

Midwest Roadside  
Safety Facility

Test Level 2 Rough Stone  
Masonry Guardwall

(Test No. RSMG-2)

System Layout with Asphalt/  
Concrete/Wood Pad and  
Ramp

DWG. NAME.  
RSMG-2v1

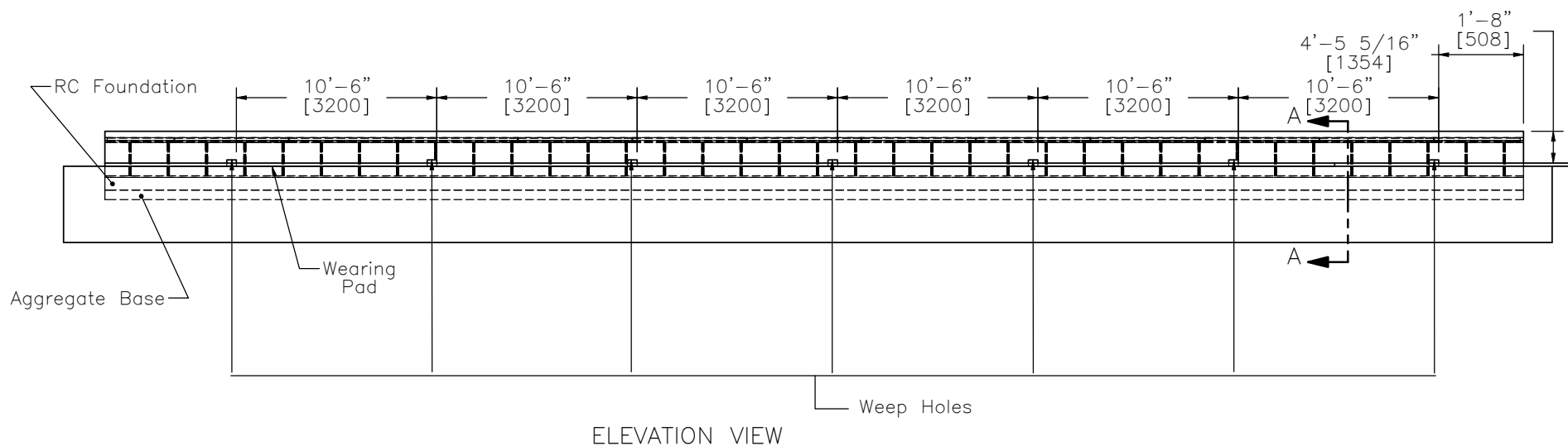
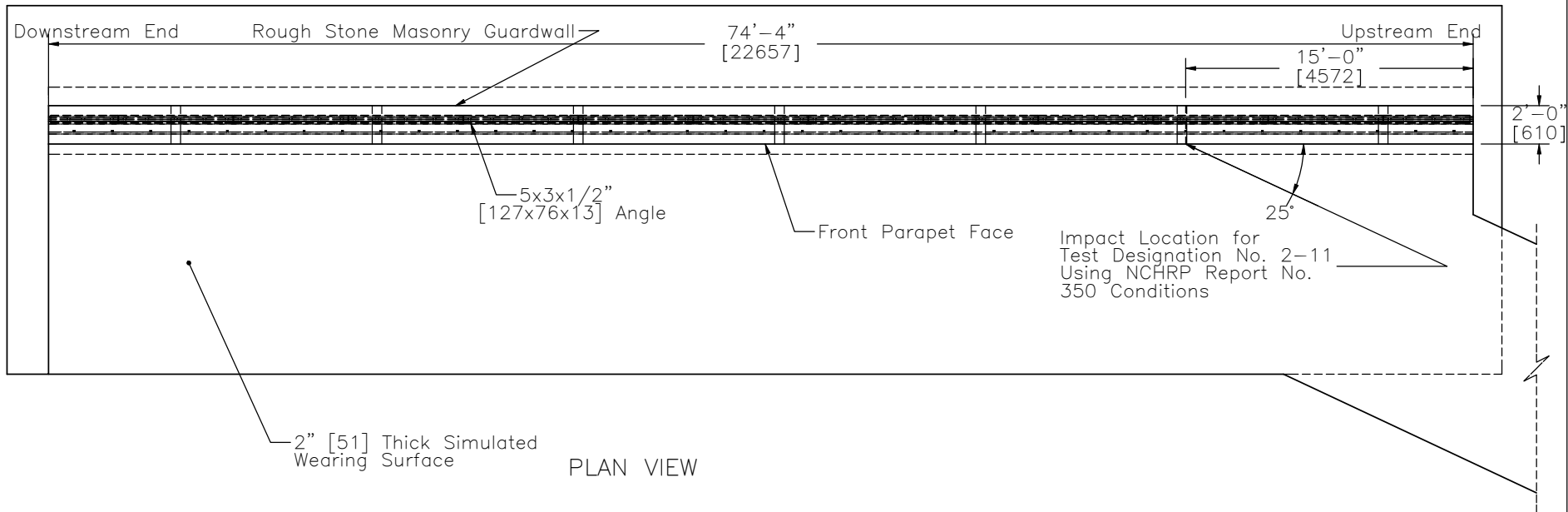
SCALE: 1:300  
UNITS: In./mm

SHEET:  
1 of 16

DATE:  
1/29/2009

DRAWN BY:  
CDB/RJT/  
EAJ

REV. BY:  
RKf/KAL

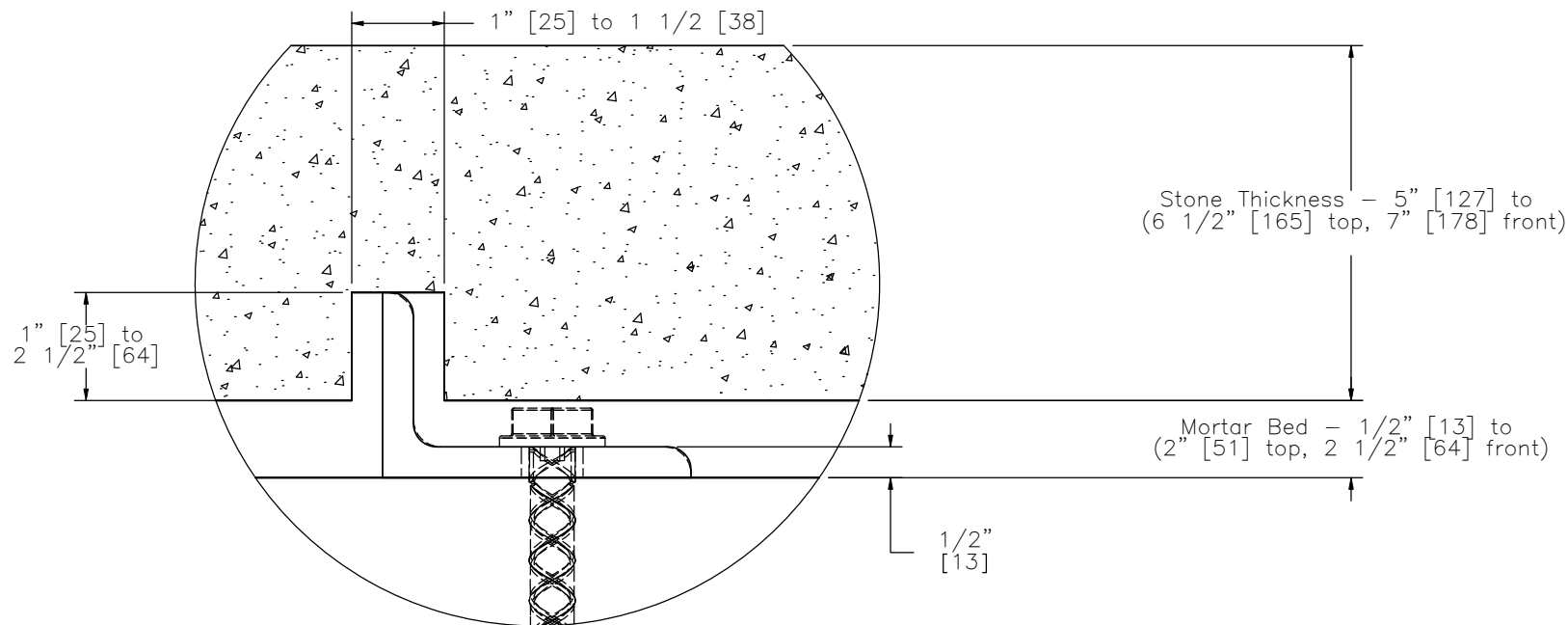


Notes: (1) Use a minimum of 1 ft [305] between the front edge of the foundation and the concrete cutout at the MwRSF test site.

(2) Internal steel reinforcement not shown for clarity.

 <p>Midwest Roadside Safety Facility</p>	<p>Test Level 2 Rough Stone Masonry Guardwall</p> <p>(Test No. RSMG-2)</p> <p>System Layout</p>	<p>SHEET:</p> <p>2 of 16</p>
	<p>DWG. NAME:</p> <p>RSMG-2v1</p>	<p>SCALE: 1:100</p> <p>UNITS: In.[mm]</p>
		<p>DATE:</p> <p>1/29/2009</p>
		<p>DRAWN BY:</p> <p>CDB/RJT/EAJ</p>
		<p>REV. BY:</p> <p>RKF/KAL</p>





DETAIL C

- Notes:
- (1) The capstones placed on the top of the barrier shall be kerfed to allow for their placement over the steel angle. The kerf width shall be approximately 1 to 1 1/2 in. [25 to 38] wide. The maximum kerf depth shall be 2 1/2 in. [64] although thinner kerf depths are allowed as long as all other geometries are met.
  - (2) The top mortar bed thickness shall range between 1/2 and 2 in. [13 and 51] for rubble stone masonry. The top capstone thickness shall range between 5 to 6 1/2 in. [127 to 165].
  - (3) Mortar shall fill the void region surrounding the angle's vertical leg when the capstones are set in place.
  - (4) The first 36 to 38 ft [10.9 to 11.6m] of barrier shall be constructed with capstones covering the entire barrier width of 24 in. [51], thus revealing a mortar joint on the front face.
  - (5) The remaining barrier length shall be constructed using alternating face and top stones to meet up at the top-front corner of the barrier.
  - (6) For top capstone thicknesses greater than 5 7/8 in. [149], it will be necessary to chisel the bottom of the stone to form a dish to allow its placement over the heads of the Wedge-Bolt anchors.
  - (7) Two types of steel anchors were used to provide vertical attachment of the stone masonry to the top of the inner core wall. Type 106 corrugated Dovetail Anchor Ties (16 gauge [1.5] by 5 1/2" [140] long) were wedged under the top-mounting angles and bent upward to engage the mortar. The Type 106 Ties were spaced approximately on 2 ft [610] centers, alternating sides of the steel angles. Stainless steel (SS 304) Z-clips were also used to anchor the stone using 1/4" [6.4] diameter by 2 3/4" [70] long, heavy-weight, stainless steel Tapcon masonry anchors. The Z-clips were spaced approximately on 2 ft [610] centers, alternating sides of the steel angles, and used to engage a recess cut in the stone.
  - (8) Dovetail Anchor Ties shall be mill galvanized steel ASTM A653 or hot dip galvanized ASTM A153.



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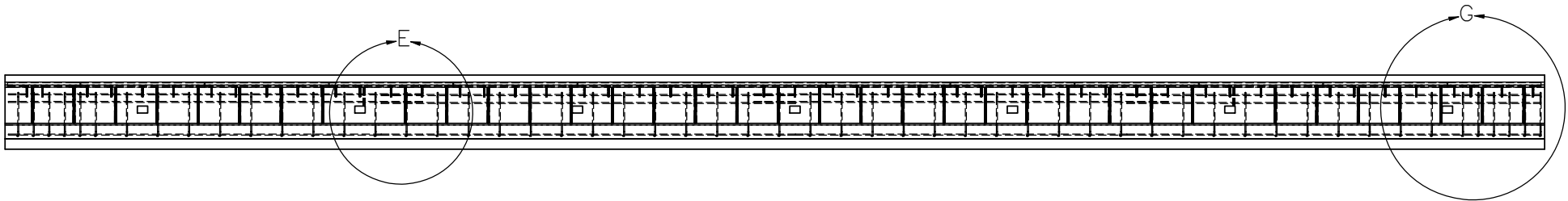
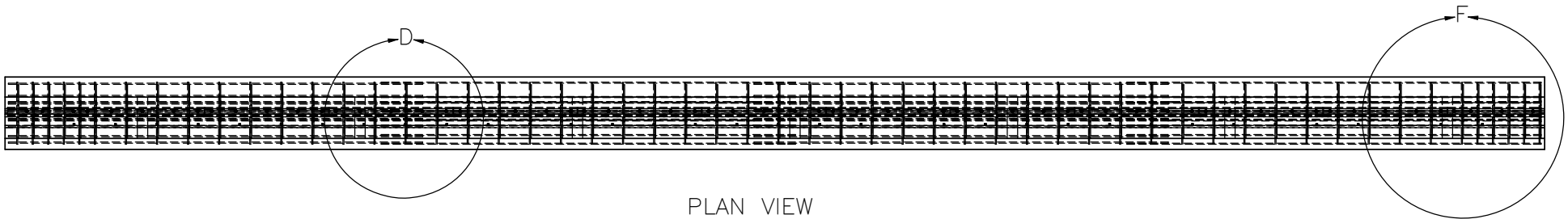
(Test No. RSMG-2)

Mortar Bed Details

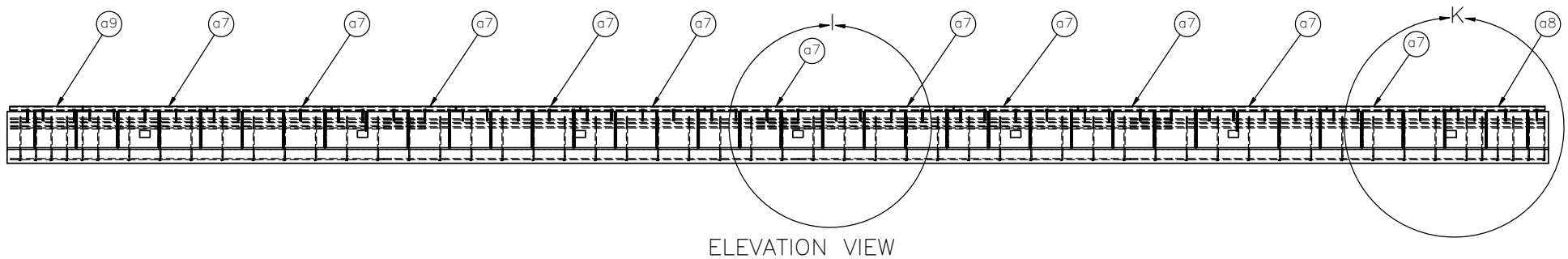
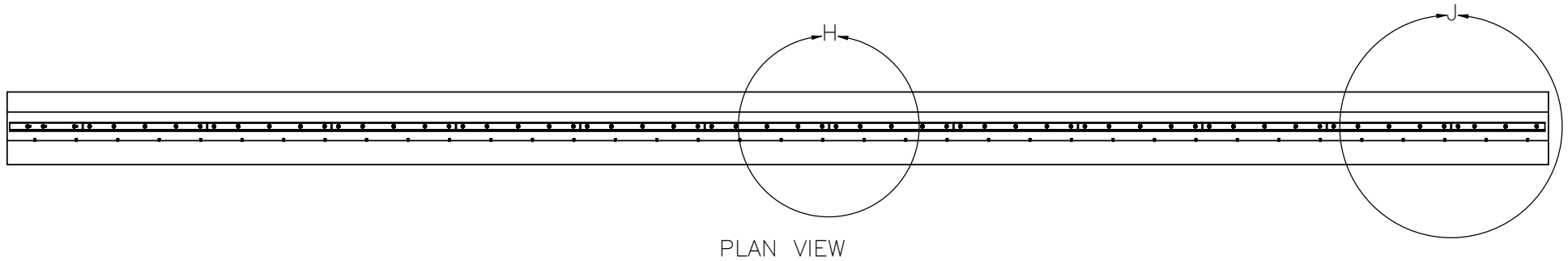
DWG. NAME:  
RSMG-2v1

SCALE: 1:3  
UNITS: In./mm

SHEET:  
4 of 16  
DATE:  
1/29/2009  
DRAWN BY:  
CDB/RJT/  
EAJ  
REV. BY:  
RKf/KAL

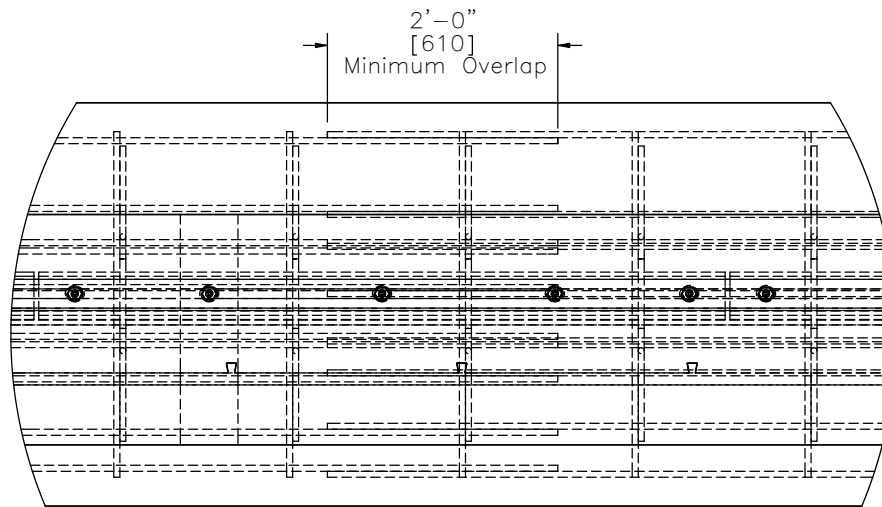


	<b>Test Level 2 Rough Stone Masonry Guardwall</b> (Test No. RSMG-2)		SHEET: 5 of 16
	Rebar Placement		DATE: 1/29/2009
<b>Midwest Roadside Safety Facility</b>	DWG. NAME: RSMG-2v1		DRAWN BY: CDB/RJT/ EAJ
	SCALE: 1:90 UNITS: In.[mm]		REV. BY: RKF/KAL

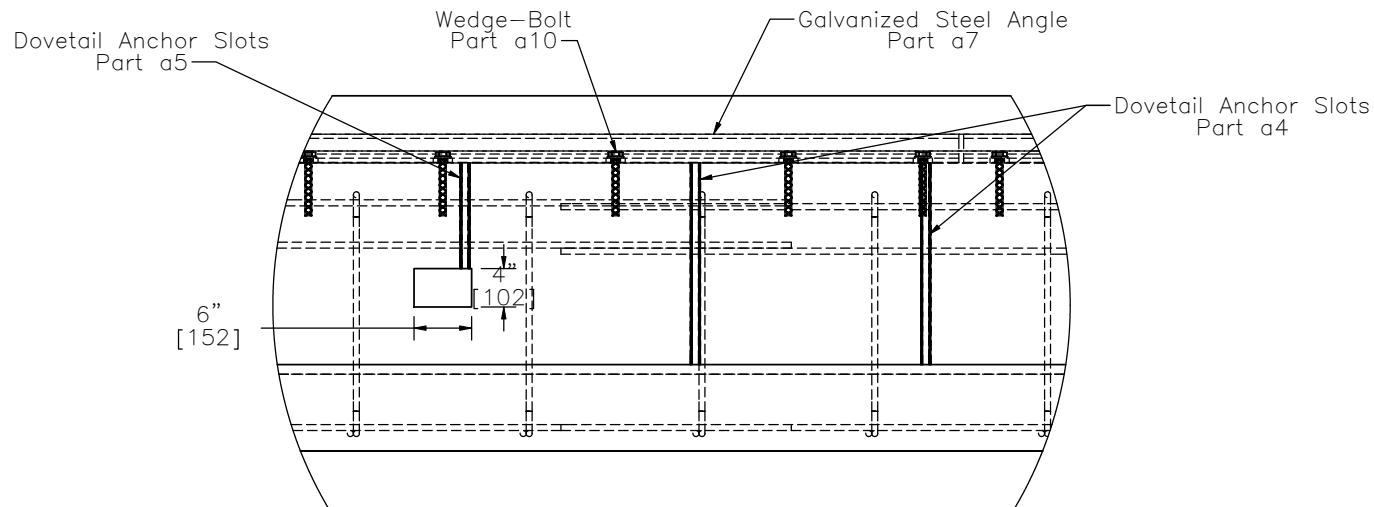


Note: (1) Vertical stirrup locations shown on elevation view only.

	<b>Test Level 2 Rough Stone Masonry Guardwall</b> (Test No. RSMG-2)		SHEET: 6 of 16
	Angle Placement		DATE: 1/29/2009
<b>Midwest Roadside Safety Facility</b>	DWG. NAME: RSMG-2v1		DRAWN BY: CDB/RJT/EAJ
	SCALE: 1:90 UNITS: In./mm		REV. BY: RKf/KAL



DETAIL D

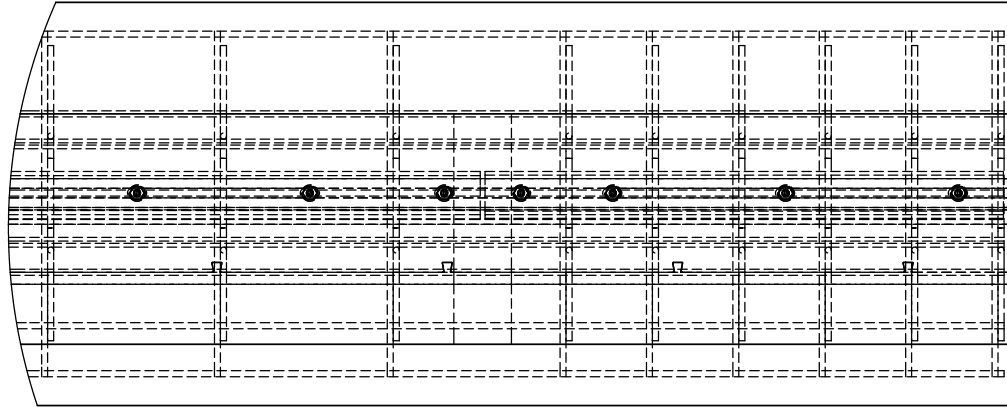


DETAIL E

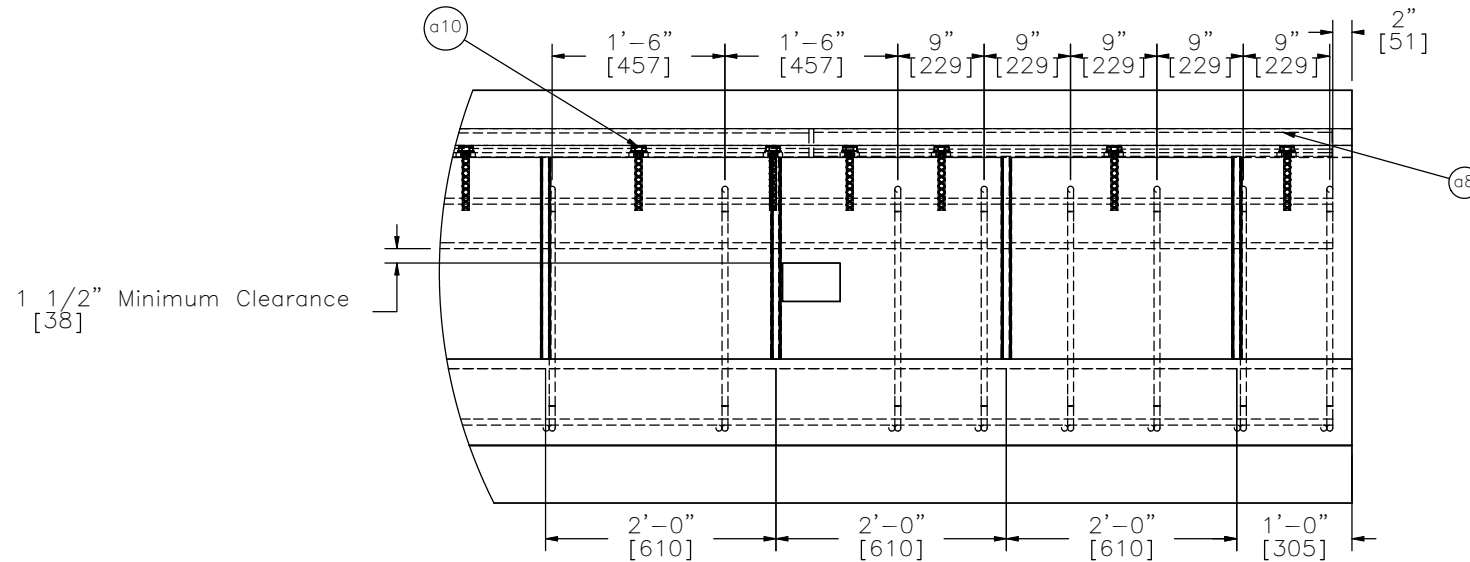
- Notes: (1) The open channels in the Dovetail Anchor Slots are 1"x1"x5/8" [25x25x16] and are foam filled to protect slot during concrete forming and placement.
- (2) Two Type 106 Dovetail Anchor Ties shall be placed in each Dovetail Anchor Slot to attach the rubble stone masonry to the front face of the inner core wall.
- (3) Bend at least 25 percent of Dovetail Anchor Ties at a short right angle to engage a recess cut in the stone. Extend the anchors to within 3 in. [76] of the exposed face of the stone work.

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	Reinforcement Details		DATE: 1/29/2009
DWG. NAME: RSMG-2v1		SCALE: 1:20 UNITS: In./mm	DRAWN BY: CDB/RJT/EAJ  REV. BY: RKf/KAL

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DETAIL F



DETAIL G



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Test Level 2 Rough Stone  
Masonry Guardwall

(Test No. RSMG-2)

Reinforcement Details

DWG. NAME.  
RSMG-2v1

SCALE: 1:20  
UNITS: In./mm

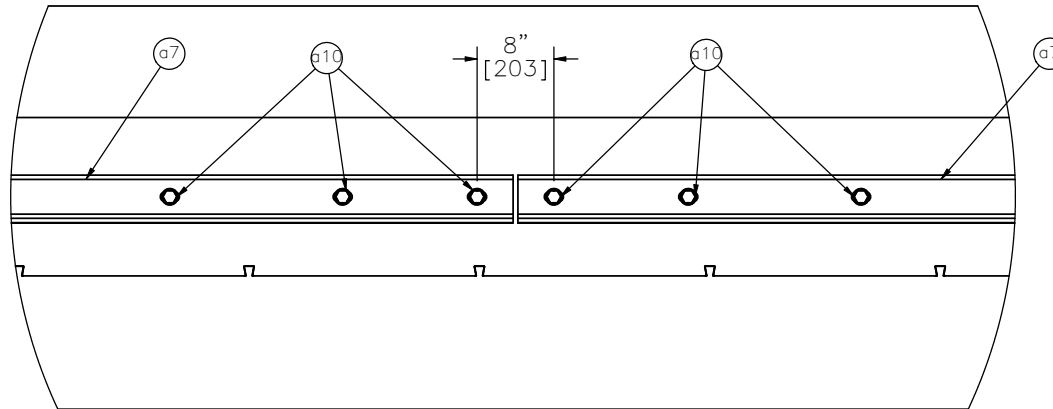
SHEET:  
8 of 16

DATE:  
1/29/2009

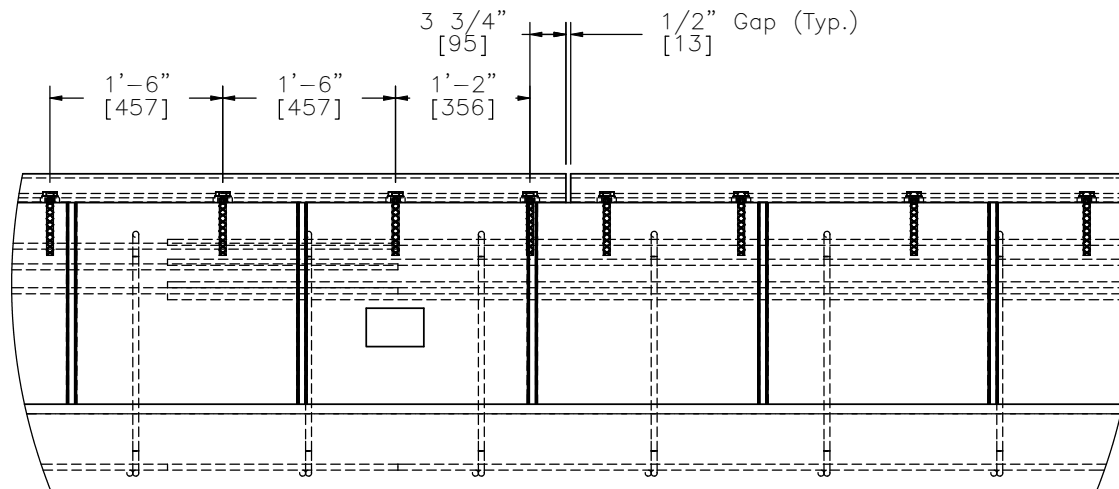
DRAWN BY:  
CDB/RJT/  
EAJ

REV. BY:  
RKf/KAL





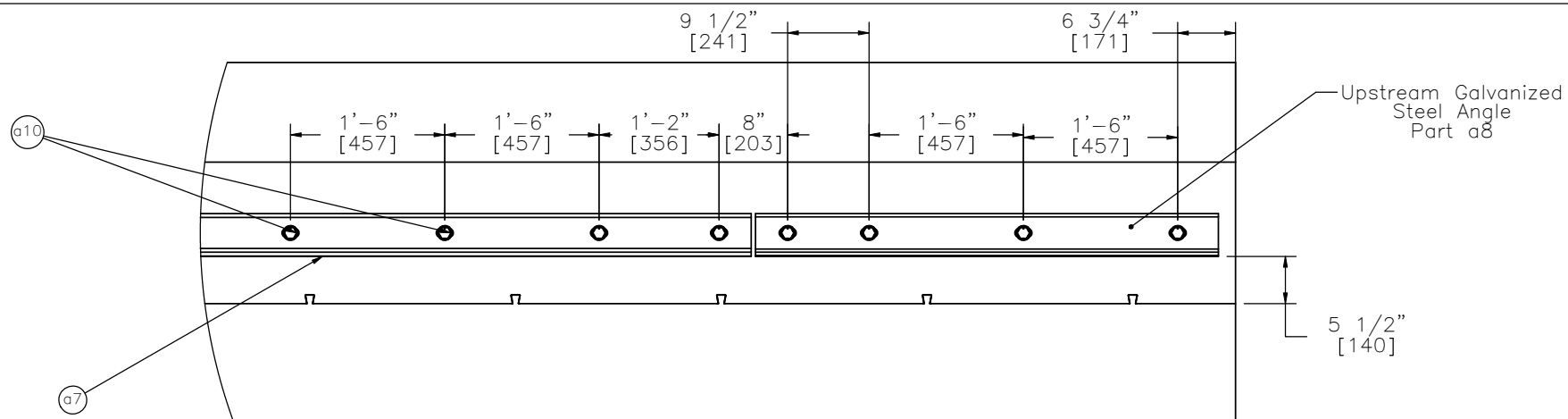
DETAIL H



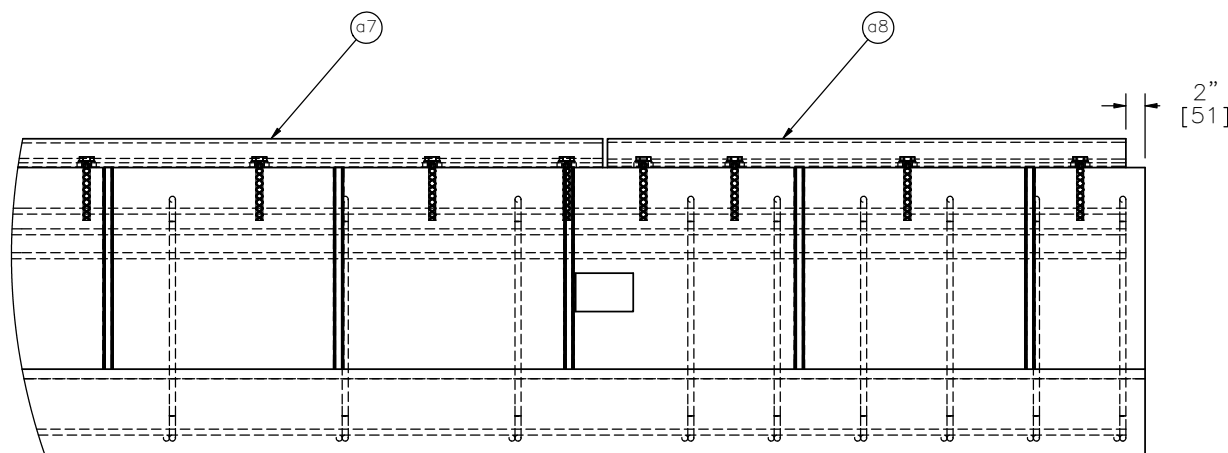
DETAIL I

Note: (1) Vertical stirrup locations shown on elevation view only.

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	Angle Placement Details		DATE: 1/29/2009
<b>Midwest Roadside Safety Facility</b>	DWG. NAME: RSMG-2v1		DRAWN BY: CDB/RJT/EAJ
	SCALE: 1:20 UNITS: In./mm		REV. BY: RKF/KAL



DETAIL J



DETAIL K

Note: (1) Vertical stirrup locations shown on elevation view only.



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Angle Placement Details

DWG. NAME.  
RSMG-2v1

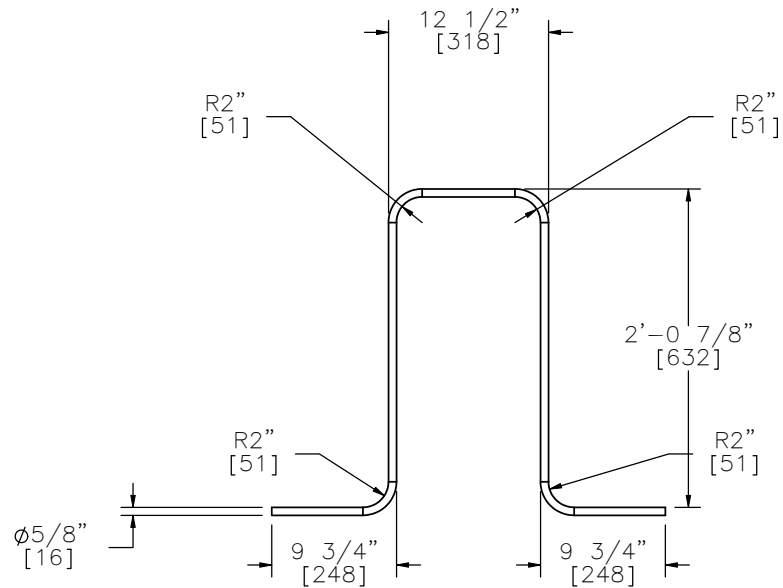
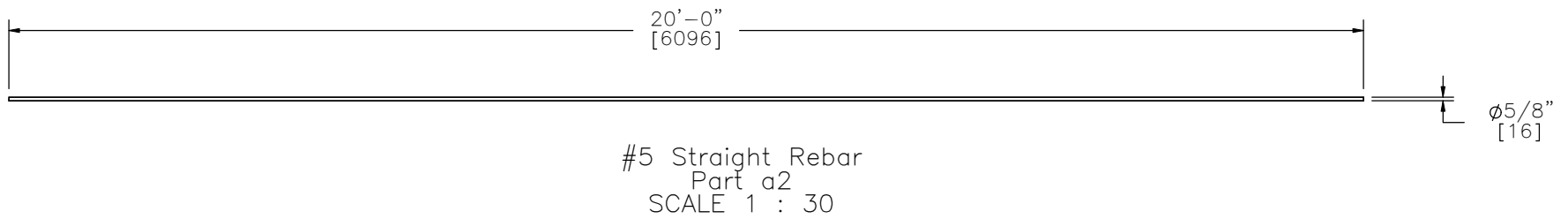
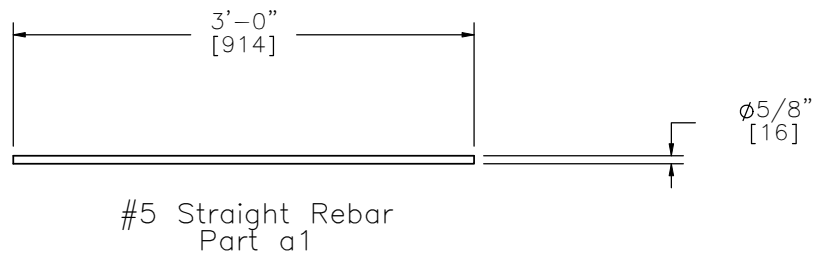
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UNITS: In./mm

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#5 Bent Rebar  
Part a3



Midwest Roadside  
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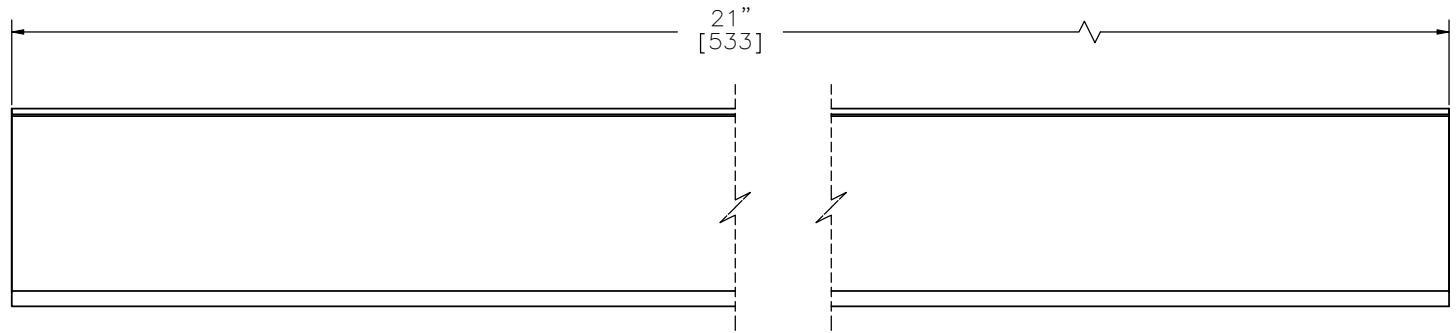
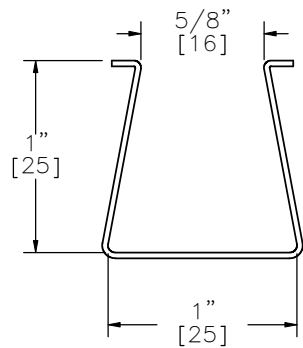
Test Level 2 Rough Stone  
Masonry Guardwall  
(Test No. RSMG-2)

Rebar Details

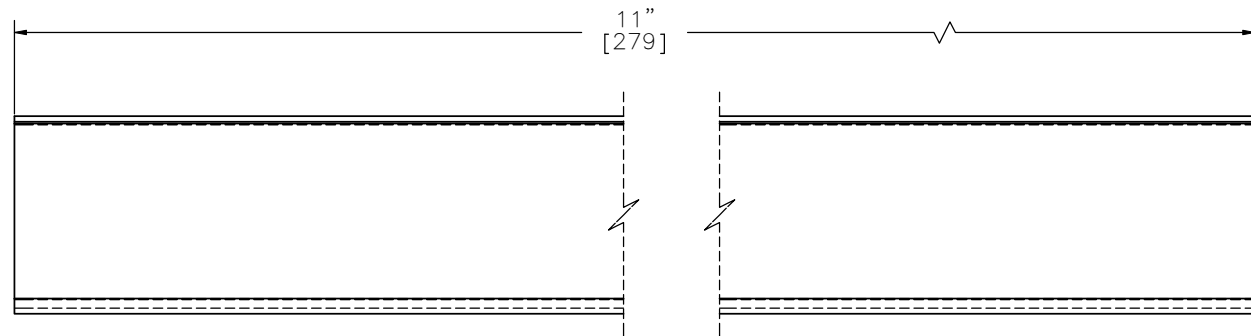
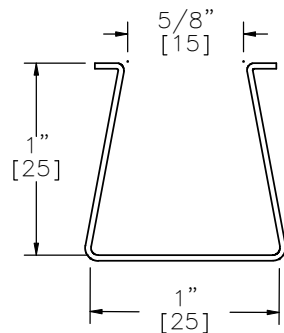
DWG. NAME.  
RSMG-2v1

SCALE: 1:15  
UNITS: In./mm

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REV. BY:  
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Dovetail Anchor Slot  
22 Gauge [0.8]  
Part a4



Dovetail Anchor Slot  
22 Gauge [0.8]  
Part a5

- Notes: (1) The finish for the Dovetail Anchor Slots shall be mill galvanized steel ASTM A653, hot dip galvanized steel ASTM A153, or Class B2 depending upon the material selected.
- (2) Two Dovetail Anchor Ties shall be used with each Dovetail Anchor Slot in order to attach the rubble stone masonry to the face of the inner concrete core wall. Type 106 (16 gauge [1.5] by 5 1/2" [140] long) Dovetail Corrugated Anchors shall be mill galvanized steel ASTM A653 or hot dip galvanized ASTM A153.
- (3) Bend at least 25 percent of anchor ties at a short right angle to engage a recess cut in the stone. Extend the anchors to within 3 in. [76] of the exposed face of the stone work.



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Channel Anchor Details

DWG. NAME.  
RSMG-2v1

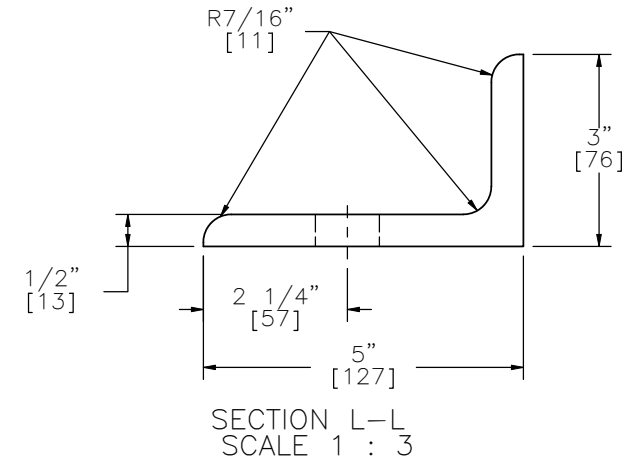
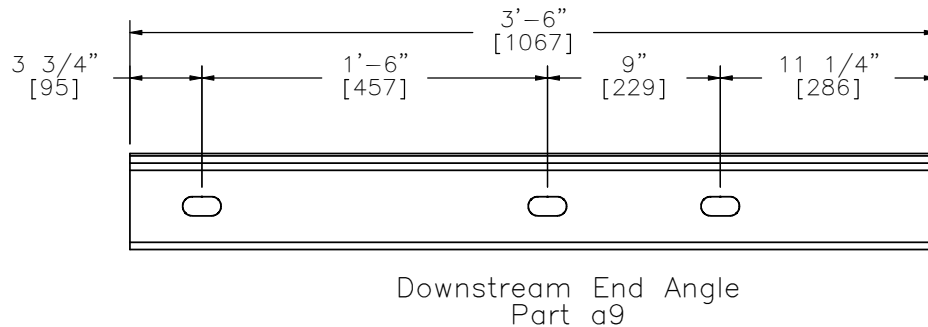
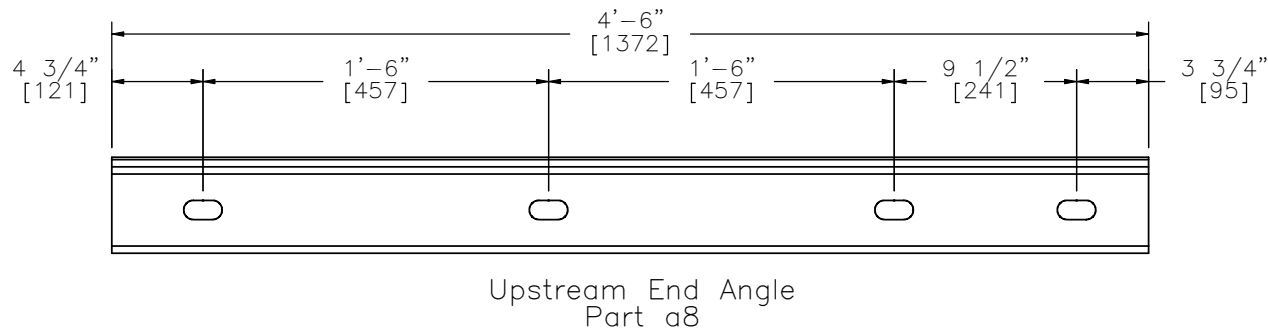
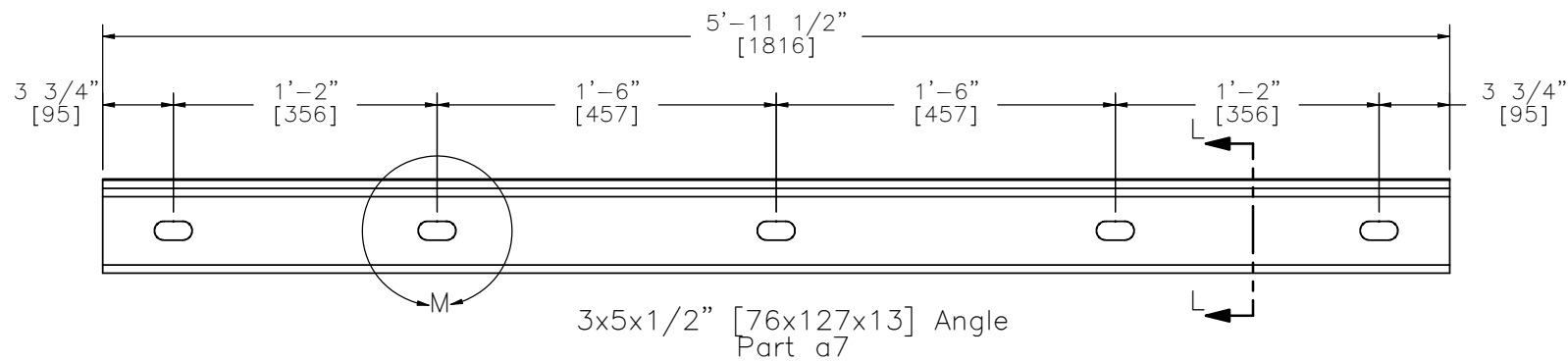
SCALE: None  
UNITS: In./mm

SHEET:  
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DATE:  
1/29/2009

DRAWN BY:  
CDB/RJT/  
EAJ

REV. BY:  
RKF/KAL



- Notes:
- (1) Angles are used to provide lateral shear resistance for the rubble stone masonry placed on top of the inner core wall.
  - (2) Spacing between all angles is approximately 1/2" [13].
  - (3) Interior steel angles are attached with Wedge-Bolt anchors. Interior anchors are centered between stirrups. End anchors on interior angles are placed between stirrups, but not centered since an anchor from the adjacent angle must also be placed within the same stirrup span.



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Angle Details

DWG. NAME.  
RSMG-2v1

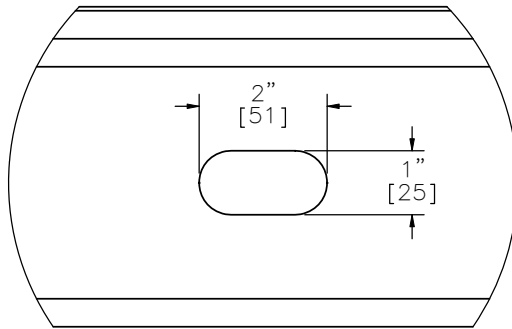
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UNITS: In./mm

SHEET:  
13 of 16

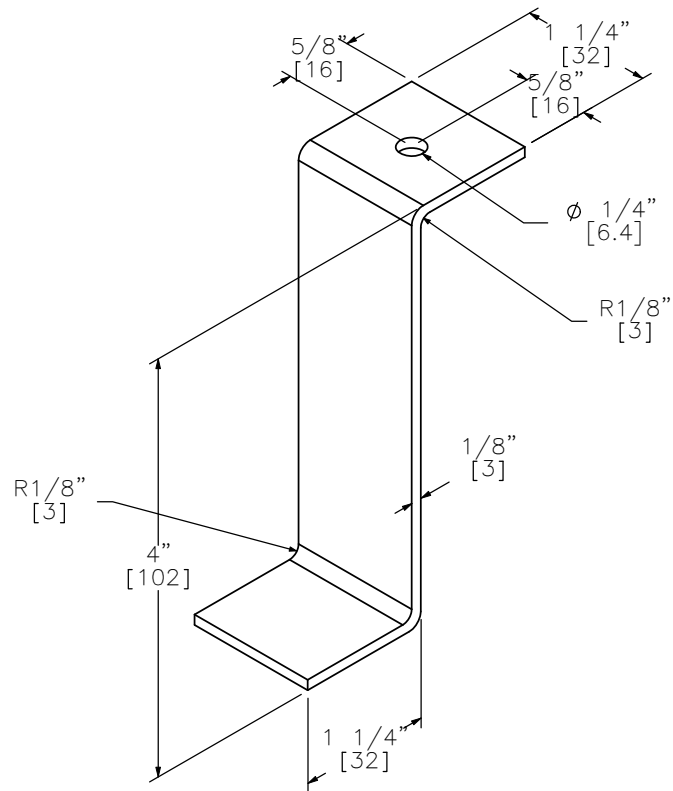
DATE:  
1/29/2009

DRAWN BY:  
CDB/RJT/  
EAJ

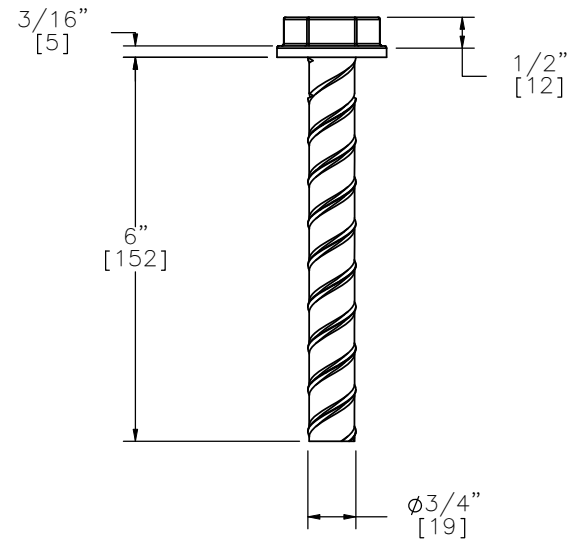
REV. BY:  
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DETAIL M



304 Stainless Steel Z-Clip  
Part a11  
SCALE 2 : 3



ø3/4" [19] x 6" [152] Wedge-Bolt Anchor  
Part a10



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Test Level 2 Rough  
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(Test No. RSMG-2)

Hole and Wedge-Bolt  
Dimensions

DWG. NAME.  
RSMG-2v1

SCALE: 1:3  
UNITS: In.[mm]

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1/29/2009

DRAWN BY:  
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Test Level 2 Rough Stone  
Masonry Guardwall

(Test No. RSMG-2)

System Isometric View

DWG. NAME:  
RSMG-2v1

SCALE: 1:95  
UNITS: In.[mm]


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DATE:  
1/29/2009

DRAWN BY:  
CDB/RJT/  
EAJ

REV. BY:  
RKf/KAL

Test Level 2 Rough Stone Masonry Guardwall			
Item No.	QTY.	Description	Material Specifications
a1	55	#5 Straight Rebar, 3' [914] long	Grade 60
a2	40	#5 Straight Rebar, 20' [6096] long	Grade 60
a3	55	#5 Bent Rebar	Grade 60
a4	35	Dovetail Anchor Slot 21" [533] long (22 gauge [0.8])—Galvanized	ASTM A1008, A109, or A1011
a5	2	Dovetail Anchor Slot 11" [279] long (22 gauge [0.8])—Galvanized	ASTM A1008, A109, or A1011
a7	11	5x3x1/2" [127x76x13] Interior Angle	Galvanized, ASTM A36 Steel
a6	111	Dovetail Anchor Tie (16 gauge by 5 1/2" long by 1" wide)	Galvanized Steel
a8	1	5x3x1/2" [127x76x13] Upstream End Angle	Galvanized, ASTM A36 Steel
a9	1	5x3x1/2" [127x76x13] Downstream End Angle	Galvanized, ASTM A36 Steel
a10	62	3/4" [19] Dia. by 6" [152] long Wedge—Bolt Anchor	Galvanized, Carbon Steel
a11	37	Z—Clips	304 Stainless Steel
a12	37	Heavy—Weight, Tapcon Masonry Anchors — 1/4" [6.4] Diam. x 2 3/4" [70] long	Stainless Steel
b1	1	3'—6" x 74'—4" x 6" [1.1mx22.7mx152mm] Aggregate Base	Aggregate
b2	1	Concrete Corewall Base	f'c = 3,500 psi [24.1 MPa]
b3	1	Concrete Corewall Top	f'c = 3,500 psi [24.1 MPa]
c1	1	Rough Stone Masonry Facade (Rubble Masonry)	Sound, Durable Rock with Mortar
c2	1	Mortar Bed — PROMIX Stone Veneer Mortar conforming to ASTM C—270 Type S Specifications	FHWA Section 712.05(a)

	Test Level 2 Rough Stone Masonry Guardwall		SHEET: 16 of 16
	(Test No. RSMG—2)		DATE: 1/29/2009
	Bill Of Materials		DRAWN BY: CDB/RJT/ EAJ
	DWG. NAME: RSMG—2v1	SCALE: None UNITS: In.[mm]	REV. BY: RKf/KAL

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