

**TECHNICAL
BRIEF**

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Product Specification

ArmorGuard™ Gate System

I. General

The ArmorGuard Gate System provides a means to close 8, 12, and 16 meter openings in rigid longitudinal barrier systems. The system can be opened to allow emergency vehicle access and to be able to reroute traffic. The system provides positive separation when in the locked position. The ArmorGuard Gate System performs to the criteria set forth for Longitudinal Barriers in the National Cooperative Highway Research Program Report 350 (NCHRP 350) at Test Level 3 (100 km/hr).

II. Performance

The ArmorGuard Gate System is a longitudinal barrier with the ability to be disconnected from the adjacent rigid barrier system and pivot open from either fixed end to move sections of the barrier laterally or longitudinally without the use of heavy equipment. The system is designed to provide positive lane separation and vehicle redirection characteristics in accordance with NCHRP 350 guidelines for longitudinal barriers. The system is intended to be attached to rigid barrier.

A. When properly installed according to manufacturer's recommendations, the ArmorGuard Gate System shall be able to meet the recommended structural adequacy, occupant risk, and vehicle trajectory criteria set forth in NCHRP 350 for Test Level 3 (100 km/hr) Longitudinal Barriers:

1. An 820 kg vehicle at 20 degrees impacting the midpoint of the system (Test 3-10).
2. A 2000 kg vehicle at 25 degrees impacting the midpoint of the system (Test 3-11).
3. A 2000 kg vehicle at 25 degrees impacting at the critical impact point of the system (Test 3-21).

B. The impact velocity of a hypothetical front seat passenger against the vehicle interior as calculated from the longitudinal vehicle acceleration and 600 mm [23 5/8 in] forward displacement, and the lateral vehicle acceleration and 300 mm [12 in] lateral vehicle

displacement, shall be less than 12 m/s (39.3 ft/s). The highest 10 ms average vehicle acceleration in the longitudinal and lateral directions subsequent to the instant of hypothetical occupant impact shall be less than 20 g's.

Detached debris shall not show potential for penetrating the vehicle occupant compartment or present a hazard to other traffic, pedestrians, or workers in a work zone. The vehicle shall remain upright during and after the collision although moderate roll, pitch, and yaw may occur.

III. Description of System

A. The ArmorGuard Gate Systems are as shown in Drawings D010321, D010322, and D010321. The systems consist of four key elements and shall be made from materials conforming to the following specifications:

1. The Gate Assembly Section (B010336) is 4 meters in length. These are assembled together in two, three, or four sections to create gates that are 8, 12, or 16 meters in length. Each Gate Assembly Section shall be composed of end supports, center supports, diagonal braces, a shear plate, and longitudinal panels for the top, center, and bottom. These components are held together using clamp strips and a variety of fasteners.
 - a. All steel clamp strips, supports, braces, shear plates, and panels shall be fabricated from mild steel in conformance with ASTM A-36 specifications and galvanized in accordance with ASTM 123.
 - b. All fasteners shall be Class 4.6 (Grade 2) or greater and galvanized in accordance with ASTM 153. Washers shall be hardened and galvanized.
2. The Connecting Hardware (B010343) is used to connect the 4 meter assemblies together. Connecting of the assembly sections is accomplished using upper and lower coupling strips, threaded rod, top panel connecting brackets, and a coupling shear plate. Fasteners and bolt strips hold the connection.
 - a. All steel coupling strips, connecting brackets, shear plates, and bolt strips shall be fabricated from mild steel in conformance with ASTM A-36 specifications and galvanized in accordance with ASTM 123.
 - b. Threaded Rods and fasteners shall be Class 4.6 (Grade 2) or greater and galvanized in accordance with ASTM 153. Washers shall be hardened and galvanized.
3. The Pneumatic System provides the lifting capacity and control functions for the gate. This installation consists of the control and filter units and all necessary air lines to facilitate independent lifting and lowering of the steering and swing units (A010330 and A010331) as well as directional control of each steering unit.
 - a. All steel components such as mounting brackets and steering and swing unit frames shall be fabricated from mild steel in conformance with ASTM A-36 specifications and galvanized in accordance with ASTM 123.

- b. All control and filter units and corresponding air lines shall be specified for outdoor use.
4. The Hinge Assembly (C010202 and B010343) connects the ends of the gate to a transition assembly. A hinge set contains two aluminum hinge covers with load carrying engagement rails and pivot rods, opposing hinges, and a master pin.
- a. All aluminum components shall be made of 5052 H32 in conformance with ASTM B209.
 - b. All steel hinges and hinge cover rails shall be fabricated from mild steel in conformance with ASTM A-36 specifications and galvanized in accordance with ASTM 123.
 - c. The master hinge pin and hinge cover pivot rod shall be fabricated from C1018 CF steel and galvanized in accordance with ASTM 123.

B. The ArmorGuard Gate System is approximately 700 mm (28 in) wide and 830mm (32 5/8) tall.

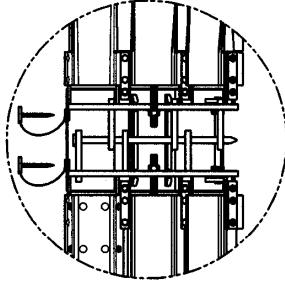
C. A 16 meter gate weighs approximately 2700 kg (6000 lb). A 12 meter gate weighs approximately 2030 kg (4500 lb). An 8 meter gate weighs approximately 1525 kg (3360 lb).

D. The ArmorGuard Gate System shall be assembled and installed in accordance with the manufacturer's instructions.

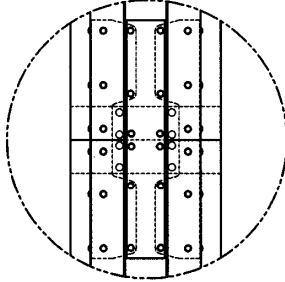
IV. Application of Safety Appurtenances

Highway safety appurtenances should be applied to hazardous sites in accordance with the guidelines and recommendations in the American Association of State Highway Transportation Officials (AASHTO), "Roadside Design Guide", and other Federal Highway Administration and State Department of Transportation requirements. Placement of the ArmorGuard Gate System must comply with these specifications and guidelines as well as those of the manufacturer.

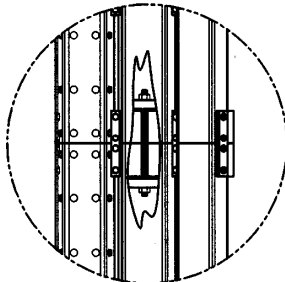
ITEM	QTY/ DWG	PART DESCRIPTION	DWG #
1	2	HINGE ASSEMBLY	C010202-PD
2	2	TRANSITION TO CONCRETE BARRIER	B010347-PD
3	4	4 METER SECTION ASSEMBLY	B010336-PD
4	3	CONNECTING HARDWARE	A010345-PD
5	2	STEERING UNIT	A010330-PD
6	2	SWING UNIT	A010331-PD



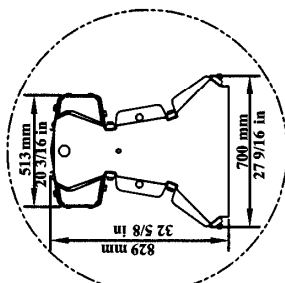
DETAIL D



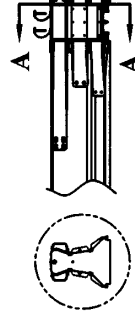
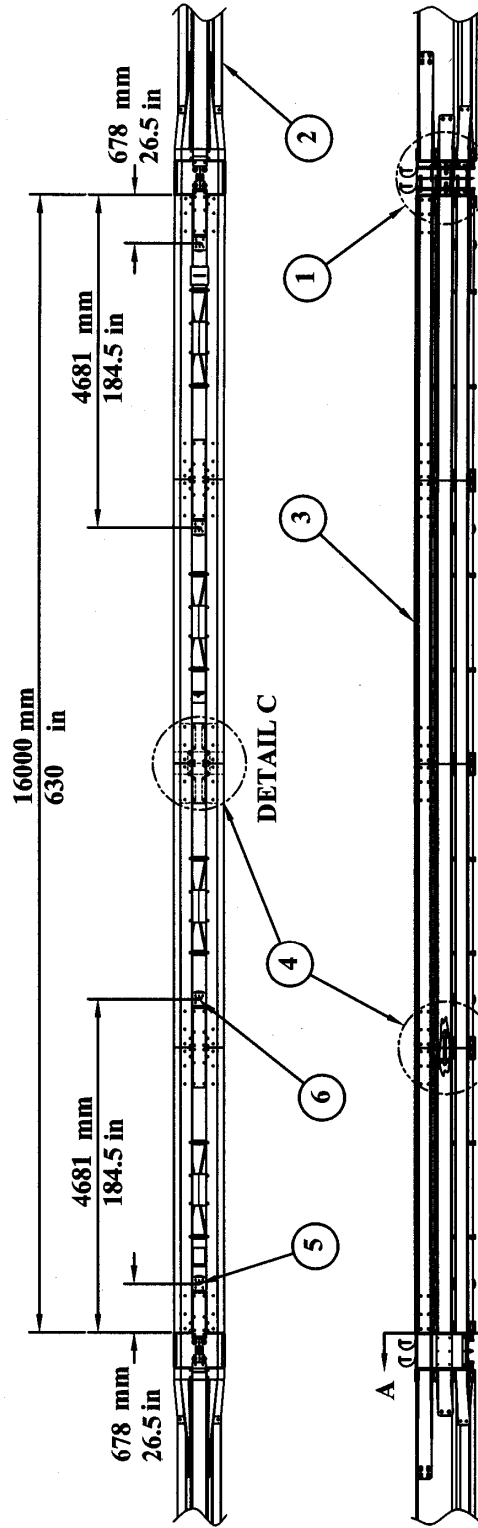
DETAIL C



DETAIL B



DETAIL A



DETAIL A
SECTION A-A

DETAIL B

DETAIL C

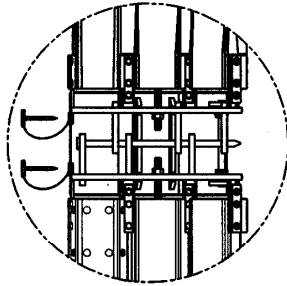
DETAIL D

SCALE: 1=30		DATE	REV.
DRAWN BY	03/22/01	NO.	
APPROVED BY			
TITLE: SAFEGUARD 16 METER GATE ASSEMBLY		MODEL	D010321-PD
DATE	BY	RECD	ITEM
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		MA	1
		NET ASST.	
		CHANGES	
		REV.	

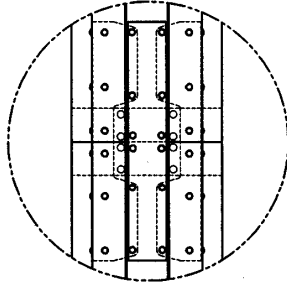
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NOTE:
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TO THE THINNER OF 2 PIECES
BEING JOINED. WELD TO BE ALL
AROUND UNLESS OTHERWISE NOTED.

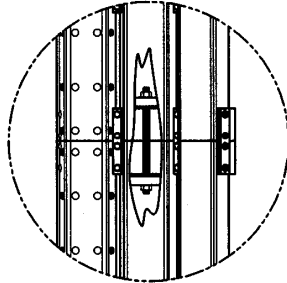
ITEM	QTY / DWG	PART DESCRIPTION	DWG #
1	2	HINGE ASSEMBLY	C010202-PD
2	2	TRANSITION TO CONCRETE BARRIER	B010347-PD
3	3	4 METER SECTION ASSEMBLY	B010336-PD
4	2	CONNECTING HARDWARE	A010345-PD
5	2	STEERING UNIT	A010330-PD
6	2	SWING UNIT	A010331-PD



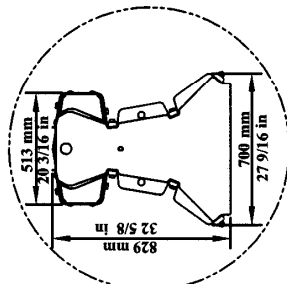
DETAIL D



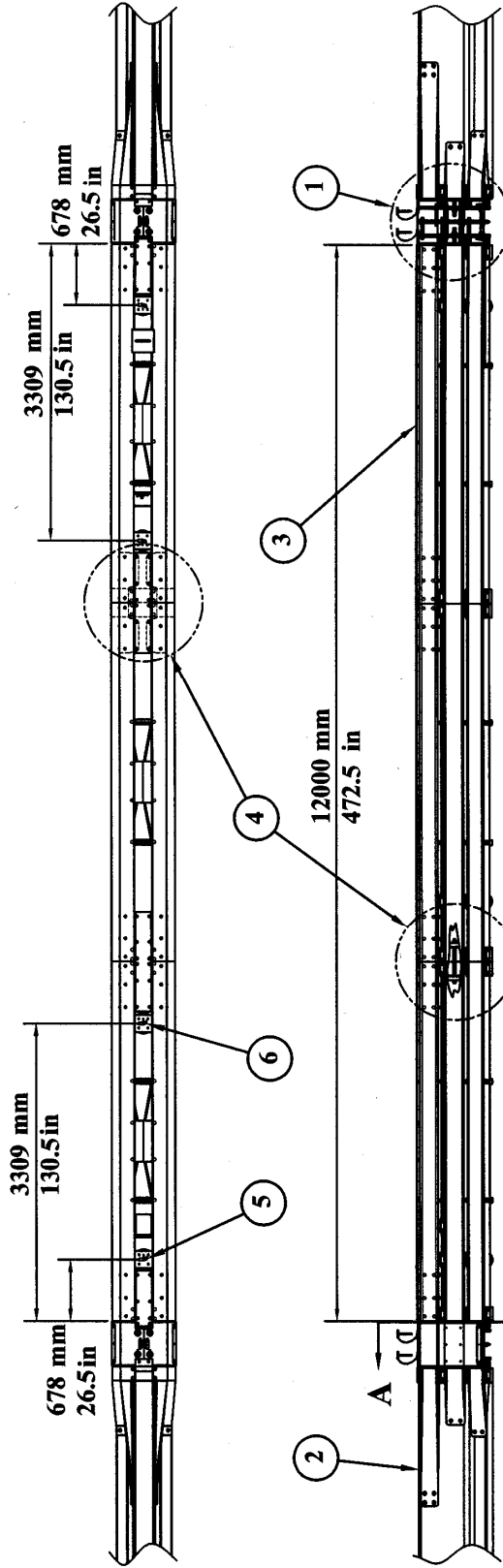
DETAIL C



DETAIL B



DETAIL A



DETAIL D

DETAIL B

DETAIL A

SECTION A-A

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SCALE: 1=30

DATE: 03/27/01

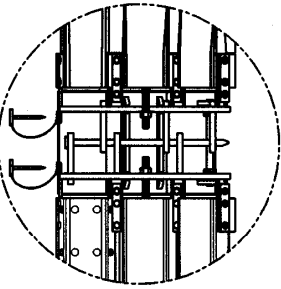
TITLE: SAFEGUARD 12 METER GATE ASSEMBLY

DATE	BY	RECD	REV	ASST	ITEM
			1	AK	1

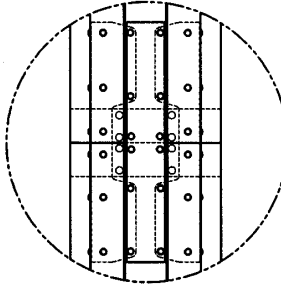
CHANGES

MODEL	DRAWING NUMBER	REV.
	D010322-PD	

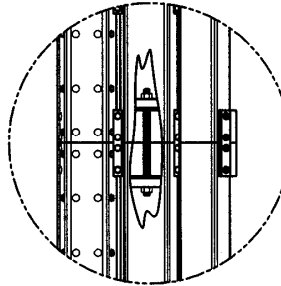
ITEM	QTY/ DWG	PART DESCRIPTION	DWG #
1	2	HINGE ASSEMBLY	C010202-PD
2	2	TRANSITION TO CONCRETE BARRIER	B010347-PD
3	2	4 METER SECTION ASSEMBLY	B010336-PD
4	1	CONNECTING HARDWARE	A010345-PD
5	2	STEERING UNIT	A010330-PD
6	2	SWING UNIT	A010331-PD



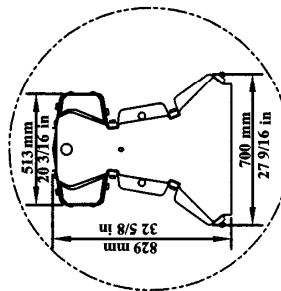
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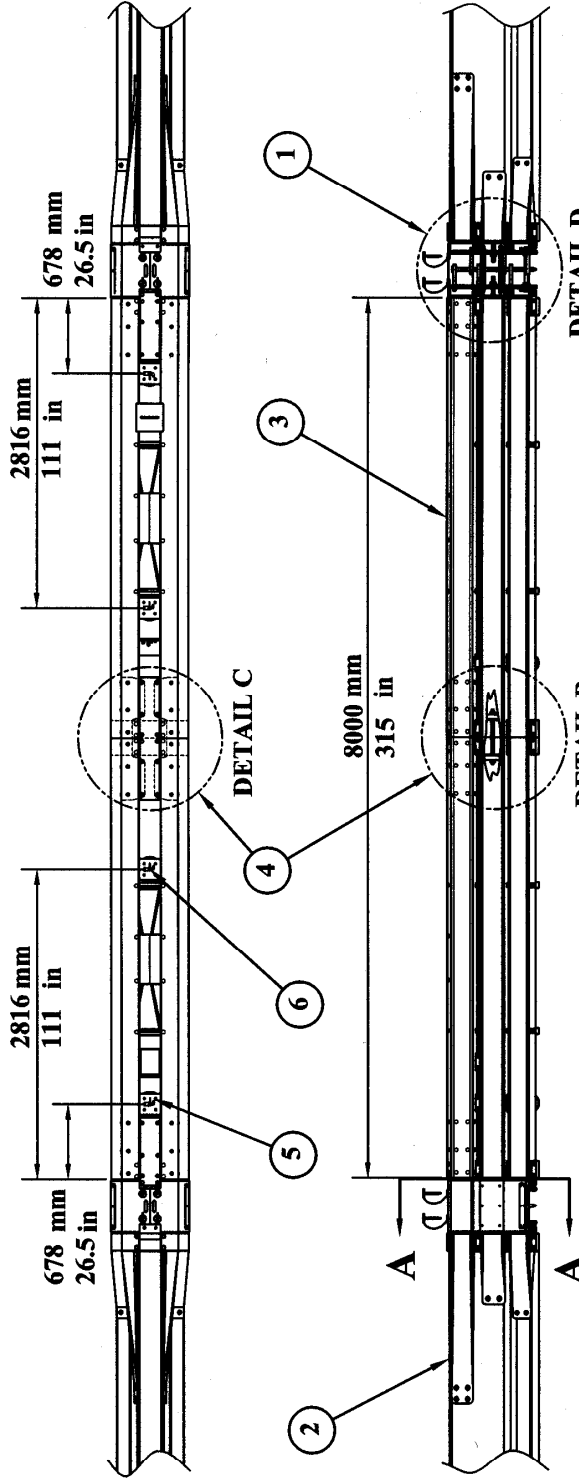
DETAIL C



DETAIL B

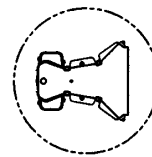


DETAIL A



DETAIL D

DETAIL B



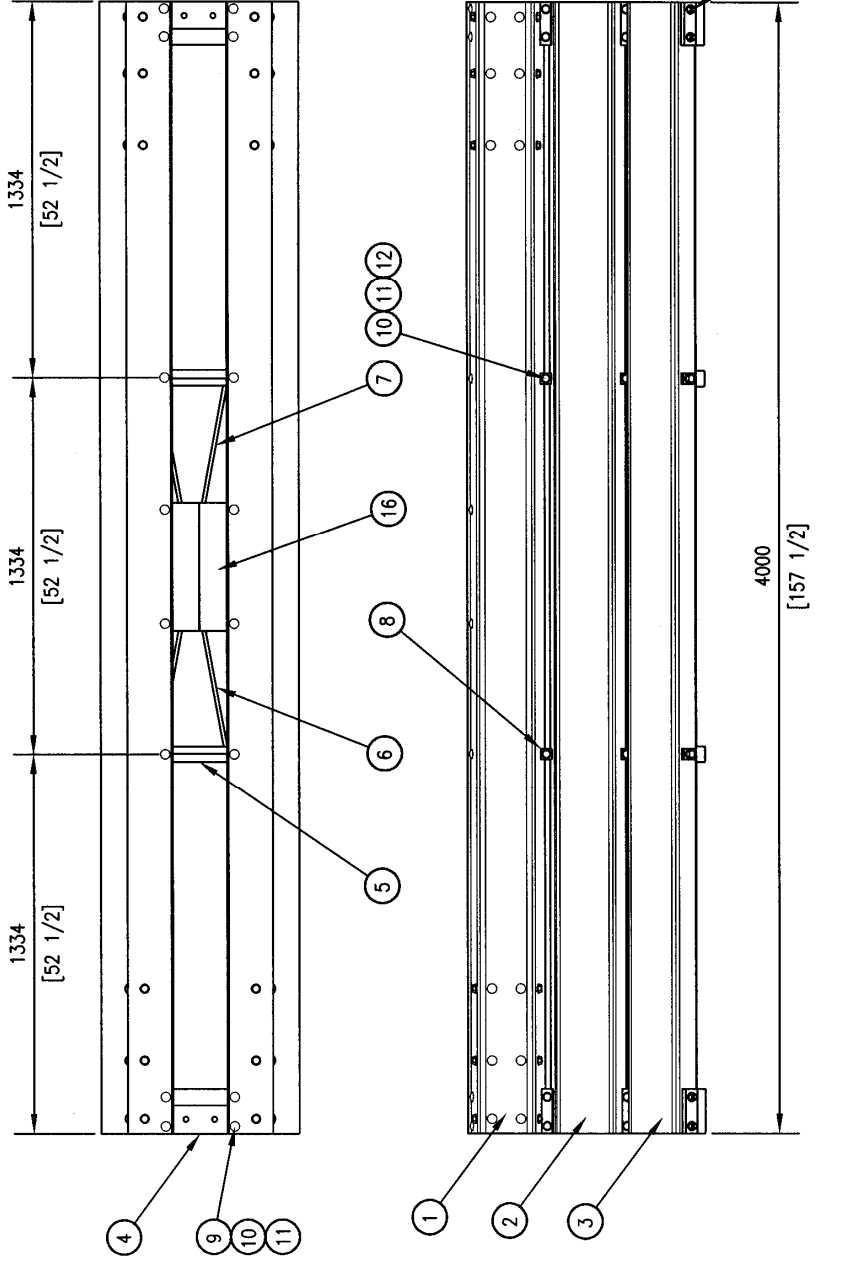
DETAIL A
SECTION A-A

SCALE: 1=30		DATE: 03/28/01		REV: 01	
DESIGNED BY	1	INCH	1	REV	01
CHECKED BY		DATE	BY	RECD	REV
CONTRACT			REV		
TITLE: SAFEGUARD 8 METER GATE ASSEMBLY			MODEL DRAWING NUMBER: D010323		
DATE			REV		

NOTE:
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ITEM	QTY / PART DESCRIPTION	SPECIFICATION	DWG #
1	TOP PANEL	ASTM A36 HRMS, 3/16" PLATE	DD0101
2	CENTER PANEL	ASTM A36 HRMS, 8 GA PLATE	BD10336-
3	BOTTOM PANEL	ASTM A36 HRMS, 8 GA PLATE	BD10336-
4	END SUPPORT	ASTM A36 HRMS, 3/16" PLATE	BD10336-
5	CENTER SUPPORT	ASTM A36 HRMS, 3/16" PLATE	BD10336-
6	DIAGONAL LEFT	ASTM A36 HRMS, 1/2" DIA RB	BD10336-
7	DIAGONAL RIGHT	ASTM A36 HRMS, 1/2" DIA RB	BD10336-
8	CLAMP STRIP	ASTM A36 HRMS, 3/8" PLATE	BD10336-
9	ROUND HEAD BOLT, M16 X 75	GRADE 5	NA
10	WASHER, M16	GRADE 5	NA
11	HEX NUT, M16 X 50	GRADE 5	NA
12	HEX BOLT, M16 X 50	GRADE 5	NA
13	HEX NUT, B-M16 (0.5D)	GRADE 5	NA
14	COUPLING STRIP NUT M16	GRADE 5	NA
15	MID SHEAR PLATE	ASTM A36 HRMS, 1/4" PLATE	BD10150

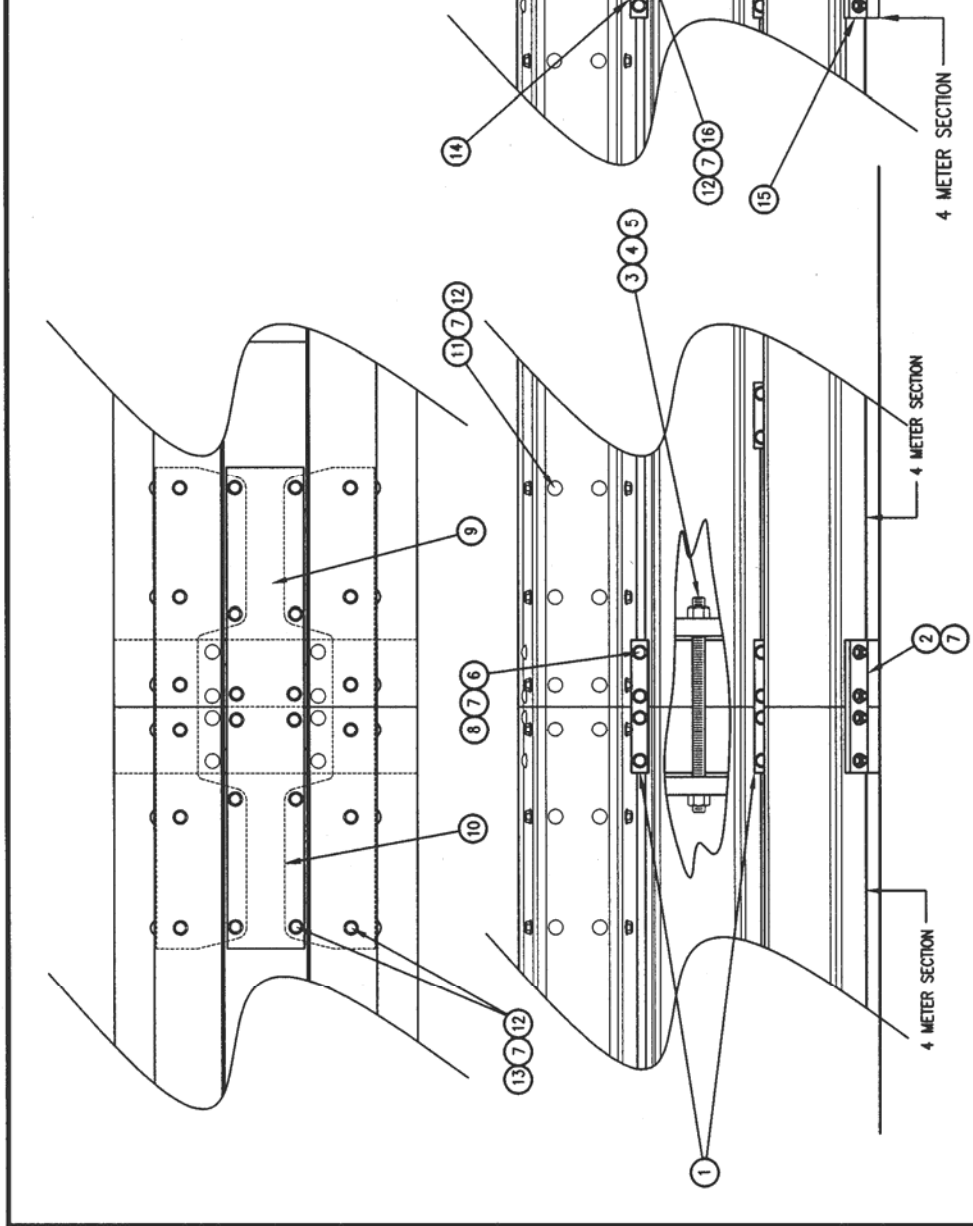


SCALE: 1=15 DRAWN BY: 3/27/01 CHECKED BY: GAO		MODEL DRAWING NUMBER B010336	
TITLE: 4 METER SECTION, SAFEGUARD		REV.	
4 DD10321	DATE BY	1 NEXT ASSTY.	REV.
CHANGES			

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ITEM	QTY/DWG	PART DESCRIPTION	SPECIFICATION	DWG #
1	4	COUPLING STRIP	ASTM A36 HRMS, 3/4" THK X 1 1/2" W X 12" L	B010343-PD1
2	2	COUPLING STRIP, BOTTOM	ASTM A36 HRMS, 3/4" THK X 2" W X 12" L	B010343-PD2
3	2	30 MM X 495 MM THREADED ROD, GRADE 5, GALVANIZED	30 MM X 495 MM THREADED ROD, GRADE 5, GALVANIZED	B010343-PD3
4	2	30 MM NUT, GALVANIZED	GRADE 5	B010343-PD4
5	4	30 MM WASHER, GALVANIZED	GRADE 5	B010343-PD5
6	16	HEX BOLT, M16 X 50	GRADE 5	NA
7	24	WASHER, M16	HARDENED	NA
8	8	BOLT STRIP	ASTM A36 HRMS, 3/8" THK X 2" W X 6" L	B010343-PD6
9	1	COUPLING SHEAR PLATE	ASTM A36 HRMS, 1/4" PLATE	B010127
10	2	TOP PANEL CONNECTING BRACKET	ASTM A36 HRMS, 1/4" PLATE	B010103
11	24	ROUND HEAD BOLT, M16 X 25	GRADE 5	NA
12	48	HEX NUT, M16	GRADE 5	NA
13	24	HEX BOLT, M16 X 40	GRADE 5	NA
14	8	HINGE MOUNT STRAP	ASTM A36 HRMS, 3/4" THK X 1 1/2" W X 8 3/4" L	B010343-PD9
15	4	HINGE MOUNT STRAP, BOTTOM	ASTM A36 HRMS, 3/4" THK X 2" W X 8 3/4" L	B010343-PD10
16	12	HEX BOLT, M16 X 70	GRADE 5	NA



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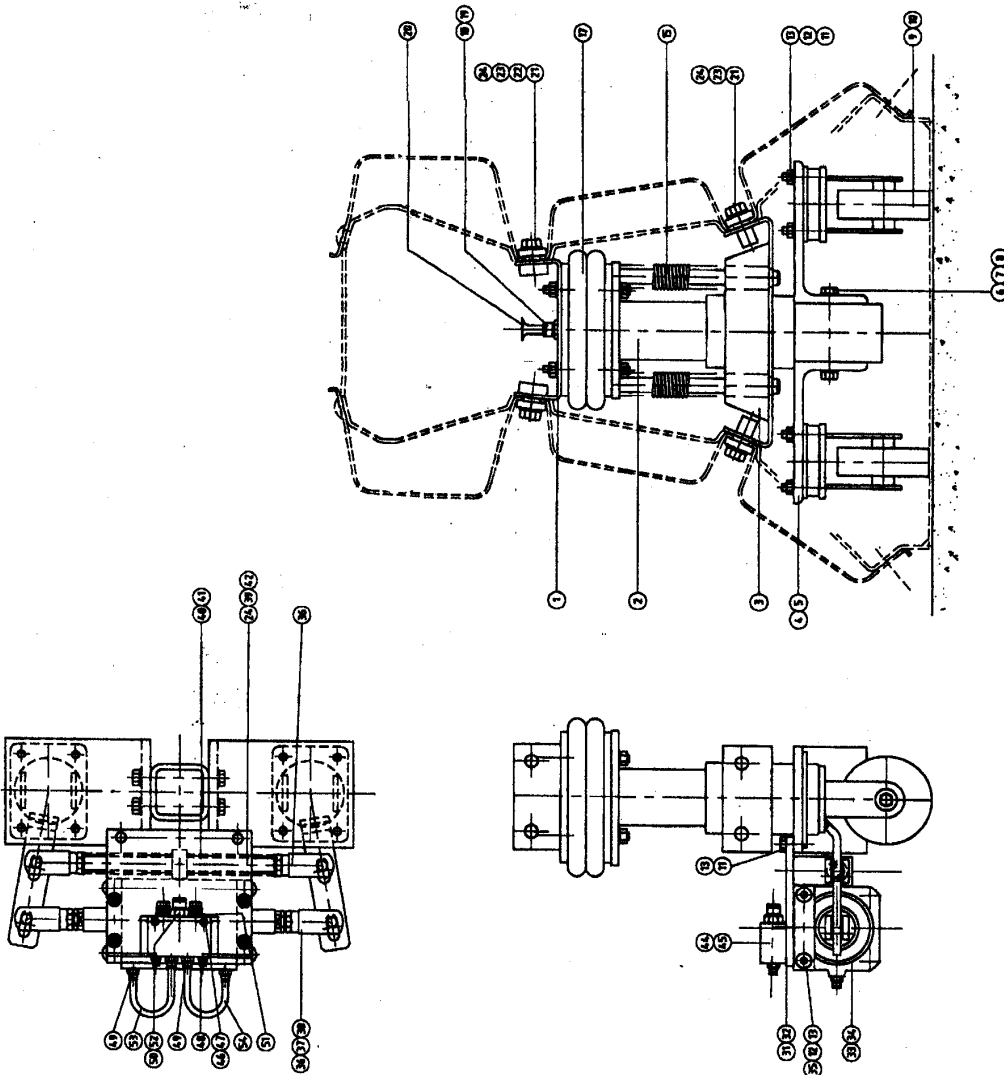
SCALE: EIGHTH
 DRAWN BY: [] DATE: 03/26/01
 CHECKED BY: []

TITLE: CONNECTING HARDWARE

REV.	CHANGES	DATE	BY	REV'D	HEAT	ASST.	ITEM
1							B010336 14

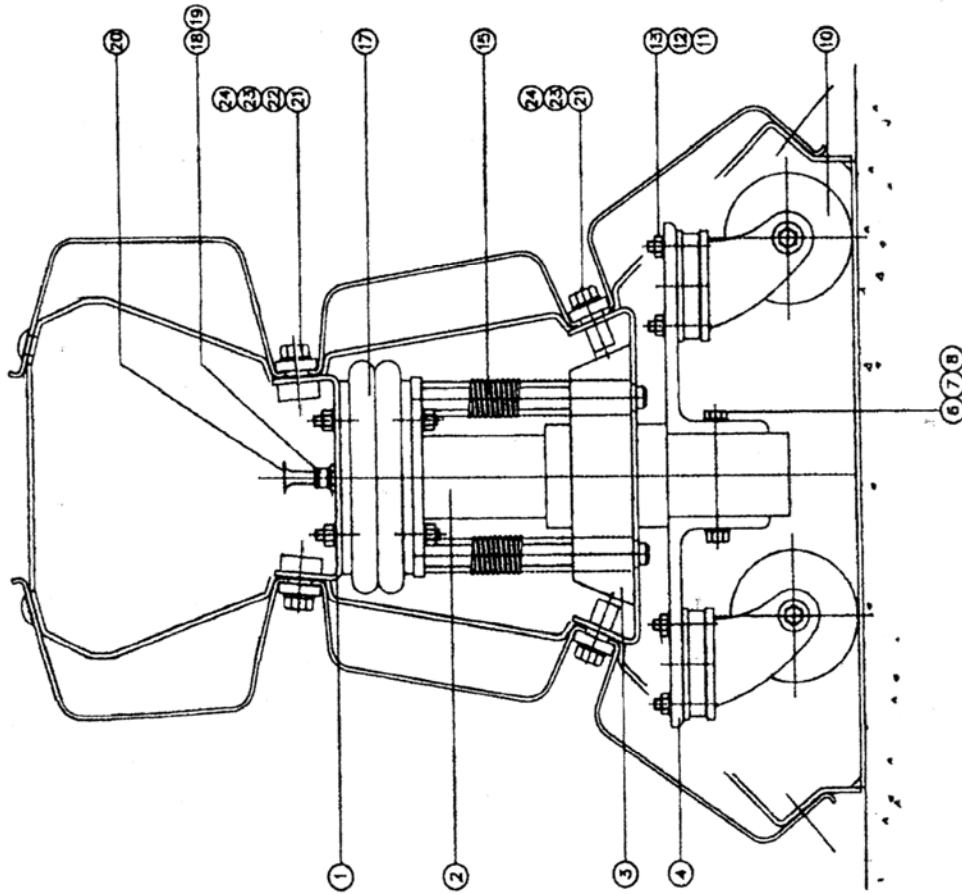
MODEL	DRAWING NUMBER	REV.
	B010343-PD	

ITEM	QTY/DWG	PART DESCRIPTION	DRAWING
1	1	CARRIER	A010330-PD1
2	1	CARRIER TUBE	A010330-PD2
3	1	SUPPORT TUBE	A010330-PD3
4	2	WHEEL SUPPORT	A010330-PD4
5	1	WHEEL SUPPORT RIGHT	A010330-PD5
6	2	HEX BOLT M12 X 120	A010330-PD6
7	2	HEX NUT M12	A010330-PD7
8	2	SPRING WASHER M12	A010330-PD8
9	1	STEERING WHEEL LEFT	A010330-PD9
10	2	STEERING WHEEL RIGHT	A010330-PD10
11	8	HEX BOLT M10 X 35	A010330-PD11
12	8	HEX NUT M10	A010330-PD12
13	8	SPRING WASHER M10	A010330-PD13
15	2	COMPRESSION SPRING	A010330-PD15
17	1	AIR BAG	A010330-PD17
18	1	STRAIGHT NIPPLE	A010330-PD18
19	1	FIBER GASKET	A010330-PD19
20	1	COUPLING PLUG	A010330-PD20
21	4	CLAMP STRIP	A010330-PD21
22	2	MOUNTING STRIP	A010330-PD22
23	8	HEX BOLT M16 X 45	A010330-PD23
24	8	WASHER M16	A010330-PD24
27	1	3-WAY VALVE	A010330-PD27
28	1	T-COUPLING	A010330-PD28
31	1	MOUNTING PLATE	A010330-PD31
32	1	INSULATION PLATE	A010330-PD32
33	1	DOUBLE ACTION CYLINDER	A010330-PD33
34	1	C CONNECTION	A010330-PD34
35	4	ALLEN BOLT	A010330-PD35
36	4	BRACKET	A010330-PD36
37	2	MOUNTING KIT BRACKET	A010330-PD37
38	2	HEX NUT	A010330-PD38
39	1	THREADED ROD	A010330-PD39
40	1	PVC TUBING	A010330-PD40
41	2	COMPRESSION SPRING	A010330-PD41
42	4	HEX NUT	A010330-PD42
44	1	PRESSURE OPERATED VALVE	A010330-PD44
45	1	ISOLATION PLATE	A010330-PD45
46	2	HEX BOLT	A010330-PD46
47	2	WASHER M5	A010330-PD47
48	2	STRAIGHT COUPLING	A010330-PD48
49	4	STRAIGHT COUPLING	A010330-PD49
50	1	KNEE COUPLING	A010330-PD50
51	2	MUFFLER	A010330-PD51
52	1	REDUCER	A010330-PD52
53	1	NYLON TUBE - BLACK	A010330-PD53
54	1	NYLON TUBE - BLUE	A010330-PD54



REV.	CHANGES	DATE	BY	REQ'D	NEXT ASSY.	ITEM
				2	D010321-PD	3
TITLE: STEERING UNIT						
SCALE: HALF		DATE	INIT.			
		03/23/01	CAD			
DRAWN BY		Standard Tolerance				
APPR'D. BY		Angular ± 1/2°				
		Fractional ± 1/16				
		Dec .XXX= ± .010				
		Dec .XX= ± .030				
MODEL	DRAWING NUMBER	REV.				
	A010330-PD					

ITEM	QTY / DWG	PART DESCRIPTION	DRAWING
1	1	CARRIER	A010331-PD1
2	1	CARRIER TUBE	A010331-PD2
3	1	SUPPORT TUBE	A010331-PD3
4	2	WHEEL SUPPORT	A010331-PD4
6	2	HEX BOLT M12 X 120	A010331-PD6
7	2	HEX NUT M12	A010331-PD7
8	2	SPRING WASHER M12	A010331-PD8
10	2	SWING WHEEL	A010331-PD10
11	8	HEX BOLT M10 X 35	A010331-PD11
12	8	HEX NUT M10	A010331-PD12
13	8	SPRING WASHER M10	A010331-PD13
15	2	COMPRESSION SPRING	A010331-PD15
17	1	AIR BAG	A010331-PD17
18	1	STRAIGHT NIPPLE	A010331-PD18
19	1	FIBER GASKET	A010331-PD19
20	1	COUPLING PLUG	A010331-PD20
21	4	CLAMP STRIP	A010331-PD21
22	2	MOUNTING STRIP	A010331-PD22
23	8	HEX BOLT M16 X 45	A010331-PD23
24	8	WASHER M16	A010331-PD24



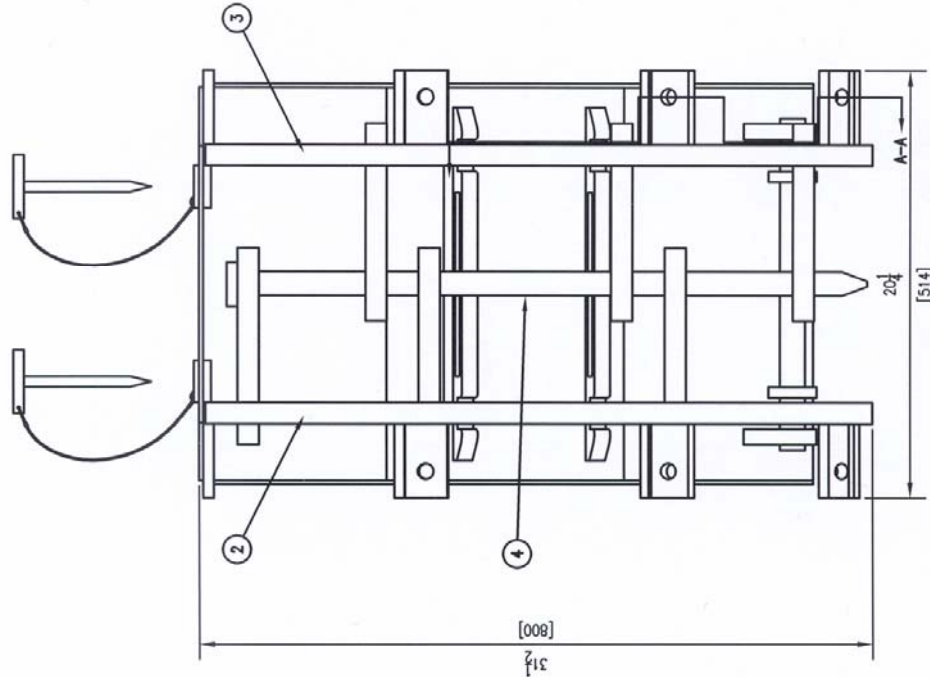
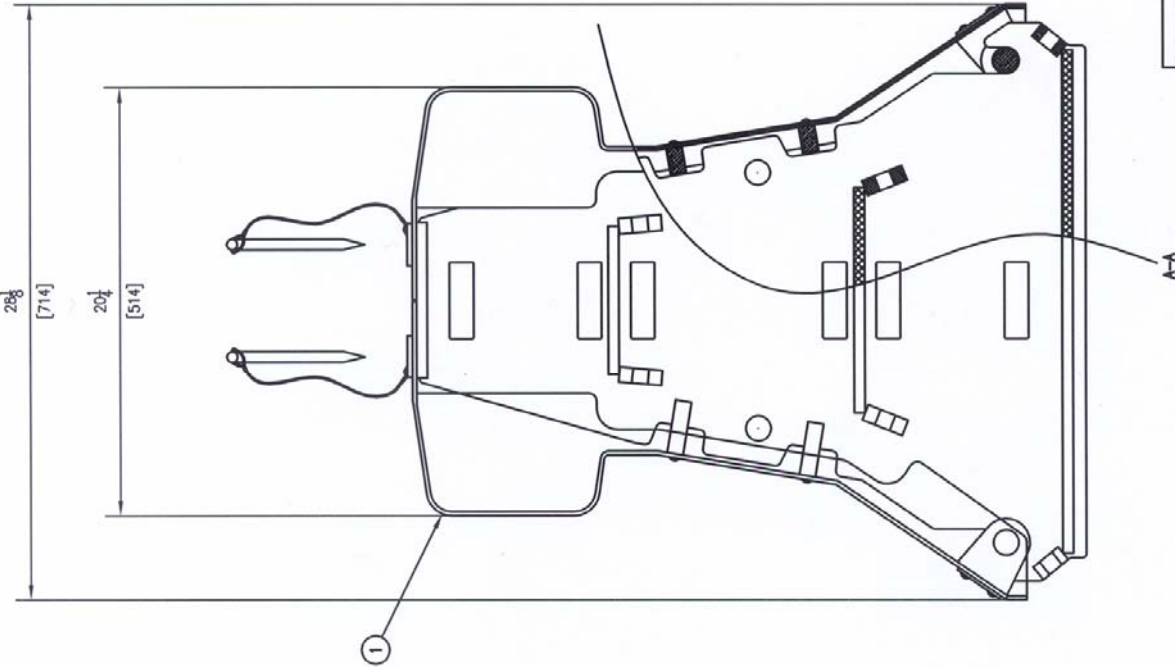
Standard Tolerance	± 1/2			
Angular	± 1/16			
Fractional	± .010			
Dec	.XX= ± .030			

SCALE:	HALF		
DRAWN BY	03/23/01	DATE	INIT.
APPR'D BY			CAD
TITLE: SWING UNIT			

REV.	CHANGES	DATE	BY	REQ'D	NEXT ASSY.	ITEM
				2	D010321-PD	3

MODEL	DRAWING NUMBER	REV.
	A010331-PD	

ITEM	QTY/ DWG	PART DESCRIPTION	SPECIFICATION	DWG #
1	2	HINGE COVER ASSEMBLY	NA	C010204-PD
2	1	HINGE, STATIONARY SIDE	NA	C010206-PD
3	1	HINGE, GATE SIDE	NA	C010207-PD
4	1	MASTER HINGE PIN	1-1/8 DIA ROUND BAR 1018C	NA



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NOTE: ALL DIMENSIONS OF WELD TO BE EQUAL TO THE THICKNESS OF THE THINNER OF 2 PIECES BEING JOINED. WELD TO BE ALL.

SCALE: QUARTER
 Standard Drawing
 Size: 1/2" x 3/4"
 Project: 1018C
 Date: 10/20/01
 Rev: 300-2-010

TITLE: HINGE ASSEMBLY
 SAFEGUARD GATE

CHANGES	DATE	BY	REASON	REV.
1		CHANGES-P	1	
1		CHANGES-P	1	

MODEL: DRAWING NUMBER: C010202-PD
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