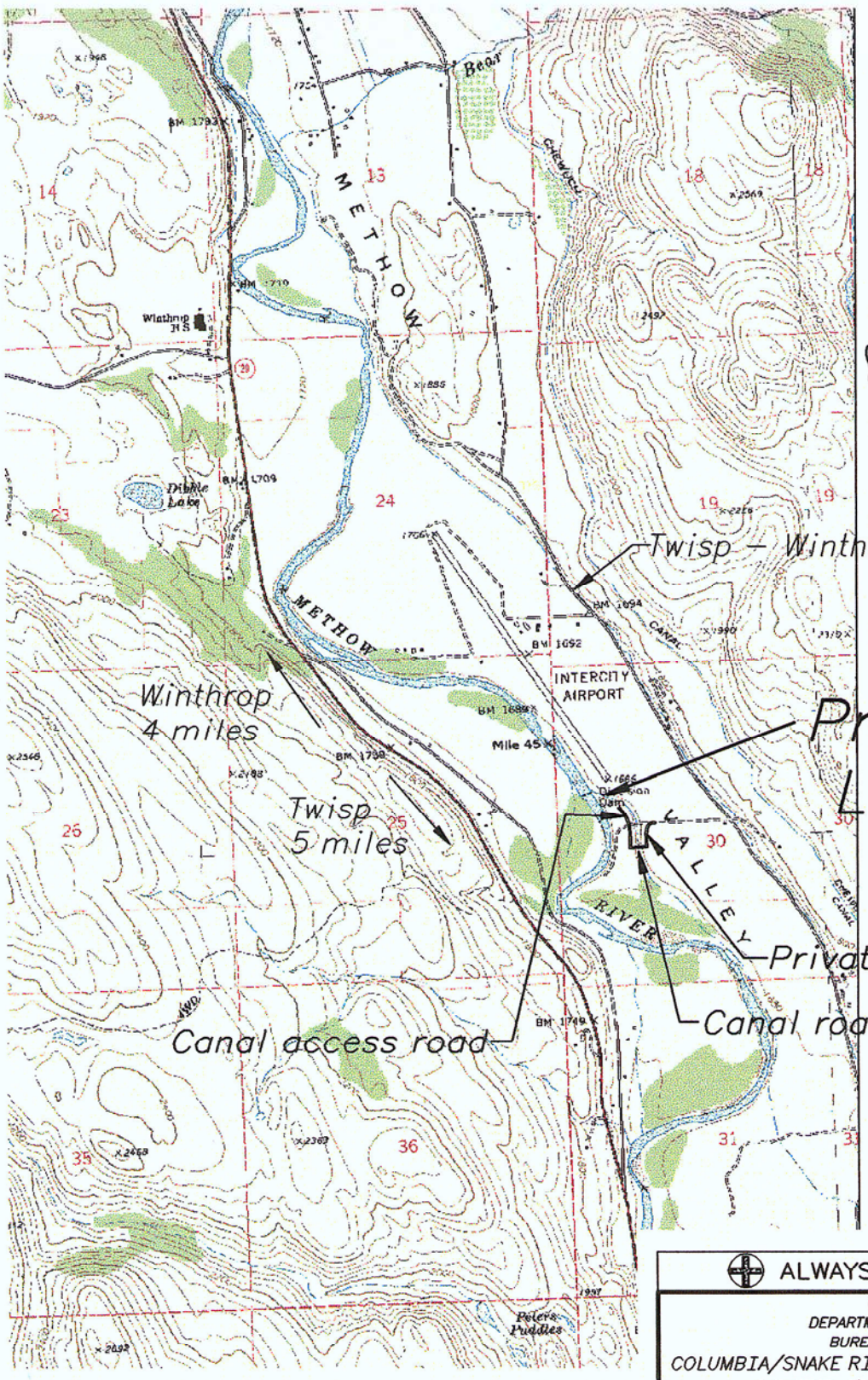
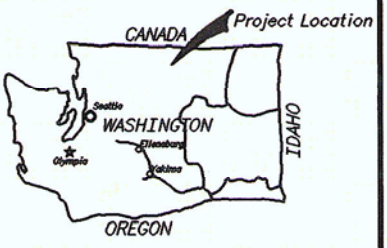
APPENDIX A
MVID East Fish Screen Structure





0 1 1.5

SCALE OF MILES

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UNITED STATES
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BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION

LOCATION MAP

DESIGNED _____	TECH. APPROVAL _____
DRAWN GGrooms _____	SUBMITTED _____
CHECKED _____	APPROVED _____ REGIONAL ENGINEER
CADD SYSTEM AutoCAD Rel. 15.06	CADD FILENAME 1678-100-305.DWG
BOISE, IDAHO MAY 1, 2003	1678-100-305

DATE AND TIME PLOTTED
AUGUST 1, 2003 10:41
PLOTTED BY
EMORDHORST

SURVEY CONTROL POINTS				
Number	Northing	Easting	Elevation	Description
1	518,321.24	1,808,601.04	1686.73	rebar
2	518,399.46	1,808,511.84	1689.29	rebar
50	518,063.45	1,808,621.11	1668.99	spike

NOTES:

- date of survey, November 2002
- horizontal control – Washington state plane coordinate system north zone nad 83 based on gps observation from ngs station "f 378"
- vertical control – north American vertical datum of 1988 based on gps observation from ngs station f 378 elevation 1752.83

LEGEND

- 6' Chain link fence
- Approximate construction ROW boundary
- Approximate permanent ROW boundary
- Approximate existing permanent ROW boundary
- Approximate property boundary

Washington State Div. of Aeronautics
Washington State Dept. of Lands
36" wide gate
CP #2
70'±
12"ø tree to be removed
Trashrack and walkway (–326)
CP #1
6' chain link fence
Existing fish screen structure and fence to be removed
Estimated "High water line"
Existing Headworks
Existing diversion dam
Fishscreen structure (–312)
Check structure (–327)
Existing Fish Ladder
Approximate limits of existing permanent ROW
Approximate limits of permanent ROW
Existing fish return pipe. Cap each end and abandon in place.
Approximate limits of staging area
Fish return inlet structure (–312)
14' wide double gate
6' chain link fence
Methow River flow
Estimated existing contour lines (typ.)
Approximate limits of existing access road
Fish return pipe (–307)
Approximate property corner
Washington State Div. of Aeronautics
Fish return outlet structure (–307)
CP #50
Merutka (private)
Approximate limits of permanent ROW
Approximate limits of construction ROW
Merutka (private)
Washington State Dept. of Lands
50.00'
40.00'
100.00'
60.00'
20.00'
50.00'
E1808300
N518300
E1808700
N518300
N518200
E1808400
N518100
E1808600
N518100
SCALE OF FEET 20 0 20 40 60

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COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION

FISHSCREEN STRUCTURE

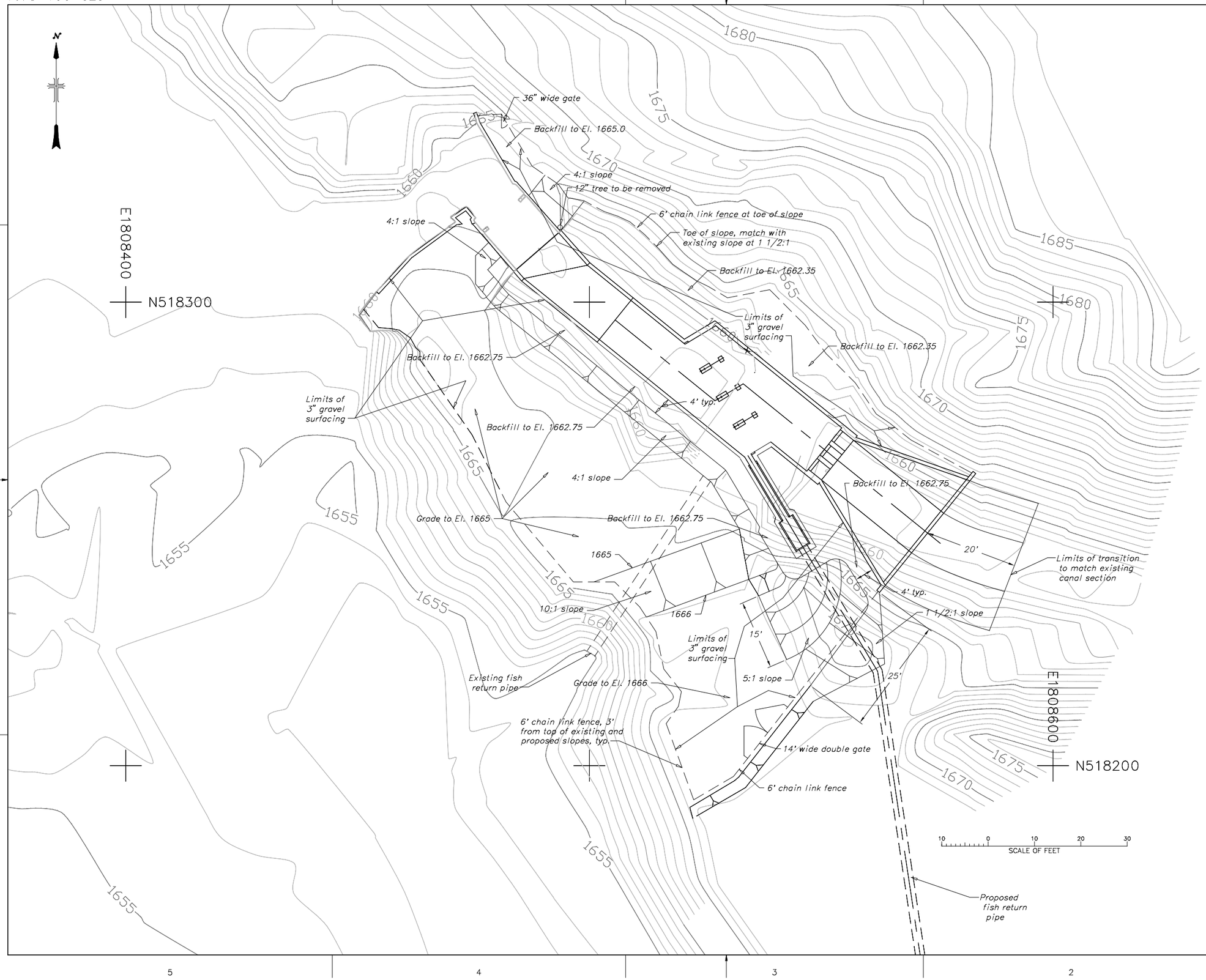
SITE PLAN

DESIGNED _____ CHECKED _____
DRAWN Ed Mordhorst/G. Hope TECH. APPROVAL _____
PROGRAM MANAGER

CADD SYSTEM AutoCAD Rel. 15.06 BOISE, IDAHO
CADD FILENAME 1678-100-324.DWG
23 JULY 2003
1678-100-324
SPECIFICATION #

SEPTEMBER 3, 2003 11:30
PLOTTED BY RODRZYCA

1678-100-323



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COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

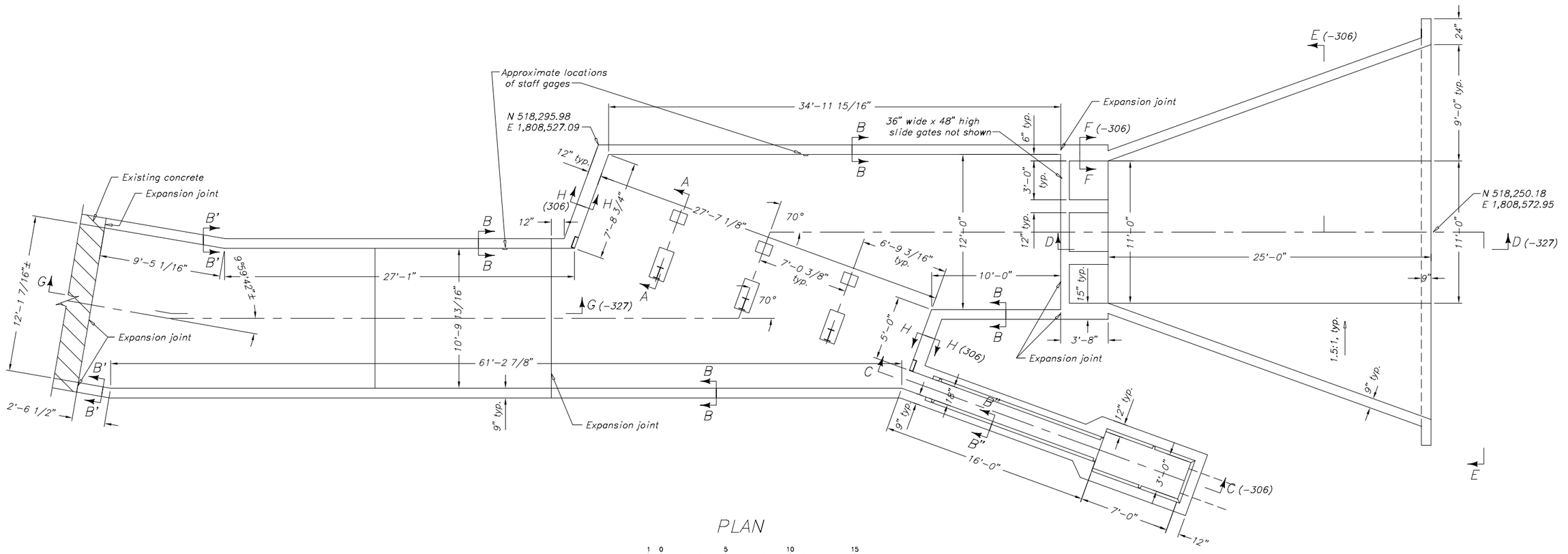
MVID EAST DIVERSION

FISHSCREEN STRUCTURE

GRADING PLAN

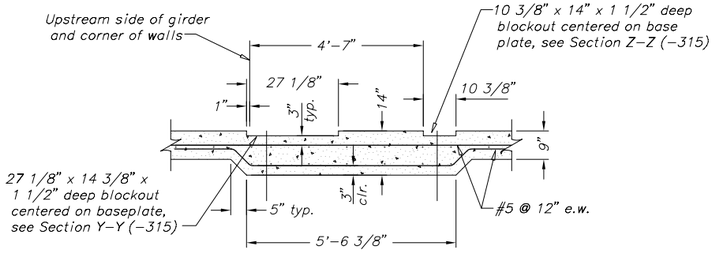
DESIGNED	CHECKED
DRAWN	TECH. APPROVAL
	PROGRAM MANAGER
CADD SYSTEM: AutoCAD Rel. 15.06	CADD FILENAME: 1678-100-323.DWG
BOISE, IDAHO	21 JULY 2003
SPECIFICATION #	1678-100-323

SEPTEMBER 3, 2003 11:00
PLOTTED BY
RDORCZYCA

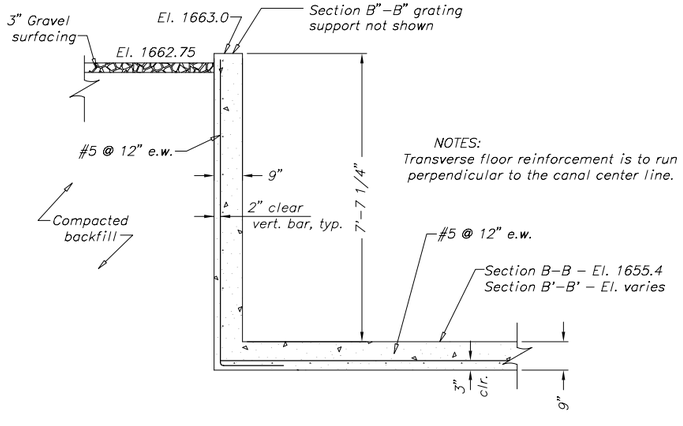


PLAN

1 0 5 10 15
SCALE OF FEET



SECTION A-A



SECTION B-B
(Section B'-B' similar)
(Section B"-B" similar)

1 0 1 2 3 4 5
SCALE OF FEET

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COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION

FISH SCREEN STRUCTURE

CONCRETE - PLAN AND SECTIONS

DESIGNED _____ CHECKED _____

DRAWN Ed Mordhorst TECH. APPROVAL _____

PROGRAM MANAGER

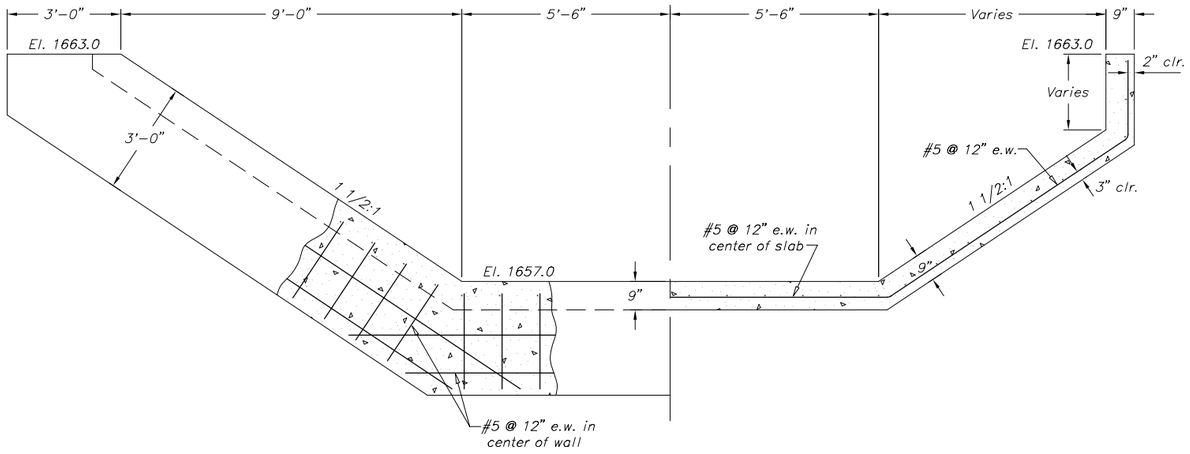
CADD SYSTEM AutoCAD Rel. 15.06
BOISE, IDAHO

CADD FILENAME 1678-100-312.DWG
8 JULY 2003

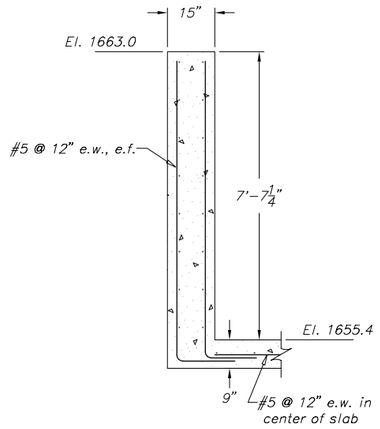
1678-100-312

SPECIFICATION #

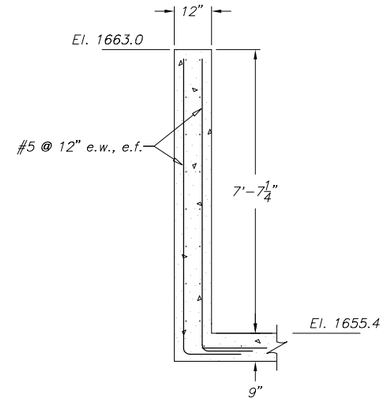
SEPTEMBER 3, 2003 11:38
PLOTTED BY RODRIZTCA



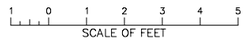
SECTION E-E
(-312)

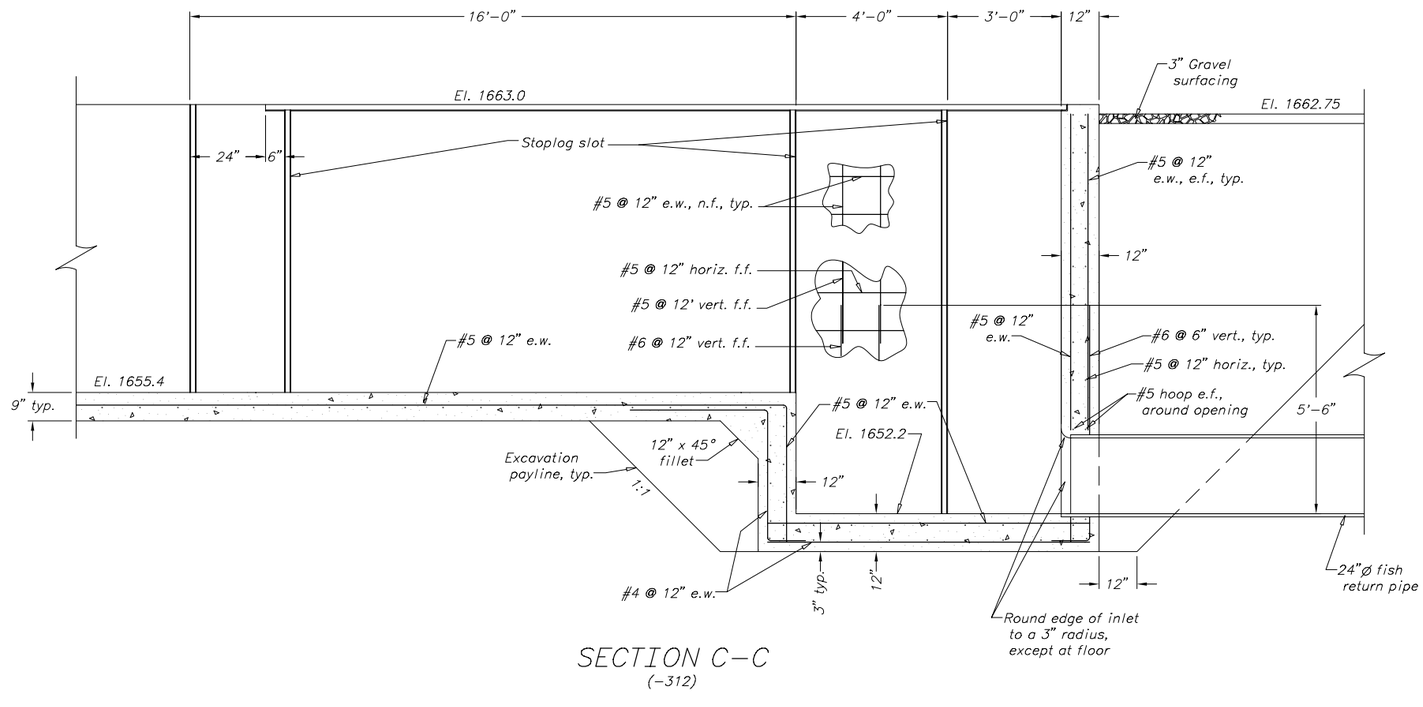


SECTION F-F
(-312)



SECTION H-H
(-312)





SECTION C-C
(-312)

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COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION
FISH SCREEN STRUCTURE
CONCRETE SECTIONS

DESIGNED _____ CHECKED _____

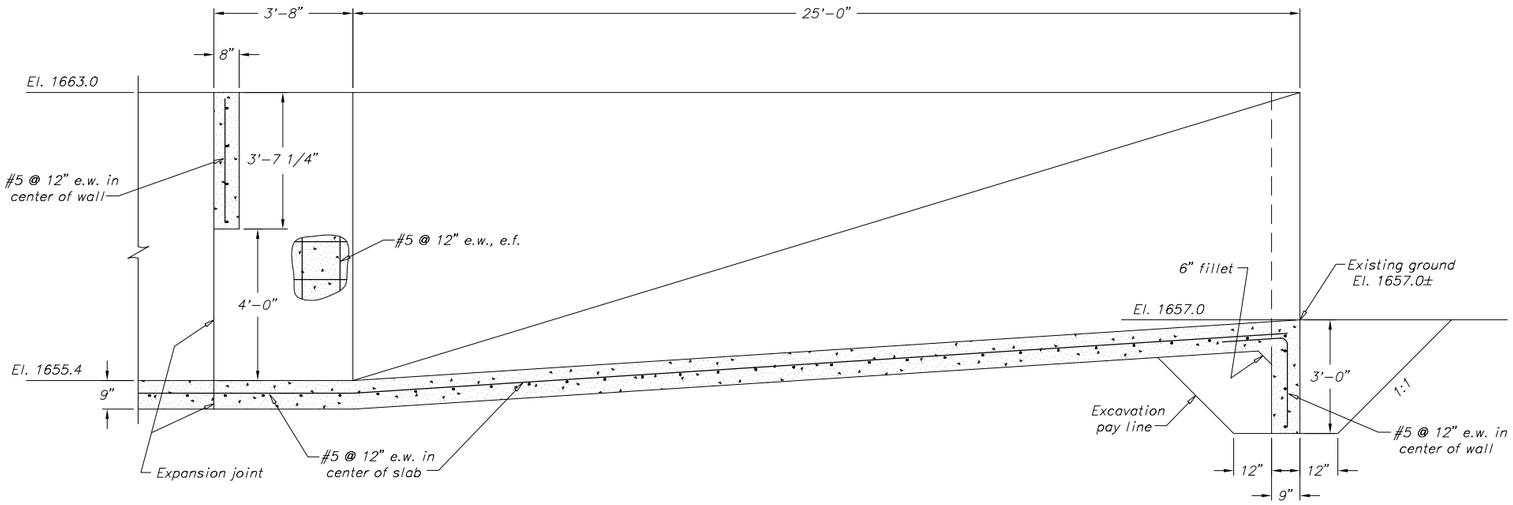
DRAWN Ed Mordhorst TECH. APPROVAL _____

PROGRAM MANAGER

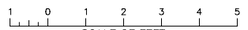
CADD SYSTEM AutoCAD Rel. 15.06	CADD FILENAME 1678-100-306.DWG
BOISE, IDAHO 27 JUNE 2003	1678-100-306

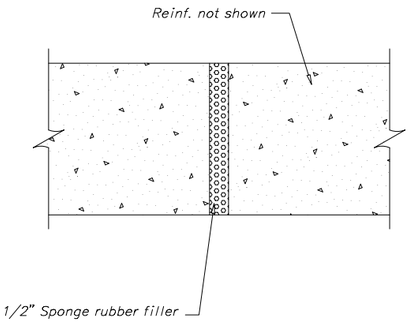
SPECIFICATION #

SEPTEMBER 3, 2003 11:37
PLOTTED BY
RGOMEZTCA

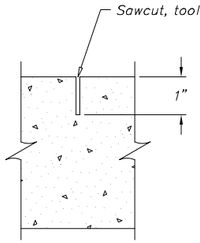


SECTION D-D
(-312)

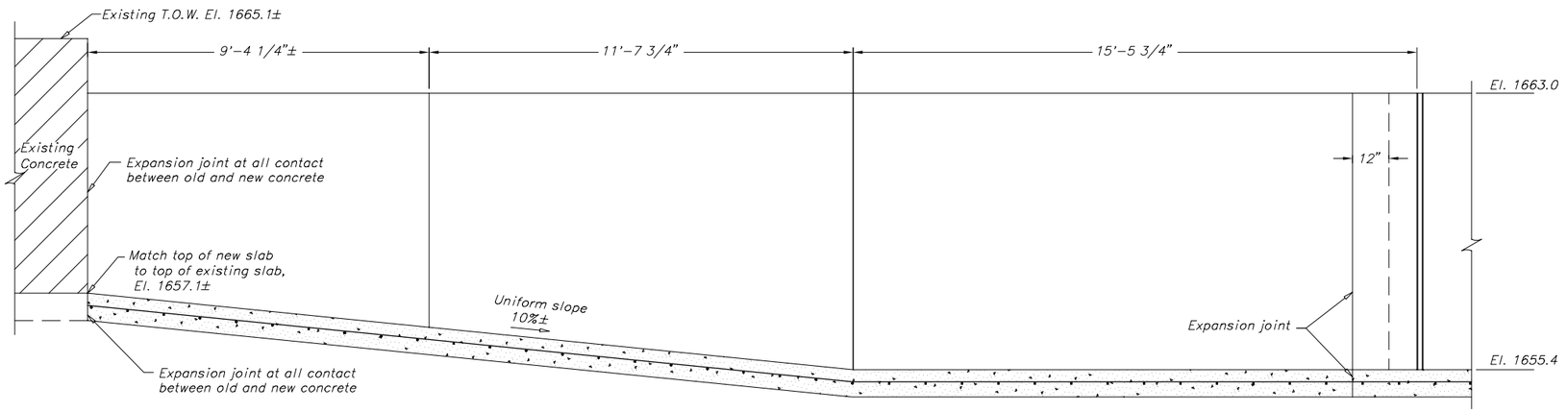




TYPICAL EXPANSION JOINT



TYPICAL CONTRACTION JOINT



SECTION G-G
(-312)

NOTE:
Transverse construction or contraction joint @10' max. spacing in walls and floors between expansion joints, in section G-G only

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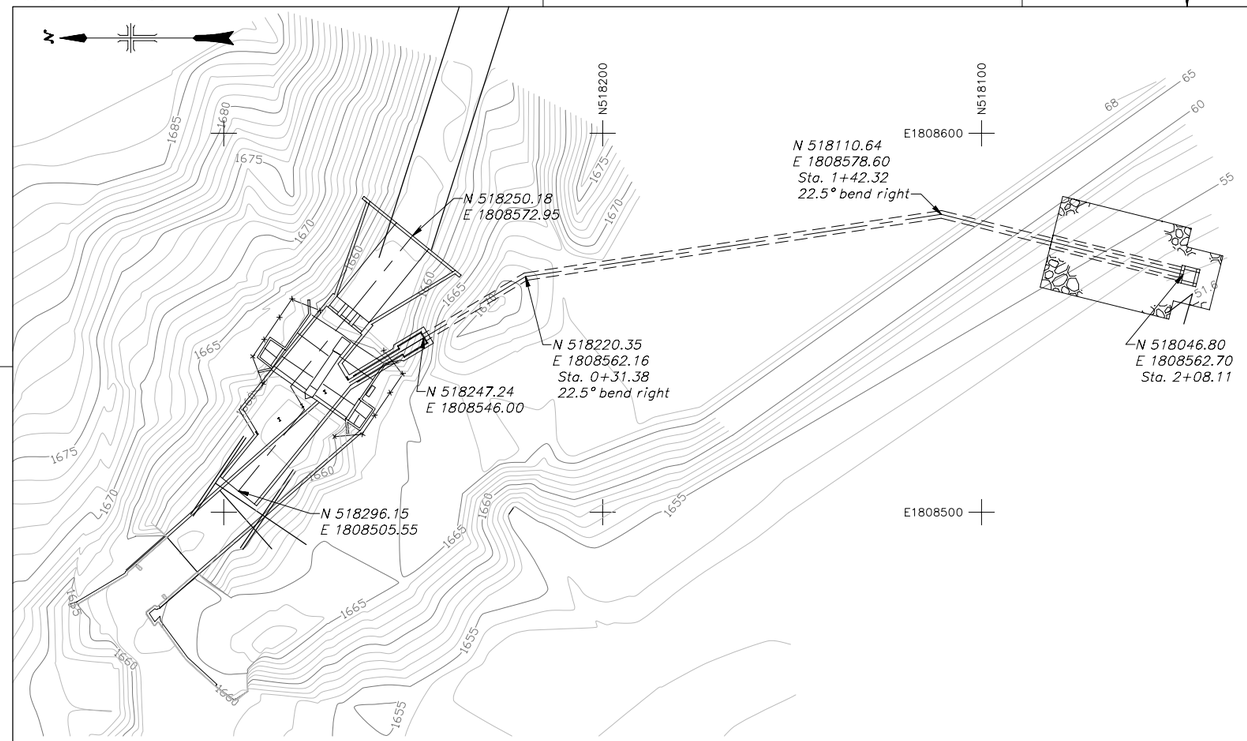
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION
FISHSCREEN STRUCTURE
CONCRETE SECTIONS AND DETAILS

DESIGNED _____ CHECKED _____
DRAWN Ed Mordhorst TECH. APPROVAL _____
PROGRAM MANAGER

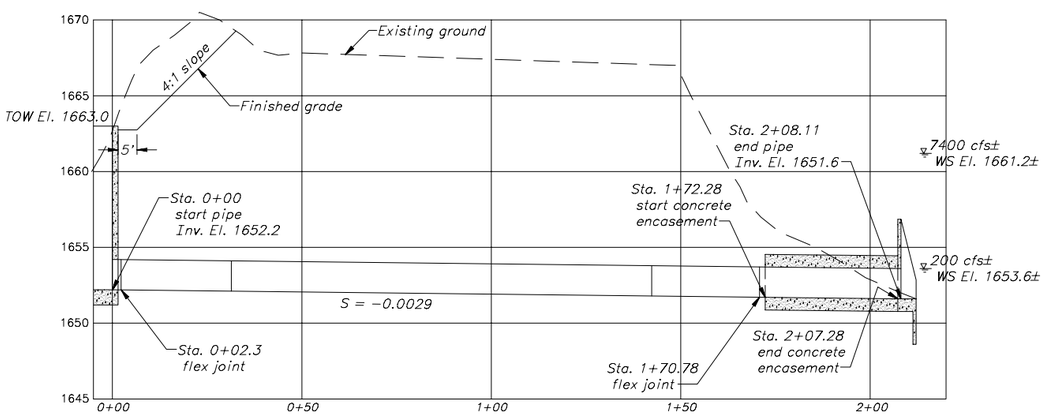
CADD SYSTEM AutoCAD Rel. 15.06	CADD FILENAME 1678-100-327.DWG
BOISE, IDAHO 29 JULY 2003	1678-100-327
SPECIFICATION #	

SEPTEMBER 3, 2003 11:39
PLOTTED BY
RODRCZYCA

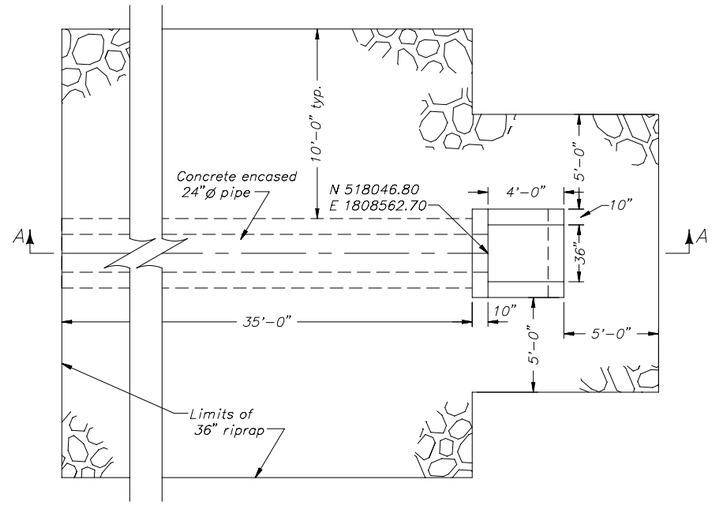


SITE PLAN

20 0 20 40 60
SCALE OF FEET

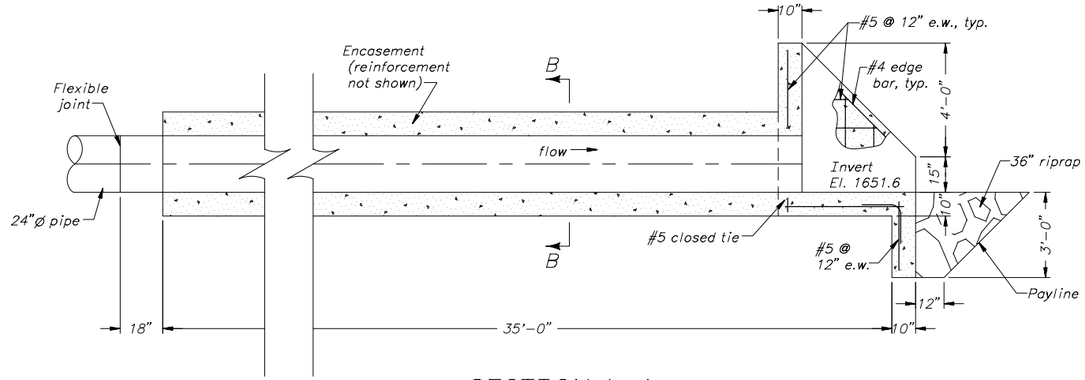


FISH RETURN PIPE – PROFILE



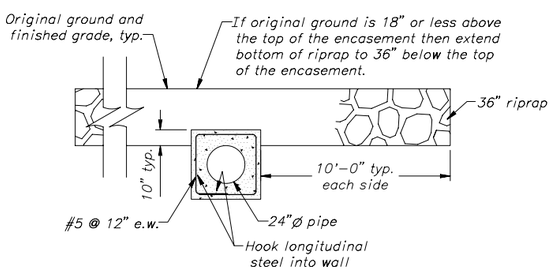
FISH RETURN OUTLET STRUCTURE PLAN

1 0 5 10 15
SCALE OF FEET



SECTION A–A

1 0 1 2 3 4 5 6 7 8
SCALE OF FEET



SECTION B–B

1 0 5 10 15
SCALE OF FEET

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BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION

FISHSCREEN
FISH RETURN PIPE
PLAN, PROFILE, AND SECTIONS

DESIGNED _____ CHECKED _____

DRAWN Ed Mordhorst TECH. APPROVAL _____

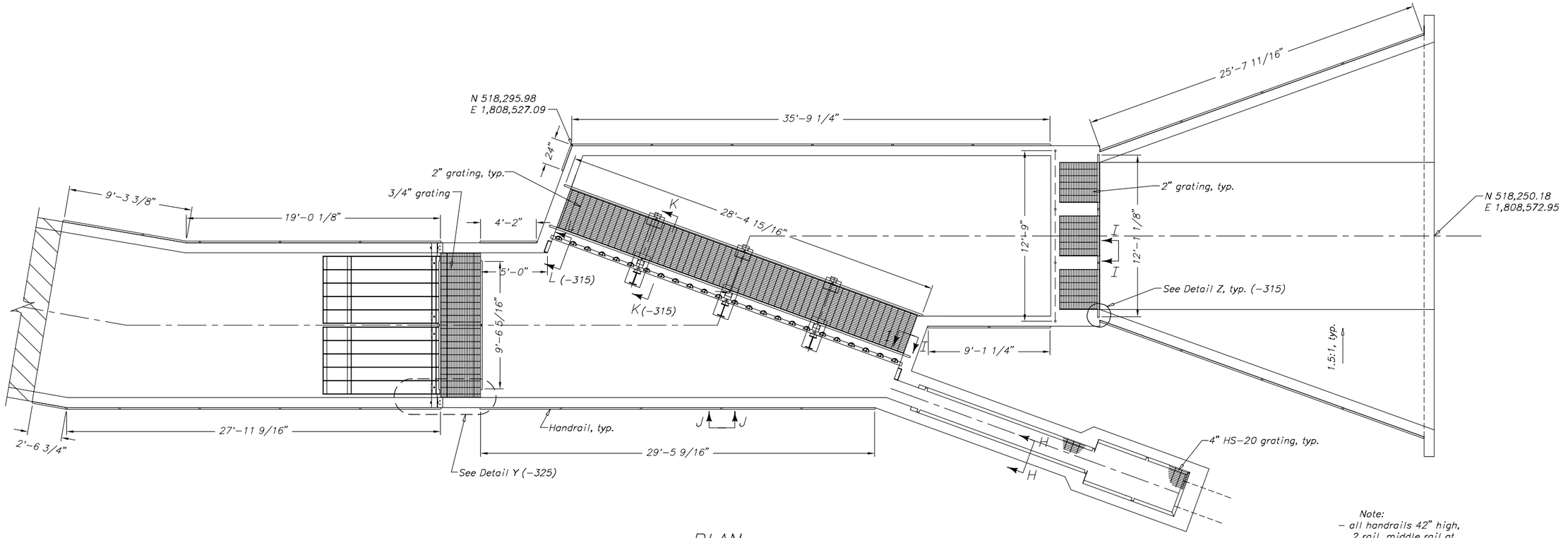
PROGRAM MANAGER

CADD SYSTEM	CADD FILENAME
AutoCAD Rel. 15.06	1678-100-307.DWG
BOISE, IDAHO	9 JULY 2003

1678-100-307

SPECIFICATION #

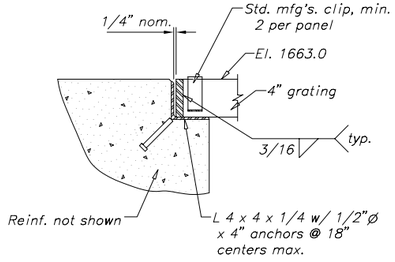
SEPTEMBER 3, 2003 12:00
PLOTTED BY
RDORCZYCA



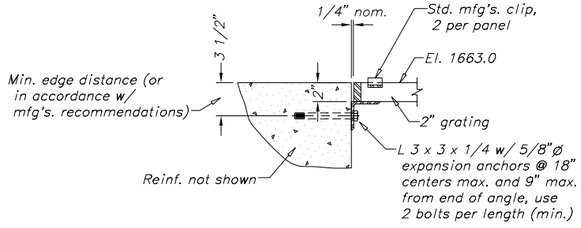
PLAN

1 0 5 10 15
SCALE OF FEET

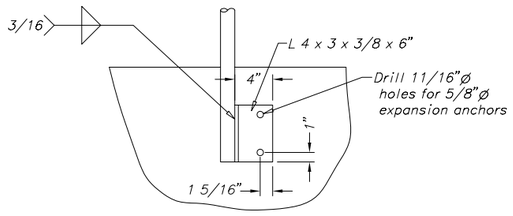
Note:
– all handrails 42" high, 2 rail, middle rail at 21" high, 8 foot max. post spacing.



SECTION H-H



SECTION I-I



Note:
Handrail post to be flush with edge of concrete

SECTION J-J

1 0 1 2
SCALE OF FEET

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COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION

FISH SCREEN STRUCTURE

METALWORK – PLAN AND SECTIONS

DESIGNED _____ CHECKED _____

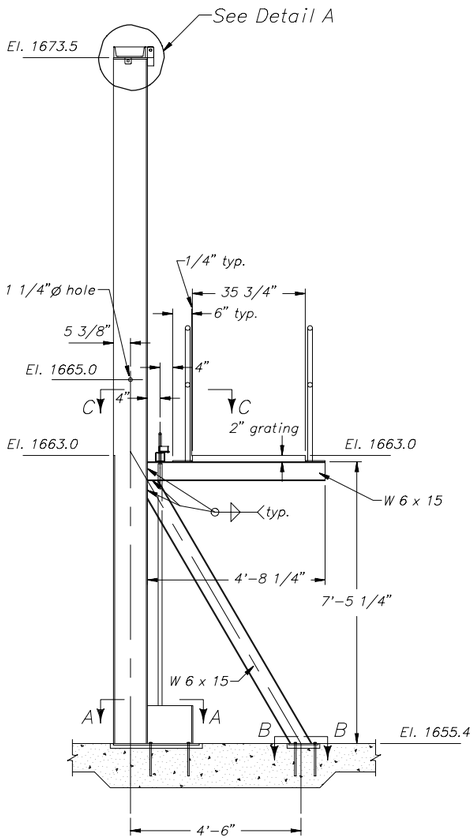
DRAWN Ed Mordhorst TECH. APPROVAL _____

PROGRAM MANAGER

CADD SYSTEM	CADD FILENAME
AutoCAD Rel. 15.06	1678-100-326.DWG
BOISE, IDAHO 22 JULY 2003	1678-100-326

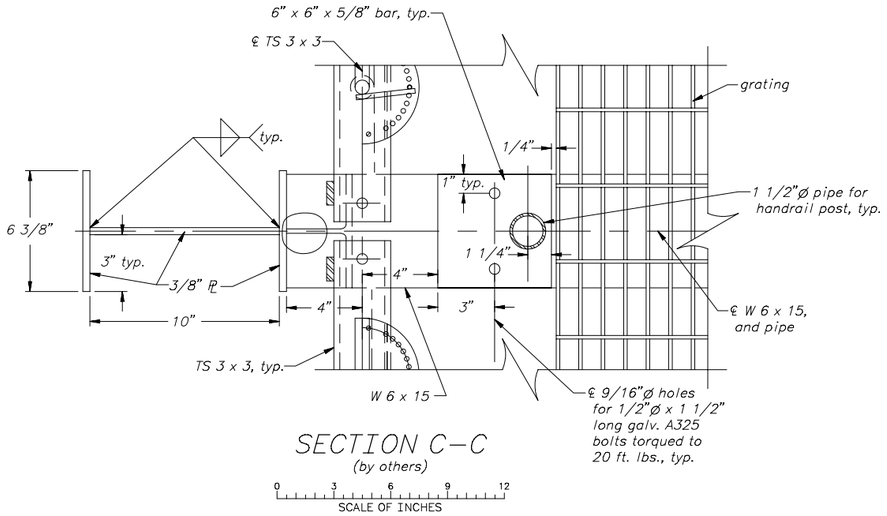
SPECIFICATION #

SETTLEMENT 3, 2003 12:01
PLOTTED BY
RDORCZYCA



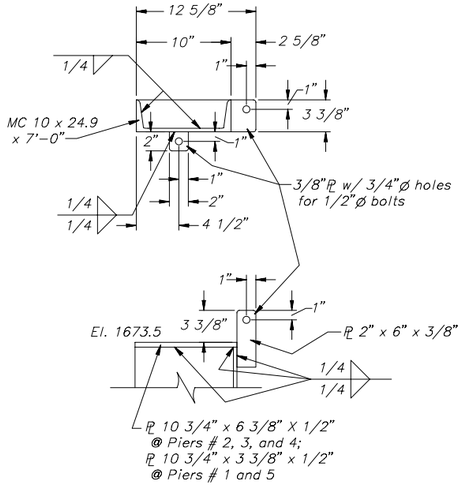
SECTION K-K
(-326)
(Typical Section, Piers 2, 3, & 4)
(by others except for blockouts and reinforced concrete)

1 0 1 2 3 4 5
SCALE OF FEET

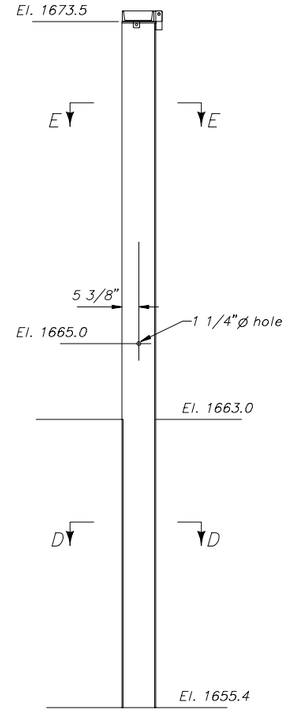


SECTION C-C
(by others)

0 3 6 9 12
SCALE OF INCHES

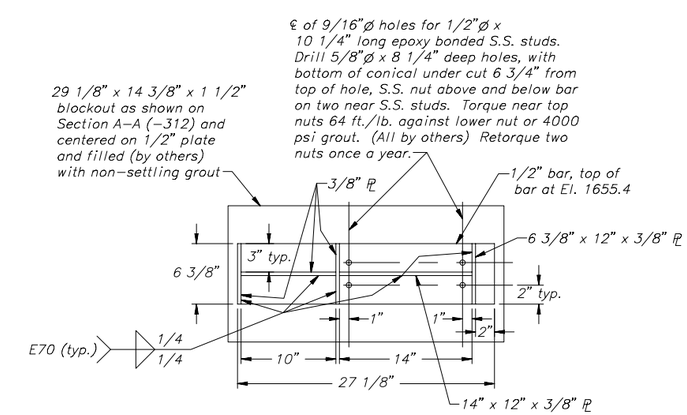


DETAIL A
(by others)
(Exploded)



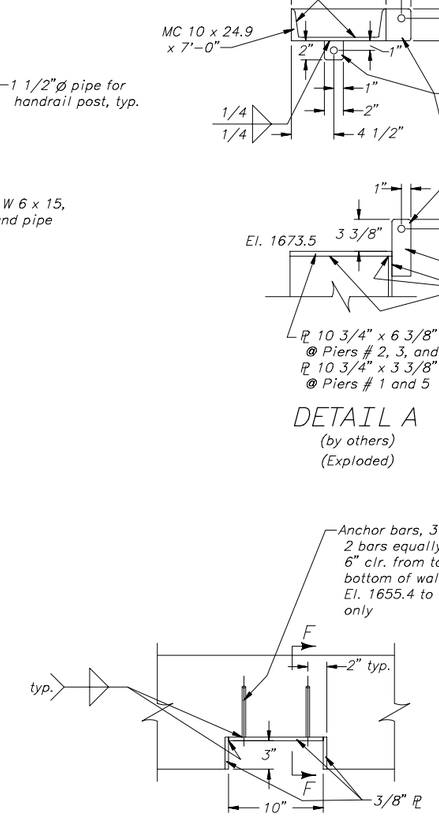
SECTION L-L
(-326)
(Piers 1 and 5, Typical Section)
(Pier 5 shown, Pier 1 opposite hand)

1 0 1 2 3 4 5
SCALE OF FEET

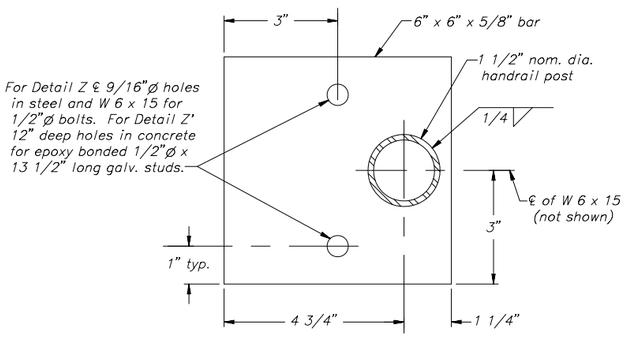


SECTION A-A
(by others except for blockouts & reinforced concrete)

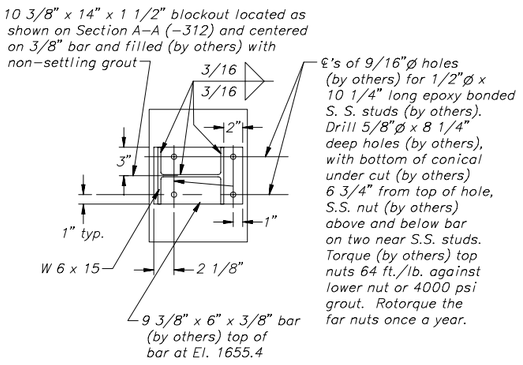
1 0 1 2
SCALE OF FEET



SECTION D-D

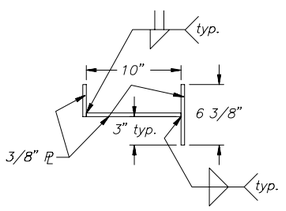


DETAIL Z
(-326)
(by others)

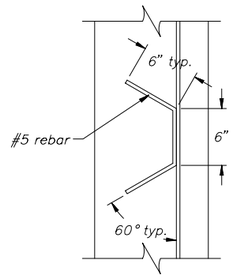


SECTION B-B
(by others except for blockouts & reinforced concrete)

1 0 1 2
SCALE OF FEET



SECTION E-E



SECTION F-F

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COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION
FISHSCREEN STRUCTURE
METALWORK - SECTIONS AND DETAILS

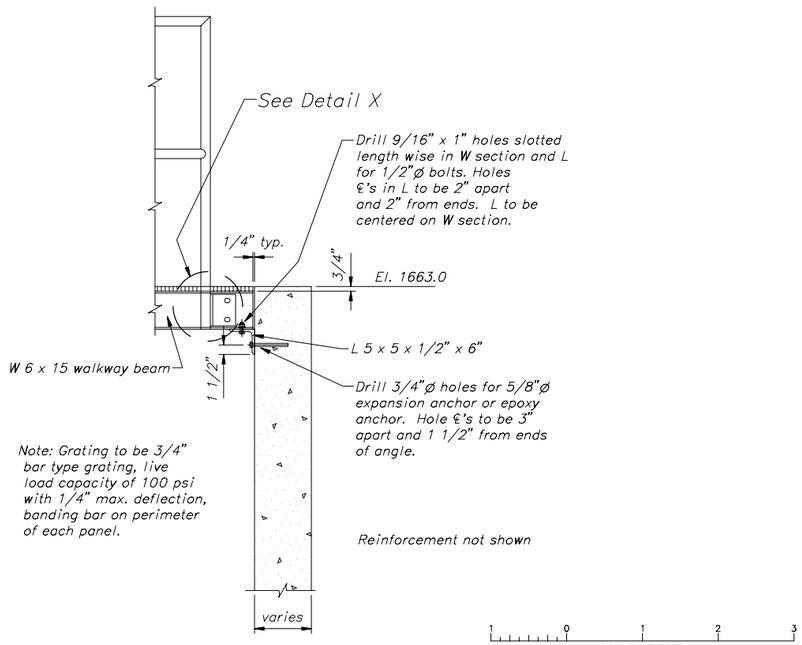
DESIGNED _____ CHECKED _____
DRAWN _____ TECH. APPROVAL _____
PROGRAM MANAGER

CADD SYSTEM	CADD FILENAME
AutoCAD Rel. 15.06	1678-100-315.DWG
BOISE, IDAHO	17 JULY 2003

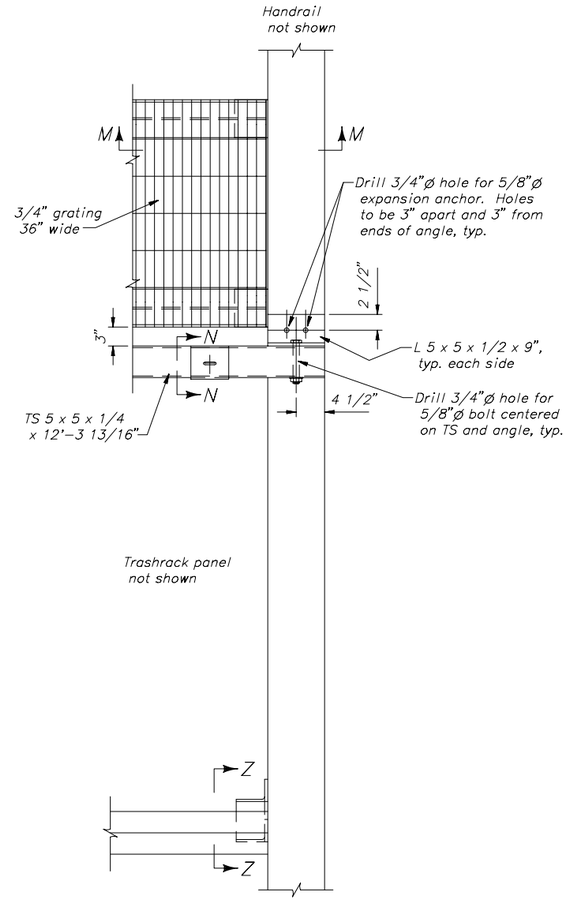
1678-100-315

SPECIFICATION #

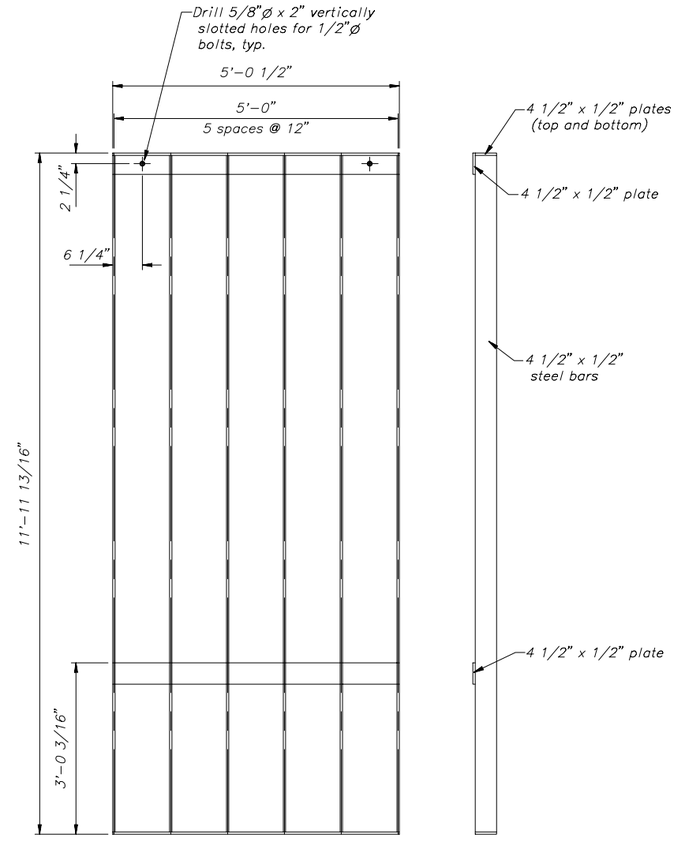
SEPTEMBER 3, 2003 12:04
PLOTTED BY
RDOMCZYCA



SECTION M-M



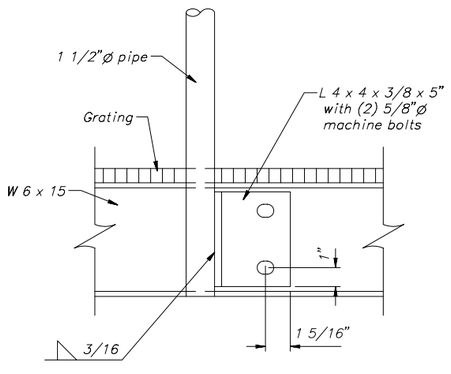
DETAIL Y
(-326)



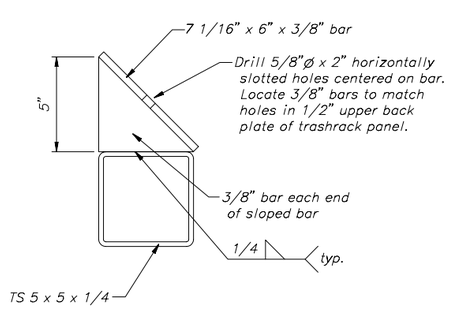
NOTES:
1. Full length, both sides, 1/4" fillet welds at all joints.
2. Diagonal measurements for each panel to be within 1/4".
3. Install panels to provide equal spacing at walls and between panels.

TRASHRACK PANEL - ELEVATION
(2 Required)

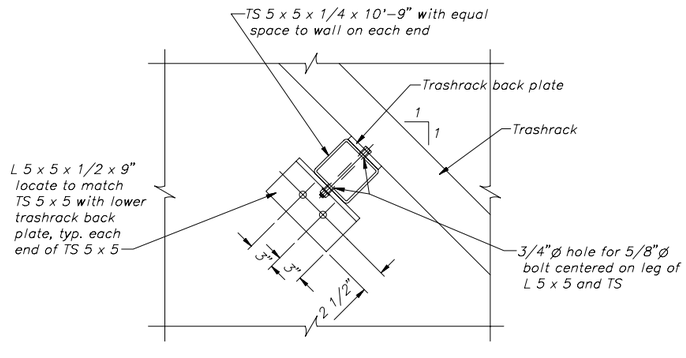
1 0 1 2 3 4 5
SCALE OF FEET



DETAIL X



SECTION N-N



SECTION Z-Z

0 3 6 9 12
SCALE OF INCHES

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COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION
FISHSCREEN STRUCTURE
METALWORK
TRASHRACK SECTIONS, ELEVATION, AND DETAILS

DESIGNED _____ CHECKED _____
DRAWN _____ TECH. APPROVAL _____
PROGRAM MANAGER

CADD SYSTEM: AutoCAD Rel. 15.06
CADD FILENAME: 1678-100-325.DWG
BOISE, IDAHO — 23 JULY 2003 — 1678-100-325

SPECIFICATION #

SEPTEMBER 3, 2003 12:03
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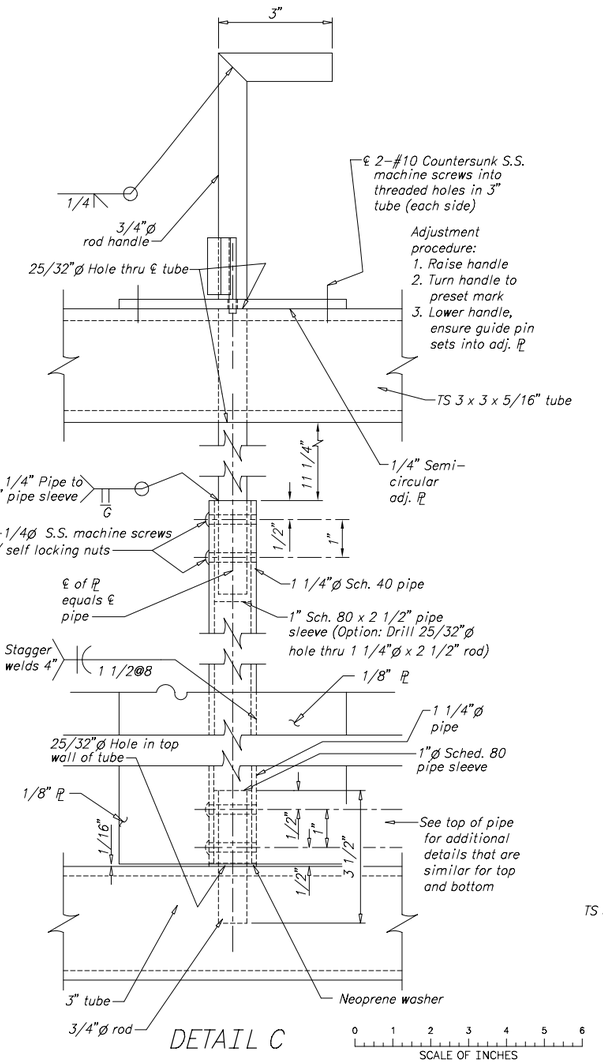
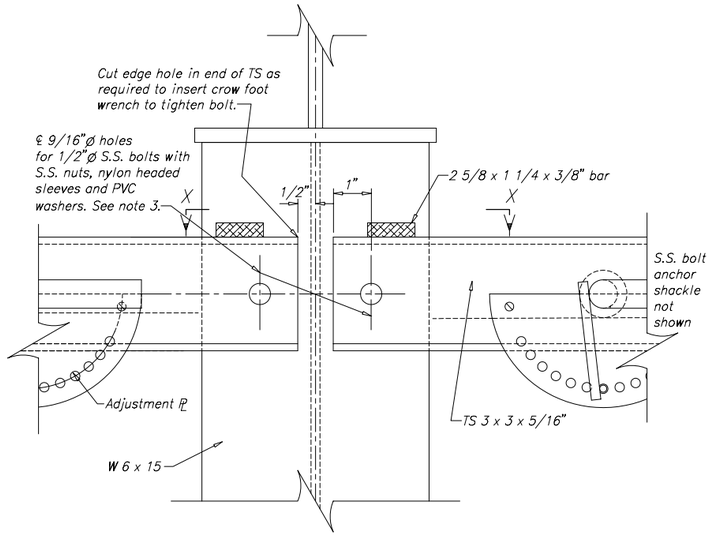
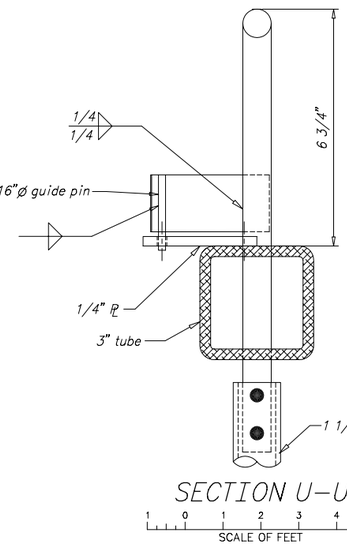


DETAIL C



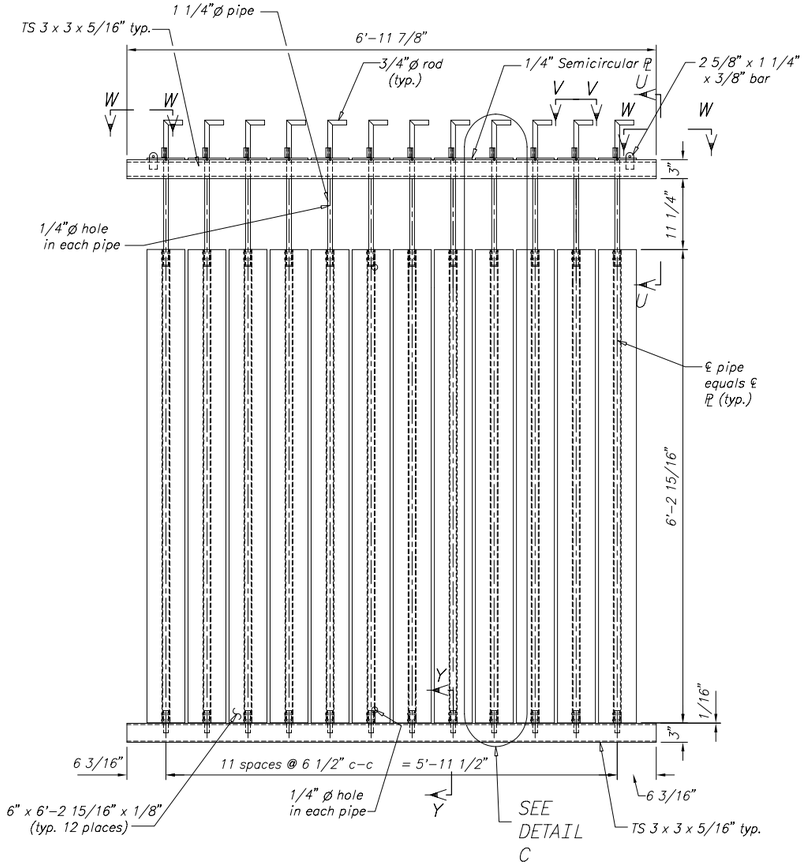
SECTION W-W
(Shown in Installed Position)

0 1 2 3 4 5 6
SCALE OF INCHES



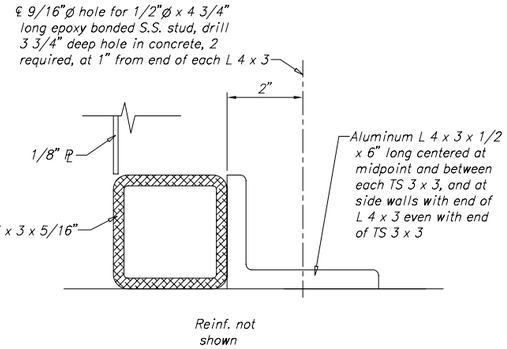
SECTION U-U

1 0 1 2 3 4 5
SCALE OF FEET

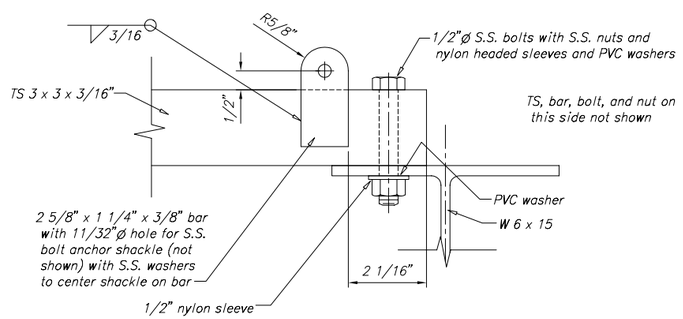


BAFFLE (4 REQ'D.)
Elevation-looking at upstream face

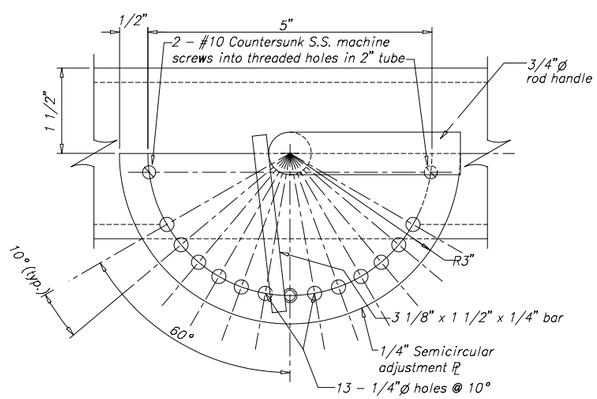
1 0 1 2 3
SCALE OF FEET



SECTION Y-Y



SECTION X-X



SECTION V-V

1 0 1 2 3 4 5
SCALE OF FEET

Notes:

1. Pipe diameters are nominal diameters.
2. Baffles are made of aluminum except where otherwise shown. Aluminum shall be 6063-T6.

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MVID EAST DIVERSION

FISHSCREEN
METALWORK
BAFFLE ELEVATION, SECTIONS & DETAIL

DESIGNED _____ CHECKED _____
DRAWN Ed Mordhorst TECH. APPROVAL _____
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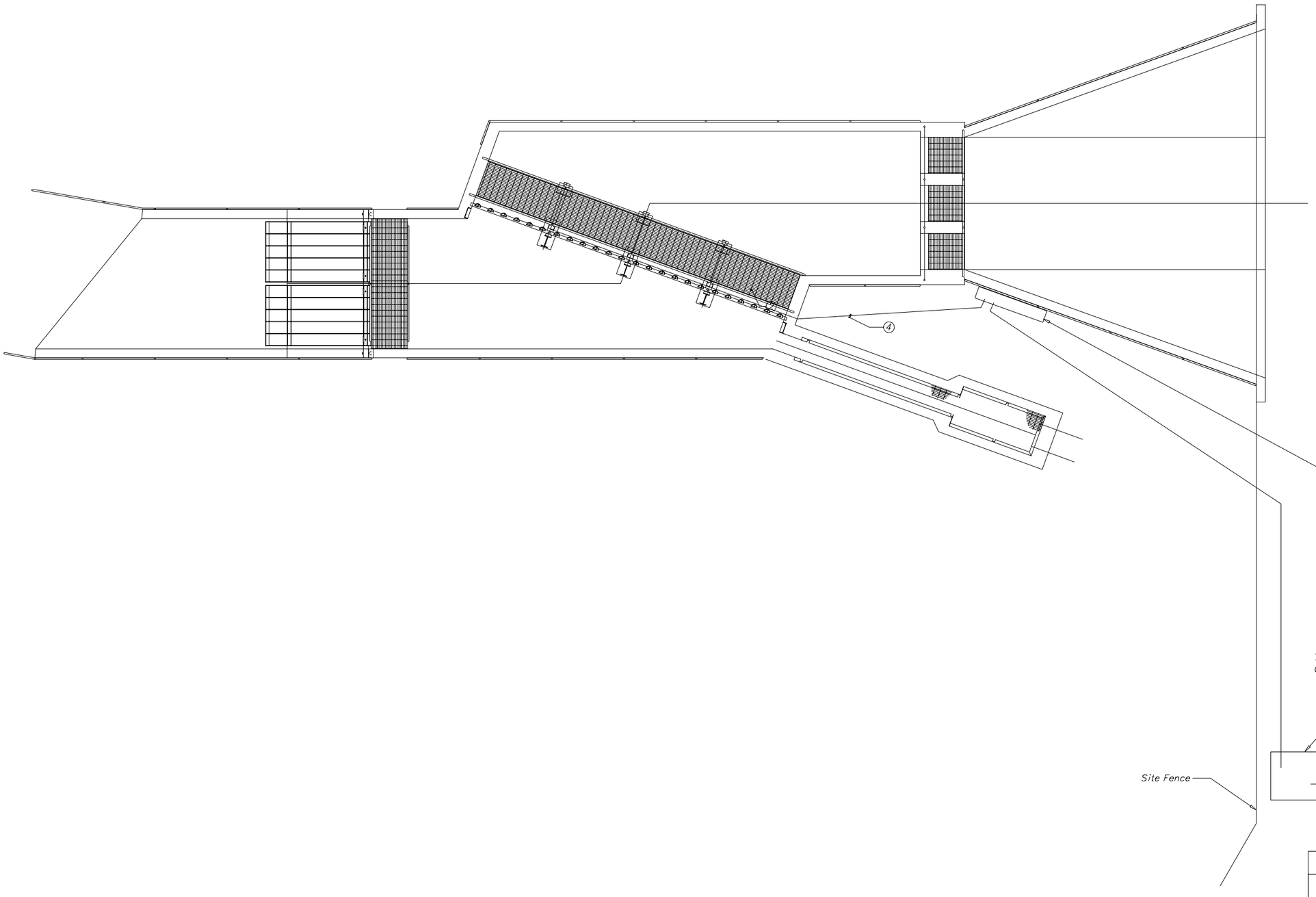
CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
AutoCAD Rel. 15.06	1678-100-314.DWG	SEPTEMBER 3, 2003 12:05
BOISE, IDAHO	14 JULY 2003	1678-100-314



Notes:

1. *Conduit No. 1 shall contain pull rope for utility installed cable.*
2. *See Drawing xxxx for motor receptacle location / detail.*
3. *See drawing 1678-100-331 for conduit 1-7 details*

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COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

MVID EAST DIVERSION

FISHSCREEN STRUCTURE

ELECTRICAL SITE PLAN

DESIGNED _____ CHECKED _____

DRAWN Ed Mordhorst TECH. APPROVAL _____

PROGRAM MANAGER

CADD SYSTEM	CADD FILENAME
AutoCAD Rel. 15.06	1678-100-329.DWG
BOISE, IDAHO 23 JULY 2003	1678-100-329

SPECIFICATION #

SEPTEMBER 3, 2003 12:08
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RGORCZYCA

Panel No. : MVID PPM	Section :	BUS: 240/120 Volts	☒ Main Ckt. Breaker 100 AMP
Location : MVID – East	Serving : Fishscreen	1 PH 3 WIRE 125 AMP	☐ Main Lugs Only
Fully Rated SCI 10,000 RMS SYS AMPS	☐ Feed Through Lugs ☐ SubFeed Lugs	☐ Isolated Ground Bus	☐ Flush Mount ☒ Surface Mount ☐ Top Feed ☒ Bottom Feed

LOAD TYPE	CIRCUIT DESCRIPTION	CONN VA	C.B. AMP	C.B. POLE	C.B. CKT	PH	C.B. CKT	C.B. POLE	C.B. AMP	CONN VA	CIRCUIT DESCRIPTION	LOAD TYPE
M	SCREEN MOTOR	741	20	2	1	N/A	2	2	20	741	SCREEN MOTOR	M
M	——— II ———	741	20	2	3	N/A	4	2	20	741	——— II ———	M
M	SCREEN MOTOR	741	20	2	5	N/A	6	2	20	741	SCREEN MOTOR	M
M	——— II ———	741	20	2	7	N/A	8	2	20	741	——— II ———	M
R	GENERAL RECEPTACLE	1800	20	1	9	N/A	10	1	20	1920	SPARE	
	SPARE	1920	20	1	11	N/A	12	1	20	1920	SPARE	
	SPARE	1920	20	1	13	N/A	14	1	20	1920	SPARE	
	Space				15	N/A	16				Space	
	Space				17	N/A	18				Space	
	Space				19	N/A	20				Space	
	Space				21	N/A	22				Space	
	Space				23	N/A	24				Space	
	Space				25	N/A	26				Space	
	Space				27	N/A	28				Space	
	Space				29	N/A	30				Space	
	Space				31	N/A	32				Space	
	Space				33	N/A	34				Space	
	Space				35	N/A	36				Space	
	Space				37	N/A	38				Space	
	Space				39	N/A	40				Space	
	Space				41	N/A	42				Space	

Total Receptacle (R) Load @ 180VA/each=>100% for first 10KVA & 50% for remainder: kVA

Total Non-coincidental (E) Load: kVA

Total Lighting (L) Load @ 125% : kVA

Total Motor (M) Load : kVA

Total Heating (H) Load : kVA

Total Non-continuous (N) Load : kVA

Largest Motor (25% added to demand load): HP kVA

TOTAL CONNECTED LOAD : kVA	CONNECTED AMP Total Amp / PH :	A	B	C	TOTAL DEMAND LOAD AMP kVA

Notes:
1. Field verify panel mounting location.

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MVID – EAST FISHSCREEN

ELECTRICAL INSTALLATION

PANEL SCHEDULE

DESIGNED _____ CHECKED _____

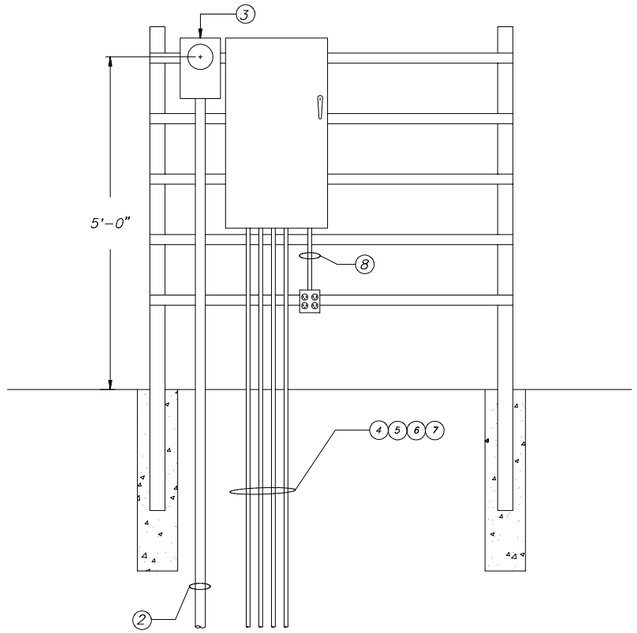
DRAWN _____ TECH. APPROVAL _____

PROGRAM MANAGER

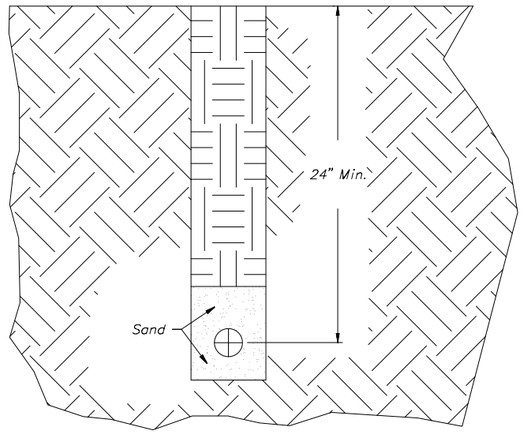
CADD SYSTEM	CADD FILENAME
BOISE, IDAHO	6 AUGUST 2003 | 1678-100-330

PLOTTED BY

Notes:
1. Conduit No. 1 Shown on Electrical Site Plan.
2. Field Verify Panel Mounting Location.



METER BASE / PANEL DETAIL



CONDUIT/ TRENCH DETAIL

CONDUIT & CABLE SCHEDULE

Conduit No.	Cable	Conduit Size	From	To	Remarks
1	(BY OTHERS)	2"	UTILITY SPLICE	UTILITY XFMR	UTILITY INSTALLED CABLE
2	3-1C No. 2	2"	UTILITY XFMR	METER BASE	BURRIED/SURFACE MOUNT
3	4-1C No. 2	2"	METER BASE	PANEL	NIPPLE
4	4-1C No. 12	3/4"	PANEL	MOTOR 1	EMBEDDED/BURRIED/SURFACE
5	4-1C No. 12	3/4"	PANEL	MOTOR 2	EMBEDDED/BURRIED/SURFACE
6	4-1C No. 12	3/4"	PANEL	MOTOR 3	EMBEDDED/BURRIED/SURFACE
7	4-1C No. 12	3/4"	PANEL	MOTOR 4	EMBEDDED/BURRIED/SURFACE
8	3-1C No. 12	3/4"	PANEL	RECEPTACLES	SURFACE

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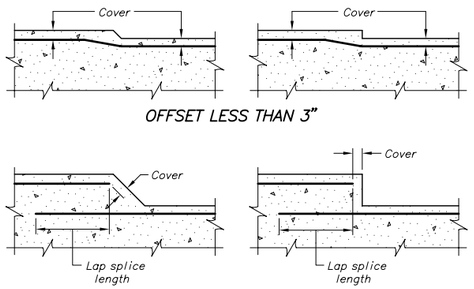
MVID - EAST FISHSCREEN
ELECTRICAL INSTALLATION
CONDUIT SCHEDULE & DETAILS

DESIGNED _____ CHECKED _____
DRAWN _____ TECH. APPROVAL _____
APPROVAL _____
PROGRAM MANAGER

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
BOISE, IDAHO	MARCH 2002	1678-100-331



OFFSET LESS THAN 3"

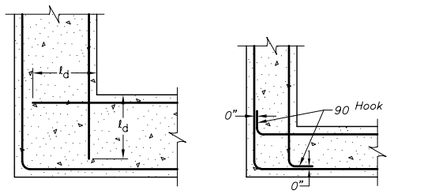
OFFSET 3" TO 8"

NOTE TO DESIGNERS AND DETAILERS: This detail may not be appropriate for tension areas of shallow structural members. If in doubt, use detail for offset greater than 8". See limits for noncontact lap splices in General Notes, Splices.

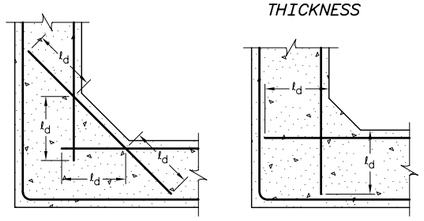
OFFSET GREATER THAN 8"

OFFSET GREATER THAN 8"
RESTRICTED MEMBER THICKNESS

TYPICAL OFFSET DETAILS



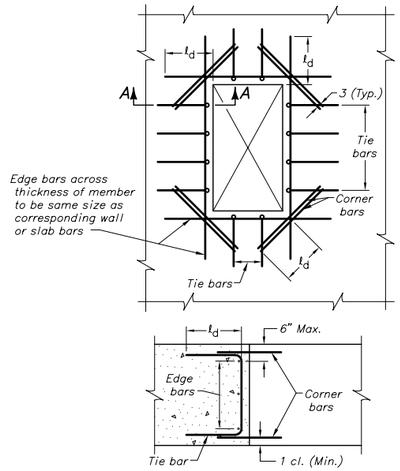
RESTRICTED MEMBER THICKNESS



FILLET 1'-0" OR GREATER

FILLET LESS THAN 1'-0"

TYPICAL CORNER DETAILS



SECTION A-A

OPENINGS:

TABLE FOR ADDITIONAL REINFORCEMENT

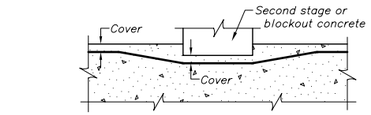
MEMBER THICKNESS	TIE BARS	EDGE BARS	CORNER BARS
Less than 10	None	1 – ctr.	2 – #4 ctr.
10 thru 1-6	None	2 – (1 ef)	4 – #4 (2 ef)
1-7 thru 3-0	#4 @ 1-0	3 – eq. spc.	4 – #4 (2 ef)
Over 3-0	#6 @ 1-0	Spc. @ 1-0	4 – #5 (2 ef)

Omit edge and tie bars along sides of openings where dimension is less than 1'-6".
Omit corner bars at sides of openings adjacent to floors, walls, or beams.
Omit corner bars if both dimensions of opening are less than 1'-6".

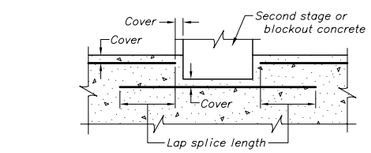
RECESSES:

Use corner bars in face of recesses deeper than 4" if either dimension of recess is equal to or greater than 1'-6".

ADDITIONAL REINFORCEMENT AROUND OPENINGS AND RECESSES

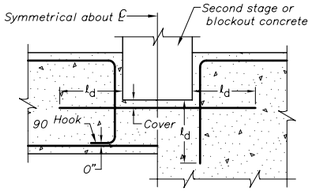


RECESS LESS THAN 3" DEEP



RECESS 3" TO 8" DEEP

NOTE TO DESIGNERS AND DETAILERS: This detail may not be appropriate for tension areas of shallow structural members. If in doubt, use detail for recess greater than 8". See limits for noncontact lap splices in General Notes, Splices.



RECESS GREATER THAN 8"

TYPICAL BLOCKOUT RECESS DETAILS

(Second stage concrete shown)

GENERAL NOTES 1/

UNLESS OTHERWISE SHOWN ON THE REINFORCEMENT DESIGN DRAWINGS, THE DETAILS AND NOTES SHOWN ARE MINIMUM REQUIREMENTS AND TYPICAL FOR ALL REINFORCEMENT DRAWINGS THAT REFER TO THIS DRAWING

ABBREVIATIONS:

bf = bottom face	br = bottom row	bl = bottom layer
tf = top face	tr = top row	tl = top layer
nf = near face	nr = near row	ml = middle layer
ff = far face	fr = far row	ns = near side
ef = each face	er = each row	fs = far side
if = inside face	ir = inside row	es = each side
of = outside face	or = outside row	ew = each way
	mr = middle row	ec = each corner

spc. = space or spaces
eq. spc. = equally spaced, equal spaces
d_b = nominal diameter or reinforcing bar
uv = uniformly varying lengths of bars between lengths shown
cl. = clear
ctr. = center or centers
add'l = additional
t_d = development length

SYMBOLS:

Bars shown thus —#8@1-0 or —#6@8 indicate a group of the same size bars equally spaced.
—o An open circle at the end of a bar indicates a bend with the bar turned away from the observer.
—● A closed circle at the end of a bar indicates a bend with the bar turned towards the observer.
Splices shown thus —— indicate a lap splice, not a bend in the bar.

DIMENSIONS:

Dimensions are to the centerline of the bars except for embedment of hooks, which are dimensioned to the outside of the bar.
Clear cover dimensions are marked "cl." and are dimensioned to the outside of the bar.

COVER:

Place the reinforcement so that the clear distance between face of concrete and nearest reinforcement is 1½" for #5 bars and smaller, 2" for #6 bars through #8 bars and 3" for #9 bars through #11 bars. Provide 3" clear distance from face of concrete for all bars when the concrete is placed against earth or rock. Clear distance is to the design dimension line.
Reinforcement parallel construction joints shall have a minimum of 2" clear cover.

PLACING:

Reinforcement at small openings (max. 1'-6") in walls and slabs may be spread apart not more than 1.50 times the bar spacing.
Reinforcement may be adjusted laterally to maintain a clear distance of at least 1" between the reinforcement and keys, water stops, anchor bolts, form ties, conduits, and other embedded materials. In heavily reinforced areas, relocation of the embedded material must be considered.
When bars are bent due to offsets less that 3" and recesses less that 3" deep, the slope of the inclined portion must not exceed 6 to 1.
Reinforcement parallel to anchor bolts or other embedded material shall be placed to maintain a clear distance of at least 1.33 times the maximum size aggregate.

SPACING:

The first and last bars in walls and slabs, stirrups in beams, and ties in columns are to start and end at a maximum of one half of the adjacent bar spacing. The minimum edge spacing shall be the smaller of either $2.5d_b$ or 0.5 of the adjacent bar spacing.

STANDARD HOOKS:

1. 180-degree bend plus $4d_b$ extension, but not less than 2½" at the free end of the bar.
2. 90-degree bend plus $12d_b$ extension at free end of the bar.

STIRRUP AND THE HOOKS:

1. #5 bar and smaller, 90-degree bend plus $6d_b$ extension at the free end of the bar.
2. #6, #7, and #8 bars, 90-degree bend plus $12d_b$ extension at the free end of the bar.
3. #8 bars and smaller, 135-degree bend plus $6d_b$ extension at the free end of the bar.

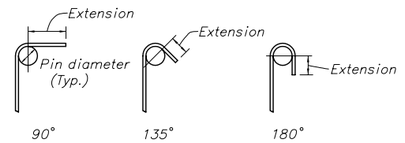


TABLE OF PIN DIAMETERS IN INCHES

BAR NO.	3	4	5	6	7	8	9	10	11
Standard bends	2 ¼	3	3 ¾	4 ½	5 ¼	6	9 ½	10 ¾	12
Stirrup and tie bends	1 ½	2	2 ½	4 ½	5 ¼	6			

REINFORCEMENT DOWELS:

Dowels indicated on the drawing, such as #8(d), shall be embedded a length equal to t_d and shall have a projection equal to that required for lap splicing to a bar of the same diameter.

PLAIN DOWELS:

Plain dowels across contraction joints shall be smooth bars uniformly coated with a film of oil before concrete placement. Viscosity of the oil shall have a SAE rating of not less than 250.

ACCESSORIES:

Bar supports, spacers, and other accessories are not shown on the design drawings. The recommendations of the ACI Detailing Manual-1988, or other approved supporting systems may be used.

DRAWING REFERENCES:

Numerals in parentheses ( ) following notes and section letters or numbers indicate the number of the drawing upon which the section or detail is shown; for example (524) denotes Drawing No. 557-D-524.

CODE AND DETAILING REFERENCES:

ACI Building Code Requirements for Structural Concrete (ACI 318-95).
ACI Detailing Manual – 1994.

NOTES TO DESIGNERS AND DETAILERS:

Splice lengths shown in the tables on this drawing are for Class B tension lap splices in accordance with ACI 318-95. Assumed conditions for these tables in addition to the requirements shown on this drawing are uncoated reinforcement, normal weight concrete, and the transverse reinforcement index (K_{tr}) equal to zero. Splices or development lengths other than those shown in the tables must be detailed on the reinforcement design drawings.

Some factors which require additional consideration are: Beams or columns with ties, lightweight aggregate concrete, epoxy-coated reinforcement, excess reinforcement, bars in compression, bundled bars, and seismic considerations.

1/ Unless otherwise shown on the reinforcement design drawings or this drawing, follow the recommendations established by the ACI Detailing manual – 1994.

SPLICES:

The minimum length of lap for splicing parallel bars shall be as given in the applicable table.
Staggered splices shall be separated to give 12 inches clear between ends of adjacent splices.
Bars spliced by noncontact lap splices shall not be spaced transversely farther apart than one-fifth the required lap splice length, nor 6" on centers.
When reinforcing bars of different size are to be spliced, the length of lap shall be governed by the smaller diameter bar.
Splices are to be made so that the required clear distances to face of concrete will be maintained.

f'c = 3000 psi TABLE 3 – 60 fy = 60,000 psi

BAR SIZE NO.	MINIMUM ℄ to ℄ BAR SPACING (INCHES)	LENGTH OF LAPPED SPLICE (INCHES)		DEVELOPMENT LENGTH l_d (INCHES)	
		TOP BARS *	OTHER BARS	TOP BARS *	OTHER BARS
3	3	17	13	13	12
4	3	23	18	18	14
5	4	28	22	22	17
6	5	34	26	26	20
7	6	49	38	38	29
8	6	56	43	43	33
9	7	63	49	49	38
10	8	71	55	55	42
11	9	79	61	61	47
9	6	63 **	49 **	49	38
10	6	75 **	58 **	58	45
11	6	93 **	71 **	71	55

f'c = 4000 psi TABLE 4 – 60 fy = 60,000 psi

BAR SIZE NO.	MINIMUM ℄ to ℄ BAR SPACING (INCHES)	LENGTH OF LAPPED SPLICE (INCHES)		DEVELOPMENT LENGTH l_d (INCHES)	
		TOP BARS *	OTHER BARS	TOP BARS *	OTHER BARS
3	3	16	16	12	12
4	3	20	16	15	12
5	4	25	19	19	15
6	5	29	23	23	18
7	6	43	33	33	25
8	6	49	37	37	29
9	7	55	42	42	33
10	8	62	47	47	37
11	9	68	53	53	41
9	6	55 **	42 **	42	33
10	6	65 **	50 **	50	39
11	6	80 **	62 **	62	48

* Top bars are all horizontal bars so placed that more than 12 inches of fresh concrete is cast below the development length or splice.
** Splices must be staggered.

6-1-97 D- G.P.G.	CONVERTED TO AUTOCAD DRAWING. REVISED TO CONFORM TO ACI 318-95. OTHER MINOR REVISIONS.
2-29-92 D- ROA	TOP BAR DEFINITION AND MINOR PUNCTUATION REVISION IN PLACING NOTE.
12-7-90 D- J.D.S.	REDRAWN TO NEW DRAFTING STANDARDS. REVISED CONCRETE COVER, NOTES TO DESIGNERS, TABLES, REINFORCEMENT AROUND OPENINGS, AND OTHER MINOR REVISIONS. REVISED TO CONFORM TO ACI 318-89.
9-27-84 D- NFP DG	REVISED PIN DIAMETER TABLE, REFERENCED THE ACI DETAILING MANUAL 1980. ADDED NOTES UNDER PLACING AND STANDARD HOOKS.
12-8-76 D- WRW	MINOR REVISIONS.

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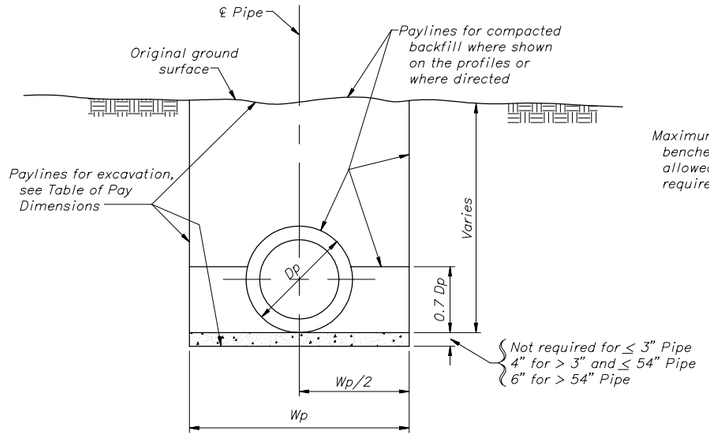
STANDARD DESIGNS

GENERAL NOTES AND MINIMUM REQUIREMENTS FOR DETAILING REINFORCEMENT

DESIGNED M.F.WARD J.G.STARBUCK CHECKED GAYLE A.ERICKSON
DRAWN M.CAMPBELL TECH. APPROVAL H.G.ARTHUR
ACTING DIRECTOR, DESIGN AND CONSTRUCTION

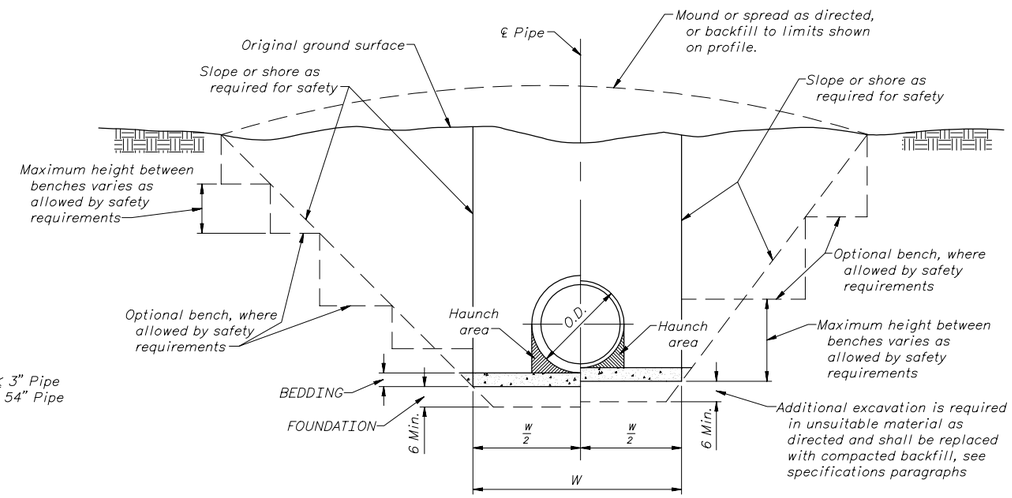
CADD SYSTEM AutoCAD Rel. 15.06	CADD FILENAME 40-D-6263.DWG	DATE AND TIME PLOTTED APRIL 3, 2003 13:49
DENVER, COLORADO	JULY 12, 1972	40-D-6263



TRENCH FOR PAYLINES ONLY ALL TYPES OF PIPE

TABLE OF PAY DIMENSIONS

Pipe I.D. (Inches)	Dp (Inches)	Wp (Feet)
6 and less	I.D. + 2	2.0
Over 6 thru 18	I.D. + 4	$\frac{1}{12}$ (I.D. +24)
Over 18 thru 24	I.D. + 4	$\frac{1}{12}$ (I.D. +40)
Over 24	1.167 I.D.	$\frac{1}{12}$ (1.167 I.D. + 36)



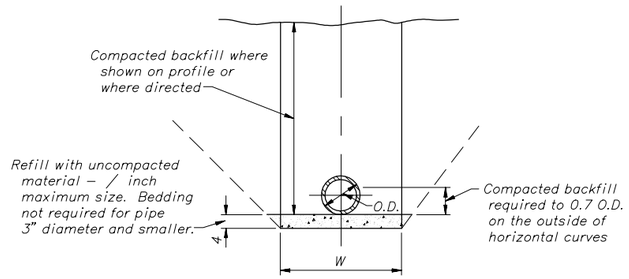
HALF SECTION RIGID PIPE

HALF SECTION FLEXIBLE PIPE

TYPICAL TRENCH DETAILS

MINIMUM INSTALLATION WIDTH

PIPE I.D. (INCHES)	W (FEET)
6 and less	2.0
Over 6 thru 18	$\frac{1}{12}$ (O.D. + 20)
Over 18	$\frac{1}{12}$ (O.D. + 36)



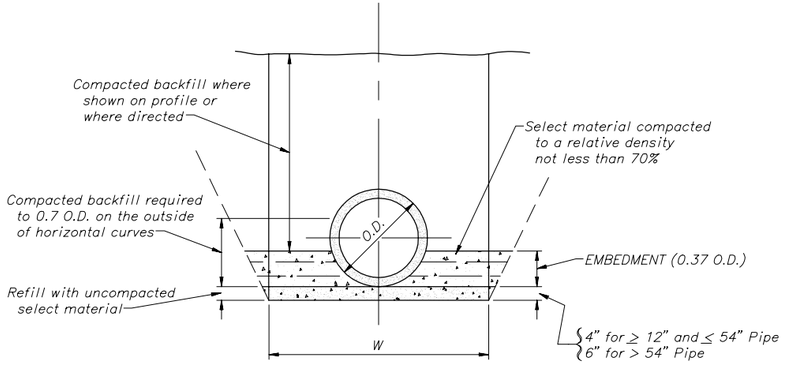
PIPE 10 INCH DIAMETER AND SMALLER

PVC
STEEL
DUCTILE IRON

GRADUATION LIMITS FOR SELECT MATERIAL

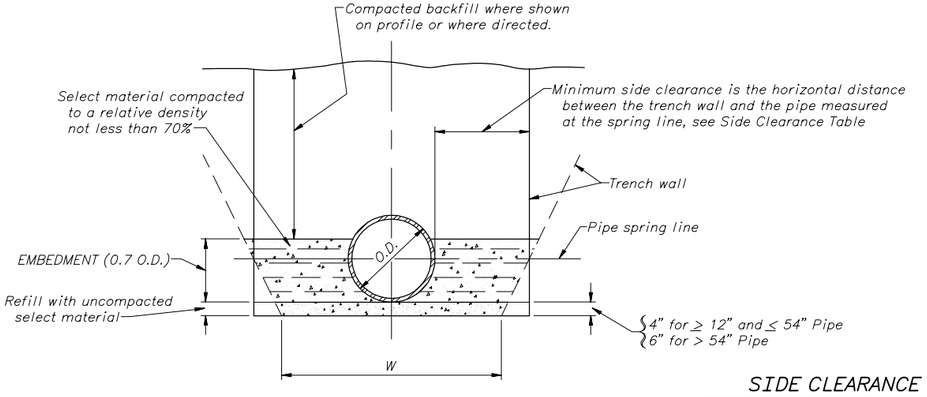
SIZE *	PERCENT BY WEIGHT
Passing No. 200 sieve	5 or less
Passing No. 50 sieve	25 or less

* Maximum size shall not exceed $\frac{3}{4}$ inch.



RIGID PIPE

DUCTILE IRON _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ 12" – 20"
REINFORCED CONCRETE _ _ _ _ _ _ _ _ _ _ _ _ 12" AND LARGER
REINFORCED CONCRETE CYLINDER _ _ _ _ _ 48" AND LARGER



FLEXIBLE PIPE

PVC _ 12" – 36"
PRETENSIONED CONCRETE CYLINDER _ _ _ _ 12" – 66"
STEEL _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ 12" AND LARGER
FIBERGLASS _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ 12" AND LARGER
DUCTILE IRON _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ 24" AND LARGER

SIDE CLEARANCE TABLE

TRENCH TYPE	MINIMUM SIDE CLEARANCE (INCHES)
1	10 INCHES FOR 12" THRU 18" I.D. 18 INCHES FOR OVER 18" I.D.
2	ONE O.D.
3	TWO O.D.

For location of Trench Types, see Specifications.

NOTES

Dp and Wp are used for calculating pay quantities for all pipe and trench types. Calculations are based on vertical walls.
Paylines for backfill will be the paylines for excavation, except the volume of the pipe, based on the diameter Dp will be deducted, and except where the depth of backfill is limited as shown on profiles.
W is minimum width of excavation in feet at bottom of bedding. The minimum side clearance for flexible pipe may require a wider trench bottom than dimension W.
Pipe diameters shown are the nominal inside diameter (I.D.) of the pipe in inches unless otherwise indicated.
O.D. is outside diameter in inches of the pipe actually installed.
Where pipe slope exceeds 0.3, see specifications paragraphs for backfill in pipe trenches.
Sloping, shoring, and benching shall be in accordance with Reclamation Construction Safety Standards.
Other installation methods with comparable pipe designs may be submitted for approval.

11/27/91 D- LAK	REMOVED NOTES ABOUT EQUAL LIFTS "RIGID PIPE" AND "FLEXIBLE PIPE".
10/17/91 D- LAK	REDRAWN WITH MINOR REVISIONS.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

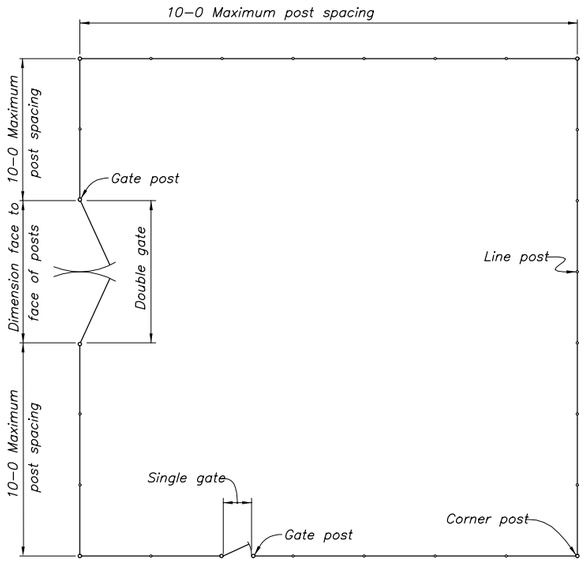
STANDARD DESIGNS

PRESSURE PIPE TRENCH INSTALLATION

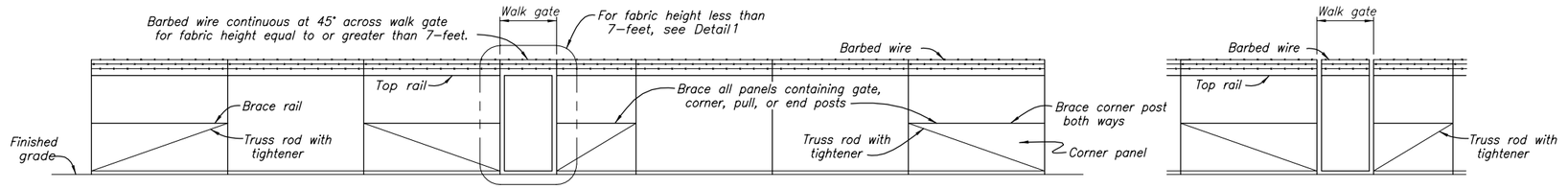
SELECT MATERIAL

DESIGNED Richard P. Fuerst TECHNICAL APPROVAL Leo A. Kinney, Jr.
DRAWN Bob Schully SUBMITTED Douglas H. Wegener
CHECKED Leo A. Kinney, Jr. APPROVED W. L. Long
CHIEF, WATER CONVEYANCE BRANCH

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
AutoCAD Rel. 15.0	40-D-6551.DWG	JULY 20, 2000 08:03
DENVER, COLORADO	APRIL 1, 1991	40-D-6551

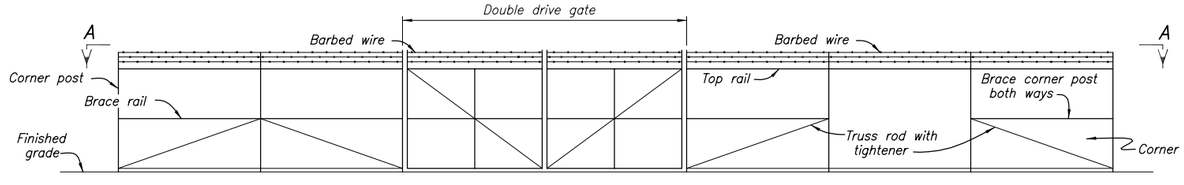


TYPICAL FENCING PLAN

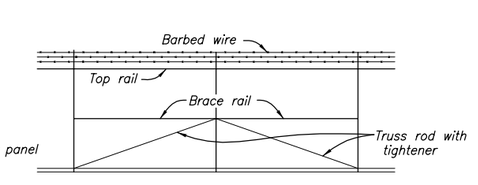


TYPICAL ELEVATION

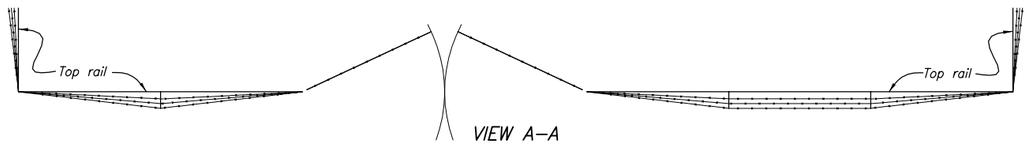
DETAIL 1



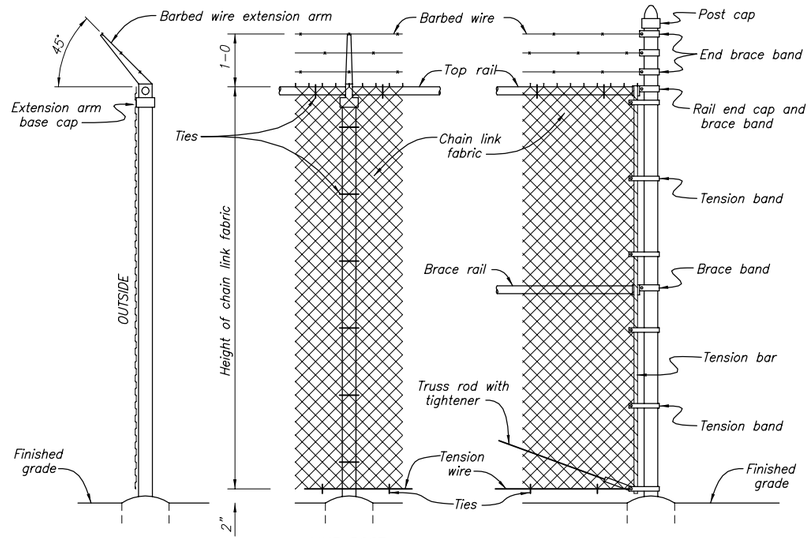
TYPICAL ELEVATION



PULL POST

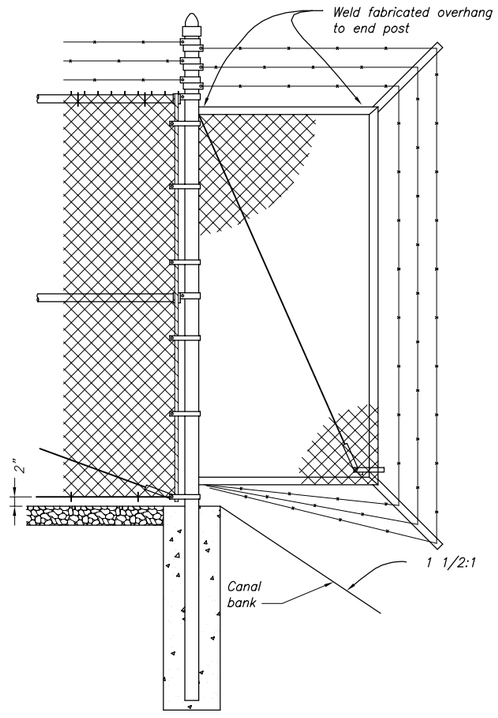


VIEW A-A

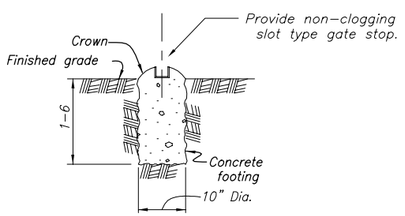


LINE POST

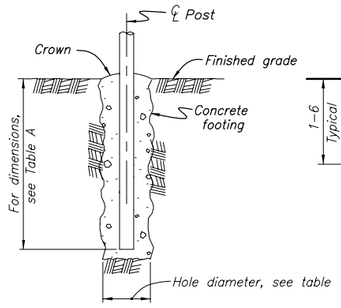
END POST, CORNER POST, OR GATE POST



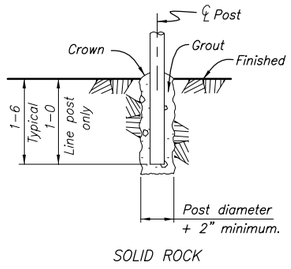
FENCE OVERHANG DETAIL



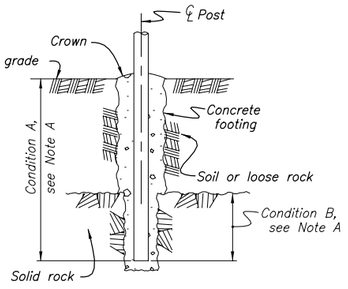
GATE STOP FOOTING



SOIL OR LOOSE ROCK



SOLID ROCK



POST FOOTING IN SOLID ROCK WITH OVERBURDEN OF SOIL OR LOOSE ROCK

TABLE A

POST FOOTING SIZES IN SOIL OR LOOSE ROCK				
POST	FABRIC HEIGHT	HOLE DIAMETER AT TOP	HOLE DEPTH	POST EMBEDMENT
Line	*3 ft. to 4 ft.*	*6 inches*	*24 inches*	*21 inches*
Line	*5 ft.*	*8 inches*	*30 inches*	*27 inches*
Line	*6 ft. to 12 ft.*	*9 inches*	*38 inches*	*36 inches*
Terminal	*3 ft. to 5 ft.*	*10 inches*	*32 inches*	*30 inches*
Terminal	*6 ft. to 12 ft.*	*12 inches*	*38 inches*	*36 inches*

Note A: Satisfy Condition A or Condition B.
Condition A: Depth required for footing in soil or loose rock.
Condition B: Depth required for embedment in rock.

NOTES

All fencing materials and accessories shall be in accordance with the specifications and the Chain Link Fencing Manufacturers Institute (CLFMI) standards.
All post and frame dimensions shall be in accordance with Table 4 (CLFMI). Concrete footing dimensions shall be in accordance with Table A above.
See site plans for fence layout and swing of gate.
Install pull posts at a maximum interval of 500 feet and at changes in horizontal or vertical alignment.
Weld all joints between tubular gate frame members and frame overhangs or use heavy fittings to provide rigid and watertight connections.
Provide latches, stops and keepers for all gates as specified.
End posts, corner posts, pull posts, and gate posts are designed as terminal posts.
Brace rails are not required for fabric less than 6 feet high.
For typical grounding details, see 40-D-4334, 40-D-4335 and 40-D-6376.

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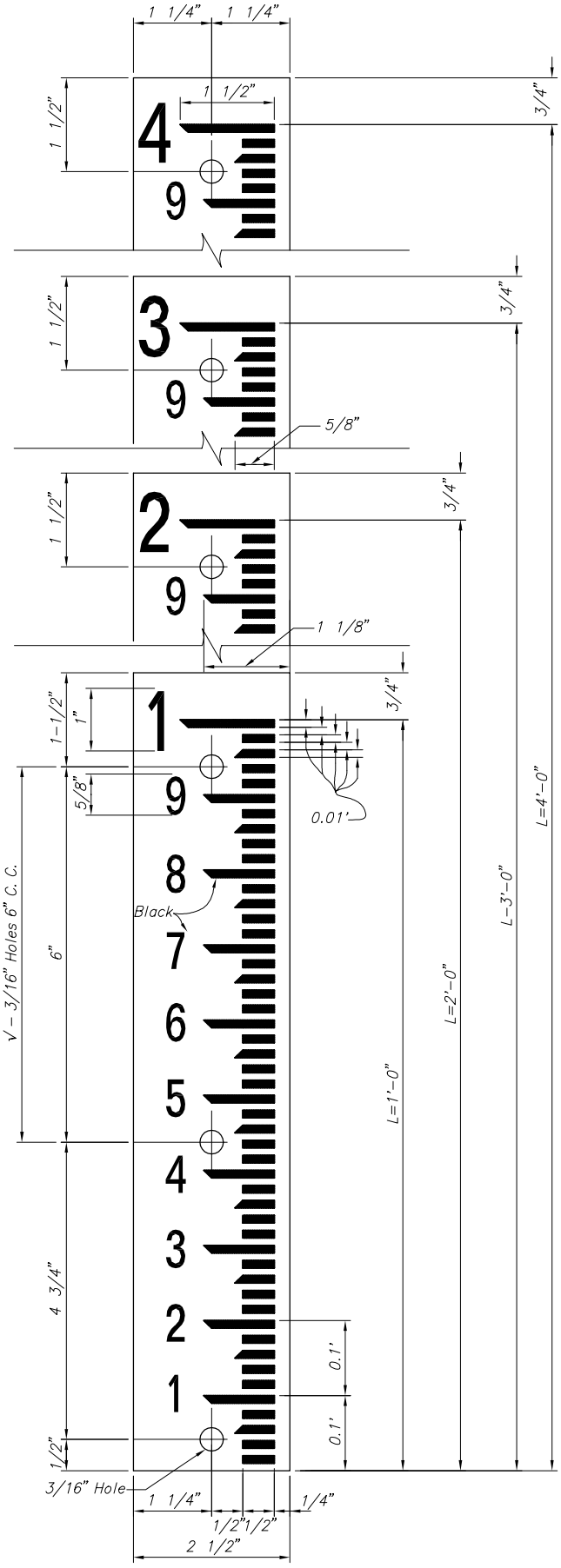
BUREAU OF RECLAMATION

STANDARD DRAWINGS

CHAIN LINK FENCING DETAILS

DESIGNED CLFMI STANDARD
DRAWN Charles H. Ferguson
CHECKED Brooklyn K. Vice
TECHNICAL APPROVAL Al Schuyler
APPROVED Brent Mahnken
PROJECT CONSTRUCTION ENGINEER

Cadd System: AutoCAD Release 13	Filename: YAK255.DWG	Date and Time Plotted: April 17, 1997
YAKIMA, WASHINGTON CADD	FEBRUARY 1997	1022-155-255



NOTES:

Gages to be of No. 18 gage (U.S. standard) mild steel plate and to be covered with porcelain enamel with a minimum thickness of 12 mils on numeral side and 3 mils on the reverse side and on edges where plate has been cut, punched or drilled.

All cutting, drilling and punching of the plates shall be completed before the porcelain enamel is applied.

The face of the gage shall be white and all numerals and graduations shall be black.

Graduations shall be sharp and accurate to the dimensions shown.

The length "L" shall be as given in the schedule. In case a greater length than 4'-0" is required the details shall be similar to details shown for shorter lengths.

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STANDARD DESIGNS

ENAMELED WEIR GAGES

DESIGNED _____ TECH. APPROVAL _____

DRAWN I. Lawyer _____

CHECKED _____ APPROVED _____

CADD SYSTEM	CADD FILENAME	DATE AND TIME PLOTTED
AutoCAD Rel.12	9003-100-217.DWG	JULY 15, 1996 09:56
BOISE, IDAHO	FEBRUARY 1995	9003-100-217