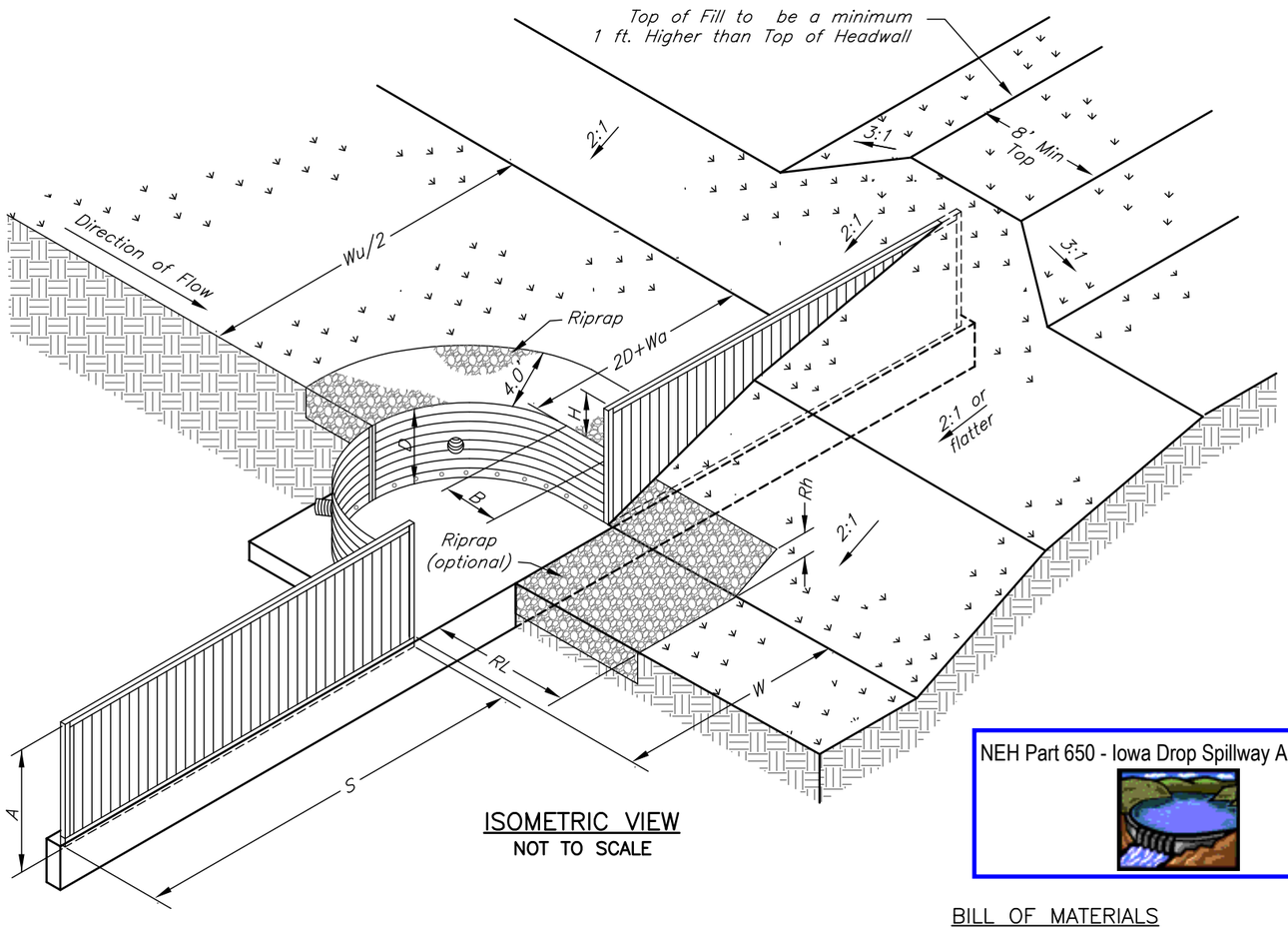
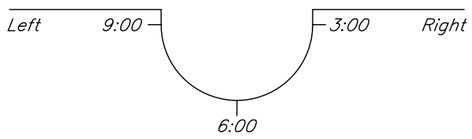


ISOMETRIC VIEW
NOT TO SCALE



TILE OUTLET DESCRIPTION

Tile outlet stubs (as required) shall be 2 ft. lengths of corrugated aluminum pipe shop–welded to the structure as specified below:

1. _____ ft. from the left headwall at the
   _____ o'clock position (6:00–9:00)
   _____ inch diameter
   _____ ft. below the weir at flowline of pipe

2. _____ ft. from the right headwall at the
   _____ o'clock position (3:00–6:00)
   _____ inch diameter
   _____ ft. below the weir at flowline of pipe

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MATERIAL NOTES

1. *Concrete shall have a minimum compressive strength at 28 days equal to 3500 psi.*
2. *All reinforcing steel bars shall be Grade 60 – #4 bars.*
3. *Aluminum sheets shall be structural plate (2 1/2" x 9" corrugations) 0.100" thickness and shall be Alloy 5052 conforming to ASTM B 209 or AASHTO M21.*
4. *Aluminum angles shall be Alloy 6061–T6 conforming to ASTM B 308.*
5. *Bolts shall be 3/4" diameter galvanized carbon steel conforming to ASTM A 307.*
6. *Seam sealant shall be knife–grade asphalt mastic or polymer adhesive sealant tape, Manus–Bond 64–A, or equal.*
7. *Drainfill aggregate shall meet the standard gradation of ASTM C 33 size 57 or 67. Do not place geotextile between the drainfill and 1/2" weep holes.*
8. *Riprap shall consist of well–graded rock, minimum size of 4", maximum size of 8". Riprap shall be underlain by nonwoven geotextile bedding.*
9. *Weir length L varies from 14.2' to 49.5' in 1.6' increments. Check with manufacturer or refer to Iowa NRCS hydraulic design spreadsheet, "Semicircular_Drop_Structure.xlsx" for a table of available weir lengths, including straight portion of weir dimension B.*

NEH Part 650 - Iowa Drop Spillway Amendment

STANDARD STRUCTURE SIZES

D	*1.9'*				*3.0'*				*4.0'*			
H	*1.8'*				*1.9'*				*2.1'*			
A	*4.2'*				*5.4'*				*6.6'*			
*S**	*9.2'*	*11.3'*	*13.7'*	*15.8'*	*11.3'*	*13.7'*	*15.8'*	*18.2'*	*13.7'*	*15.8'*	*18.2'*	*20.3'*
Wa	*0.0'*	*2.0'*	*4.0'*	*6.0'*	*0.0'*	*2.0'*	*4.0'*	*6.0'*	*0.0'*	*2.0'*	*4.0'*	*6.0'*

** Minimum value of S for corresponding value of Wa.*

BILL OF MATERIALS

Item	Quantity	Unit
Aluminum Drop Structure	*1*	*each*
Concrete (3500 psi)		*cu.yd.*
Reinforcing Steel, Grade 60 – #4 Bars		*lb.*
Drainfill		*cu.yd.*
Rock Riprap		*cu.yd.*
Excavation, Structure		*cu.yd.*
Earthfill		*cu.yd.*
Corrugated Aluminum Pipe, 16 Gauge		
_____ Dia.		*lin.ft.*
_____ Dia.		*lin.ft.*
Connecting Band, Aluminum		*each*
Animal Guard, Aluminum		*each*
*Geotextile, Nonwoven ***		*sq.yd.*

*** Quantity includes covered surfaces only (no allowance for laps, anchorage, etc.)*

STRUCTURE DIMENSIONS

Overfall Height (D)		*ft.*
Notch Depth (H)		*ft.*
Headwall Height (A)		*ft.*
Headwall Length (S)		*ft.*
Notch Width (W)		*ft.*
Weir Length (L)		*ft.*
Straight Portion of Weir (B)		*ft.*
Added Upstream Channel Width (Wa)		*ft.*
Upstream Channel Bottom Width (Wu)		*ft.*
Downstream Riprap Length (RL)		*ft.*
Downstream Riprap Height (Rh)		*ft.*
Concrete Apron Elevation		*ft.*
Weir Crest Elevation		*ft.*
Top of Headwall Elevation		*ft.*
Auxiliary Spillway Elevation		*ft.*
Top of Embankment Elevation		*ft.*

Planned w/ an Aux. Spwy.
No Aux. Spwy.

Date . . .
Designed . . .
Drawn J.Gibbs/J.Sandstrom 11/12.
Checked . . .
Approved . . .

ALUMINUM DROP SPILLWAY

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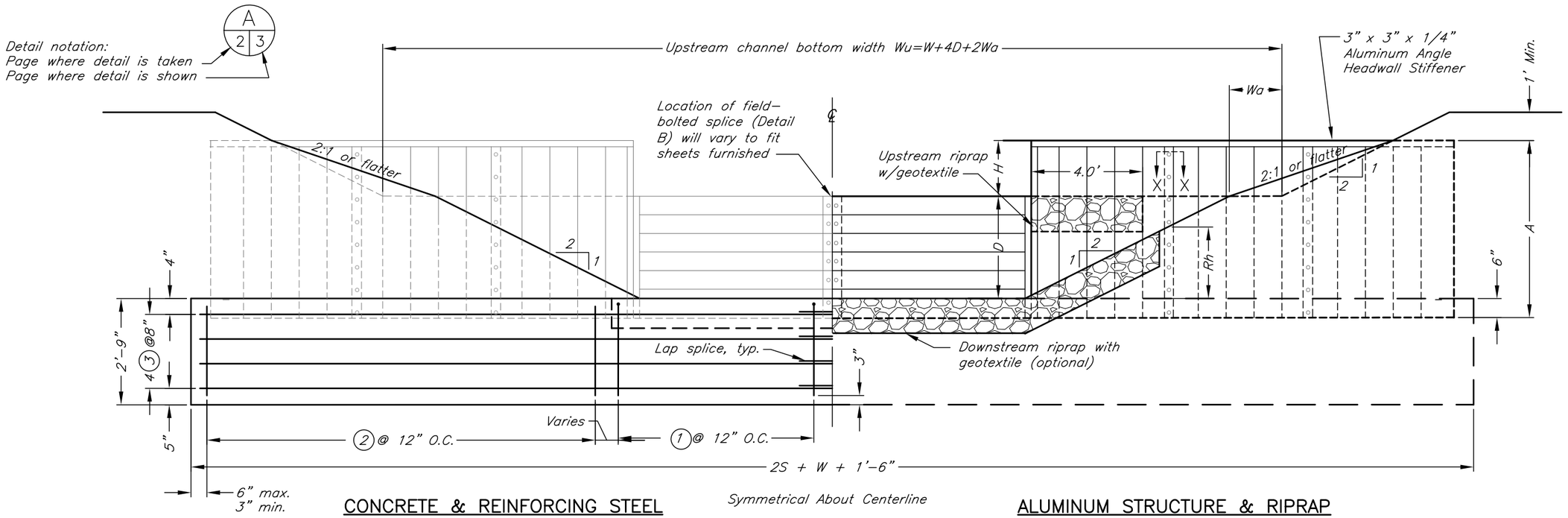


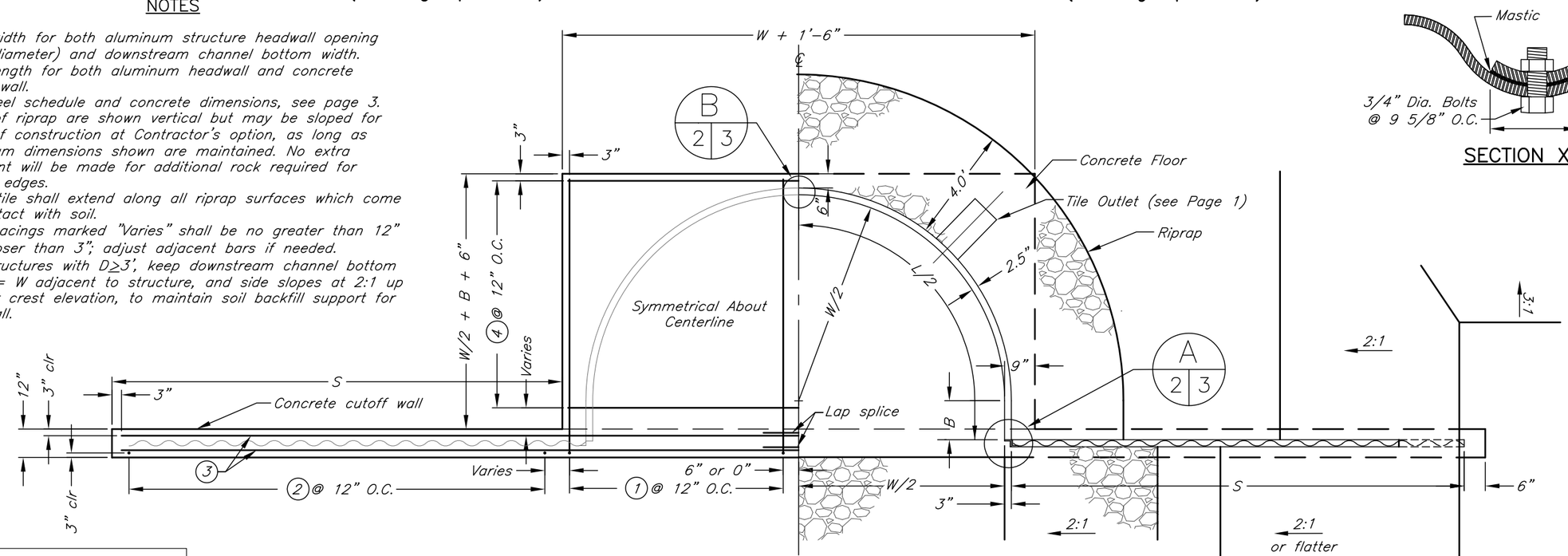
CONCRETE & REINFORCING STEEL
HALF ELEVATION
(Looking Upstream)

Symmetrical About Centerline

ALUMINUM STRUCTURE & RIPRAP
HALF ELEVATION
(Looking Upstream)

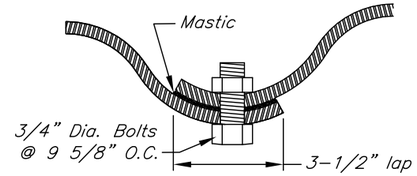
NOTES

1. W = width for both aluminum structure headwall opening (weir diameter) and downstream channel bottom width.
2. S = length for both aluminum headwall and concrete cutoff wall.
3. For steel schedule and concrete dimensions, see page 3.
4. Ends of riprap are shown vertical but may be sloped for ease of construction at Contractor's option, as long as minimum dimensions shown are maintained. No extra payment will be made for additional rock required for sloped edges.
5. Geotextile shall extend along all riprap surfaces which come in contact with soil.
6. Bar spacings marked "Varies" shall be no greater than 12" nor closer than 3"; adjust adjacent bars if needed.
7. For structures with D≥3', keep downstream channel bottom width = W adjacent to structure, and side slopes at 2:1 up to weir crest elevation, to maintain soil backfill support for headwall.



CONCRETE & REINFORCING STEEL
HALF PLAN

ALUMINUM STRUCTURE & RIPRAP
HALF PLAN



SECTION X–X

NOT TO SCALE

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DATE Nov. 2012 | PAGE 2 OF 3

Date 11/12.
Designed
Drawn J.Gibbs/J.Sandstrom.
Checked
Approved

ALUMINUM DROP SPILLWAY

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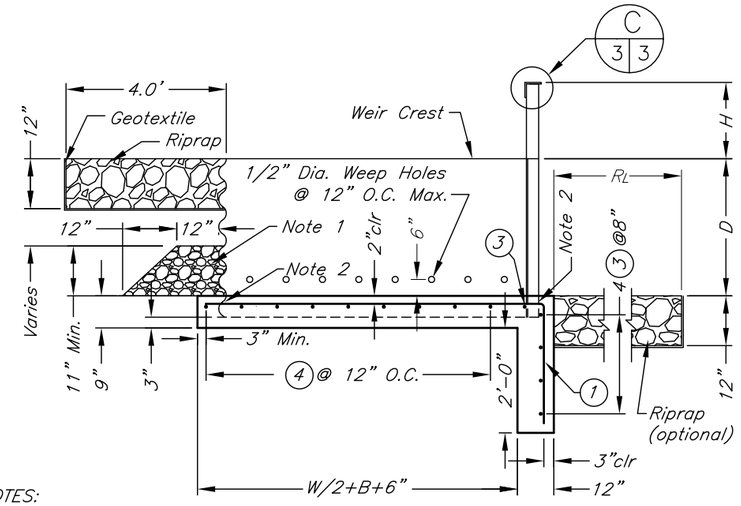
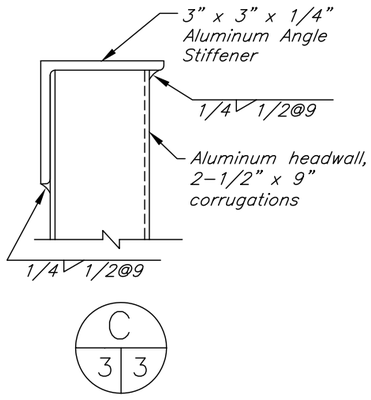


NOTES:

1. Drainfill extends completely around weir.
2. Field drill 7/8" holes as required in the aluminum structure. Place steel reinforcement through holes. Wrap rebar as described in Construction Note 4.

SECTION ON CENTERLINE



CONSTRUCTION NOTES

1. Forms are not required for concrete apron or cutoff wall if excavated soil will stand vertically. Side slopes above the top of the concrete shall be 1.5:1 or flatter.
2. When necessary, the site shall be dewatered in accordance with Iowa Construction Specification IA-11, Removal of Water. A sump pump and crushed rock may be needed.
3. Set aluminum structure to grade and place reinforcing bars. Apply asphalt mastic between aluminum sheets before bolting together. Check elevations of the weir, top of floor and bottom of cutoff trench. Check that the reinforcing steel has the required minimum cover.
4. Wrap reinforcing bars with three layers of electrical tape, or equal, where they pass through the aluminum sheets.
5. Place the concrete floor and cutoff wall in one continuous pour.
6. After a minimum of 24 hours, place drain fill, attach C.M. pipe to tile outlet stubs, and install animal guards. Lay additional drain tile/tubing if needed to connect with existing surface drains.
7. Backfill around structure with moist soil. Place backfill in 6 inch layers and tamp to a density equivalent to adjacent required earthfill. Remove dry soil from sides of excavations as backfill is placed so that moist soil is tamped against moist soil. Keep backfill approximately level around all parts of the structure.
8. Place riprap with geotextile bedding and complete grading and shaping.
9. Seed, fertilize and mulch all disturbed areas in accordance with the seeding plan provided by NRCS.

QUANTITY FORMULAS:

CONCRETE: $[(W+1.5)(\frac{W}{2}+B+0.5)(0.75) + (W+2S+1.5)(2.75)]/27$ (CuYd)

DRAINFILL: $\{\frac{\pi}{2}[(\frac{W}{2}+1.5)^2 - (\frac{W}{2})^2] + 3B\}/27$ (CuYd)

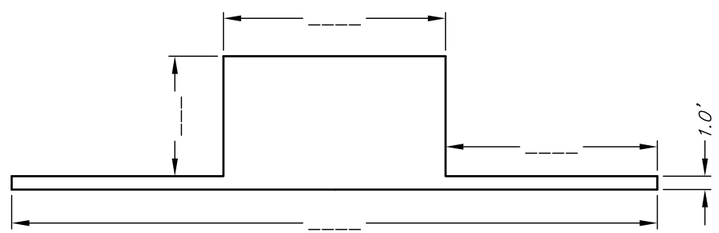
UPSTREAM RIPRAP: $\{\frac{\pi}{2}[(\frac{W}{2}+4)^2 - (\frac{W}{2})^2]+8B\}/27$ (CuYd)

DOWNSTREAM RIPRAP: $(W+4Rh)(R_L)/27$ (CuYd)

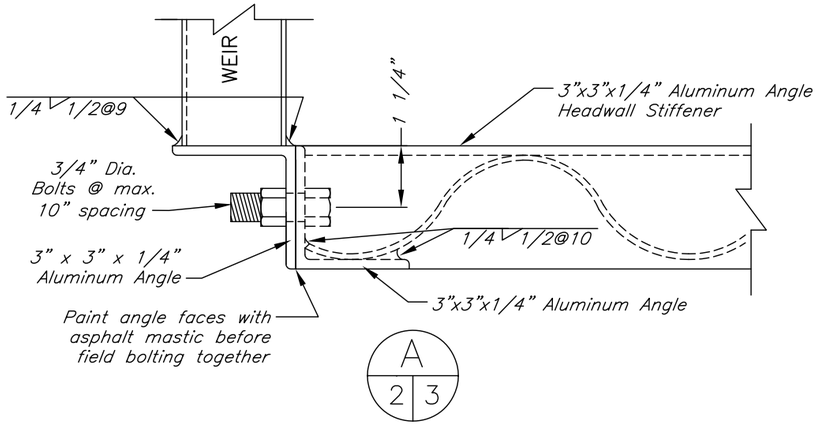
UPSTREAM GEOTEXTILE: $\{\frac{\pi}{2}[(\frac{W}{2}+4)^2 - (\frac{W}{2})^2] + 10B + \pi(\frac{W}{2}+4)\}/9$ (SqYd)*

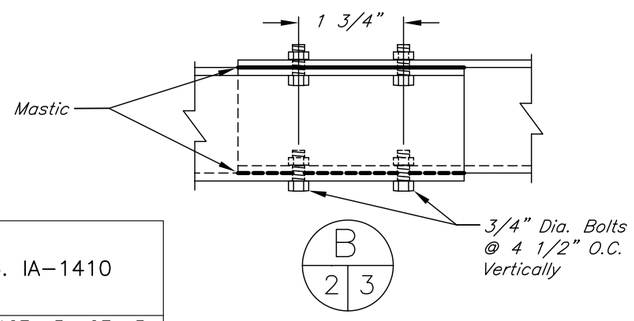
DOWNSTREAM GEOTEXTILE: $(R_L+1)(W+4.47Rh+2)/9$ (SqYd)*

* Geotextile formulas for covered surfaces only



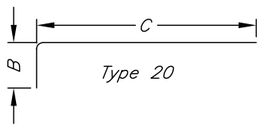
CONCRETE DIMENSIONS SUMMARY





STEEL REINFORCING NOTES:

1. Radius of bend for Type 20 bar = 2".
2. Alternate splice locations for Mark (3) bars may be used at Contractor's option, with Engineer's approval. Minimum splice length is 1'-9".
3. Minimum splice length for Mark (4) bars is 1'-4".



STEEL SCHEDULE (All #4 bars)

Mark	Type	B	C	Quantity	Length	Total Length	Quantity Formulas	Length Formulas
1	20	2'-4"					W + 2	C Leg = $W/2$ + B + 1'
2	Str.	–	–		2'-4"		2[RoundUp(S – .25')]	Given
3	Str.	–	–	10			Given	$W/2$ + S + 1.42'
4	Str.	–	–				RoundUp($W/2$ + B + 0.5')	W + 1.0'
					Total Length		lin. ft.	
					Weight = Total Length x 0.668 lb./lin. ft.		lb.	

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