADJUSTABLE MAST ARM ONE WAY MOUNTING AT INTERMEDIATE POINT MA-1W(I)

MAST ARM ONE WAY MOUNTING AT ENDS MA-1W(E)

## VEHICULAR SIGNAL MOUNTINGS

| ORIGINAL PLAN | SURVEY PLOTTED BY | DATE |
|---|---|---|
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

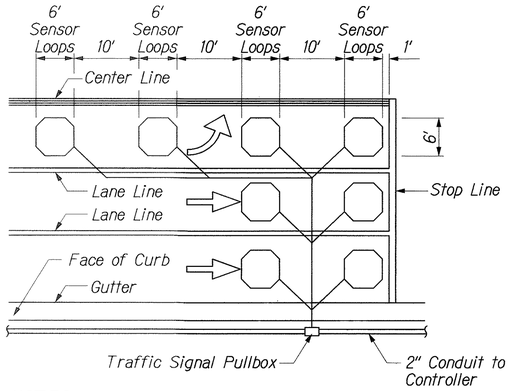
# MOUNTING BRACKET & BASE DETAILS

NIMITZ HIGHWAY IMPROVEMENTS
KEEHI INTERCHANGE TO PACIFIC STREET
PROJECT NO. 92A-01-03

Scale: AS SHOWN Date: March 2, 2003

SHEET No. TS11 OF 14 SHEETS

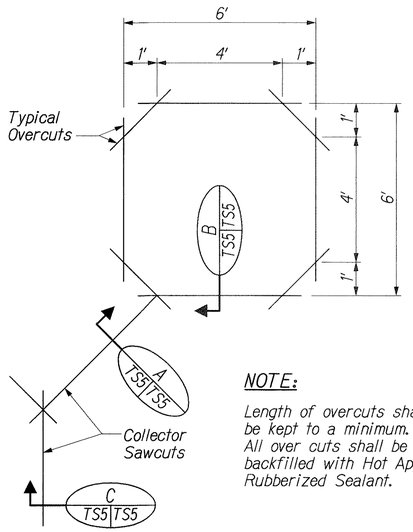
| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | 92A-01-03 | 2003 | 40 | 69 |




NOTES:

1. Center sensor loops in lanes.
2. Collector Cables shall be twisted 2 turns per foot.
3. Number of loops and locations vary. See project plans.
4. Number and locations of Collector Sawcuts may be varied in the field.

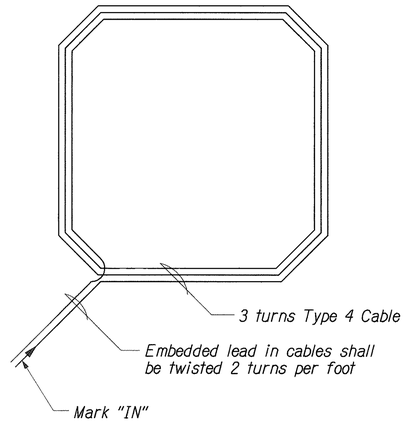
## TYPICAL SENSOR LOOP LAYOUT




NOTE:

Length of overcuts shall be kept to a minimum. All over cuts shall be backfilled with Hot Applied Rubberized Sealant.

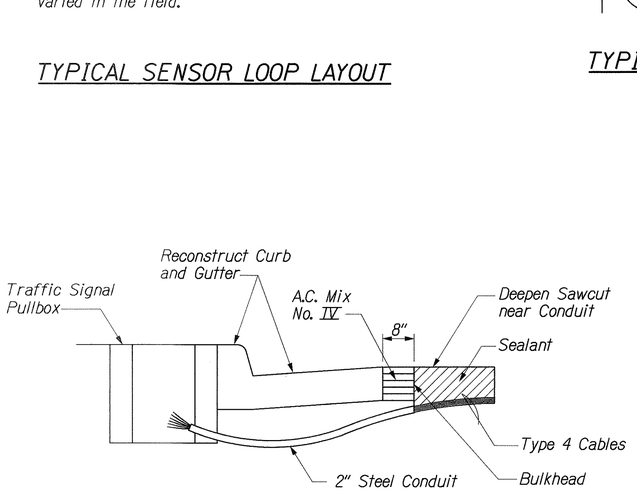
## TYPICAL SENSOR LOOP SAWCUT DETAIL




## TYPICAL SENSOR LOOP WIRING DIAGRAM

## TYPES OF CABLES

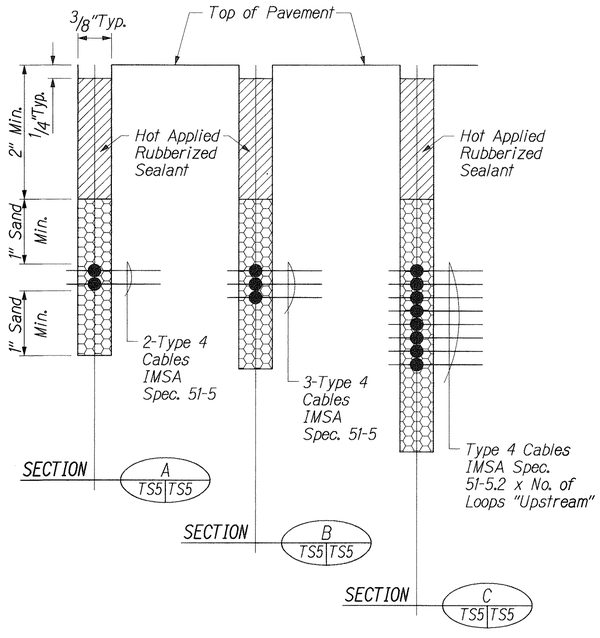
| | |
|---|---|
| Type 1 | Signal Loop Cable: Stranded No. 14, 26 conductors |
| Type 2 | Detector lead in cable and pedestrian push button circuit cable: Stranded, No. 14, two conductors |
| Type 3 | Interconnect Cable: Solid No. 19, 12 pairs |
| Type 4 | Loop Sensor Cable: Solid No. 12, single conductor to IMSA spec. 51-5 |
| Type 5 | Cable from signal loop to signal head: Stranded, No. 14, four conductors |
| Type 6 | Service Cable: Solid, No. 6, three conductors |
| Type 7 | Optical Detector Cable: Berktek Type B, Stranded, No. 20, three conductors |
| Type 8 | Drop Cable: Solid, No. 14, four conductors |

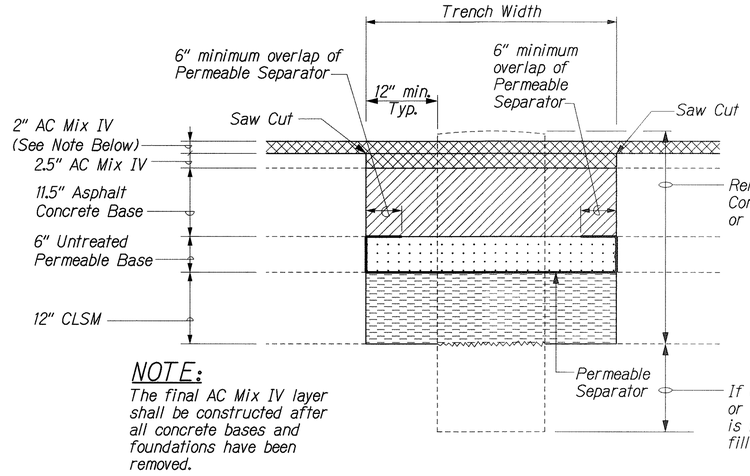



NOTES ON CONSTRUCTION AT END OF SAWCUT:

1. Seal roadway end of conduit after installation of Conductors.
2. Install Bulkhead across conduit trench.
3. Place Hot Tar in Sawcut.
4. Backfill over conduit with New A.C.
5. Reconstruct Curb and Gutter as required

## DETAIL OF SENSOR LOOP INSTALLATION AT EDGE OF PAVEMENT




NOTE:

The final AC Mix IV layer shall be constructed after all concrete bases and foundations have been removed.

## PAVEMENT RESTORATION DETAIL FOR REMOVAL OF CONCRETE BASE OR FOUNDATION

Not to Scale

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TRACED BY
NOTE BOOK | DESIGNED BY
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

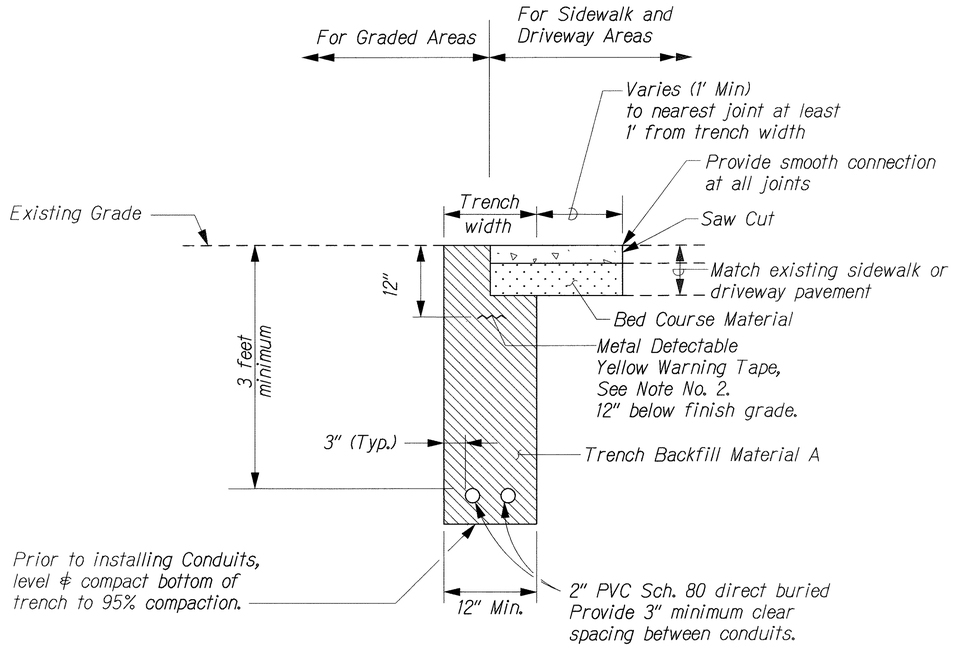
## LOOP DETECTOR DETAILS

NIMITZ HIGHWAY IMPROVEMENTS
KEEHI INTERCHANGE TO PACIFIC STREET
PROJECT NO. 92A-01-03

Scale: NONE Date: March 2, 2003

SHEET No. TS12 OF 14 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | 92A-01-03 | 2003 | 41 | 69 |

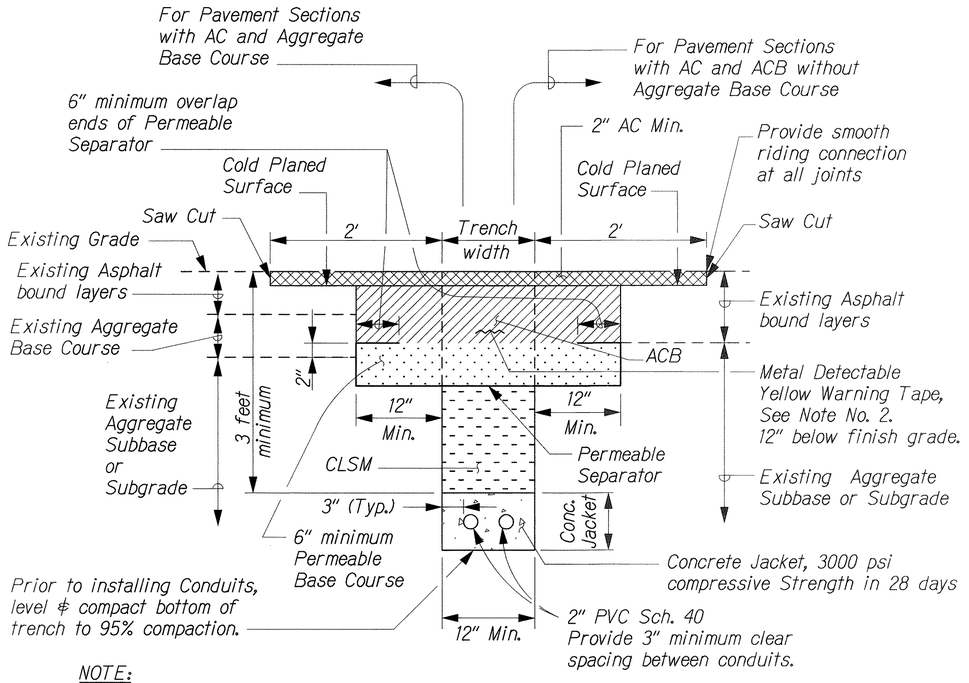



## RESTORATION OF NON-ROADWAY AREAS DUE TO TRENCH EXCAVATION

Not to Scale

## GENERAL NOTES

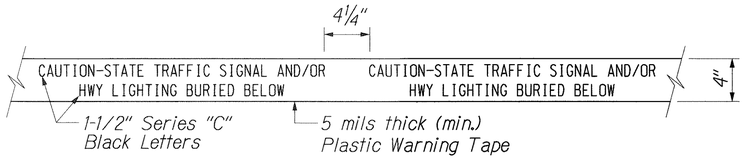
1. If trench is located on unpaved area, the Contractor shall replace 10" A.C. Base Course and 4" A.C. Pavement with Type "A" backfill material.
2. The Metal Detectable Yellow Plastic Warning Tape shall be a minimum 5 mils thick and 4" wide with a continuous metallic backing and corrosion resistant 1± mil thick foil core. The message on the tape shall read, "CAUTION - STATE TRAFFIC SIGNAL AND/OR HWY. LIGHTING BURIED BELOW," utilizing 1-1/2 inches series "C" black lettering. The message will be repeated with a 4-1/4" spacing between top line of message and start of next repeat.
3. The Contractor may begin backfilling the conduit trench when the concrete reaches 3000 psi compressive strength after 3 days.
4. Maximum four (4) conduits per row for multiple conduit duct section.
5. For direct buried duct sections, the concrete jacket required at the conduit by-pass for various utilities shall not be paid for separately but considered incidental to the direct buried conduits.
6. After installing all the traffic signal cables, the Contractor shall duct seal all conduits in the pullboxes, traffic signal standards and traffic signal controller cabinet concrete base. The duct seal material shall be approved by the Engineer and shall not be paid for separately but considered incidental to the direct buried and/or concrete encased conduits.




NOTE:
Tack Coat faces of Existing Asphalt Bound Materials prior to filling excavation with New Asphalt bound materials.

## RESTORATION OF EXISTING PAVEMENT DUE TO TRENCH EXCAVATION

Not to Scale




For additional information, see Note No. 2.

## METAL DETECTABLE YELLOW PLASTIC WARNING TAPE

Not to Scale

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

J:/NIMITZ CF/TRAFFIC SIGNAL/TS-DET3.dgn

PERRY M. SMALL LICENSED PROFESSIONAL ENGINEER No. 8627-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

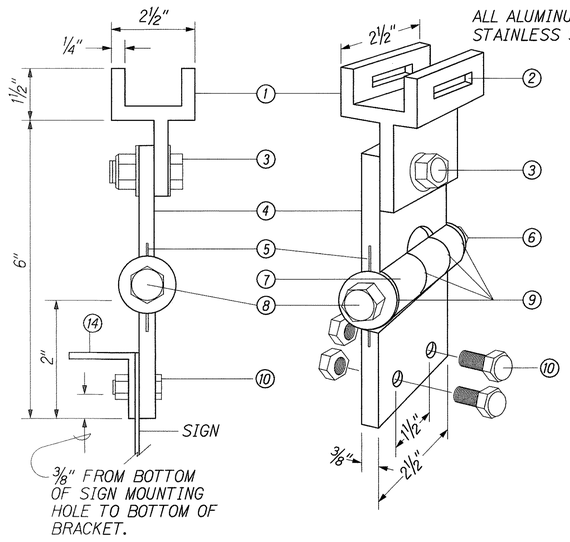
# TRAFFIC SIGNAL MISCELLANEOUS DETAILS

NIMITZ HIGHWAY IMPROVEMENTS
KEEHI INTERCHANGE TO PACIFIC STREET
PROJECT NO. 92A-01-03

Scale: NONE Date: March 2, 2003

SHEET No. TSI3 OF 14 SHEETS

| FED. ROAD DIST. NO. | STATE | PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|---|---|
| HAWAII | HAW. | 92A-01-03 | 2003 | 42 | 69 |




ALL ALUMINUM 6061T6 ALLOY AND STAINLESS STEEL COMPONENTS.

## FIXED LENGTH NON-ADJUSTABLE SWING SIGN BRACKET

(1) PIVOTAL UPPER BRACKET

(2) 1⅝" X¼" SLOT FOR DOUBLE STRAPPING TO ELECTROLIER MAST ARM. (M2G-34S(HD) .030" X ¾" HEAVY DUTY STAINLESS STEEL STRAP WITH M2G-34B(HD) BUCKLE RECOMMENDED.)

(3) ½" - 13 X 1½" STAINLESS STEEL HEX HEAD BOLT WITH STAINLESS STEEL HEX LOCK NUT AND 1/16" STAINLESS STEEL WASHER (BOTH SIDES). ALLOWS UPPER BRACKET TO PIVOT AND ALIGN WITH ELECTROLIER MAST ARM.

(4) 6" OVERALL DROP WITH FIXED LENGTH SIGN BRACKET

(5) STAINLESS STEEL DAMPENER SPRING (REMOVABLE)

(6) STAINLESS STEEL HEX LOCK NUT WITH 1/16" STAINLESS STEEL WASHER

(7) 1" O.D. AXLE HOUSING

(8) ½" - 13 X 4" STAINLESS STEEL HEX HEAD BOLT WITH 1/16" STAINLESS STEEL WASHER

(9) OILITE BUSHING

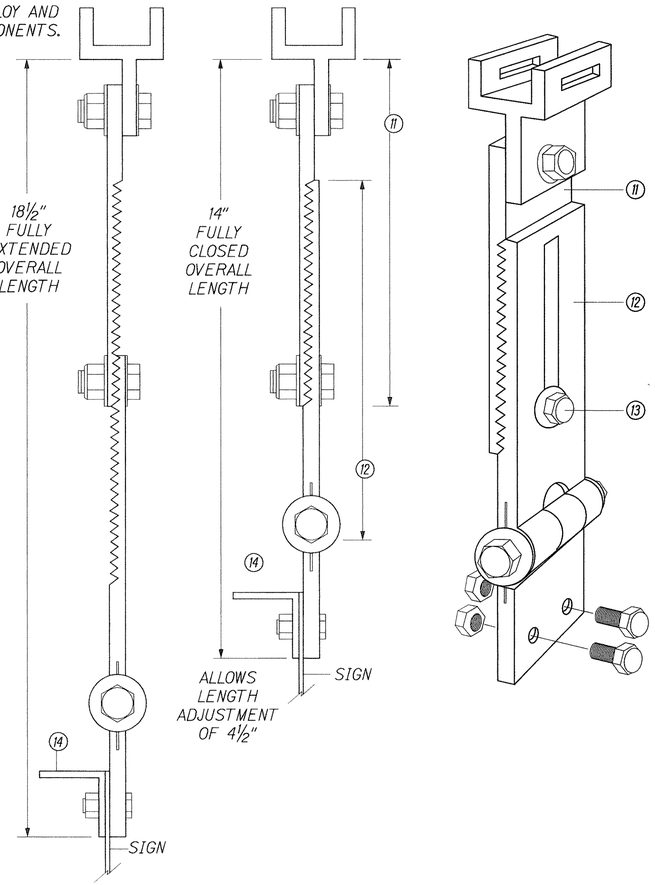
(10) SIGN MOUNTING SETS, CONSISTING OF TWO EACH 5/16" - 18 X 1" STAINLESS STEEL HEX HEAD BOLT WITH STAINLESS STEEL HEX LOCK NUT. TWO HOLES ON 1½" CENTERS PROVIDE POSITIVE LOCK SIGN MOUNTING TO BRACKET.

(11) 8¼" OVERALL LENGTH UPPER ADJUSTABLE SIGN BRACKET SECTION

(12) 9" OVERALL LENGTH LOWER ADJUSTABLE SIGN BRACKET SECTION, INCLUDING AXLE HOUSING (8" OVERALL LENGTH TO TOP OF AXLE HOUSING)

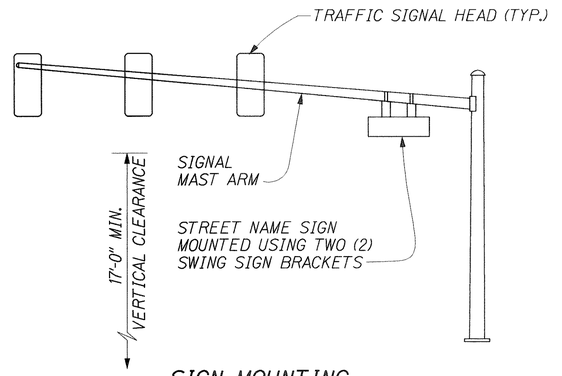
(13) ½" - 13 X 1½" STAINLESS STEEL HEX BOLT WITH STAINLESS STEEL HEX LOCK NUT AND 1/16" STAINLESS STEEL WASHERS (BOTH SIDES). LOOSEN LOCK NUT, ADJUST BRACKET TEETH TO LEVEL SIGN.

(14) 1¼" X 1¼" X⅛" ALUMINUM ANGLE

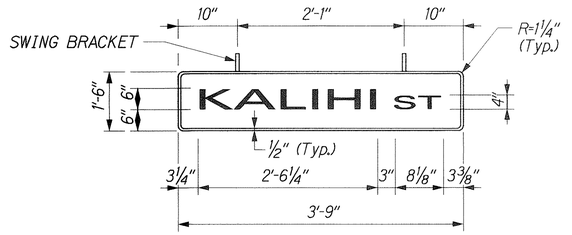



## ADJUSTABLE LENGTH SWING SIGN BRACKET

NOTE: DIMENSIONS MAY VARY SLIGHTLY.




## SIGN MOUNTING ON MAST ARM




## SIGN DETAIL

NTS

### NOTES:

1. SIGN DETAILS SHALL CONFORM TO THE LATEST EDITIONS OF THE FOLLOWING FHWA PUBLICATIONS: "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", AND "STANDARD HIGHWAY SIGNS", AND AS AMENDED.

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

J:/NIMITZ CF/TRAFFIC SIGNAL/TS-DET5.dgn

PERRY M. SMALL LICENSED PROFESSIONAL ENGINEER No. 8627-C HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

STATE OF HAWAII
**DEPARTMENT OF TRANSPORTATION**
HIGHWAYS DIVISION

## SIGN BRACKET DETAILS

NIMITZ HIGHWAY IMPROVEMENTS
KEEHI INTERCHANGE TO PACIFIC STREET
PROJECT NO. 92A-01-03

Scale: NONE Date: March 2, 2003

SHEET No. TS14 OF 14 SHEETS