FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-0-02-11R	2014	1	43

STATE OF HAWAII

DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

HONOLULU, HAWAII

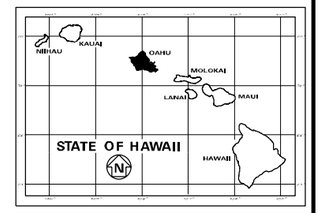
PLANS FOR

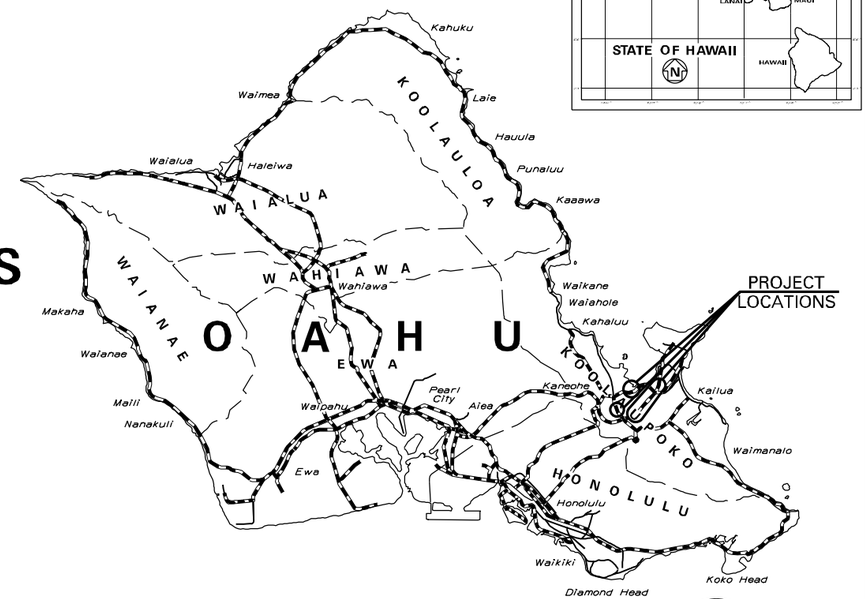
MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU

PROJECT NO. HWY-O-02-11R

DISTRICT OF KOOLAUPOKO

ISLAND OF OAHU





INDEX TO DRAWINGS	
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	STANDARD PLANS SUMMARY
3	GENERAL NOTES, LEGEND, AND ABBREVIATIONS
4	GRADING NOTES
5 – 8	UTILITY NOTES
9 – 11	WATER POLLUTION AND EROSION CONTROL NOTES
12	BEST MANAGEMENT PRACTICE NOTES AND DETAILS
13	EROSION CONTROL PLAN – KAMEHAMEHA HIGHWAY
14	EROSION CONTROL PLAN – KANEOHE BAY DRIVE
15 – 16	BIOSWALE TYPICAL SECTION
17 –21	BIOSWALE PLANS – INTERSTATE ROUTE H–3
22 – 29	BIOSWALE PROFILES – INTERSTATE ROUTE H–3
30	BIOSWALE PLAN AND PROFILE – KAMEHAMEHA HIGHWAY
31	KAHEOHE BAY DRIVE BMP RETROFIT PLAN
32	KAHEOHE BAY DRIVE BMP RETROFIT SECTIONS
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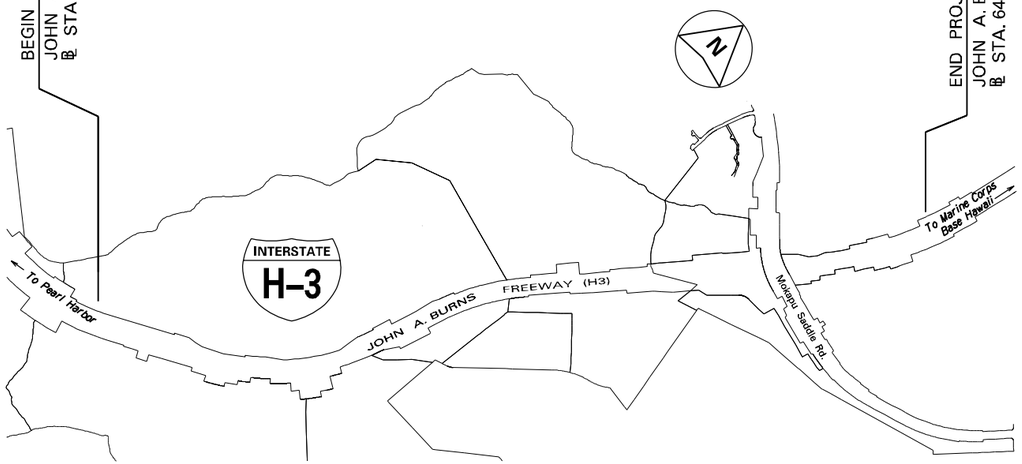
34 – 35	BIOSWALE DETAILS
36	FREEWAY WORK ZONE SIGNING PLAN, NOTES & DETAILS
37	LOW SPEED UNDIVIDED HIGHWAY WORK ZONE SIGNING PLAN, NOTES & DETAILS
38 – 39	TRAFFIC CONTROL PLANS INTERSTATE ROUTE H–3
40 – 42	TRAFFIC CONTROL PLANS – KAMEHAMEHA HIGHWAY
43	TRAFFIC CONTROL PLANS – KANEOHE BAY DRIVE

PARSONS BRINCKERHOFF INC. — DESIGNED BY
HWY-DE — MANAGED BY
692-7594 — PHONE
MAY 2012 — DATE

BEGIN PROJECT JOHN A. BURNS FWY. @ STA. 535+00

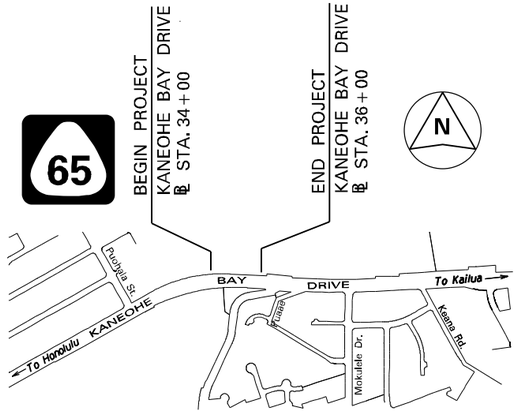
END PROJECT JOHN A. BURNS FWY. @ STA. 642+00



JOHN A. BURNS FREEWAY (H3)
LOCATION PLAN - SITE
Scale: NTS

BEGIN PROJECT KANEOHE BAY DRIVE @ STA. 34+00

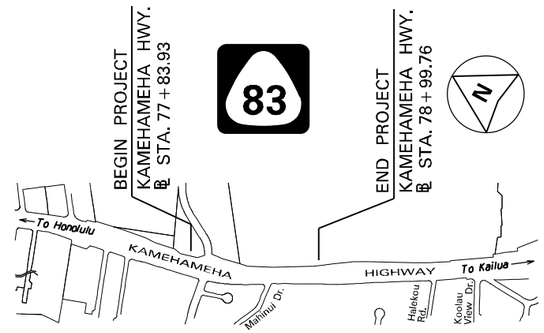
END PROJECT KANEOHE BAY DRIVE @ STA. 36+00



KANEOHE BAY DRIVE
LOCATION PLAN - SITE
Scale: NTS

BEGIN PROJECT KAMEHAMEHA HWY. @ STA. 77+83.93

END PROJECT KAMEHAMEHA HWY. @ STA. 78+99.76



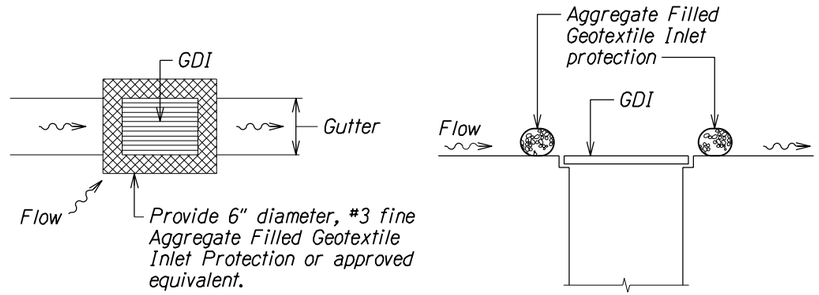
KAMEHAMEHA HIGHWAY
LOCATION PLAN - SITE
Scale: NTS

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

DEPARTMENT OF TRANSPORTATION STATE OF HAWAII	
APPROVED:	
DIR. OF TRANSPORTATION	DATE

tsht.dgn 4/3/2014 9:12:39 AM

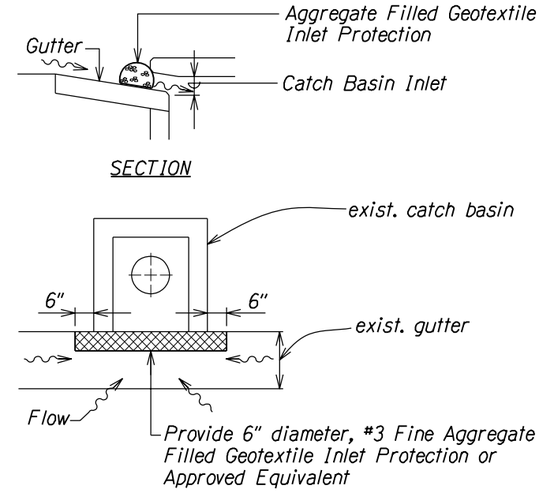
FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-0-02-11R	2014	12	43



PLAN SECTION

INLET PROTECTION AT GRATED DROP INTAKE (GDI)

Not to Scale

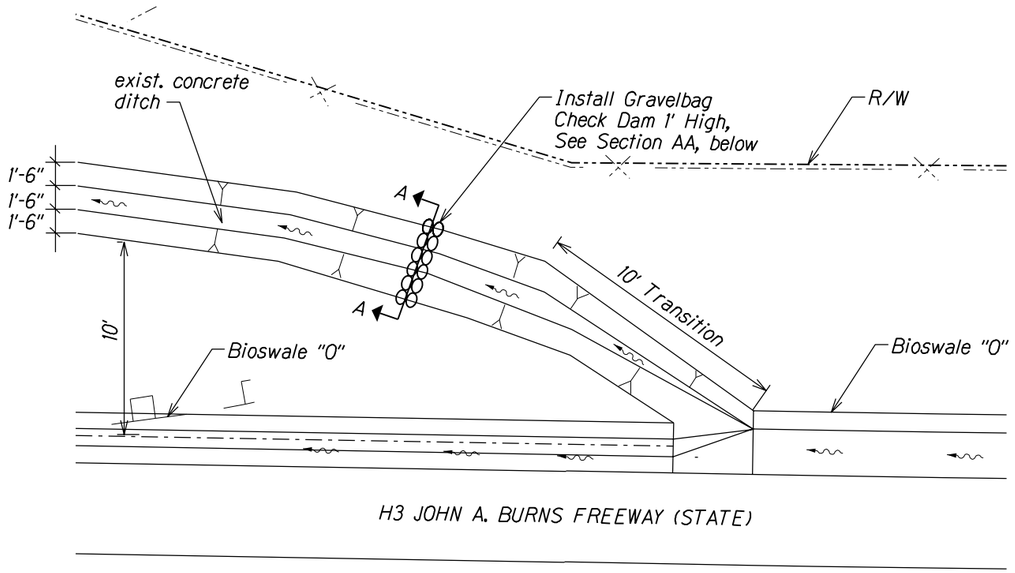


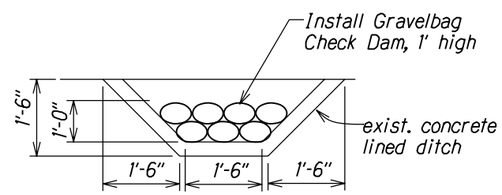
SECTION

PLAN

INLET PROTECTION AT EXISTING CATCH BASIN

Not to Scale



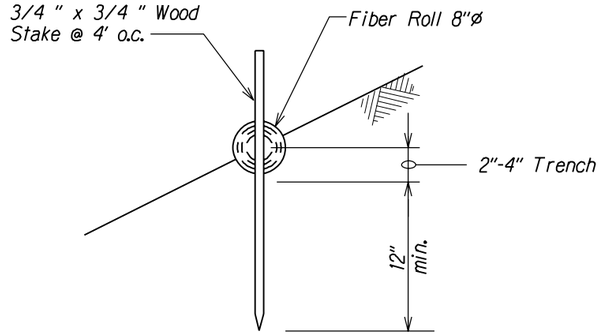


SECTION A-A

Not to Scale

GRAVEL BAG CHECK DAM DETAIL - H3 STATION 637+05

Not to Scale



FIBER ROLL DETAIL

Not to Scale

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

T:/16523A-Permanent_BMP/Cadd/Sheets/misc/G-11.dgn

GERALD D. ANDRADE LICENSED PROFESSIONAL ENGINEER No. 10377-C HAWAII, U.S.A.

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SIGNATURE

04/30/14
EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

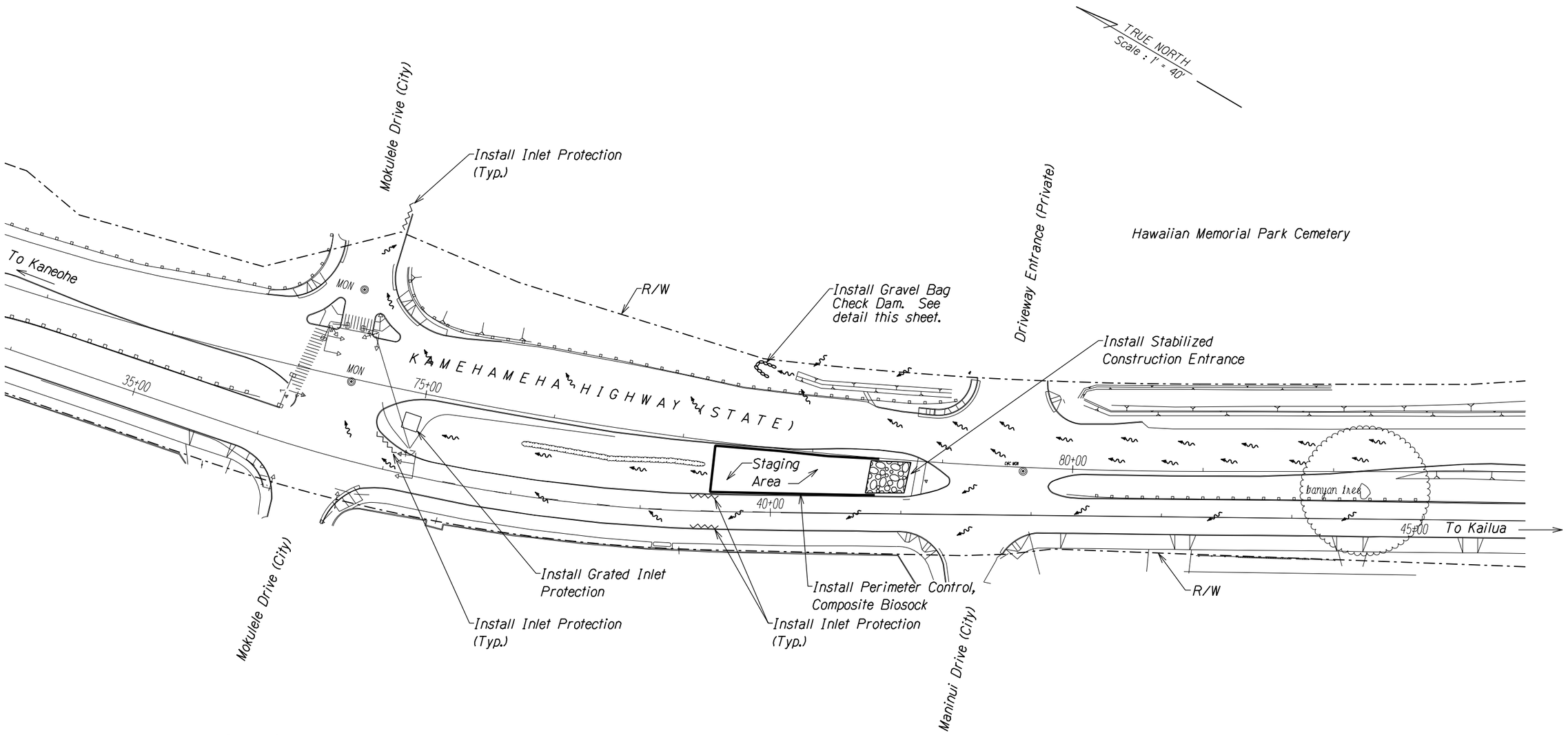
BEST MANAGEMENT PRACTICE DETAILS

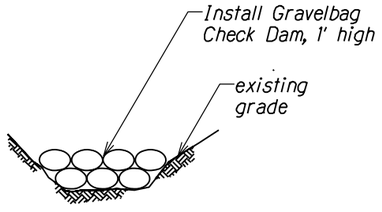
MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU
PROJECT NO. HWY-0-02-11R

Scale: Not to Scale Date: May, 2012

SHEET No. G-11 OF 11 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-0-02-11R	2014	13	43





GRAVEL BAG CHECK DAM DETAIL
Not to Scale

1"=20' 20 0 20 40
SCALE IN FEET

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

T:/16523A-Permanent_BMP/Cadd/Sheets/ ECP/Kam_hwy_BMP.dgn

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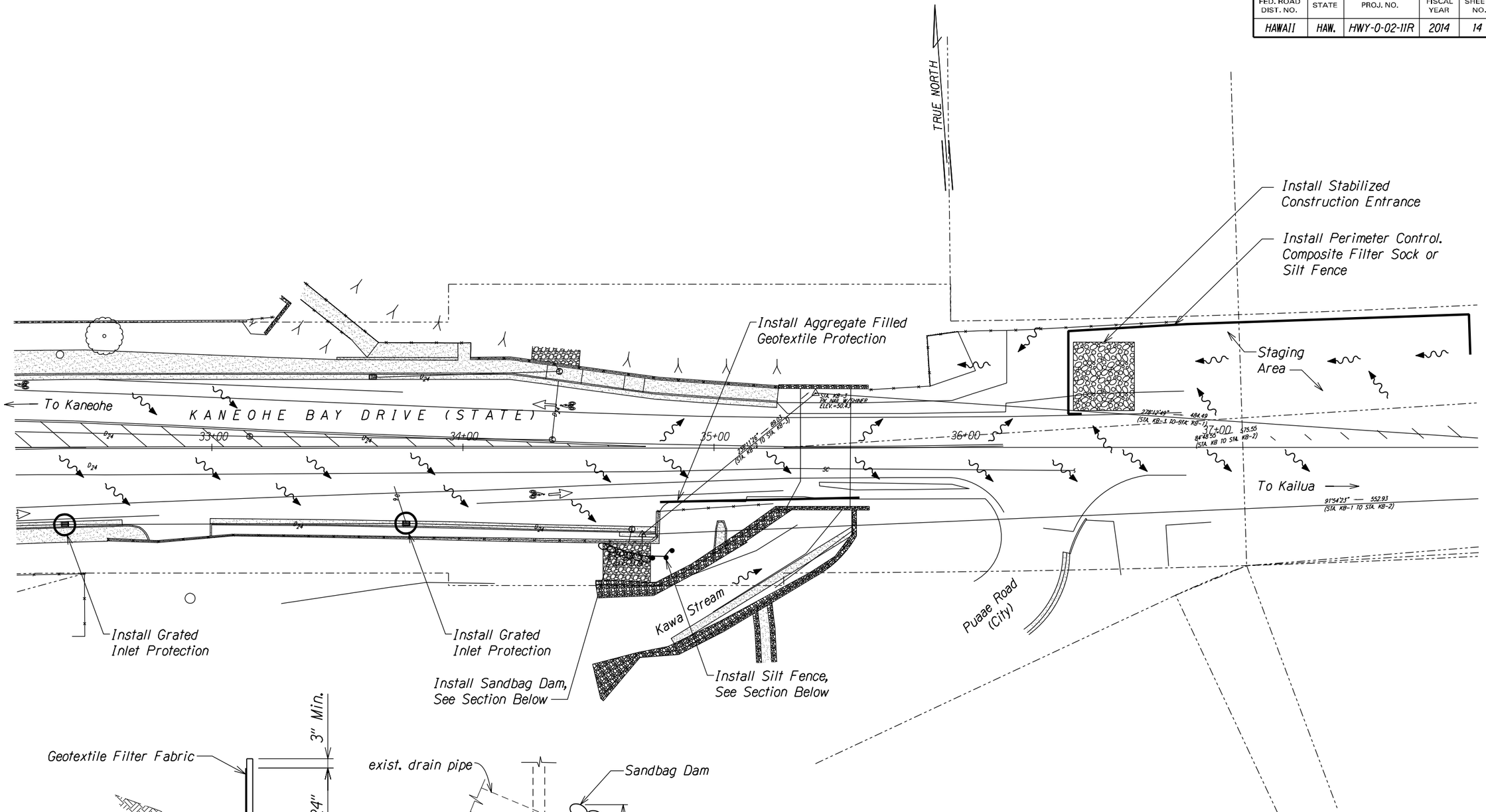
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EROSION CONTROL PLAN
KAMEHAMEHA HIGHWAY
MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU
PROJECT NO. HWY-0-02-11R

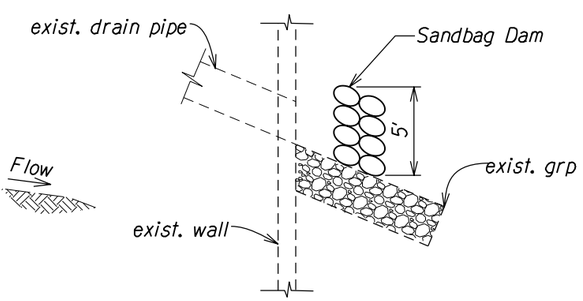
Scale: 1"=40' Date: April, 2014

SHEET No. C-1 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-0-02-11R	2014	14	43



SILT FENCE SECTION
Scale: NTS



SANDBAG DAM SECTION
Scale: NTS

1"=20' 20 0 20 40
SCALE IN FEET

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

T:/16523A-Permanent_BMP/Cadd/Sheets/ECP/KBD_BMP_1.dgn

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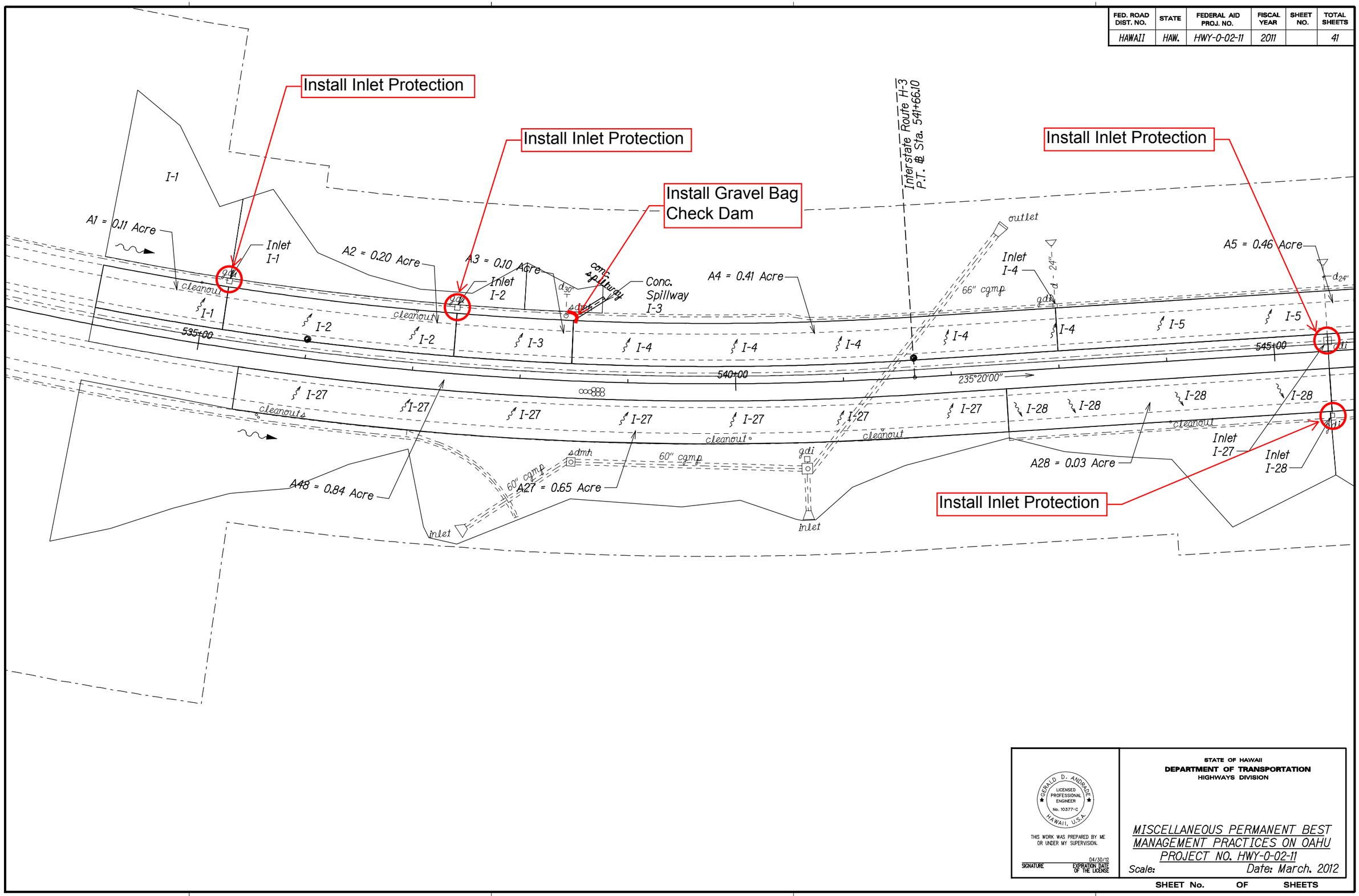
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

EROSION CONTROL PLAN
KANEOHE BAY DRIVE
MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU
PROJECT NO. HWY-0-02-11R

Scale: 1"=20' Date: April, 2014

SHEET No. C-2 OF 23 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-0-02-11	2011		41



ORIGINAL PLAN

SURVEY PLOTTED BY ____ DATE
DRAWN BY ____ " "
TRACED BY ____ " "
DESIGNED BY ____ " "
NOTE BOOK ____ QUANTITIES BY ____ " "
No. ____ CHECKED BY ____ " "

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No. 10377-C
HAWAII, U.S.A.

04/30/12
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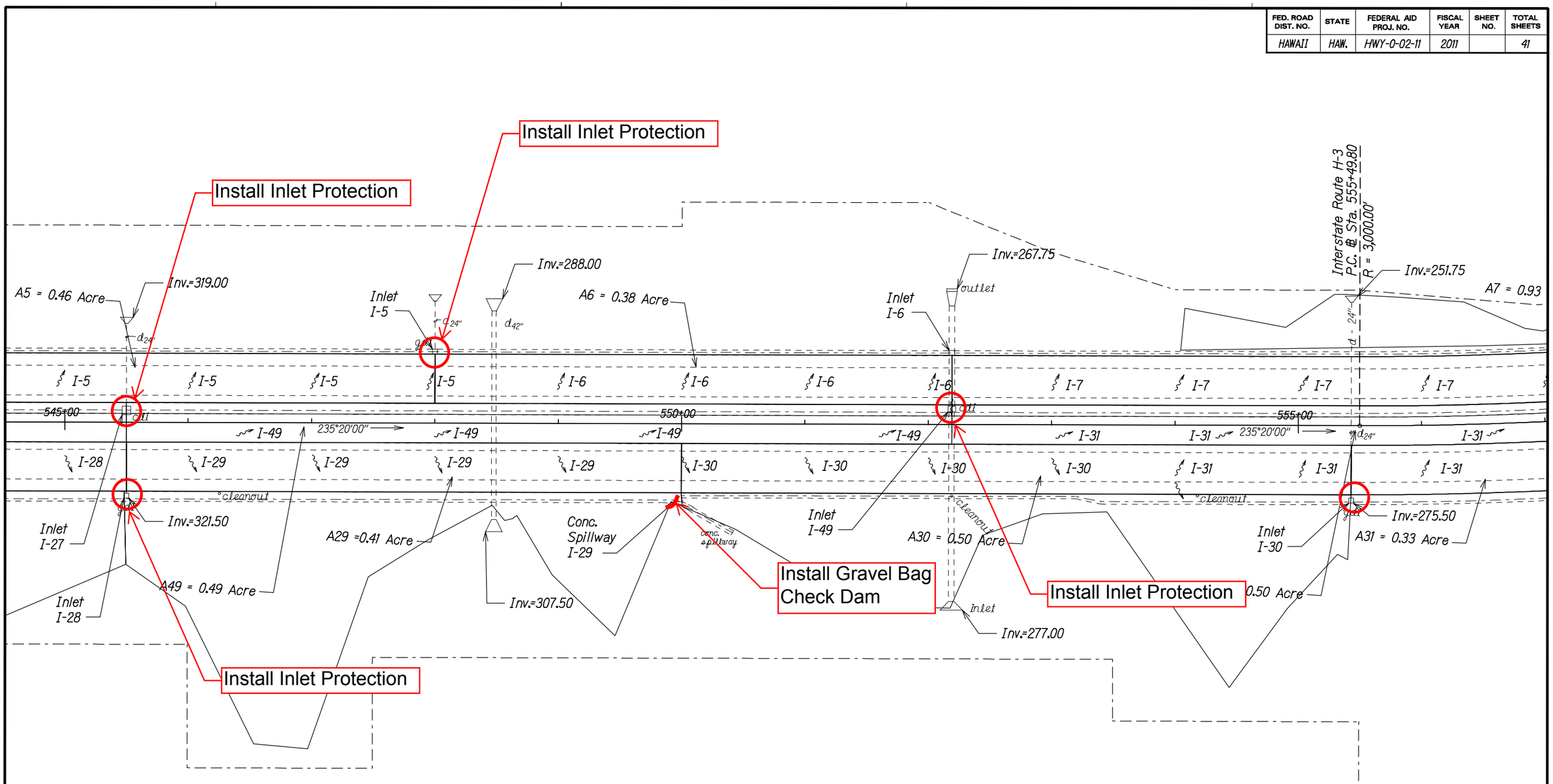
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU
PROJECT NO. HWY-0-02-11

Scale: Date: March. 2012

SHEET No. OF SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-0-02-11	2011		41



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

ORIGINAL PLAN
NOTE BOOK
No.

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MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU

PROJECT NO. HWY-0-02-11

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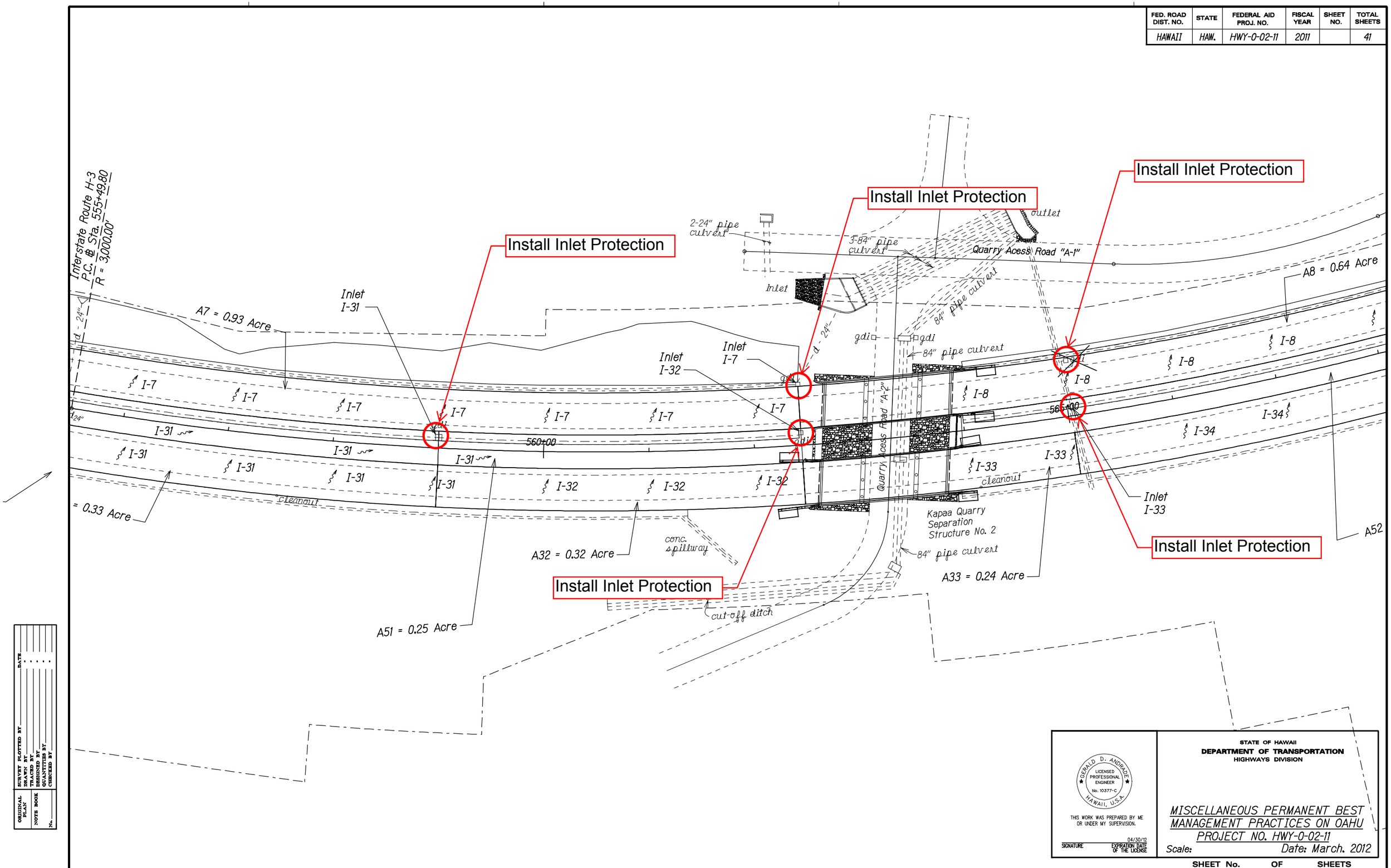

SURVEY PLOTTED BY ____ DATE
DATA BY ____
TRACED BY ____
DESIGNED BY ____
QUANTITIES BY ____
CHECKED BY ____

ORIGINAL PLAN
NOTE BOOK ____ No. ____

GERALD D. ANDRADE
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STATE OF HAWAII
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MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU

PROJECT NO. HWY-0-02-11

Scale:

Date: March. 2012

SHEET No. OF SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-0-02-11	2011		41

Install Inlet Protection

Install Inlet Protection

Install Inlet Protection

Install Inlet Protection

Install Inlet Protection

Install Inlet Protection

Inlet I-8

Inlet I-9a

Inlet I-9b

Inlet I-34

Inlet I-35a

Inlet A-35b

Inlet I-35c

Kapaa Quarry Road "A-1"

Kapaa Quarry Separation Structure No. 1

Interstate Route H-3 P.T. & Sta 1841+

A8 = 0.64 Acre

A9a = 0.23 Acre

A9b = 0.23 Acre

A10 = 0.59 Acre

A36 = 0.86 Acre

A52 = 0.44 Acre

A34 = 0.46 Acre

A53a = 0.15 Acre

A35a = 0.19 Acre

A35b = 0.19 Acre

A53b = 0.15 Acre

A53c = 0.10 Acre

A35c = 0.10 Acre

2'x2.5' lined drainage ditch

2'x2.5' lined drainage ditch

24"

575.00

196°26'50"

I-8 I-9a I-9b I-10 I-34 I-35a I-35b I-35c I-36

cleanout

cleanout

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

GERALD D. ANDRADE
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No. 10377-C
HAWAII, U.S.A.

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STATE OF HAWAII
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HIGHWAYS DIVISION

MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU
PROJECT NO. HWY-0-02-11

Scale: Date: March. 2012

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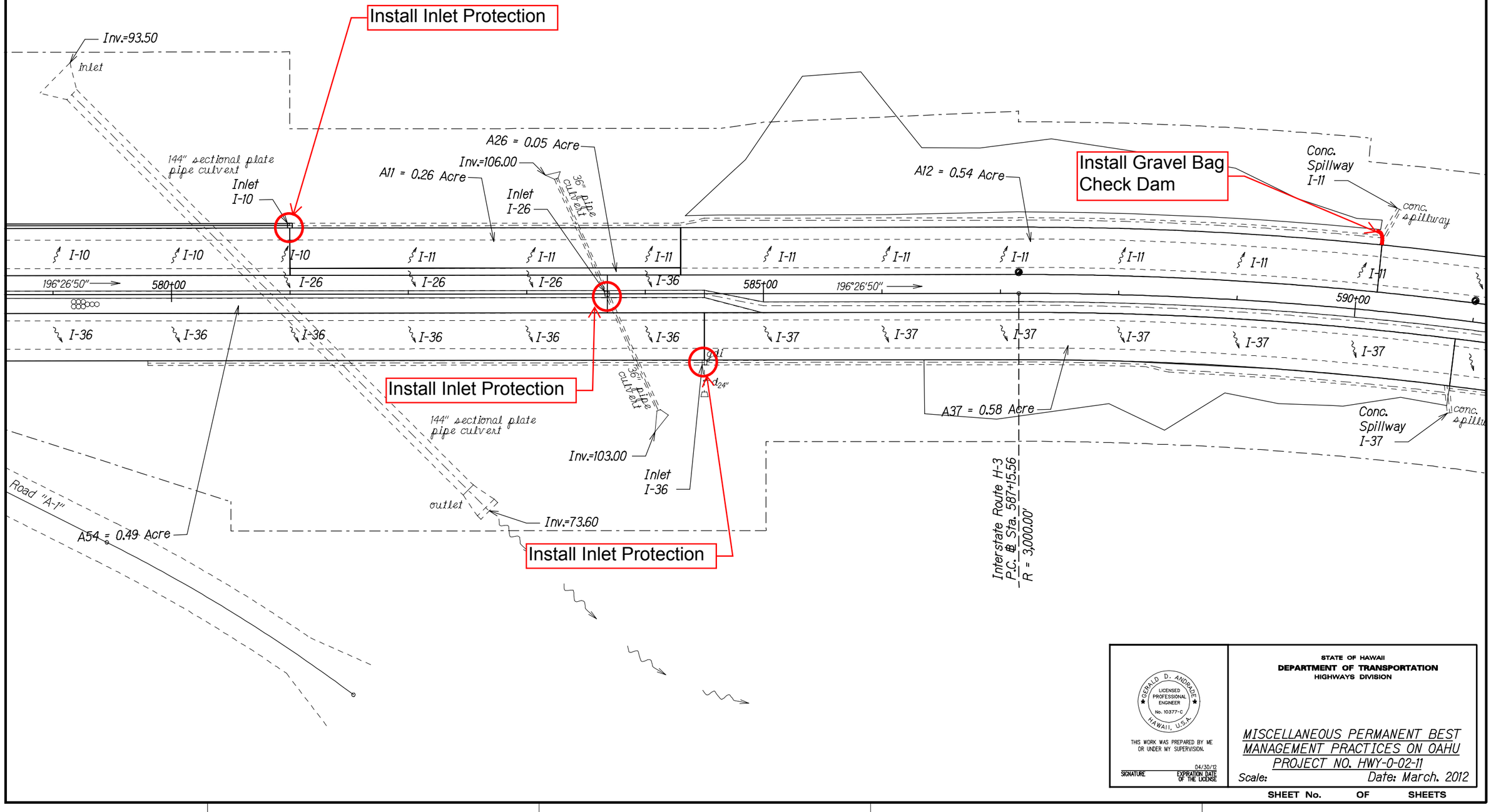
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-0-02-11	2011		41



ORIGINAL PLAN

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

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MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU

PROJECT NO. HWY-0-02-11

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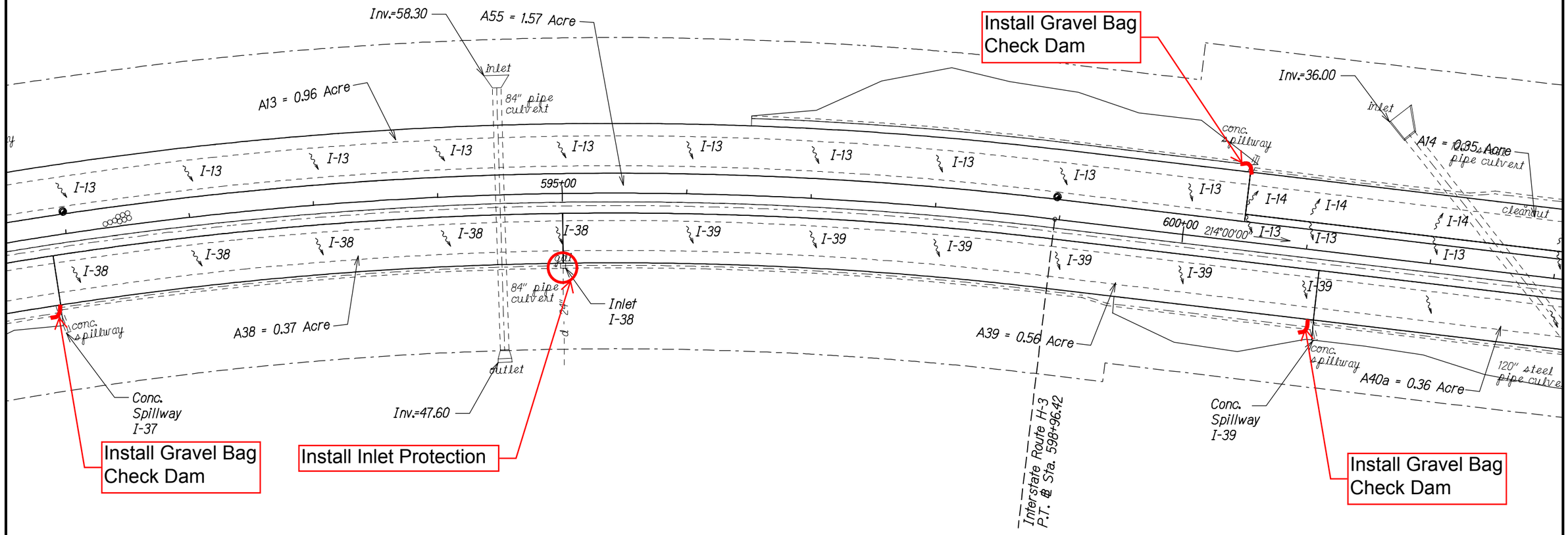

ORIGINAL PLAN

SURVEY PLOTTED BY ____ DATE
DRAWN BY ____ : : : :
TRACED BY ____
DESIGNED BY ____
QUANTITIES BY ____
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NOTE BOOK ____
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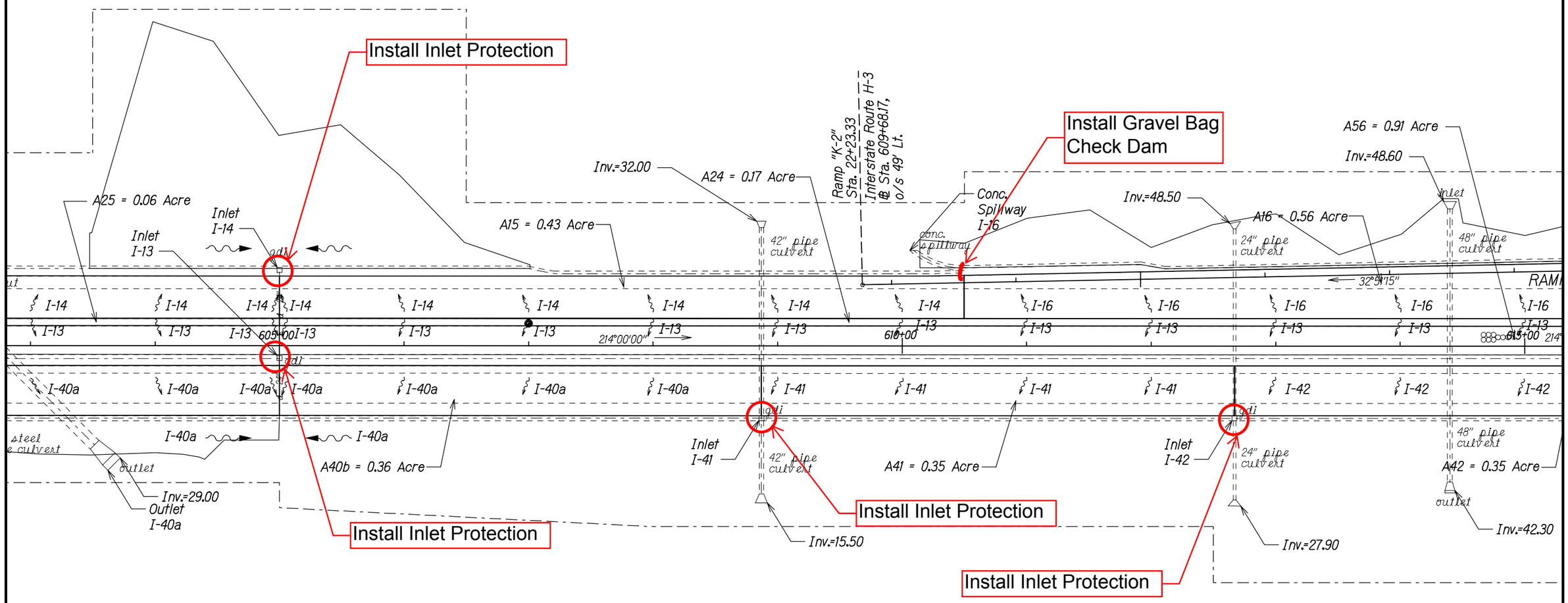

SURVEY PLOTTED BY ..... DATE
DRAWN BY .....
TRACED BY .....
DESIGNED BY .....
QUANTITIES BY .....
CHECKED BY .....
ORIGINAL PLAN
NOTE BOOK ..... No. .....

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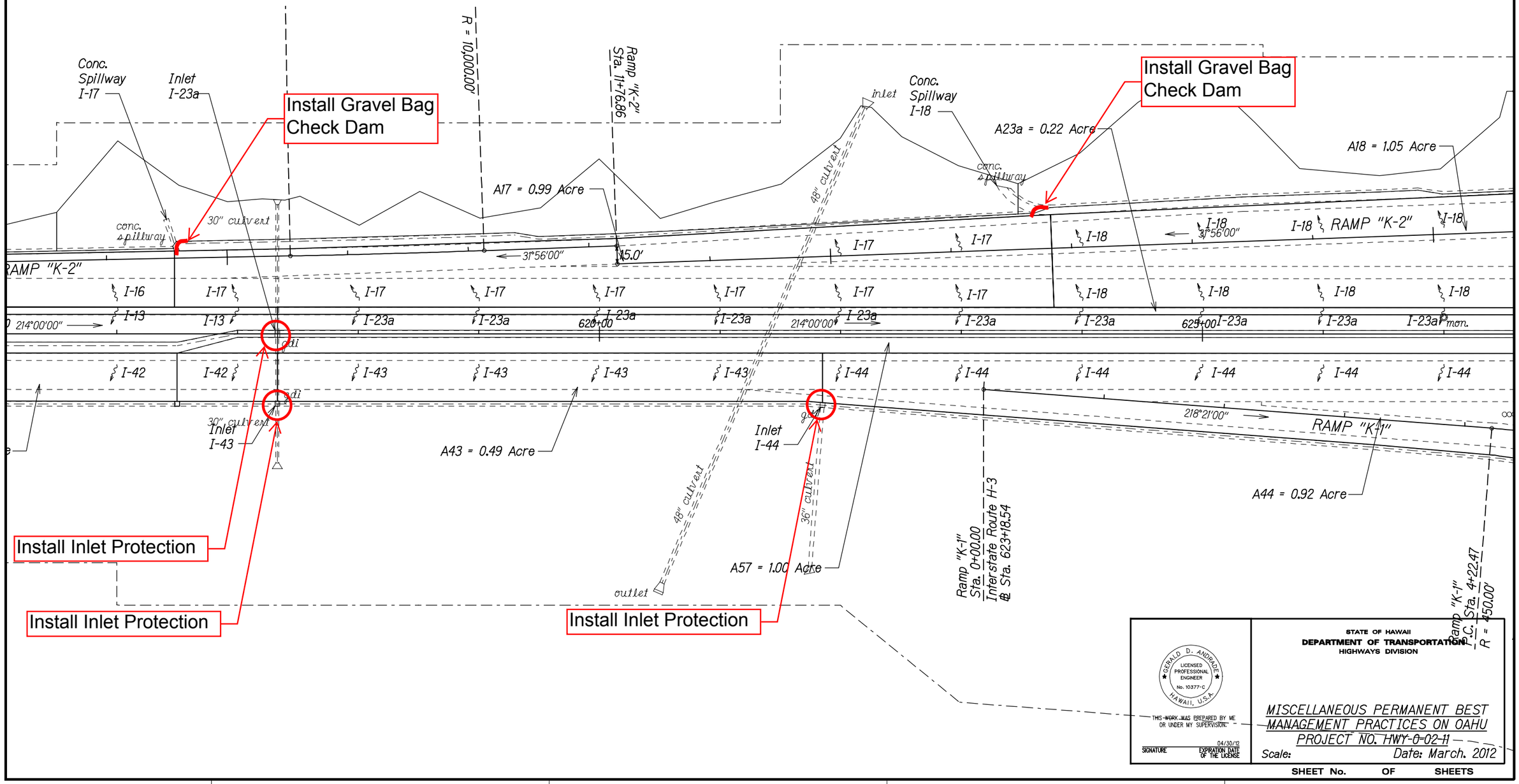

ORIGINAL PLAN

NOTE BOOK No. ____

SURVEY PLOTTED BY ____ DATE
DRAWN BY ____
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MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU
PROJECT NO. HWY-0-02-11

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SHEET No. OF SHEETS

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HAWAII	HAW.	HWY-0-02-11	2011		41

Install Inlet Protection

Install Inlet Protection

Install Inlet Protection

Install Inlet Protection

Install Inlet Protection

Contractor's Staging and Area

Mokapu Saddle Road
P.C. Sta. 31+47.44
R = 1,200.00'

R = 200.00'

RAMP "K-3"

Ramp "K-2"
Sta. 0+00.00 =
Mokapu Saddle Road
@ Sta. 34+16.19

A25 = 0.03 Acre

A18 = 1.05 Acre

A18 = 0.36 Acre

A20 = 0.31 Acre

A58 = 0.24 Acre

A45 = 0.45 Acre

A44 = 0.92 Acre

A46 =0.31 Acre

A59 = 0.14 Acre

Inlet I-19

Inlet I-58

Inlet I-59

Inlet I-22

Inlet I-46

Inlet I-45

36" culvert

30" pipe culvert

24" d.

RAMP "K-2"

RAMP "K-1"

RAMP "K-3"

Kailua Interchange Structure

I-18 I-19 I-20 I-44 I-45 I-46 I-58 I-59 I-22

356°56'00"

214°00'00"

218°21'00"

262°21'00"

278°41'00"

625+00

630+00

635+00

Ramp "K-1"
P.I. Sta. 7+68.05

Ramp "K-1"
Sta. 4+22.47
450.00'

Mokapu Saddle Road
P.C. Sta. 37+86.40

Outbound Lanes
P.C. @ Sta. 636+63.93
R = 5,000.00'

Interstate Route H-3
P.C. @ Sta. 636+84.45

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

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

GERALD D. ANDRADE
LICENSED PROFESSIONAL ENGINEER
No. 10377-C
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE ____ 04/30/12 EXPIRATION DATE OF THE LICENSE

MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU
PROJECT NO. HWY-0-02-11

Scale: ____ Date: March. 2012

SHEET No. ____ OF ____ SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	HWY-0-02-11	2011		41

Install Inlet Protection

A20 = 0.31 Acre

30" pipe culvert

A22 = 0.12 Acre

42" pipe culvert

A21 = 0.52 Acre

I-20

I-22

I-46

645+00

640+00

635+00

214°00'00"

30" pipe culvert

A46 =0.31 Acre

A60 = 0.61 Acre

A47 = 0.66 Acre

47" pipe culvert

Outbound Lanes
P.C. @ Sta. 636+63.93
R = 5,000.00'

Interstate Route H-3
P.C. @ Sta. 636+84.45

Inbound Lanes
P.C. @ Sta. 637+05.04
R = 5,000.00'

dle Road
37+86.40

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

GERALD D. ANDRADE
LICENSED PROFESSIONAL ENGINEER
No. 10377-C
HAWAII, U.S.A.

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04/30/12
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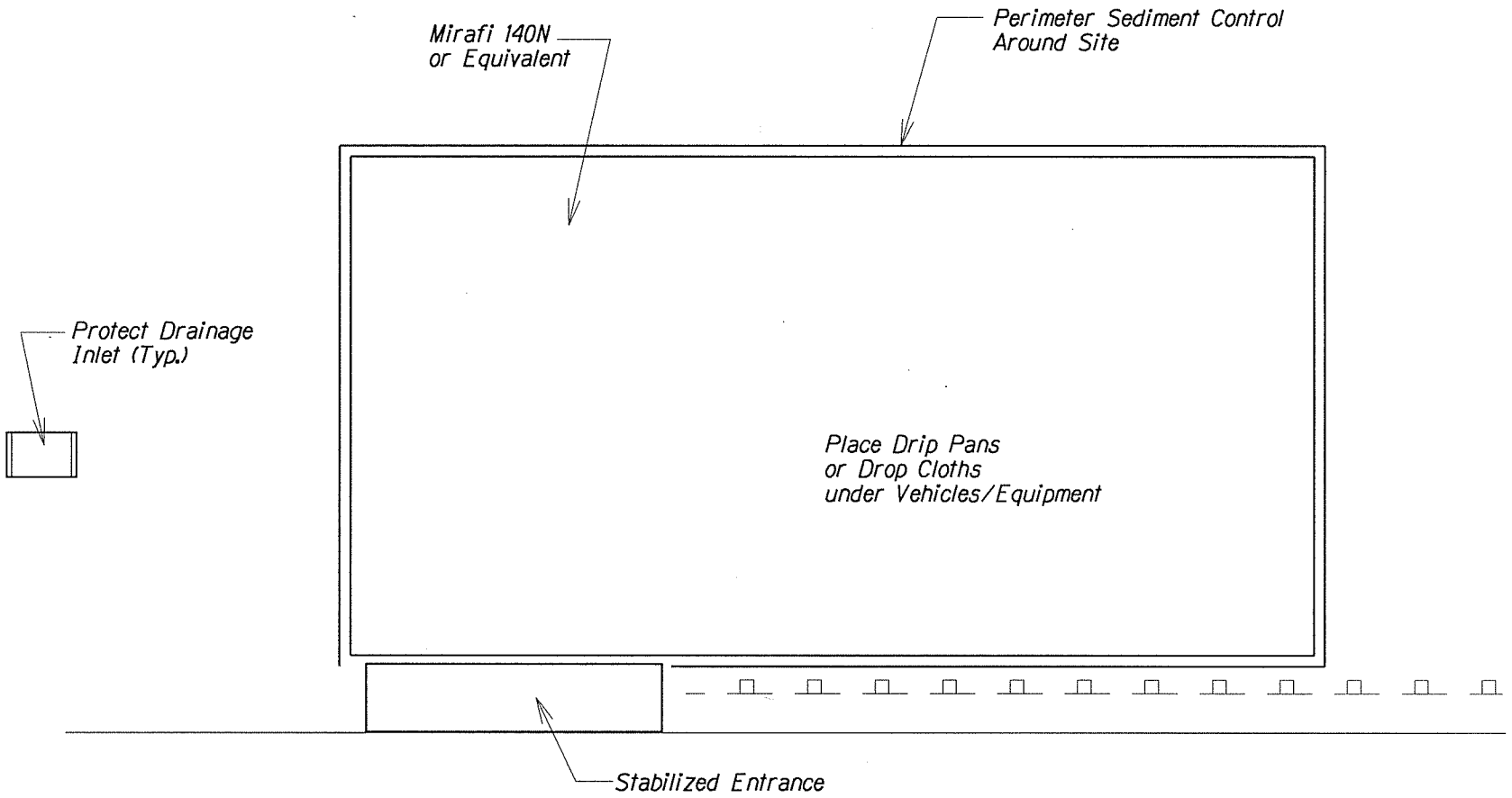
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

MISCELLANEOUS PERMANENT BEST MANAGEMENT PRACTICES ON OAHU
PROJECT NO. HWY-0-02-11

Scale:

Date: March. 2012

SHEET No. OF SHEETS

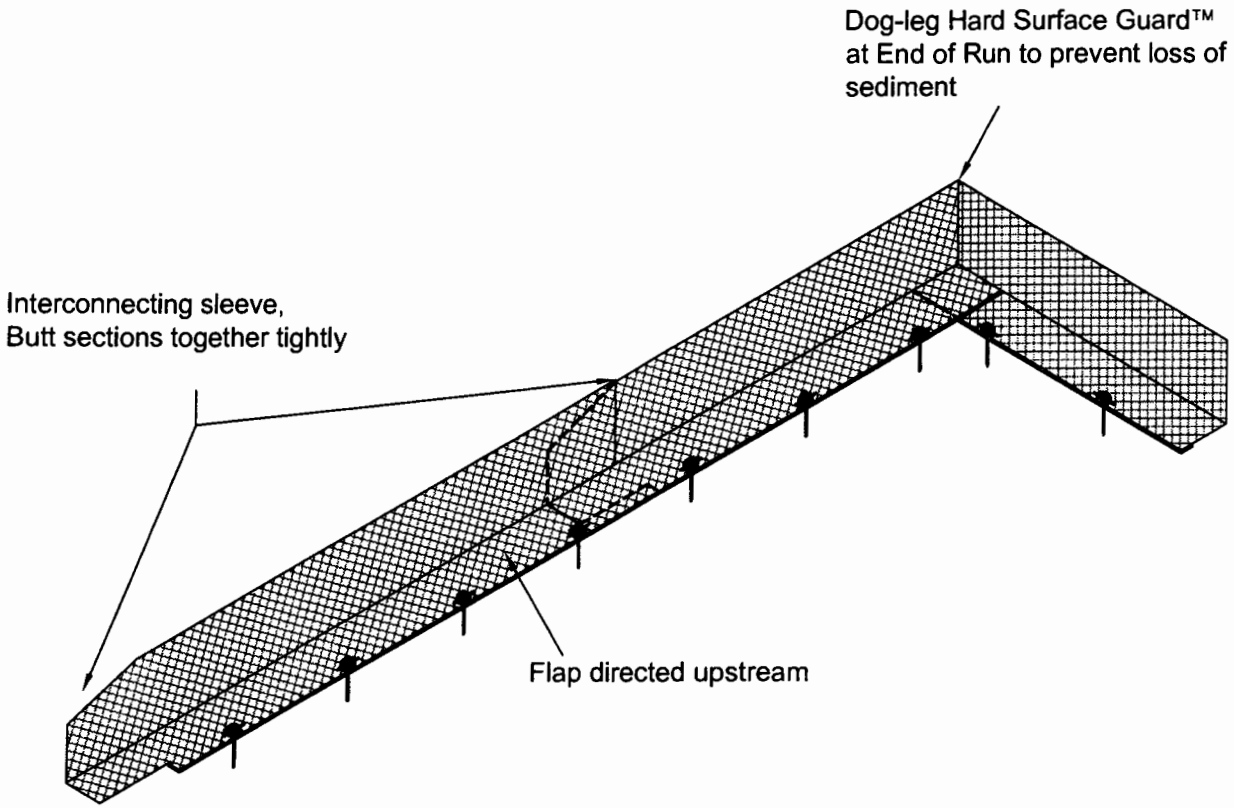


Note:
1) Restore area to equivalent of original condition once construction is completed.
2) Contractor shall ensure proper protection for Equipment Storage Area.

EQUIPMENT STORAGE AREA
Not to Scale

Hard Surface Guard™

End-of-Run Details



Maintenance

Perform maintenance as required. Inspect following rainfall events and at least daily during prolonged rainfall. Maintain to provide an adequate sediment holding capacity. Debris shall be removed daily and sediment shall be removed when the sediment accumulation reaches 50% of the barrier height. Removed sediment shall be incorporated in the project at designated locations.

**** NOT TO SCALE ****

#	Date	Revisions
1	02/28/07	Initial Drawings
2	00/00/00	
3	00/00/00	
4	00/00/00	

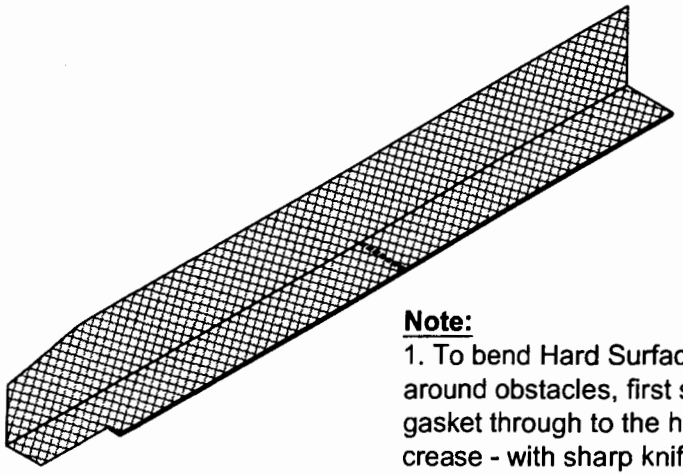
ERTEC Environmental Systems
http://www.ertecsystems.com/
1150 Ballena Blvd.
Suite 250
Alameda, CA 94501
P. 866-521-0724
F. 510-521-3972

ERTEC

File Name: Ertec_Installation_Details_HSG.Dwg
Layout Name: P2 End-of-run
Default Print Size: 8.5" x 11"

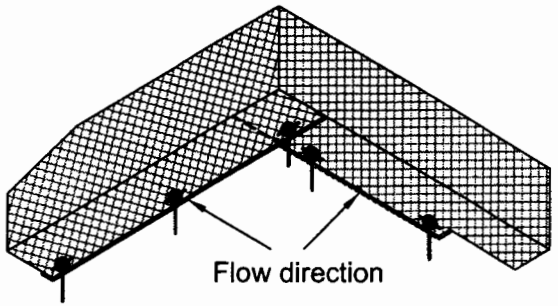
Hard Surface Guard™

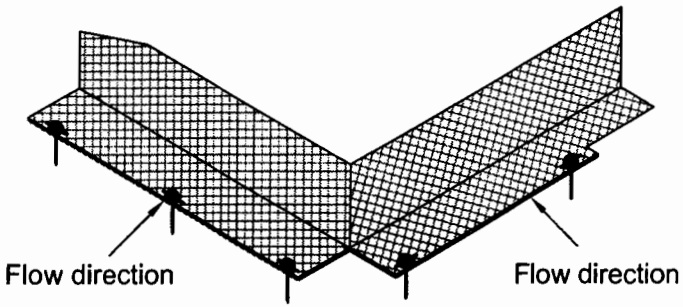
Angled Installation - 90°



Note:

1. To bend Hard Surface Guard™ around obstacles, first slit flap and gasket through to the horizontal crease - with sharp knife or shears.
2. Then bend to desired angle, in either direction, as shown.





Note:

1. If bend is in this direction, locate gravel bag at the angle to prevent underflow

Maintenance

Perform maintenance as required. Inspect following rainfall events and at least daily during prolonged rainfall. Maintain to provide an adequate sediment holding capacity. Debris shall be removed daily and sediment shall be removed when the sediment accumulation reaches 50% of the barrier height. Removed sediment shall be incorporated in the project at designated locations.

**** NOT TO SCALE ****

#	Date	Revisions
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2	00/00/00	
3	00/00/00	
4	00/00/00	

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Alameda, CA 94501
P. 866-521-0724
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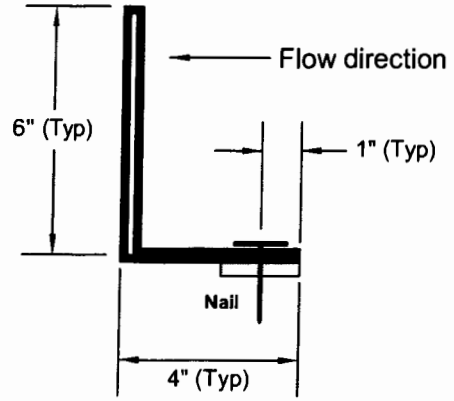
ERTEC

File Name: Ertec_Installation_Details_HSG.Dwg
Layout Name: P3 Angled Installation - 90°
Default Print Size: 8.5" x 11"

HARD SURFACE GUARD™

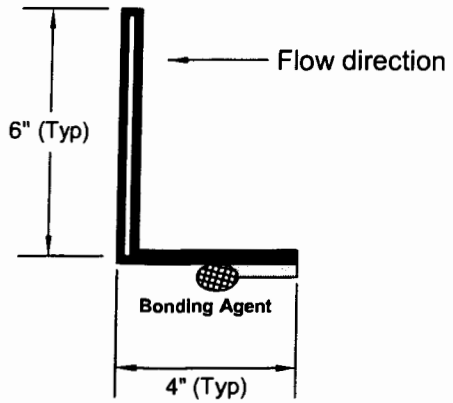
Anchor Details

1. Asphalt Installation
Masonry Nails



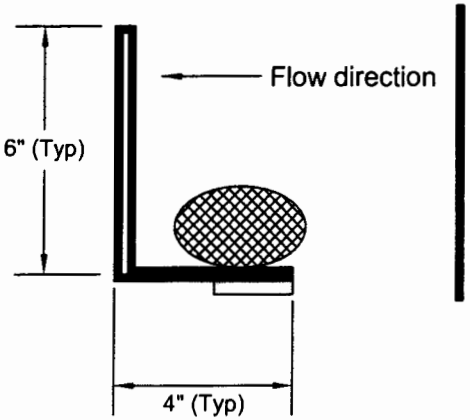
Notes:
1. Install nails flush with netting so that gasket is in good contact with surface.
2. Install 4 to 5 nails per each seven food segment. Use HILTI X-ZF 1½" fasteners with 23mm pre-mounted steel washer (X-ZF 32 P8 S23) or equivalent with automatic powder-actuated hand tool.

2. Asphalt or Concrete
Bonding Agent



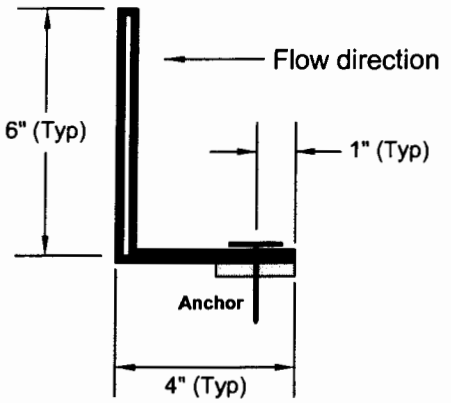
Notes:
1. Install bonding agent between gasket and surface. Use PaverBond, Liquid Nails, or other equivalent. Anchor with gravel bags or other weights until set.

3. Asphalt or Concrete Installation
Gravel Bags, Snake Bags



Notes:
1. Install anchor flap facing upstream. Place small snake bags or equivalent (gravel bags) containing clean, pea-sized graded gravel every 2.5 feet. Additional bags can be placed on the flap as necessary to assure good gasket to surface contact.

4. Alternative Concrete Installation
Concrete Anchors



Notes:
1. Install anchors flush with netting so that gasket is in good contact with surface.
2. Install 4 to 5 anchors per each seven foot segment. Use Red Head Redi-Drive or Hammer Set ¼" x 1¼" anchors or equivalent.

Maintenance

Perform maintenance as required. Inspect following rainfall events and at least daily during prolonged rainfall. Maintain to provide an adequate sediment holding capacity. Debris shall be removed daily and sediment shall be removed when the sediment accumulation reaches 50% of the barrier height. Removed sediment shall be incorporated in the project at designated locations.

**** NOT TO SCALE ****

#	Date	Revisions
1	02/28/07	Initial Drawings
2	00/00/00	
3	00/00/00	
4	00/00/00	

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ERTEC

File Name: Ertec_Installation_Details_HSG.Dwg
Layout Name: P4 Anchor Details
Default Print Size: 8.5" x 11"

SNAKE BAG



The Green Snake Bag is a specially engineered UV resistant monofilament geotextile fabric bag intended to be filled with coarse sand or fine clean gravel for use as a sediment control device.

The Green Snakes Bags are commonly used as gravel "wattles" catch basin/curb inlet protection, grated inlet protection, check structures, filter berms, sediment control devices, etc (see back of brochure for function and common uses)

The Green Snake bag unique physical properties woven seams (which gives the bag overall strength stronger than traditional welding, gluing and standard sewing seams). Material makeup (which gives the Snake bag the ability to conform to irregular terrain better than traditional woven polypropylene bags of similar construction) and the high UV rating 3 to 7 years (depending on color) makes the snake bag the chose for most sediment control projects.

The material is designed to withstand moderate road traffic which is superior over the traditional poly or burlap sand bags that have been used in the past for sediment control as well as their fixed high filtration design enables the sediment laden water turbidity to be reduced as the water passes through a series of snake bags on its way to the drain outlet.

Physical Properties:

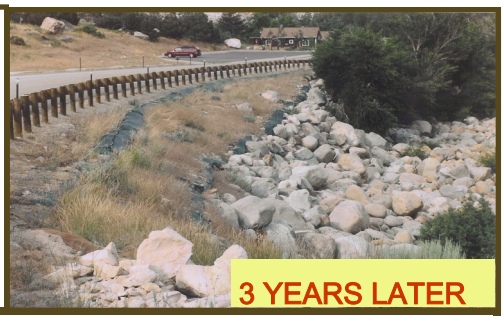
Fabric Structure:	Woven	Yarn: High density polyethylene
Physical Property:	Test Method:	(MEAN) Roll Value
Grab Tensile Strength:	ASTM D4632	W326/F216 lbs
Fabric Weight:	D-5261	5 oz/sq./yd.
Mullen Burst Strength	ASTM D3786	376 lbs./in/sq.
Water Flow	ASTM D4491	180 gal/ft./sq./min.
UV Resistance (@2000 hrs)	ASTM D4355	> 70%

Sizing: lengths and diameters can be custom to project needs please see your local distributor for information and availability in your area.

ESI Resource Services 11854 Larisa Way Rancho Cordova, CA 95742 Phone number 916-985-7787 | fax number 916-985-7887

20 ” *Anaconda Bags* above dry channel (river underground)

- note toe berm function & curb function above
- Sinks Canyon WY 4-11-05



INSTALLATION INSTRUCTIONS:

The green snake bag can be filled with clean coarse sand or gravel (up to ¾ ”) .

For Larger Diameter Anaconda Bags up to 20 ” to 24 ” 1 ” to 1 1/4 ” minus gravel should be used.

Caution should be taken not to over fill the bag….. Bags should be placed with the flap side down and the tied end on the flap which creates a seal where the 2 bags intersects. For higher follow areas, 2 row of bags can be installed side by side staggering joints.

FUNCTIONS:

Snake bags is a practical BMP that can serve multiple functions at the same time.

- Surface protection either on a slope or in a channel
- Minimization of concentrated flows
- Velocity reduction either on slopes or in channels
- Sediment capture

APPLICATIONS:

Snake bags are suitable for multiple applications:

- *Disrupting concentrated flows*
- *Capturing sediment by ponding*
- *Used in place of silt fence*
- *Rock check dams*
- *Ridge diversions*
- *Pipe socks*
- *Level spreader*
- *Redirecting concentrated flows*
- *Anchoring other devices*
- *Used as toe berms*
- *Rock outlet protection*
- *Inlet protection*
- *Mulch filled filter bags*
- *Oil absorption containment*

Or part of the structure of sediment basins, sediment traps, storm drain diversions, and structural stabilization of streams.

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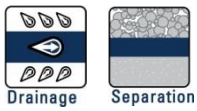
TENCATE Mirafi®



Mirafi® 170N

Mirafi® 170N is a needlepunched nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Mirafi® 170N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D4632	N (lbs)	801 (180)	801 (180)
Grab Tensile Elongation	ASTM D4632	%	50	50
Trapezoid Tear Strength	ASTM D4533	N (lbs)	334 (75)	334 (75)
CBR Puncture Strength	ASTM D6241	N (lbs)	2003 (450)	
Apparent Opening Size (AOS)[1]	ASTM D4751	mm (U.S. Sieve)	0.15 (100)	
Permittivity	ASTM D4491	sec^{-1}	1.4	
Flow Rate	ASTM D4491	$l/min/m^2$ ($gal/min/ft^2$)	4278 (105)	
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	70	

[1] ASTM D 4751: AOS is a Maximum Opening Diameter Value

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D5261	g/m^2 (oz/yd^2)	251 (7.4)
Thickness	ASTM D5199	mm (mils)	1.7 (67)
Roll Dimensions (width x length)	--	m (ft)	4.5 x 91 (15 x 300)
Roll Area	--	m^2 (yd^2)	418 (500)
Estimated Roll Weight	--	kg (lb)	111 (245)

Made in USA

TENCATE™ materials that make a difference

FGS000347
ETQR27