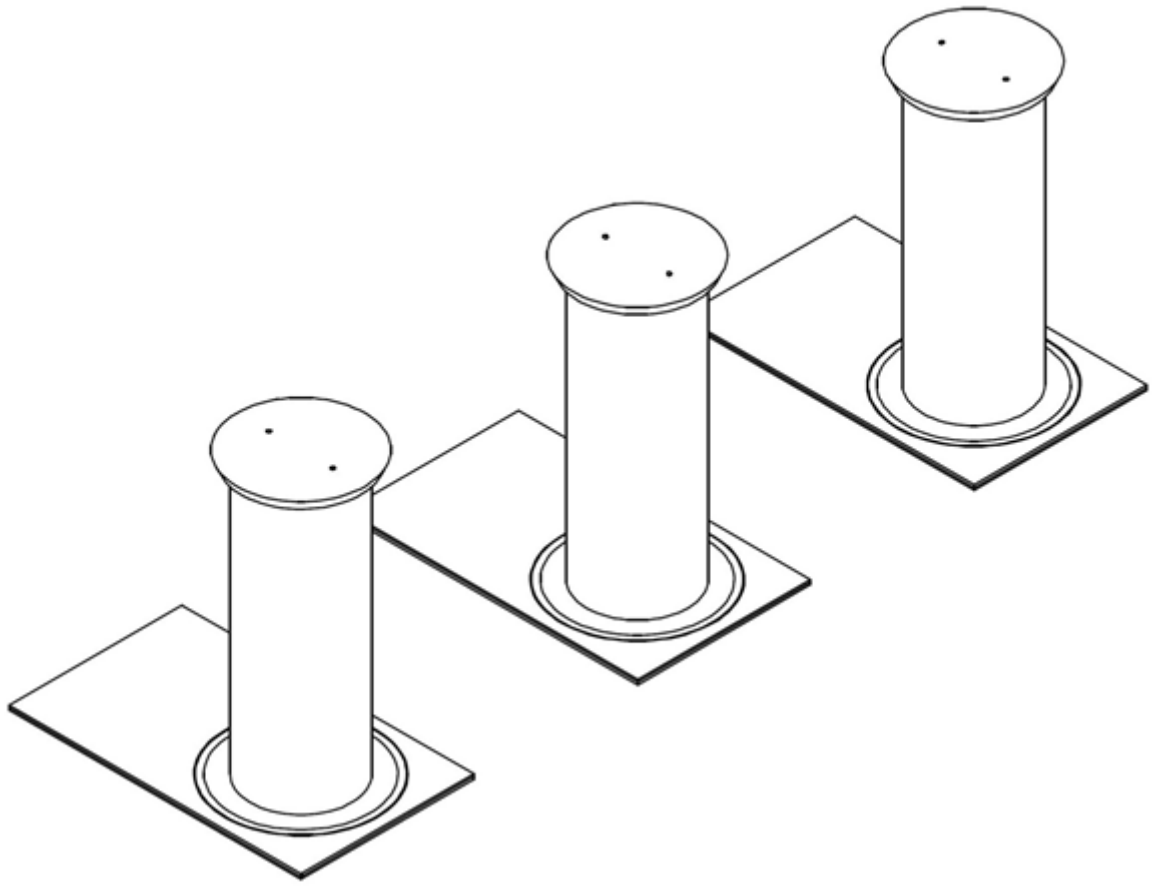
AMERISTAR®

ASSA ABLOY

ATG ACCESS

TITAN BARRIER SYSTEM INSTALLATION GUIDE



Installation

1) Close the traffic lane in which the Titan Barrier System is to be installed to create a safe working area, see OSHA 29 CFR 1926 Subpart G.
2) Wear appropriate safety apparel, see ANSI/ISEA 107-2015 and OSHA 29 CFR 1926 Subpart E.
3) Take all necessary steps to make sure the excavated pit for the Titan Bollard Array is secured. Follow all OSHA requirements for digging a foundation of this depth and size, see OSHA 29 CFR 1926 Subparts P & Q.

1. BARRIER FOUNDATION

A Titan Bollard array foundation size will vary based on the number of bollards purchased. Please refer to the chart below for excavation dimensions.

	Dimension	A	B	C	D	E	F	G	H	J
3 Bollard	INCH	72.00	120.00	66.5	38.00	10.75	60.1875	31.25	18.5	32.00
4 Bollard	INCH	72.00	152.00	66.5	38.00	10.75	63.1875	31.25	18.5	32.00
5 Bollard	INCH	72.00	184.00	66.5	38.00	10.75	63.1875	31.25	18.5	32.00
6 Bollard	INCH	72.00	216.00	66.5	38.00	10.75	63.1875	31.25	18.5	32.00

Figure 1 – Foundation Dimensions Table

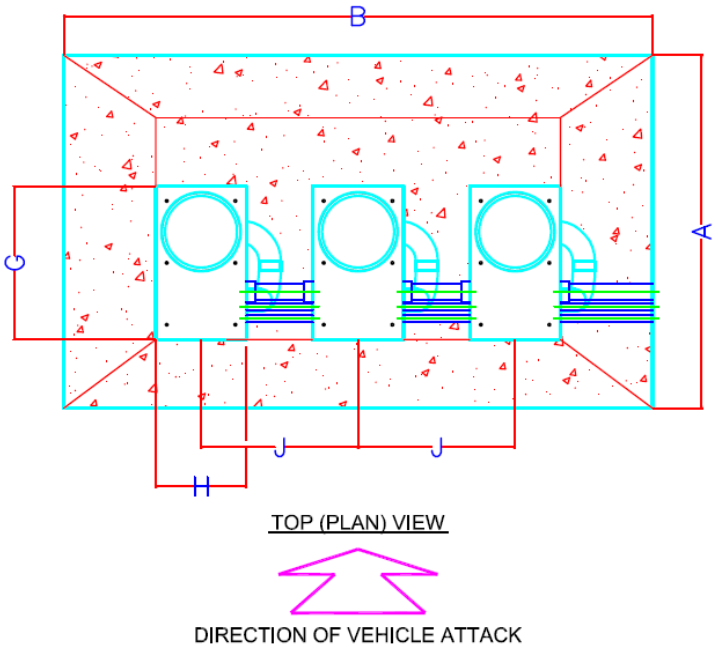


Figure 2 – Foundation Top View

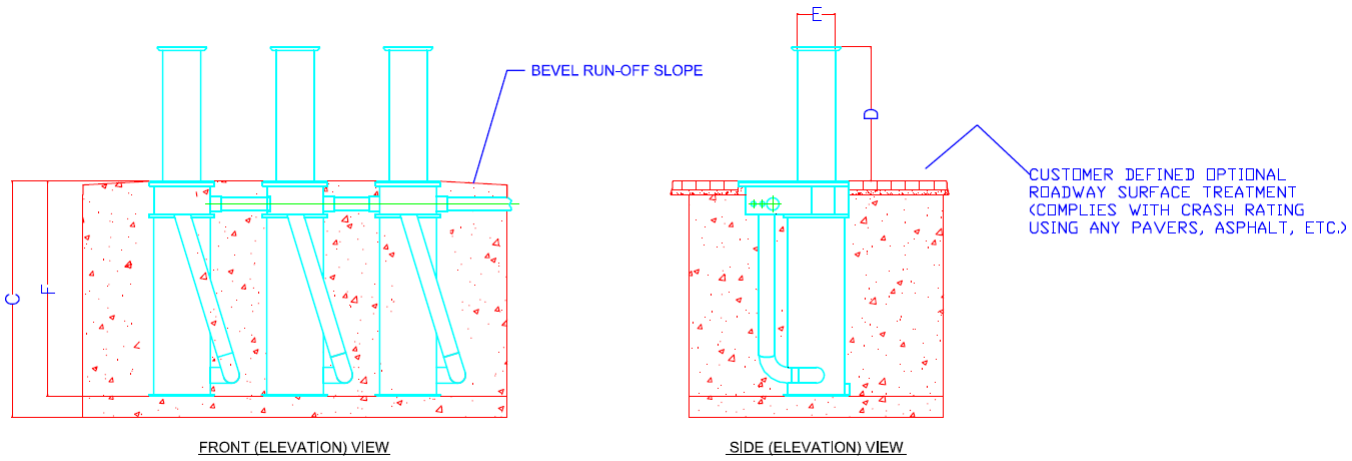


Figure 3 – Elevation Drawing

1.1. SETTING TITAN BOLLARDS

1) After the foundation is excavated to the required depth and dimensions, install the Titan Bollards. Spacing of the bollards should be 32" on center unless Ameristar has approved a different spacing.

Note: Spacing up to 46" may be used, however all spacing wider than 32" is considered an engineered product.

2) Check the final grade of the barrier. Barrier should be flush or up to ½" above the final roadway grade.

Note: Barrier base plate should be 6-5/16" above bottom of excavation.

3) Once the bollards are in place and level install drain lines by connecting to the 2" female connector at the base of the bollard. Run the drain outside of the foundation area. See Drainage Options in Appendix A.

1.2. INSTALLING REBAR

Install rebar per the Rebar Drawings provided by Ameristar. If necessary make minimal rebar adjustments to allow access to drain and conduit connections.

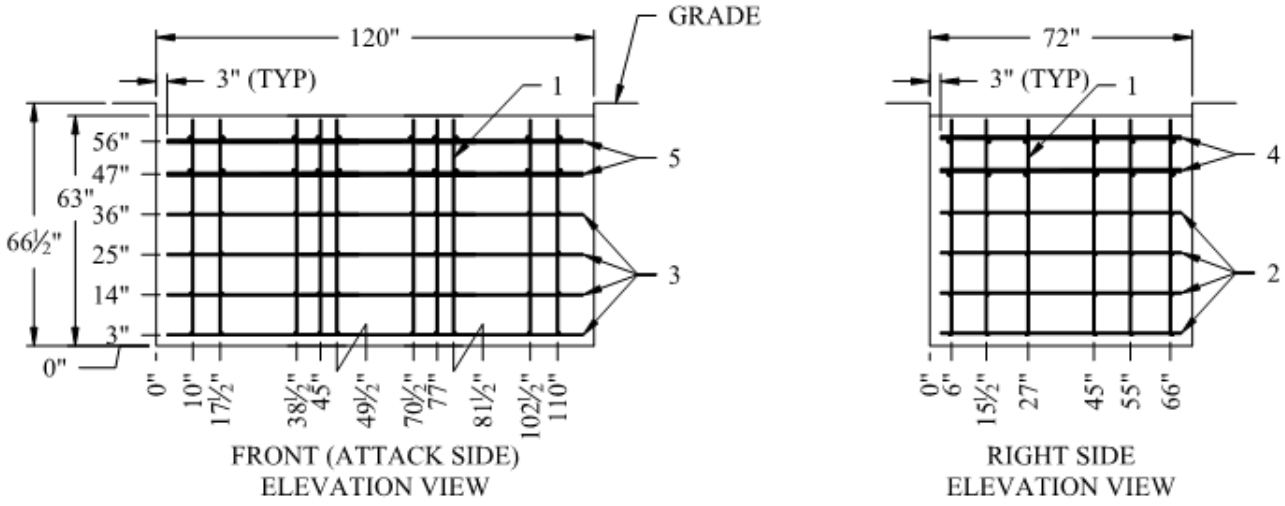


Figure 4 - Titan Rebar Layout

1.3. INSTALLATION OF CONDUITS

All below ground conduits should be PVC type conduits and all turns should utilize long radius elbows. See Electrical and Hydraulic Conduits in Appendix A.

1.3.1. HYDRAULIC LINES CONDUIT

1) Install one 3" Schedule 40 PVC conduit per zone to the side of the closest Titan Bollard to the HPU. Interconnect bollards in a single zone with 3" conduit using the conduit holes on opposite sides of the junction box.

Note: Install one 3" conduit to each zone. Example: install one 3" conduit from the HPU to the closest bollard in the entry lane. Install a second 3" conduit from the HPU to the closest bollard in the exit lane.

Note: Only interconnect bollards in the same Zone. Example: interconnect all bollards in the entry lane. Interconnect all bollards in the exit lane. DO not interconnect any entry lane bollards with exit lane bollards.

2) All conduit bends should avoid 90 degrees. If 90 degree bends are necessary utilize a long sweep 90.

3) No more than three – 90 degree bends should be made for any Titan Bollard installation.

4) The last bollard in the system must have the conduit opening not being utilized capped off.

1.3.2. ELECTRICAL CONDUITS

1) Install one 1" Schedule 40 PVC conduit per zone to the side of the closest Titan Bollard to the HPU. Interconnect bollards in a single zone with 1" conduit using the conduit holes on opposite sides of the junction box.

Note: Install one 1" conduit to each zone. Example: install one 1" conduit from the HPU to the closest bollard in the entry lane. Install a second 1" conduit from the HPU to the closest bollard in the exit lane.

Note: Only interconnect bollards in the same Zone. Example: interconnect all bollards in the entry lane. Interconnect all bollards in the exit lane. DO not interconnect any entry lane bollards with exit lane bollards.

2) Interconnect each bollard together.

3) The last bollard in the system must have the conduit openings not being utilized capped off.

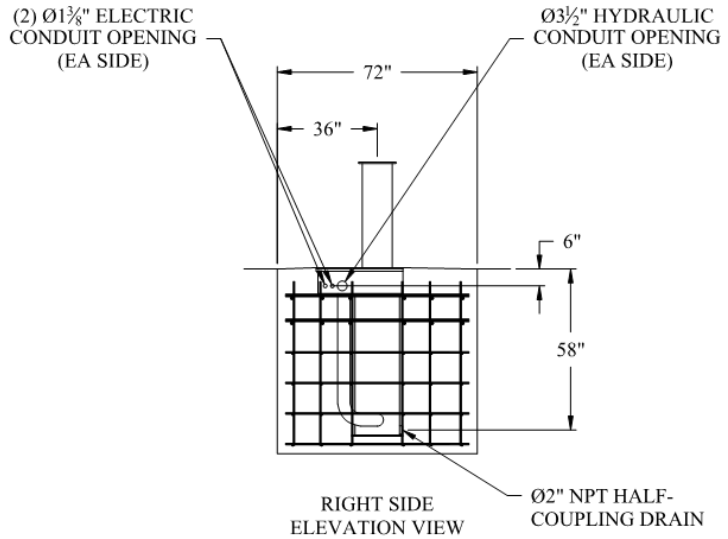


Figure 5 - Titan Conduit Connection Points

1.4. FINAL CONCRETE POUR

The Titan Bollards require 3000 psi concrete. Ameristar recommends utilizing a 4000 psi or 5000 psi mix for the final pour to achieve a 3000 psi strength sooner.
Note: Manufacturer warranty void if the product is tested prior to concrete reaching 3000 psi.
Note: 3000 psi concrete will achieve 3000 psi compressive strength in approx. 28 days

1) Installation contractor should utilize a vibrator when pouring the concrete to insure all air voids are removed from the slab.
2) When finishing the concrete make sure the concrete falls away from the bollards in all directions a minimum of ½".
3) Broom or trowel finish is acceptable and if four or more bollards are set together side by side a control joint is recommended to be placed between the bollards.

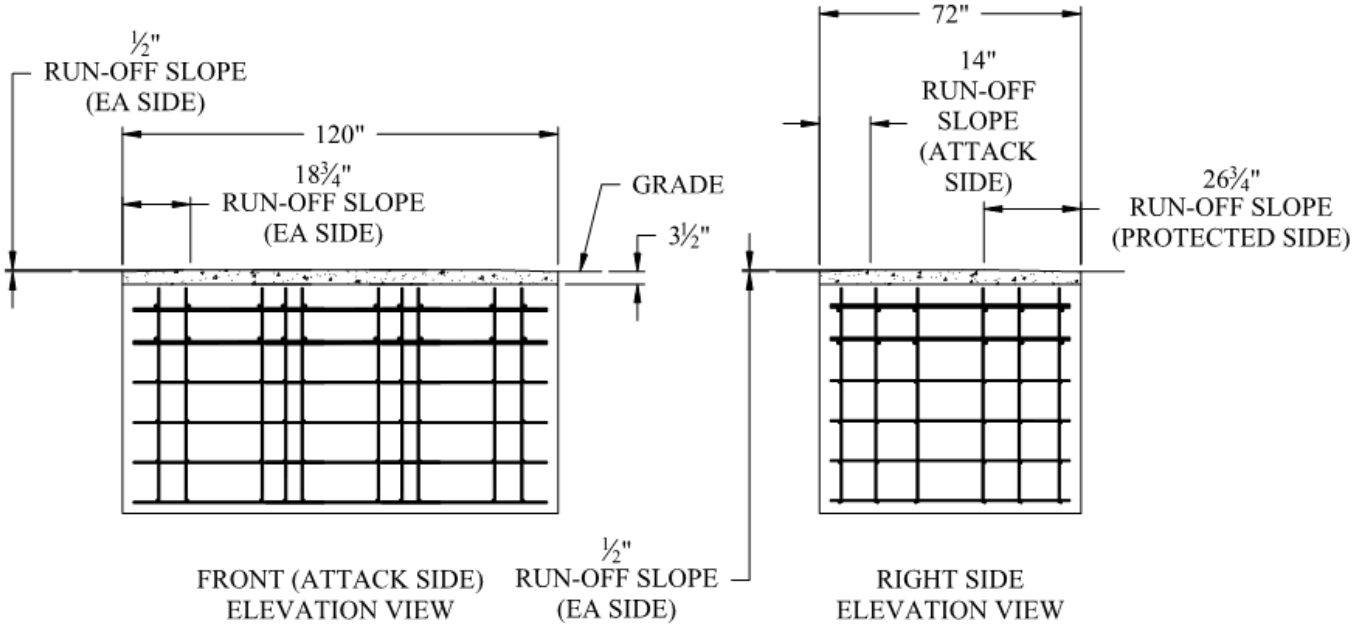


Figure 6 - Titan Run-Off Slope

2. HPU INSTALLATION

1) If necessary, close the traffic lane adjacent to where the HPU installation will be performed to create a safe working area, see OSHA 29 CFR 1926 Subpart G.
2) Wear appropriate safety apparel, see ANSI/ISEA 107-2015 and OSHA 29 CFR 1926 Subpart E.
3) Take all necessary steps to make sure the excavated pit for the HPU Foundation is secured. Follow all OSHA requirements for digging a foundation of this depth and size, see OSHA 29 CFR 1926 Subparts P & Q.

2.1. FOUNDATION

1) The HPU should not be installed further than 100' from the furthest barrier connected to it. If the HPU is further than 100' contact the manufacturer immediately for potential resizing of the Hoses, Reservoir, and Accumulators.
2) Dimensions of pad are 57" (L) x 42" (W) x 36" (D). Placed 30" below grade and 6" above grade.

Note: The depth of the foundation could vary based on the geographical location.

3) The HPU Slab shall have a minimum cutout opening of 24"x16" for the system conduits. This cutout shall be centered 15" from the 42" edge of the slab that the control panel will be mounted on and 21" from either 57" edge. See drawing HPU Unit, Foundation.

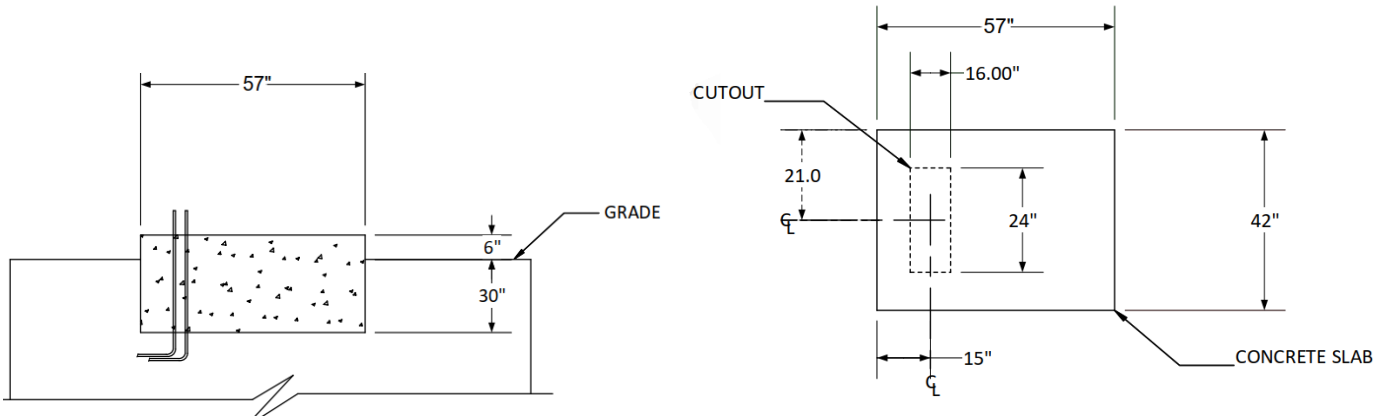


Figure 7 – HPU Slab Layout

2.2. HPU REBAR & FORM

HPU Foundation utilizes 3 layers of 8x8 Rebar Mesh.

1) Build forms in excavation for HPU Foundation. 30” below grade and 6” above grade.
2) Make previsions for the 24” x 16” Conduit opening.
3) Place rebar mesh in place per Figure 8 – HPU Rebar, or other drawing provided by Ameristar.

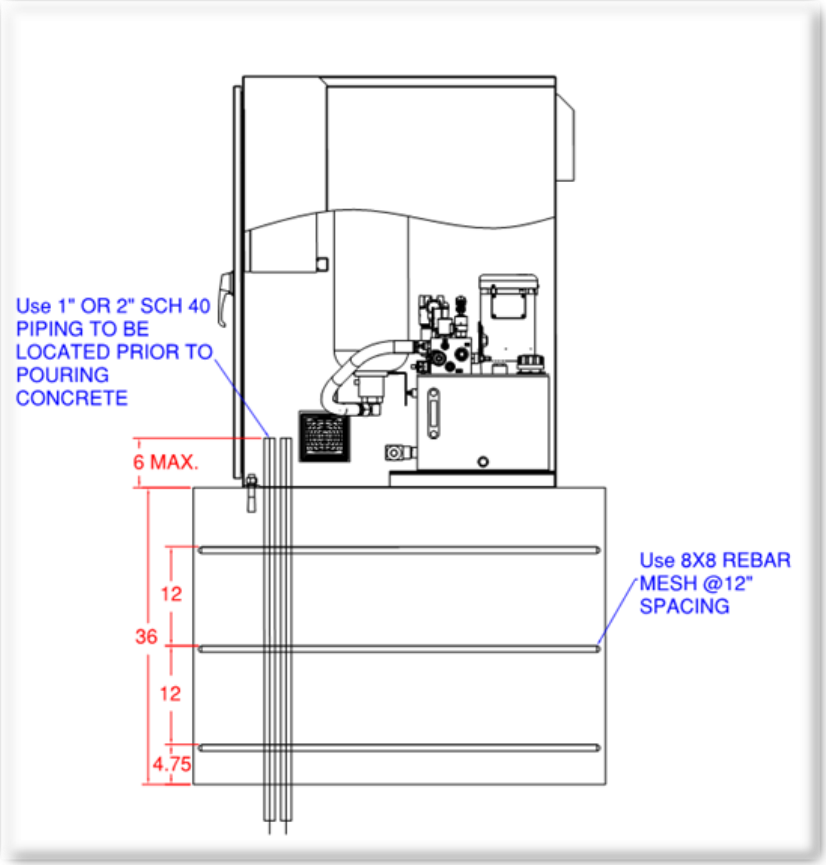


Figure 8 - HPU Rebar

2.3. CONDUIT CONNECTIONS

2.3.1. Hydraulic Conduit Connection

1) All below ground conduits should be PVC type conduits and all turns should utilize long radius elbows. 90 degree bends or greater should be avoided at all times. If you cannot avoid a 90 degree or greater bend, a maximum of 3 long radius elbows should be used.

2) All Hydraulic Conduits should be installed below frost depth to ensure the fluid viscosity remains at an acceptable temperature. If conduit cannot be installed below frost line then Heat trace should be utilized to ensure fluid viscosity.

3) All Conduits after installation should be blown free of all debris or swept free of all debris before installation of Hydraulic hose. Sharp or jagged debris could damage the hose on installation.

2.3.2. Electric Conduit Connections

1) All below ground conduits should be PVC type conduits and all turns should utilize long radius elbows. 90 degree bends or greater should be avoided at all times. If you cannot avoid a 90 degree or greater bend, a maximum of 3 long radius elbows should be used.

2) All Electrical Conduits should be installed below frost depth to ensure the integrity of the wires. After installation both ends of the conduit should be sealed to prevent filling with water, debris and animals from entering the conduit and causing potential harm to the wiring.

3) All Conduits after installation should be blown free of all debris or swept free of all debris before installation of wire. Sharp or jagged debris could damage the wire on installation.

4) Route all conduits from the vehicle barrier system to the HPU.

5) The main facility electrical power for the vehicle barrier system must be connected at the HPU.

6) Be sure to also connect all conduits for the control stations (operator control panels) to the HPU.

7) Vehicle Loops are a recommended safety option requiring conduits installed from the Loop Location back to the HPU.

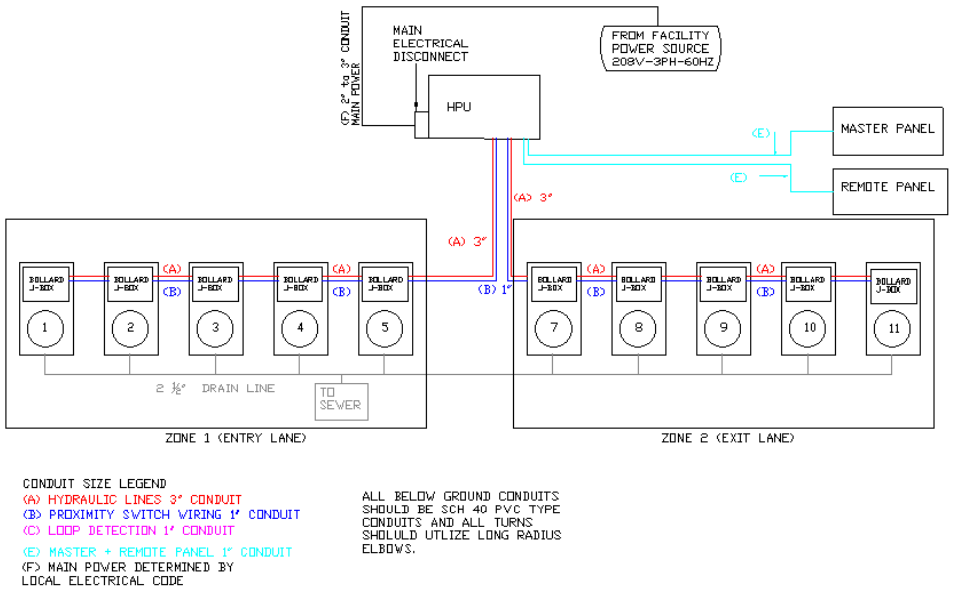


Figure 9 - Typical Conduit Layout

2.3.3. Control Stations

For safety purposes, it is recommended that one control panel be installed within “line of sight” of the vehicle barrier. This is usually installed inside a guard house.

1) Locate and install the Master Control Panel
2) Locate and install the Remote Control Panel (if used).
3) All control panels must be interconnected directly with the HPU. Normally a 1” PVC conduit per control panel is adequate for control wiring.

2.3.4. Vehicle Loop Detectors *(Recommended Option)*

When used, the Loop Detection Module is installed inside the HPU.

1) Customer/End-user is responsible for the in-ground loops, conduit and wiring back to the HPU. See Appendix D – Vehicle Loop Detail.
2) All loop wiring must be in PVC conduits. (Metallic conduits introduce higher than acceptable inductive noise levels to the loop detection modules).
3) See site specific drawings for loop size and placement.

2.4. HPU FOUNDATION POUR

The HPU requires 3000 psi concrete. Ameristar recommends utilizing a 4000 psi or 5000 psi mix for the final pour to achieve a 3000 psi strength sooner.
Note: 3000 psi concrete will achieve 3000 psi compressive strength in approx. 28 days

1) Installation contractor should utilize a vibrator when pouring the concrete to insure all air voids are removed from the slab.
2) Broom or trowel finish is acceptable

2.5. SETTING THE HPU

1) Allow a minimum of 12 - 24 hours to cure before setting the HPU in position
2) Allow the concrete 48 – 72 hours to cure, before fastening to concrete pad with min. 5/16” x 3-1/2” anchor bolt.

2.6. FINAL SYSTEM CONNECTION

1) Interconnect hydraulic lines between the HPU and the barrier. Install the hydraulic lines as required on the site specific hydraulic schematic. Ensure that dust, dirt and other contaminates do not get into the hydraulic lines.
2) Install control and power wiring as required per the electrical schematics.
3) Be sure to follow the HPU start-up procedures (or have a qualified technician to perform this procedure) and run several operational tests on the complete system prior to barrier usage.

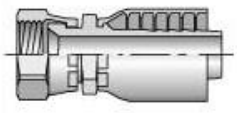
3. HYDRAULIC INSTALLATION

3.1. HYDRAULIC HOSES

All hoses are - Parkers TOUGH COVER 451TC 3000psi Hose
Note: See the Titan Hydraulic Hose and Fitting Diagram in Appendix A – Standard Exclusions.

3.1.1. Hydraulic Feed Hose

1) All hoses are - Parkers TOUGH COVER 451TC 3000psi Hose
2) Hose Lines - 12 (3/4") Pressure Line
3) Ameristar provides male fittings at the Bollards J-Box Manifolds and male fittings at the HPU. The installer provides all other hose fittings and couplings. The following are to be provided: (All part numbers are Parker Hannifin part numbers). Both ends of each hose should be complete with hose fitting, crimp hose to female JIC swivel. Pressure Line - (10643-12-12)



DESCRIPTION	ATTRIBUTE VALUE
PRODUCT TYPE	HOSE FITTING, CRIMP HOSE TO FEMALE JIC SWIVEL
HOSE SIZE	3/4
HOSE CONNECTION	CRIMP
CONNECTION B	
CONNECTION SIZE	
CONNECTION STYLE	
MATERIAL	STEEL - ZINC DICHROMATE PLATING
ADDITIONAL DETAIL	
TRADE/BRAND NAME	PARKRIMP 43 SERIES FITTING
SYNONYM	PERMANENT FITTINGS, HOSE COUPLINGS

Figure 10 - HPU Pressure Feed Coupling

Item	Description with Parker Part #s	QTY
1	SUPPLIED BY AMERISTAR (-8 SECURE, -6 UNSECURE)	1
2	BOLLARD FLOW CONTROL VALVE (PURCHASED WITH BOLLARD)	1
3	10643-12-12, -12 CRIMP TO -12 FEMALE SWIVEL	8
4	-12 ($\frac{3}{4}$") 3000 PSI TOUGH COVER 451TC HOSE	4

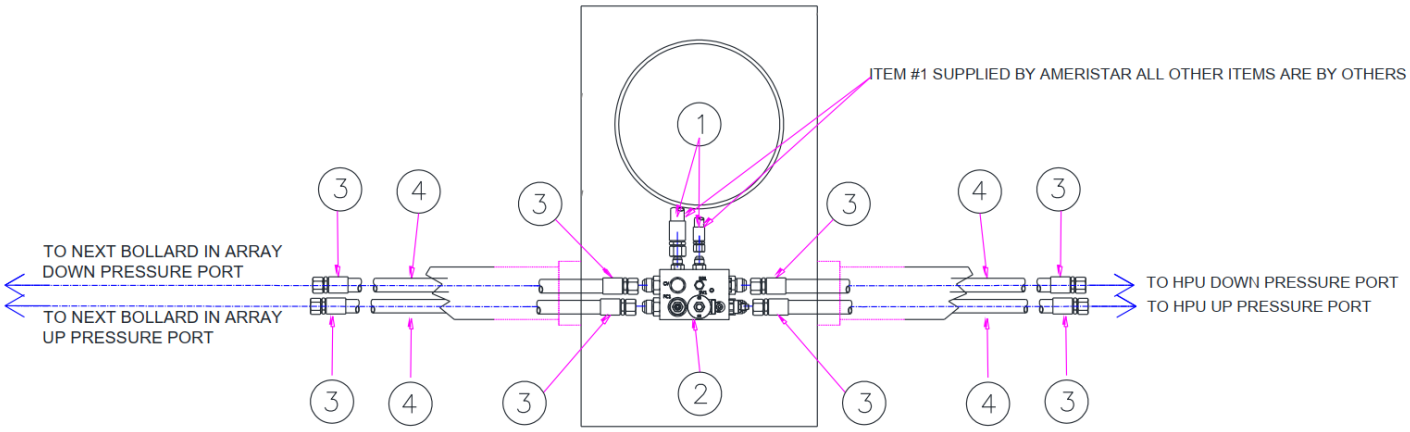


Figure 14 - Bollard Hydraulic Hoses

3.2. HYDRAULIC FLUID

1) For Normal Temperature climates Ameristar recommends Hydro Safe VG32, Non-Toxic Biodegradable, non-hazardous, general purpose hydraulic oil.
2) For High temperature climates Ameristar recommends Hydro Safe VG-46FR, Non-Toxic Biodegradable, non-hazardous, general purpose hydraulic oil.
3) For Low temperature climates Ameristar recommends Hydro Safe 22, Non-Toxic Biodegradable, non-hazardous, general purpose hydraulic oil.

TYPICAL SPECIFICATIONS	METHOD	**ISO 22**	**ISO 32**	**ISO 46**	**ISO 68**	Spec. Requirements
Specific Gravity @ 15.6°C	ASTM D-287	**0.88**	**0.88**	**0.88**	**0.88**	Report
Viscosity @ 40°C	ASTM D-445	**22.3**	**30.5**	**43.1**	**62.8**	Note 1
Viscosity @ 100°C	ASTM D-445	**5.27**	**6.7**	**8.8**	**11.9**	Note 1
Viscosity @ -25°C, Brookfield	ASTM D-2983	**1,000 cP**	**1,400 cP**	**3,400 cP**	**4,700 cP**	Note 1
Viscosity Index	ASTM D-2270	**182**	**186**	**190**	**189**	90 (min)
Pour Point	ASTM D-97	**-38°C**	**-35°C**	**-33°C**	**-30°C**	Note 1
Flash Point (COC)	ASTM D-92	**205°C**	**232°C**	**240°C**	**248°C**	198°C (min)
Fire Point (COC)	ASTM D-92	**230°C**	**255°C**	**264°C**	**270°C**	218°C (min)
Foam Sequence I, II, III (10 min)	ASTM D-892	**0 Foam**	**0 Foam**	**0 Foam**	**0 Foam**	0 Foam
Rust Prevention	ASTM D-665					
Distilled Water		**Pass**	**Pass**	**Pass**	**Pass**	Pass
Syn. Sea Water		**Pass**	**Pass**	**Pass**	**Pass**	Pass
Copper Corrosion Strip 3hr @ 100°C	ASTM D-130	**1A**	**1A**	**1A**	**1A**	DIN 51524 2(max)
Dielectric Strength, KV (Avg)	ASTM D-877	**46**	**40**	**40**	**40**	>35
Rotary Bomb Oxidation, (minutes)	ASTM D-2272	**270**	**272**	**270**	**260**	USS 120 (min)
Neutralization Number mg KOH/g	ASTM D-974	**0.5**	**0.5**	**0.5**	**0.5**	1.5 (max)
Swell of Synthetic NBR-L Rubber, % (Avg.)	DIN 53538,					
Volume Change (%)	Part 1	**8.0**	**6.0**	**5.0**	**5.0**	0 to 12
Shore A Hardness Change (%)		**-5**	**-4**	**-4**	**-4**	0 to -7
Demulsibility, ML Oil/Water/Emulsion	ASTM D-1401	**40/40/0 <10 minutes**	**40/ 40/0 <10 minutes**	**40/ 40/0 <10 minute**	**40/ 40/0 <10 minute**	40/37/3 (max) (30 minutes)
4-Ball Wear, 1h, 167°F, 1200 RPM, 40 kg	ASTM D-4172	**0.42**	**0.40**	**0.40**	**0.40**	USS 127 0.5 (max)
FZG Test	DIN 51354	**11**	**11**	**11**	**11**	US.Steel 10 (min)
Biodegradation Classification	ASTM D-5864	Ultimate PW1	Ultimate PW1	Ultimate PW1	Ultimate PW1	Ultimate PW1
Environmentally Friendly	ISO 15380	yes	yes	yes	yes	
USDA Biobased Tested	New Carbon	yes	yes	yes	yes	meets/exceeds over 50%
Note 1 Viscosity Sufficient for Application						
Note 2 Not Required						
HS® Product Item #		8081	8082	8083	8084	

Figure 17 – Hydro Safe Standard Hydraulic Fluids ISO 22, 32, 46, 68

4) A site glass is provided on both the 10 Gallon and 25 Gallon fluid reservoirs. The site glass will give a visual on the amount of oil currently stored in the tank. See Owner's Manual for reservoir filling instructions.

Note: Please Contact Manufacturer if other than recommended oil is specified.

4. ELECTRICAL NSTALLATION

4.1. POWER FEEDS

Safety Precautions - At all times observe good safety practices when working on the electrical system. Particular attention should be paid to the danger of working on the Barriers when the power is on. The Barriers are powered by High Voltage and could cause injury or death. Turn off the electric power and bleed the hydraulic pressure down to zero before working on any part of the system. Traffic should be controlled around the Barriers during any work so that vehicular accidents do not occur. It is recommended that a qualified electrical professional work on the high voltage at all times.

4.1.1. Standard HPU Power Provided

Ameristar provides a 3 phase 208-240 VAC 60HZ HPU as a standard delivery. If different power requirements are needed make sure it is noted at the time of order.

4.1.2. Optional Power Feeds

Optional – Electrical power voltages which may be factory configured are as follows:

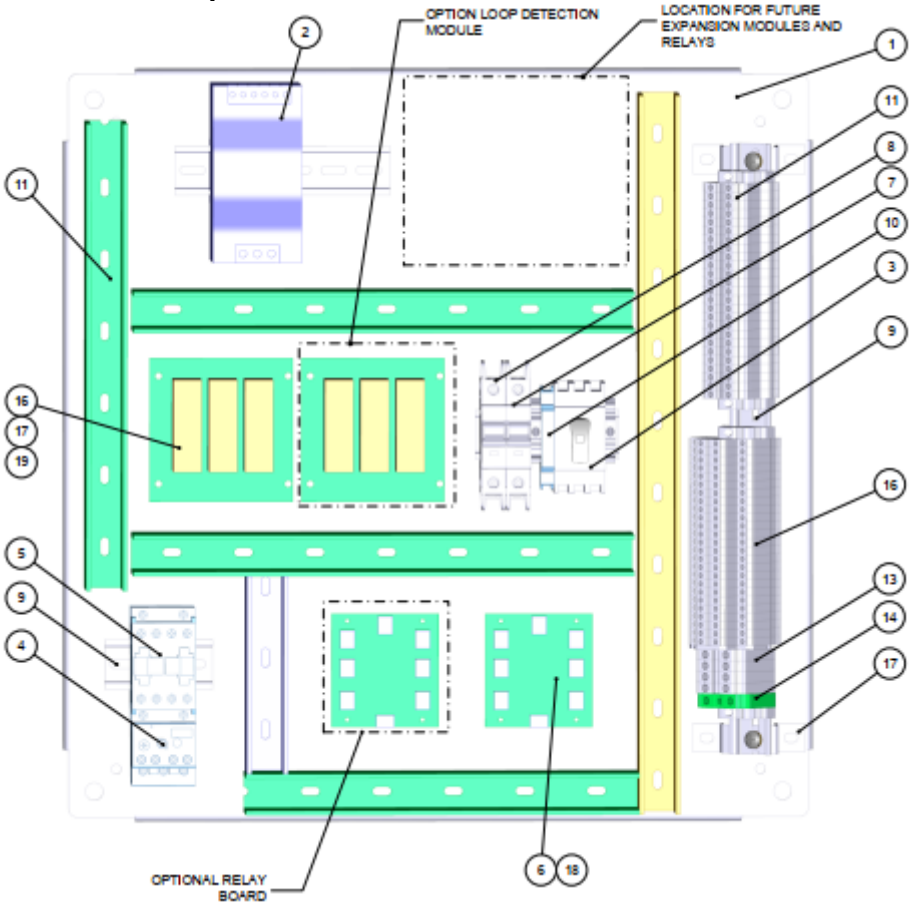
Table 4 - HPU Power Options

Description	Conductors	Voltage	Frequency
Single Phase*	2 Wire w/neutral	120 VAC	60 HZ
Single Phase*	2 Wire w/neutral	208 – 240 VAC	60 HZ
3 Phase	3 Wire wo/neutral	415 - 480 VAC	60 HZ

Note: 3 Phase 415 – 480 VAC requires dedicated 120 VAC circuit

4.2. HPU CONTROL PANEL

4.2.1. Control Panel Components



ITEM	PART NO.	DESCRIPTION
21	FC4505-832-A	STANDOFF, 8-32 X ½ HEX AL
20	FC4505-440-A	STANDOFF, 4-40 X ½ HEX AL
19	EMX ULTRA II	MOTHER BOARD LOOP DETECTOR
18	NP2-ESL	LOOP DETECTOR
17	WTB2-BRKT1	BRACKET RAIL SUPPORT ANGLE
16	WTB2-W4DD	TERM BLK, DUAL LEVEL
15	WTB2-EB	TERM BLK, END STOP BRACKET
14	WTB2-W4-10G	TERM BLK, SINGLE 22-8 AWG GND
13	WTB2-W6	TERM BLK, SINGLE 22-8 AWG
12	WTB2-W4	TERM BLK, SINGLE 22-10 AWG
11	EF1X3WH6.5/C	RAIL WIRE DUCT 1 X 3 WHT W/COVER
10	GAX1110EA	SWITCH, AUX. CONTACT
9	TS3575SL	DIN RAIL 35MM X 7.2MM
8	P1MBUH1PC04	CIRCUIT BREAKER 4 AMP
7	P1MBUH1PC05	CIRCUIT BREAKER 5 AMP
6	RSSC	6 CH RELAY BOARD
5	BF1801L024	MOTOR CONTACTOR
4	RF381800	3 POLE OVERLOAD RELAY
3	GA025 A	SWITCH DISCONNECT
2	SDR-240-24	POWER SUPPLY, 10A, 240W, 24 V
1	ES-P2424	PLATE, 24X24 CONTROL PANEL

Figure 18 - Main Control Panel Layout

4.3. FIELD WIRING INSTALLATION

Depending on the type of controls provided, installation of the field wiring will vary. Please refer to the drawings specific to your installation.

4.3.1. Diagram of Typical Terminal Block Wiring

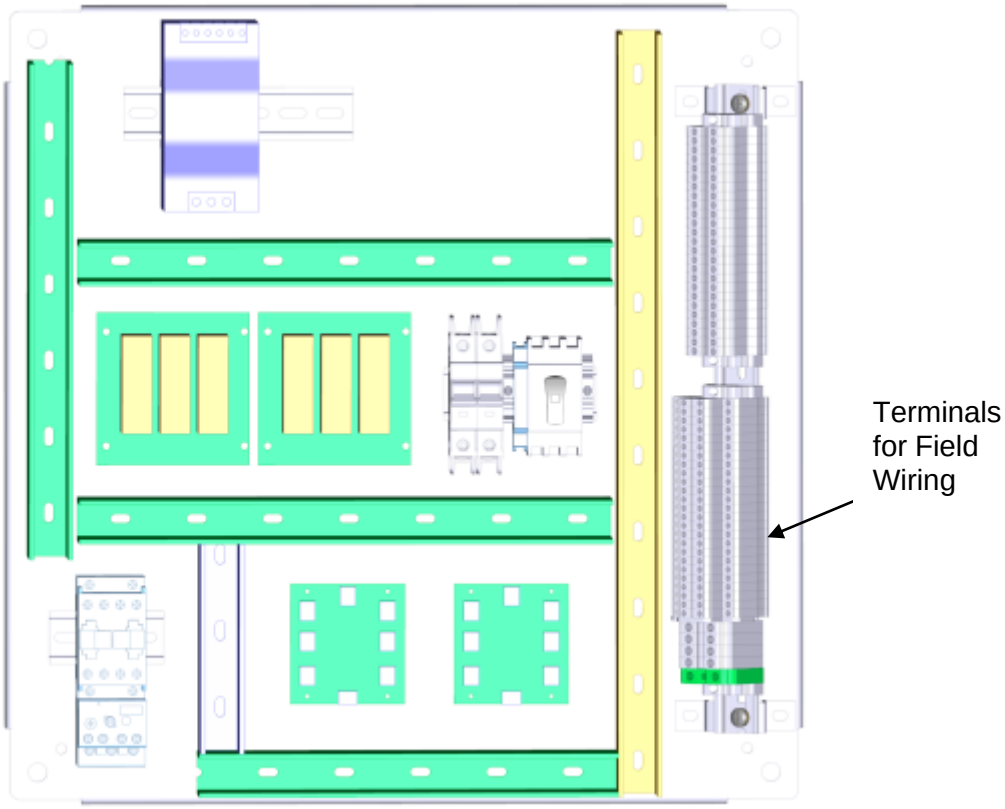


Figure 20 – Terminal Block Wiring

4.3.2. Typical Wiring for Low Voltage Loop Detectors

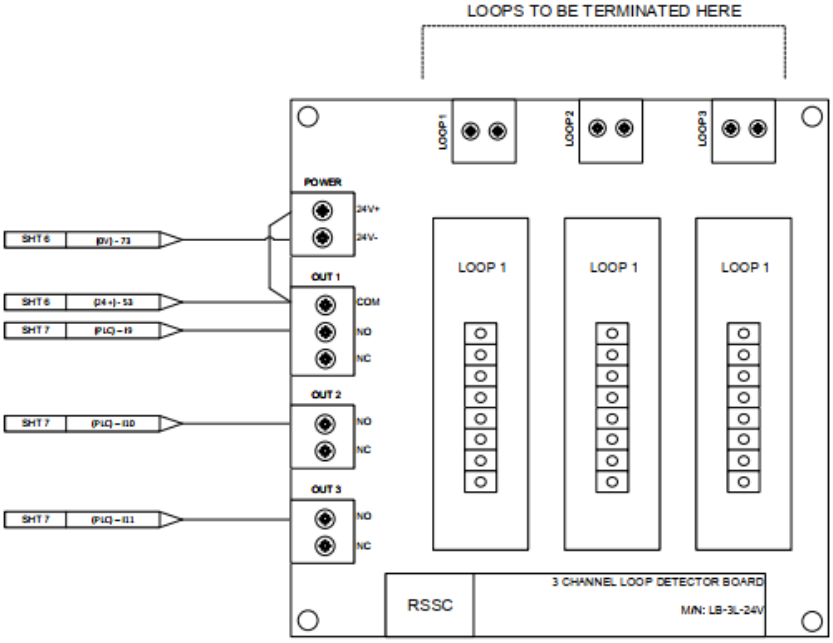


Figure 21 - Loop Detector Wiring

4.3.3. Typical Master Control Panel wiring

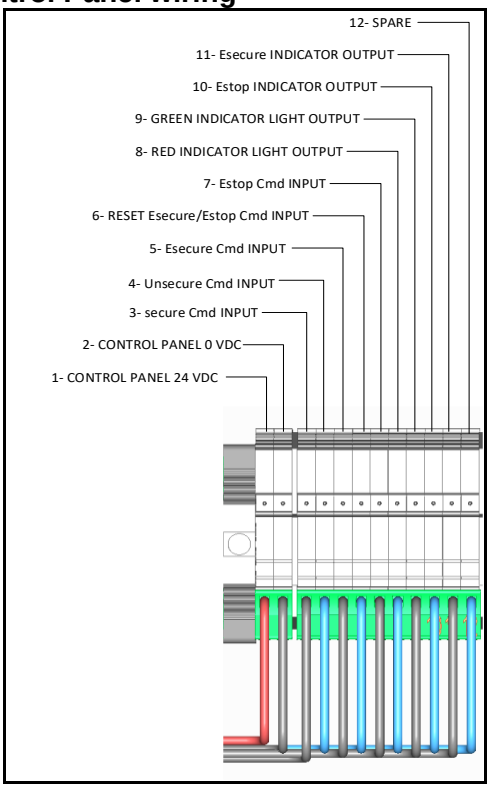


Figure 22 - Master Control Panel Typical Wiring

4.3.4. Typical Remote Control Panel wiring

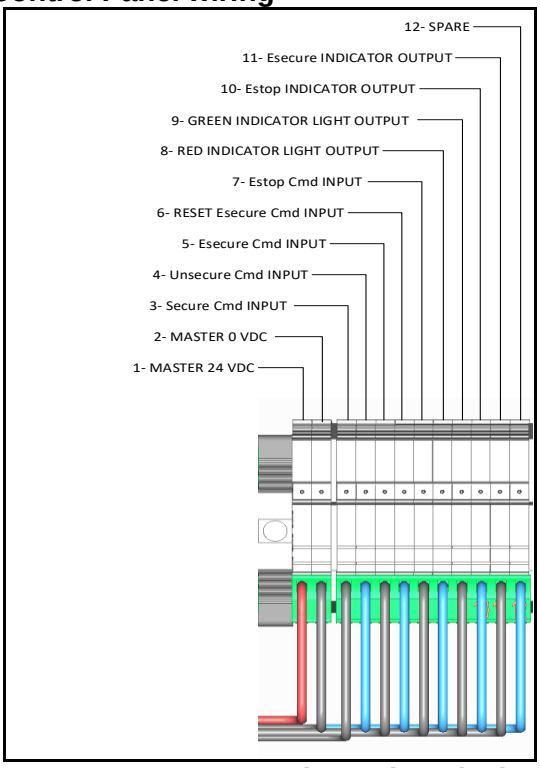


Figure 23 - Remote Control Panel Typical Wiring

5. APPENDIX A – AMERISTAR'S STANDARD EXCLUSIONS

Appendix A
Ameristar's Standard Exclusions – Titan Barrier System

Standard Exclusions – Titan Bollard

The following work is excluded from our proposal and is to be furnished by others:

1. Excavation and trenching for barrier pits
2. Locating, marking or removing of existing underground utilities and/or any other unforeseen conditions
3. Barrier concrete and reinforcing bar
4. Backfill, both dirt and concrete
5. Soil stabilization, remediation, compaction, etc.
6. Concrete pads for HPU's
7. Drains and connections to storm drains
8. All electrical conduits to, from and between barrier equipment, HPU's and control panel
9. All hydraulic conduits to, from and between barrier equipment, HPU's and control panel
10. All external hydraulic hoses from barrier to HPU fittings and hydraulic oil
11. Electrical power to HPU, heaters, and barrier
12. All electrical power wiring and connections to, from and between barrier equipment, HPU's and control panel
13. Access control system and/or card reader devices and any required integration
14. Permits and permit fees
15. Any removal and/or replacement of pavers, stones, road surfaces or landscaping
16. On-site or off-site storage of the equipment and/or trash removal, if necessary
17. Not responsible for site surveys or drawings – we do not mark or place barrier on architectural drawings
18. Hazardous material handling and/or removal
19. Nitrogen for accumulator and pre-charge kit
20. In-ground vehicle loop detection wiring, sealant and installation
21. Customs and duties fees (if applicable)
22. Engineering stamps services….

Ameristar Recommended Hydraulic Oil

Ameristar recommends the use of one of the following hydraulic fluids and can provide to you if required:

- Envirologic 132 – RSC Bio Solutions Terrosolve
- Hydro Safe Hydraulic Oil
- Renewable Lubricants - Bio-Fleet Hydraulic Fluid

For High temperature climates Ameristar recommends 146 ISO 46, Non-Toxic Biodegradable, non-hazardous, general purpose hydraulic oil.

For Low temperature climates Ameristar recommends 122 ISO 22, Non-Toxic Biodegradable, non-hazardous, general purpose hydraulic oil.

For extremely Low temperature climates Ameristar recommends 1200LT, full biodegradable synthetic optimal oil.

The oils listed above have been used by Ameristar for testing and in field installation applications. Following system testing, we do drain the tank but cannot be assured that ALL oil and residue have been completely removed.

Ameristar can supply oil if required and can ship to you. CONTACT AMERISTAR FOR CURRENT PRICING

Note - Mixing oils with different additive packages is never recommended. Mixing oils could compromise the additive performance, cause corrosion and or mechanical wear.

Ameristar has not mixed the oils listed above with other oils in the market or tested for compatibility and therefore is not able to review oil specifications or cut sheets and approve as compatible, or comment on compatibility of different oils. For the protection of the equipment, installer, and end user, we recommend you contact the oil manufacturer to ensure compatibility before using different types of oils to those listed.

If you have contacted your hydraulic oil manufacturer to ensure the different oils are compatible before mixing, and must mix the oils or live with an accidental mixture at your own risk, we recommend taking the following precautions:

1. Visually inspect for signs of sludge, poor demulsibility and foaming.
2. Increase the frequency of oil analysis to spot abnormal wear, corrosion or lubricant degradation.
3. Flush and change the oil as quickly as possible. A drain leaves 5 to 40 percent of the old oil in the system. Therefore, a flush will need to be performed.
4. Keep up the frequent inspections and oil analysis to be sure that the oil stabilizes.

Should you determine before production commences that having explored all options you are unable to source the recommended oil, have decided not to purchase from Ameristar, and wish to use an alternate oil, at your own risk and cost, you can supply an alternate oil to Ameristar which we will be happy to use in the system during testing, and ship back to you with delivery of the HPU. Ameristar cannot be responsible for any failures or damage to the system, short term or long term, as a result of an alternate oil. Any costs for repairs will be charged directly to you.

Electric and Hydraulic Conduits

All below ground conduits should be PVC type conduits and all turns should utilize long radius elbows.

From	To	Purpose	Size	Type	Qty
HPU	Bollard	Hydraulic Lines	3"	PVC	1 Per Bollard
HPU	Bollard	LV - Proximity Switches	1"	PVC	1 Per Bollard
HPU	Traffic Light	Traffic Light	1"	PVC	1 Per Light
HPU	Loop Detector	Loop	1"	PVC	1 Per Loop
HPU	Master Console	Console	1"	PVC	1 Per Master
HPU	Remote Console	Console	1"	PVC	1 Per Remote

Electrical Power

Standard HPU Power Requirements

- 208V/3PH/60Hz/20A – HPU

Heat Trace Cable – optional

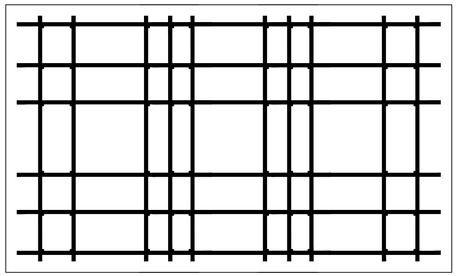
- 208V/1PH/60Hz – 6W per ft.

Electrical power wiring and connections

From	To	Purpose	AWG	# Wires per	Max Distance from HPU
HPU	Bollard	Proximity Switch	14AWG	3 per bollard	50FT
HPU	Master Console	Controls	14AWG	14 per console	250ft
HPU	Remote Console	Controls	14AWG	10 per console	250ft
HPU	Traffic Light	Traffic Lights	16AWG	3 per light	250FT
HPU	Loop	Loops	18AWG	2 per loop	50ft

6. APPENDIX B – REBAR DRAWING 3 BOLLARD ARRAY

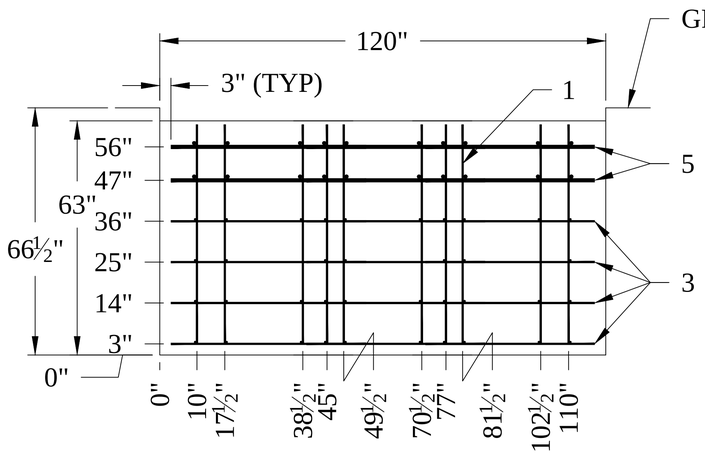
Appendix B
Rebar Drawing 3 Bollard Array - Titan Barrier System



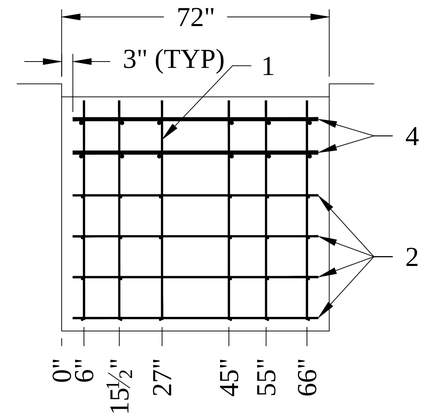
PLAN VIEW

CONCRETE
1. MINIMUM CONCRETE COMPRESSIVE STRESS: 3,000 PSI [C20/25] @ 28 DAYS
2. MAXIMUM WATER CEMENT RATIO: 0.45 IN FREEZE/THAW CLIMATES, OTHERWISE 0.50
3. HIGH WORKABILITY REQUIRED TO PLACE CONCRETE IN SIDE BEAM SECTION. VIBRATION "STINGER" REQUIRED FOR PROPER PLACEMENT.
4. SPECIFICATIONS:
   A. PORTLAND CEMENT: ASTM C150, TYPE I OR II [EN 1.97.1]
   B. FLY ASH: ASTM C 618, CLASS F OR C
   C. AGGREGATES: ASTM C33
   D. WATER: POTABLE
   E. ALL ADMIXTURES MUST MEET ASSOCIATED ASTM SPECIFICATIONS

INSTALLATION
1. METAL REBAR CHAIRS REQUIRED TO HOLD REINFORCING @ PROPER DISTANCE (3" MIN) ABOVE SOIL
2. REINFORCING TO BE TIED TOGETHER AT ALL INTERSECTIONS
3. REBAR MATERIAL: ASTM A615 GRADE 60



FRONT (ATTACK SIDE)
ELEVATION VIEW



RIGHT SIDE
ELEVATION VIEW

CONCRETE WITH REINFORCING
- SEE SHEET 2 FOR TOP LAYER
- SEE SHEET 3 FOR COMPLETED INSTALLATION
- SEE SHEET 4 FOR REBAR DETAIL

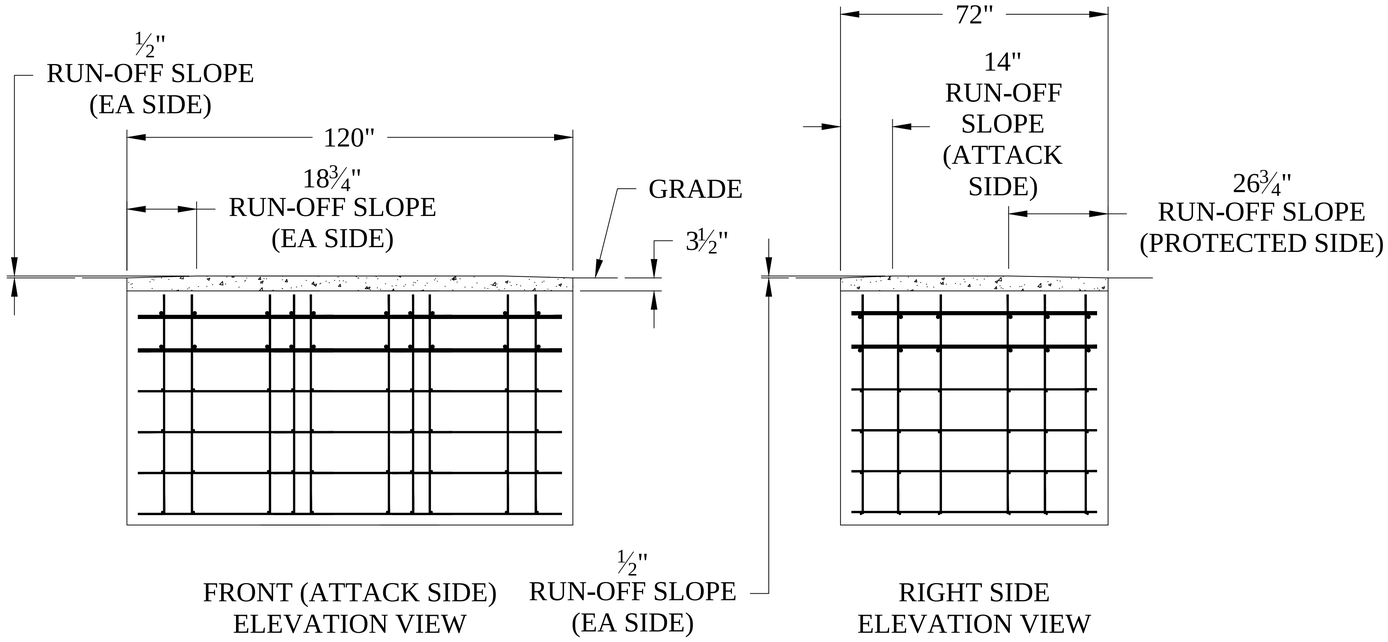
Unless Noted Otherwise
.x Decimal .040
.xx Decimal .030
.xxx Decimal .020
.xxxx Decimal .010
Angular 0.5°
DO NOT SCALE OFF DRAWING

AMERISTAR®
1555 N. Mingo
Tulsa, OK 74116
1-888-333-3422
www.ameristarfence.com

REVISION HISTORY

REV	ECN	AUTHOR	DATE	DESCRIPTION
A		INIT	DATE	Initial Release

TITLE: TITAN 3 BOLLARD REBAR STD
DATE: 05/14/20 SHEET: 1 of 4
DRN BYDM REV: A
DRAWING NO: TITAN 3 BOLLARD REBAR STD



FRONT (ATTACK SIDE)
ELEVATION VIEW

RIGHT SIDE
ELEVATION VIEW

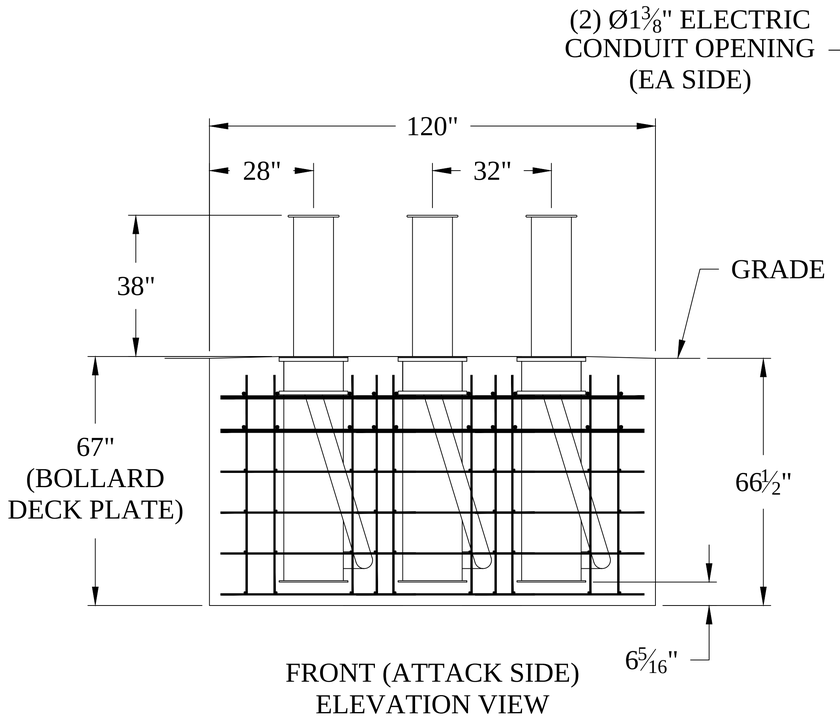
TOP LAYER

- SEE SHEET 1 FOR CONCRETE WITH REINFORCING
- SEE SHEET 3 FOR COMPLETED INSTALLATION
- SEE SHEET 4 FOR REBAR DETAIL

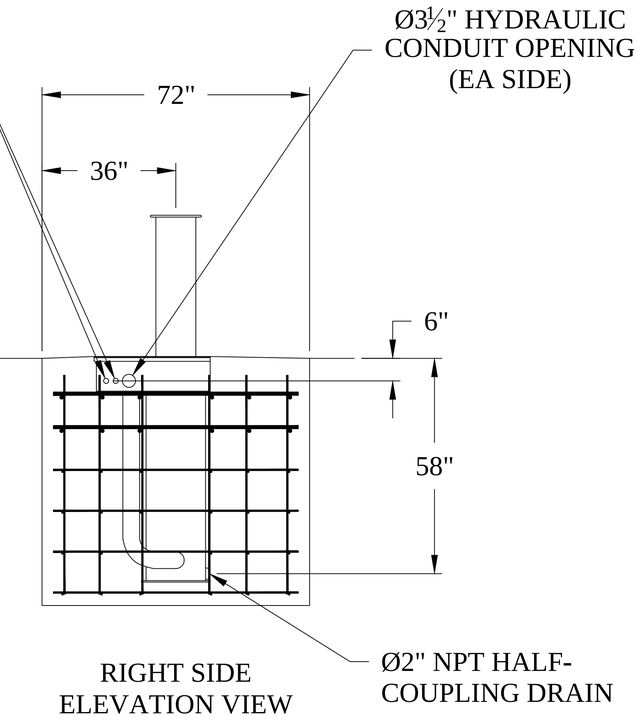
Unless Noted Otherwise			PROPRIETARY INFORMATION	AMERISTAR®	1555 N. Mingo Tulsa, OK 74116 1-888-333-3422 www.ameristarfence.com
.x Decimal ± .040 .xx Decimal ± .030 .xxx Decimal ± .020 .xxxx Decimal ± .010	DO NOT SCALE OFF DRAWING Angular ± 0.5°	This drawing is the proprietary property of AMERISTAR, Tulsa, OK and must not be duplicated or used in whole or in part for the making of drawings, prints or parts to the detriment of, or harm to, the owner. In accepting this drawing, the recipient agrees to keep the information contained confidential.		TITLE: TITAN 3 BOLLARD REBAR STD	
				DATE: 05/14/20	SHEET: 2 of 4
				DRN BYDM	REV: A
				DRAWING NO: TITAN 3 BOLLARD REBAR STD	

REVISION HISTORY

REV	ECN	AUTHOR	DATE	DESCRIPTION
A		INIT	DATE	Initial Release



FRONT (ATTACK SIDE)
ELEVATION VIEW



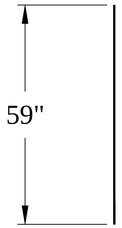
RIGHT SIDE
ELEVATION VIEW

COMPLETED INSTALLATION

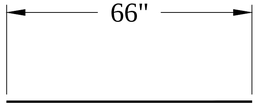
Unless Noted Otherwise			PROPRIETARY INFORMATION	AMERISTAR®	1555 N. Mingo Tulsa, OK 74116 1-888-333-3422 www.ameristarfence.com
.x Decimal ± .040 .xx Decimal ± .030 .xxx Decimal ± .020 .xxxx Decimal ± .010	DO NOT SCALE OFF DRAWING Angular ± 0.5°		This drawing is the proprietary property of AMERISTAR, Tulsa, OK and must not be duplicated or used in whole or in part for the making of drawings, prints or parts to the detriment of, or harm to, the owner. In accepting this drawing, the recipient agrees to keep the information contained confidential.	TITLE: TITAN 3 BOLLARD REBAR STD	
				DATE: 05/14/20	SHEET: 3 of 4
				DRN BYDM	REV: A
				DRAWING NO: TITAN 3 BOLLARD REBAR STD	

REVISION HISTORY

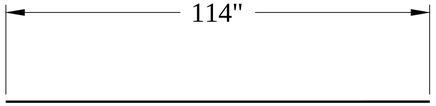
REV	ECN	AUTHOR	DATE	DESCRIPTION
A		INIT	DATE	Initial Release



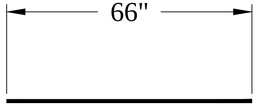
ITEM 1
#4 (Ø1/2") REBAR
QTY: 60



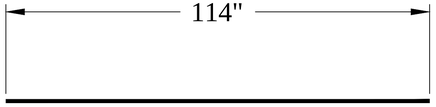
ITEM 2
#4 (Ø1/2") REBAR
QTY: 40



ITEM 3
#4 (Ø1/2") REBAR
QTY: 24



ITEM 4
#8 (Ø1") REBAR
QTY: 20



ITEM 5
#8 (Ø1") REBAR
QTY: 12

REBAR DETAIL

NOTES:
1. REBAR MATERIAL: ASTM A615 GRADE 60

Unless Noted Otherwise
.x Decimal ± .040
.xx Decimal ± .030
.xxx Decimal ± .020
.xxxx Decimal ± .010
DO NOT SCALE OFF DRAWING
Angular ± 0.5°

REVISION HISTORY

REV	ECN	AUTHOR	DATE	DESCRIPTION
A		INIT	DATE	Initial Release

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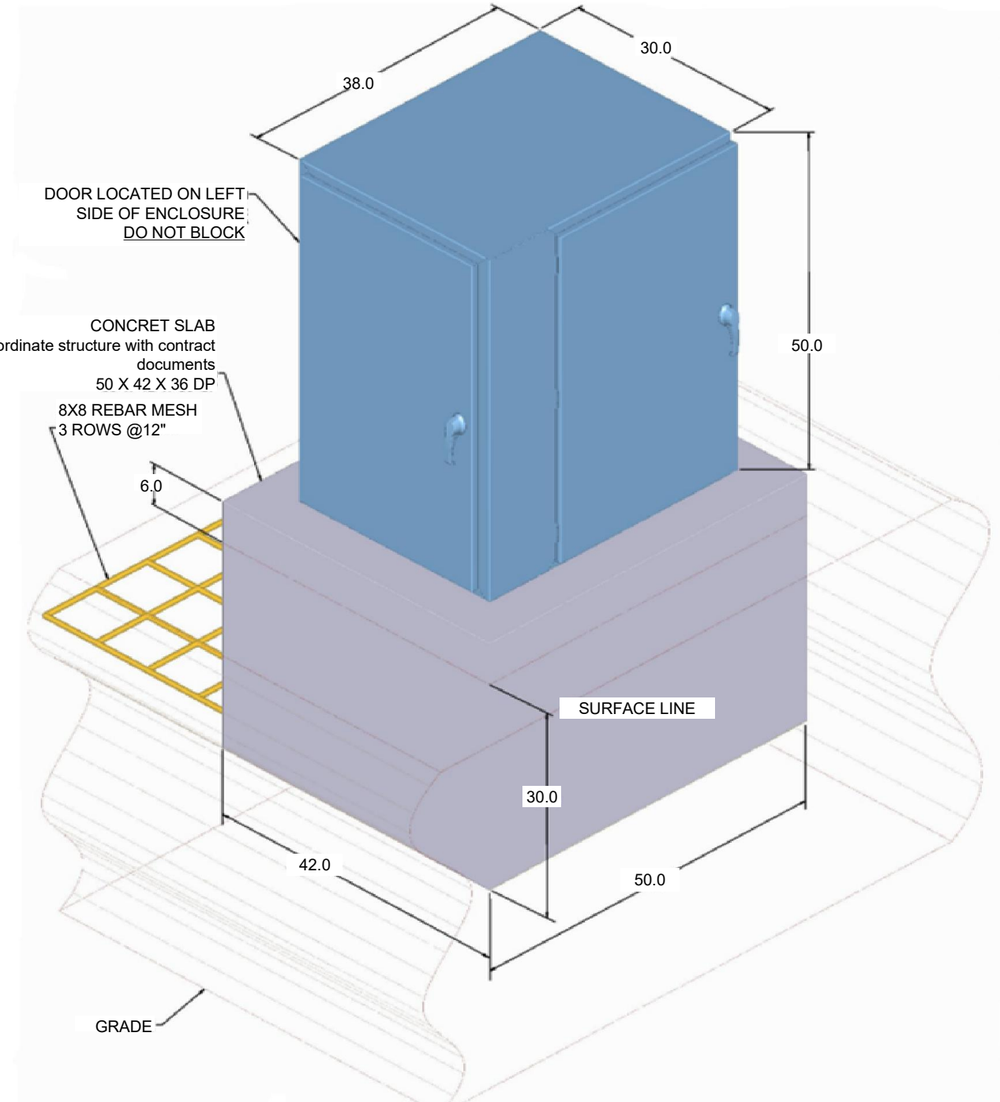
TITLE: TITAN 3 BOLLARD REBAR STD	
DATE: 05/14/20	SHEET: 4 of 4
DRN BYDM	REV: A
DRAWING NO: TITAN 3 BOLLARD REBAR STD	

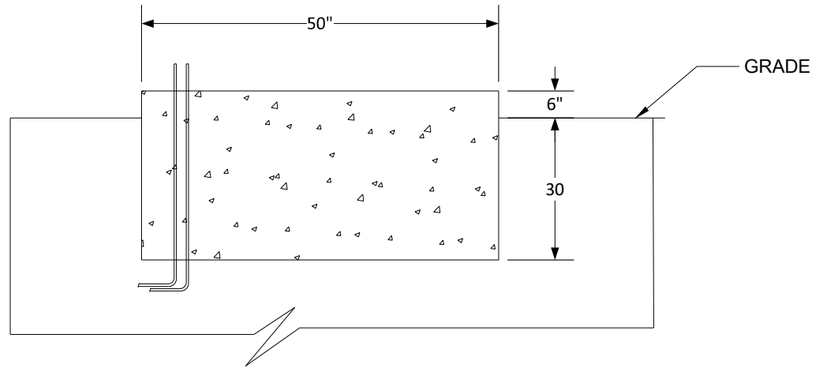
7. APPENDIX C – HPU FOUNDATION DRAWING

Appendix C
HPU Foundation Drawing

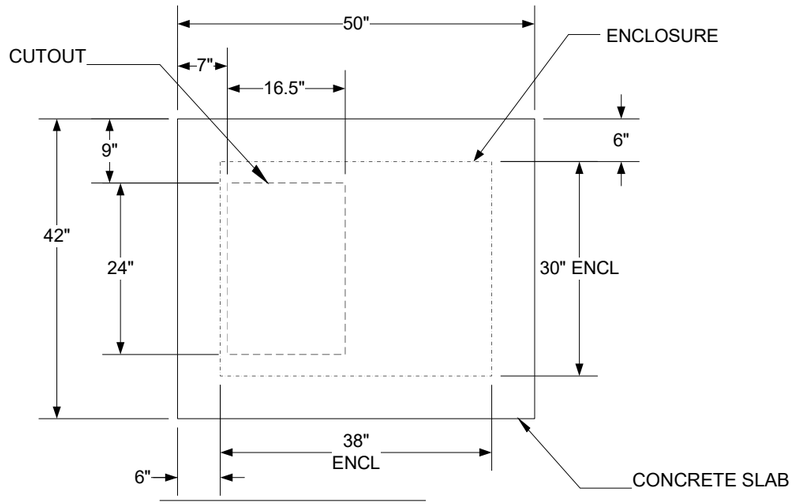
NOTES:
1. LOCAL CODES SUPERSEDE FOUNDATION DIMENSIONS
2. RECOMMEND TO INSTALL FOUNDATION BELOW FREEZE LINE



FOUNDATION LAYOUT
ENCLOSURE



CONCRETE SLAB SIDE VIEW
N.T.S.



TOP VIEW STUB-UP LOCATION
N.T.S.

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HPU UNIT, FOUNDATION

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	HP-2	2
PROJECT DESCRIPTION:	SCALE: N/A	ENGINEER: RKS	SHEET	5 OF 19

8. APPENDIX D – HPU DETAIL AND MASTER CONTROL

APPENDIX D HPU DETAIL AND MASTER CONTROL

REV.	DESCRIPTION	DATE	BY

2 LANE
HYDRAULIC POWER UNIT

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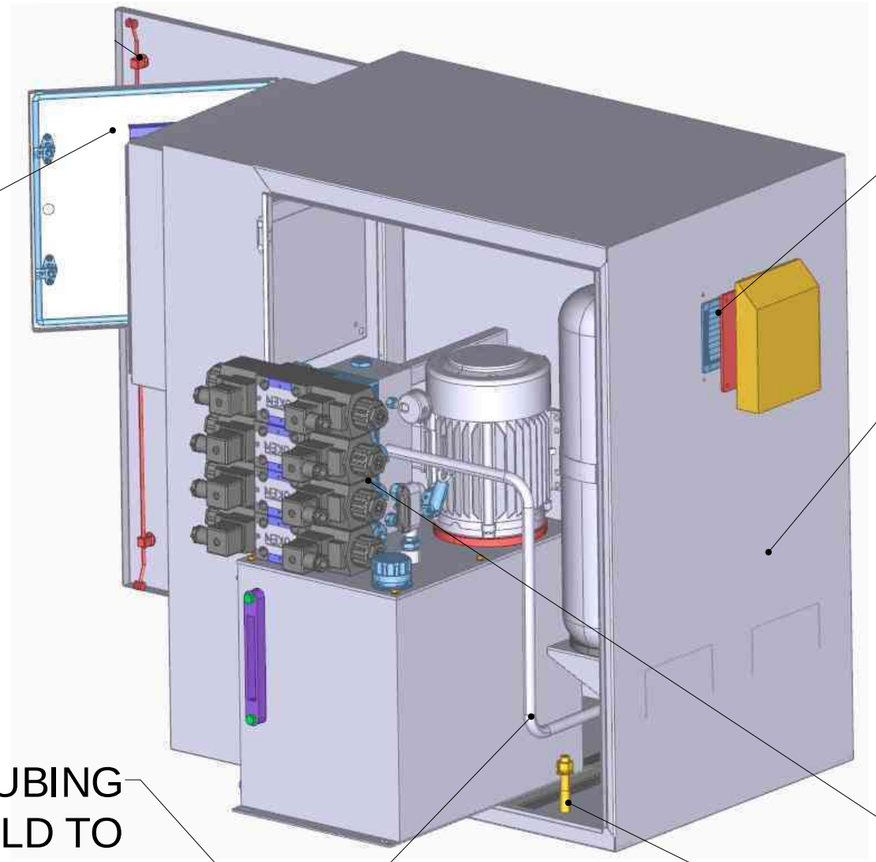
COVER SHEET

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	C1	0
PROJECT DESCRIPTION:	SCALE NONE	ENGINEER: JJY	SHEET	



CONTROL PANEL BOX 24X24

1) FAN/FILTER
1) EXHAUST/ FILTER
2) RAIN COVER

CABINET 504530 W/DUAL 5 GAL ACCUMULATOR

ASSY, TUBING MANIFOLD TO ACCUMULATOR

SHOWN PUMP ASSY 5 HP 2 ZONE 4 BOLLARD

ANCHOR BOLT ¾ 52045

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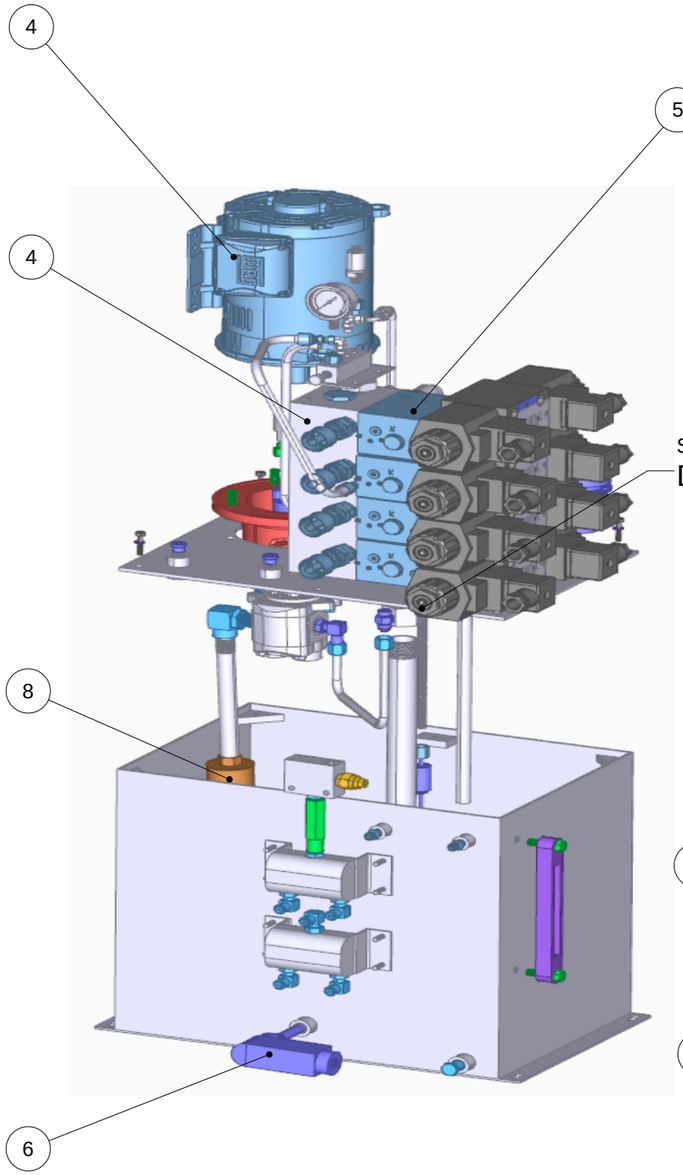
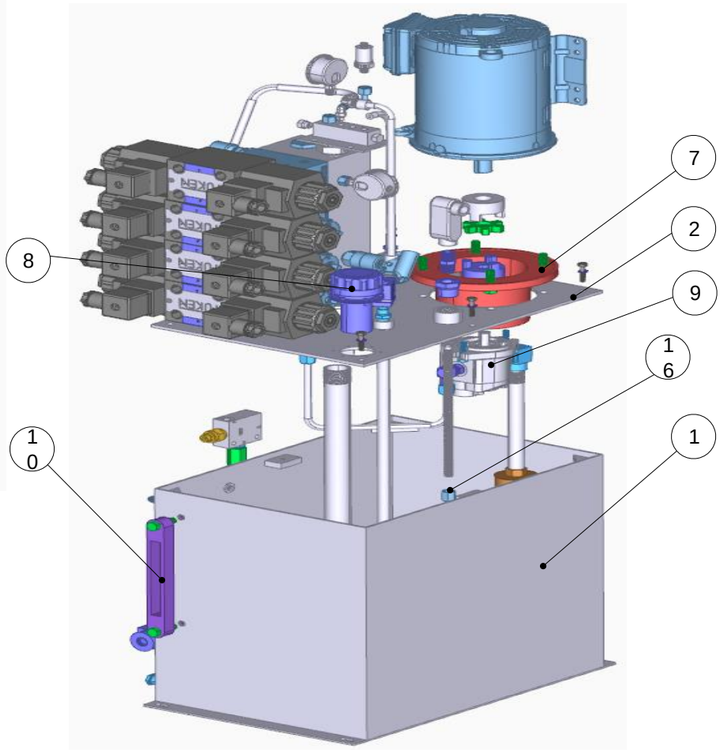
CABINET ASSEMBLY

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	EN1	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	



VIEW SHOWN FOR 2 ZONE 4 BOLLARD 2/2/1
FOR 2 ZONE QTY ITEM 3 TO BE 2

SEE DETAIL D



ITEM	QTY.	PART NO.	DESCRIPTION
11	1	SMBB-80E-S-L-10-0-C-S095P-0	FILLER BREATHER CAP
11	1	T-52111-60B	LOW/LEVEL/HIGH TEMP SWITCH
10	1	LLG-10	SIGHT LEVEL GAUGE 10 C/C
9	1	2PE11.3D-R82S2	PUMP GEAR 3.0 GPM
8	1	24W721	STRAINER, SUCTION 3/4NPT
7	1	M182472A	PUMP/MOTOR MOUNT 182TC 4.75 HT
6	1	ET2-251	HEATER, EMERSION 120V,250W 1/2NPT
5	1	JEM160265	MANIFOLD, 1 ZONE BOLLARD STACKABLE
4	1	00518ET3E184TC-S	MOTOR, 5 HP 1800RPM, AC, 184TC, TEFC
3	1	JEM150333-A	MANIFOLD, 4 ZONE BOLLARD STACK
2	1	70-10-008	WELDMENT, TOP PLATE 3Z BOLLARD
1	1	70-10-003	WELDMENT, TANK 25GAL

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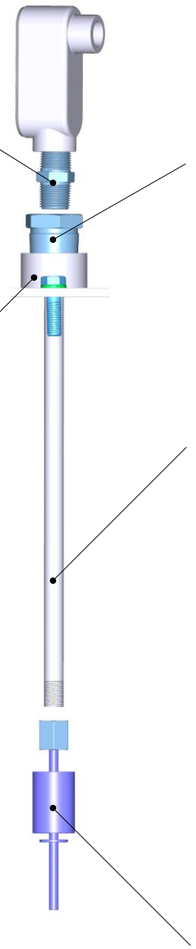
TANK ASSEMBLY

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	EN2	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	



DETAIL D
FROM SHT 2

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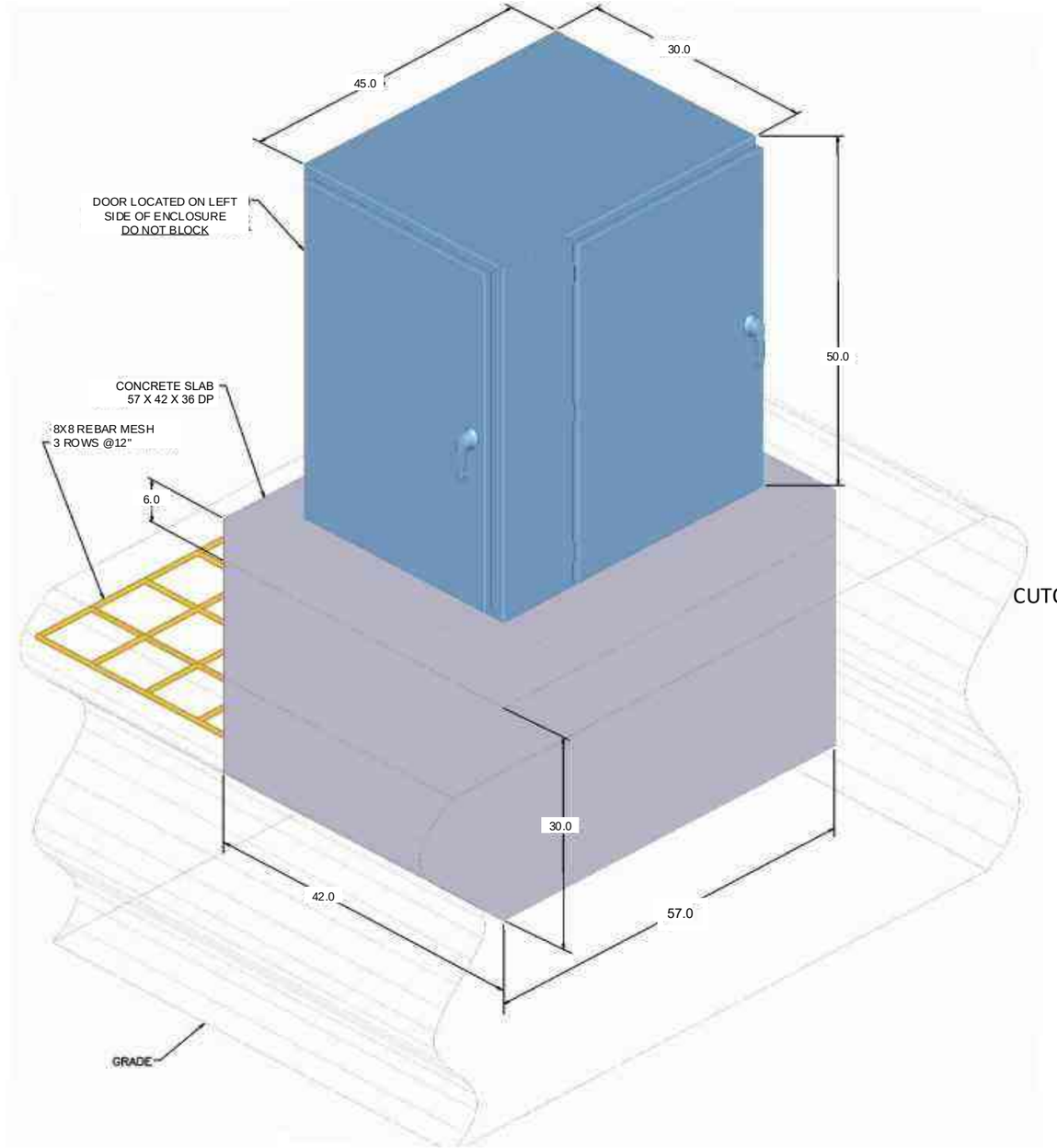
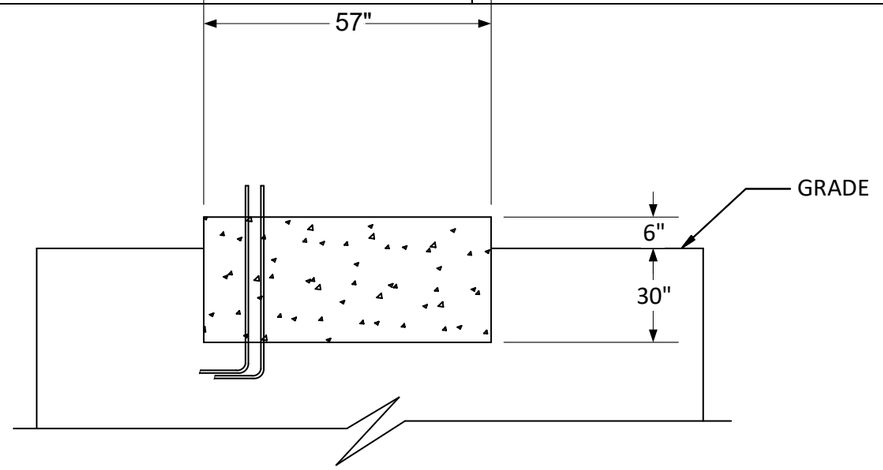
Tulsa, Ok. 74116

LOW LEVEL DETAIL

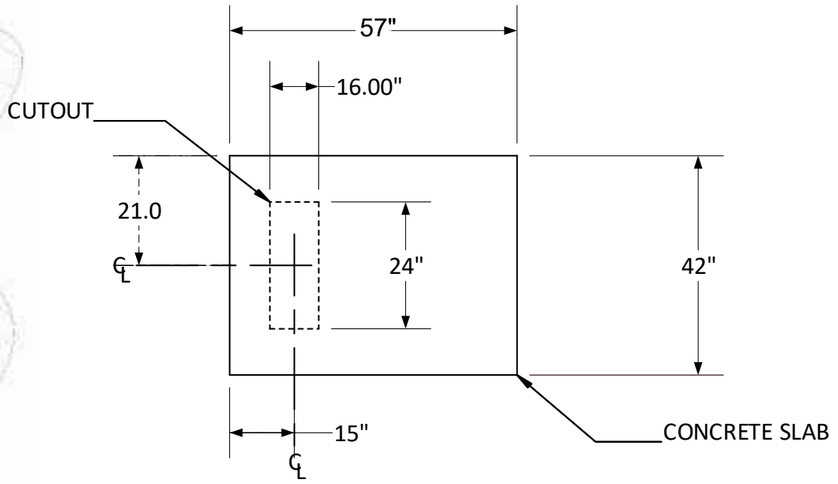
PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	EN3	0
PROJECT DESCRIPTION:	SCALE NONE	ENGINEER: JJY	SHEET	



FOUNDATION LAYOUT
504530 ENCLOSURE



CONCRETE SLAB SIDE
VIEW N.T.S



N.T.S

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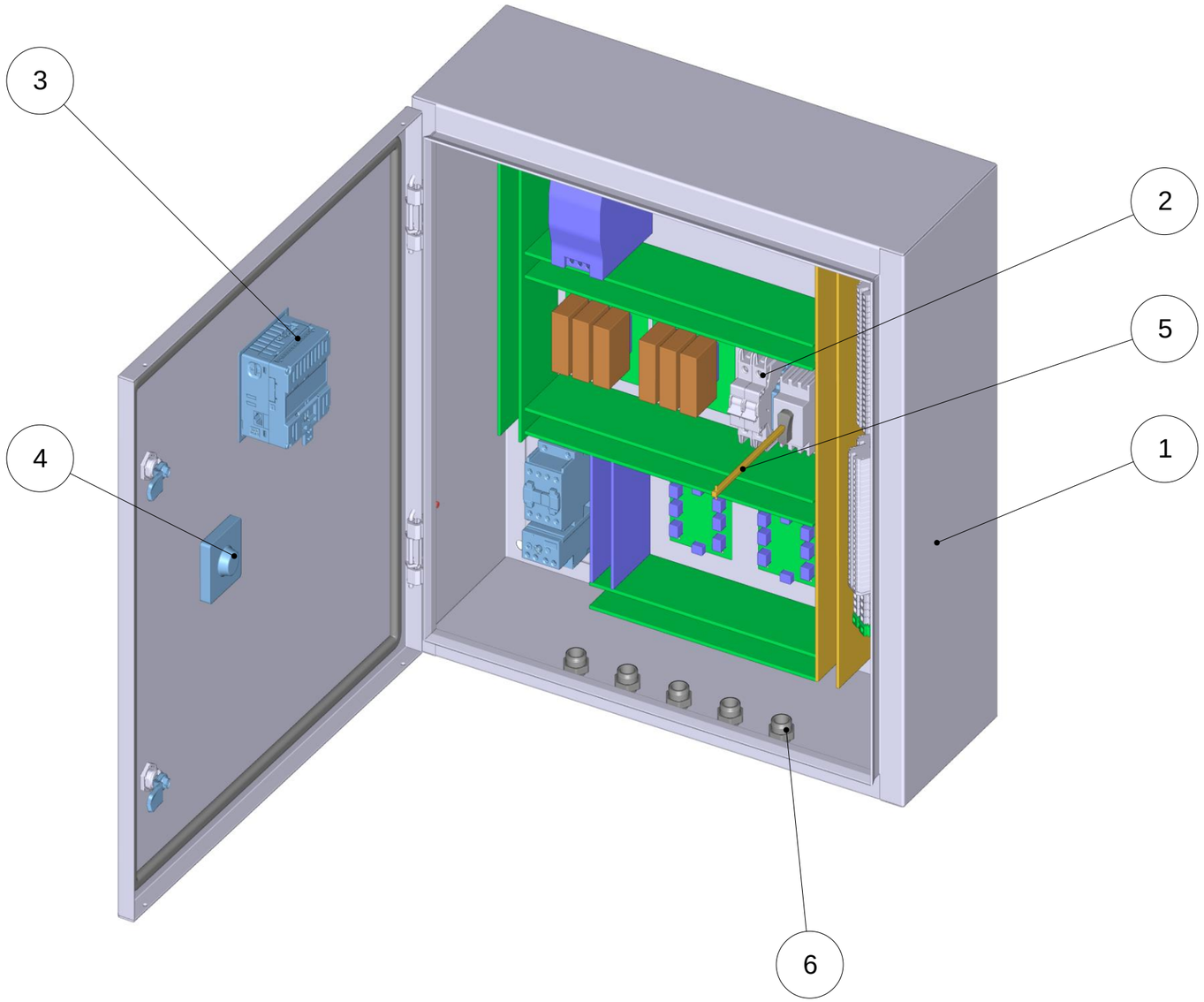
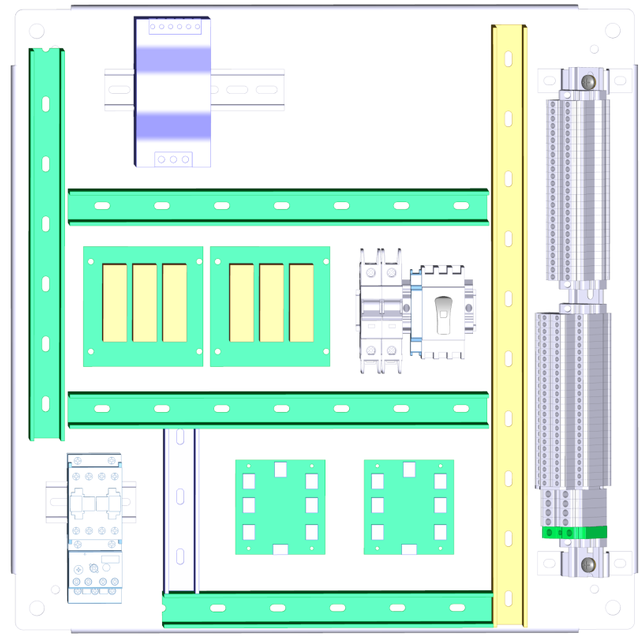
FOUNDATION & CONDUIT LAYOUT

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	EN4	0
PROJECT DESCRIPTION:	SCALE NONE	ENGINEER: JJY	SHEET	





ITEM	PART NO.	DESCRIPTION
6	CG-½ NPT-0712-50	CABLE STAIN RELIEF ½ NPT
5	GAX7150	SHAFT EXTENSION
4	GAX61	LOCKABLE HANDLE
3	V350-J-R34	PLC DUAL ZONE
2	SEE DETAIL	ASSY, PANEL CIRCUIT CONTROL
1	ES-24248	ENCLOSURE, 24 X 24 X 8 NEMA 4

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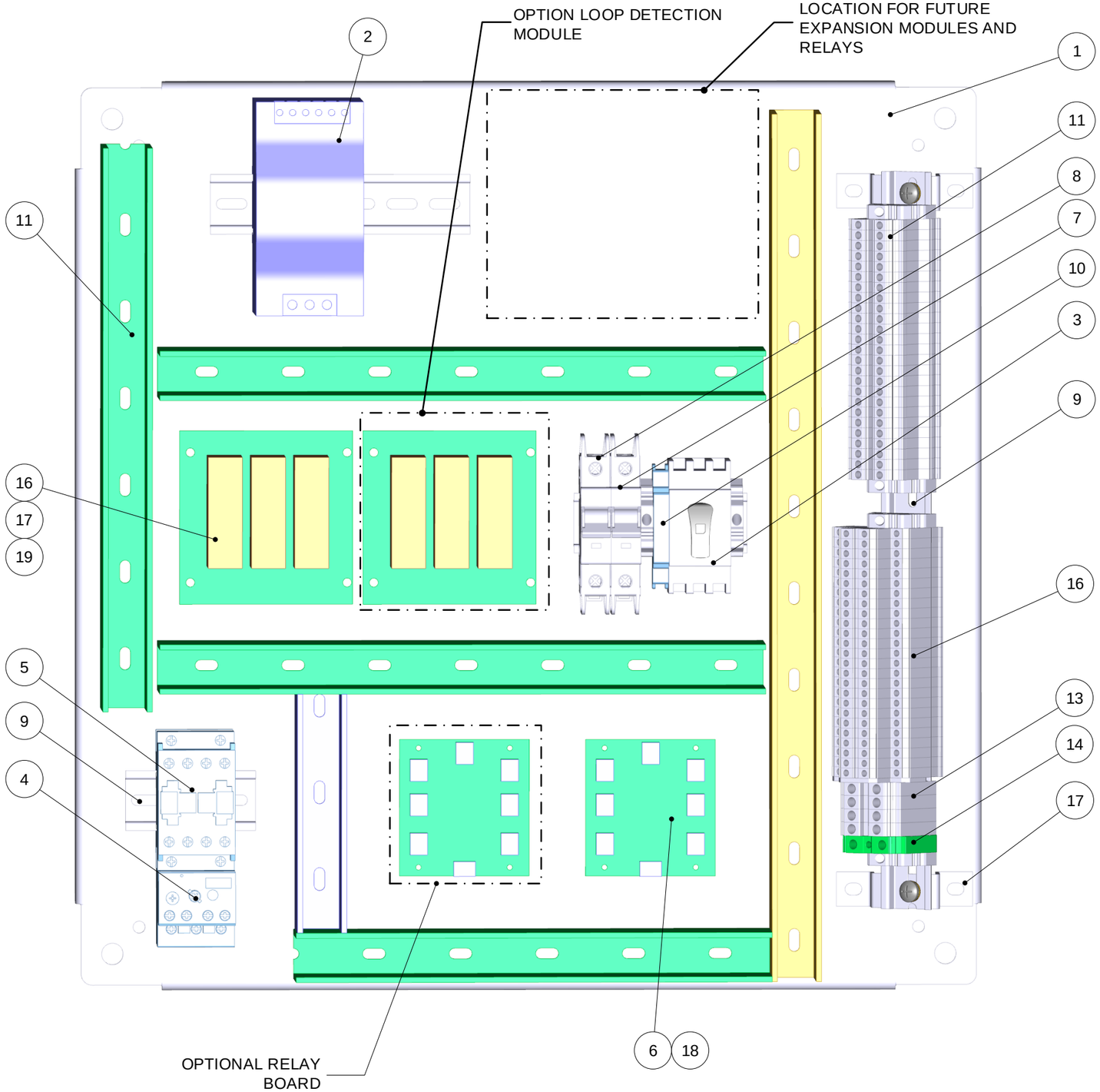
CONTROL PANEL

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	EN5	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	



ITEM	PART NO.	DESCRIPTION
21	FC4505-832-A	STANDOFF, 8-32 X ½ HEX AL
20	FC4505-440-A	STANDOFF, 4-40 X ½ HEX AL
19	EMX ULTRA II	MOTHER BOARD LOOP DETECTOR
18	NP2-ESL	LOOP DETECTOR
17	WTB2-BRKT1	BRACKET RAIL SUPPORT ANGLE
16	WTB2-W4DD	TERM BLK, DUAL LEVEL
15	WTB2-EB	TERM BLK, END STOP BRACKET
14	WTB2-W4-10G	TERM BLK, SINGLE 22-8 AWG GND
13	WTB2-W6	TERM BLK, SINGLE 22-8 AWG
12	WTB2-W4	TERM BLK, SINGLE 22-10 AWG
11	EF1X3WH6.5/C	RAIL WIRE DUCT 1 X 3 WHT W/COVER
10	GAX1110EA	SWITCH, AUX. CONTACT
9	TS3575SL	DIN RAIL 35MM X 7.2MM
8	P1MBUH1PC04	CIRCUIT BREAKER 4 AMP
7	P1MBUH1PC05	CIRCUIT BREAKER 5 AMP
6	RSSC	6 CH RELAY BOARD
5	BF1801L024	MOTOR CONTACTOR
4	RF381800	3 POLE OVERLOAD RELAY
3	GA025 A	SWITCH DISCONNECT
2	SDR-240-24	POWER SUPPLY, 10A, 240W, 24 V
1	ES-P2424	PLATE, 24X24 CONTROL PANEL

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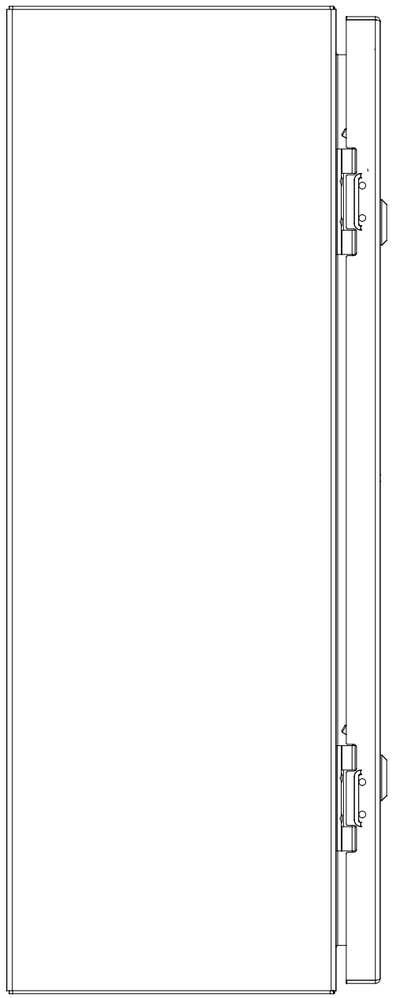
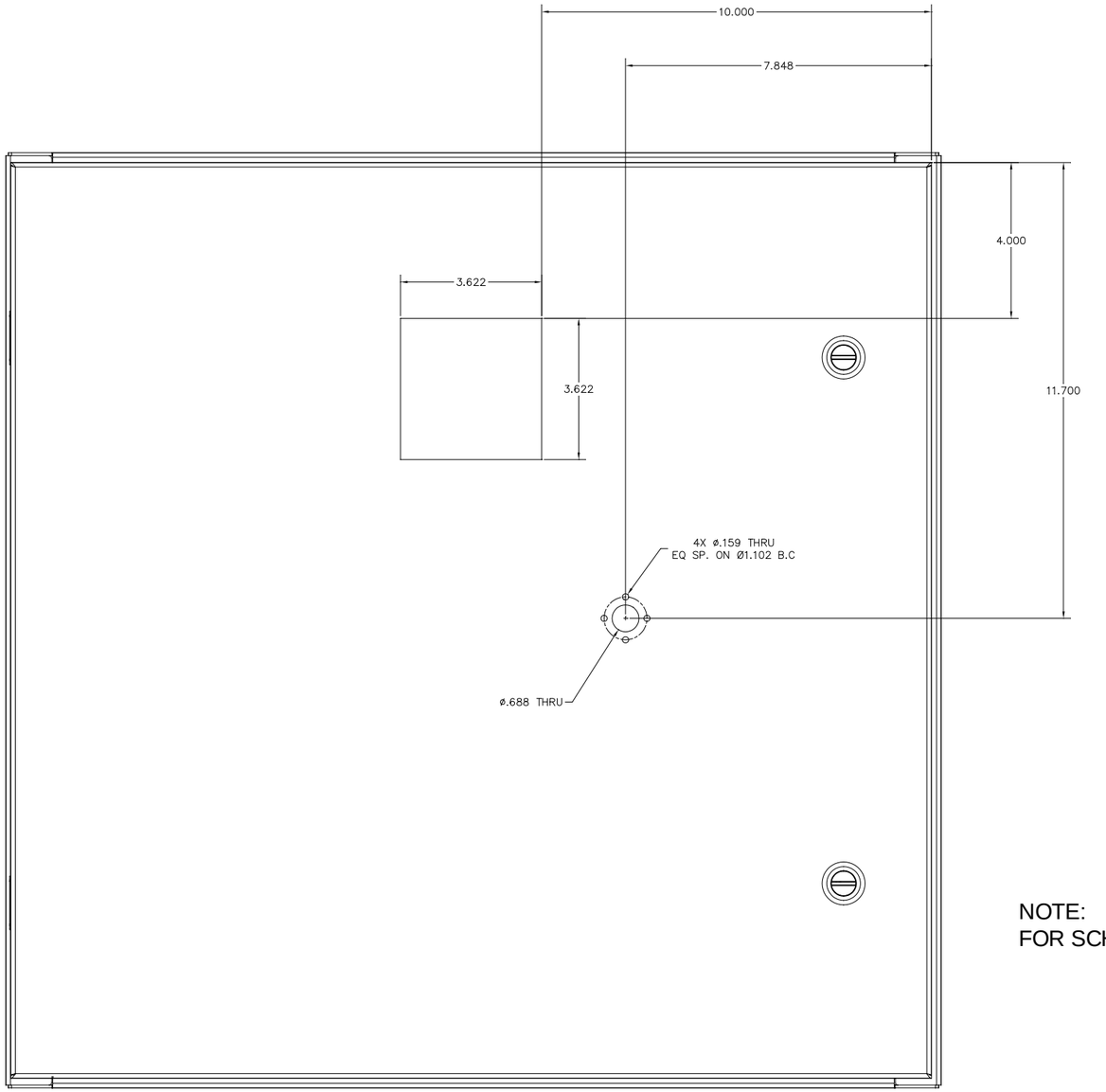
CONTROL PANEL - COMPONENTS

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	EN6	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	





NOTE:
FOR SCHAEFERS MODIFY DOOR ON PART ES 24248-223

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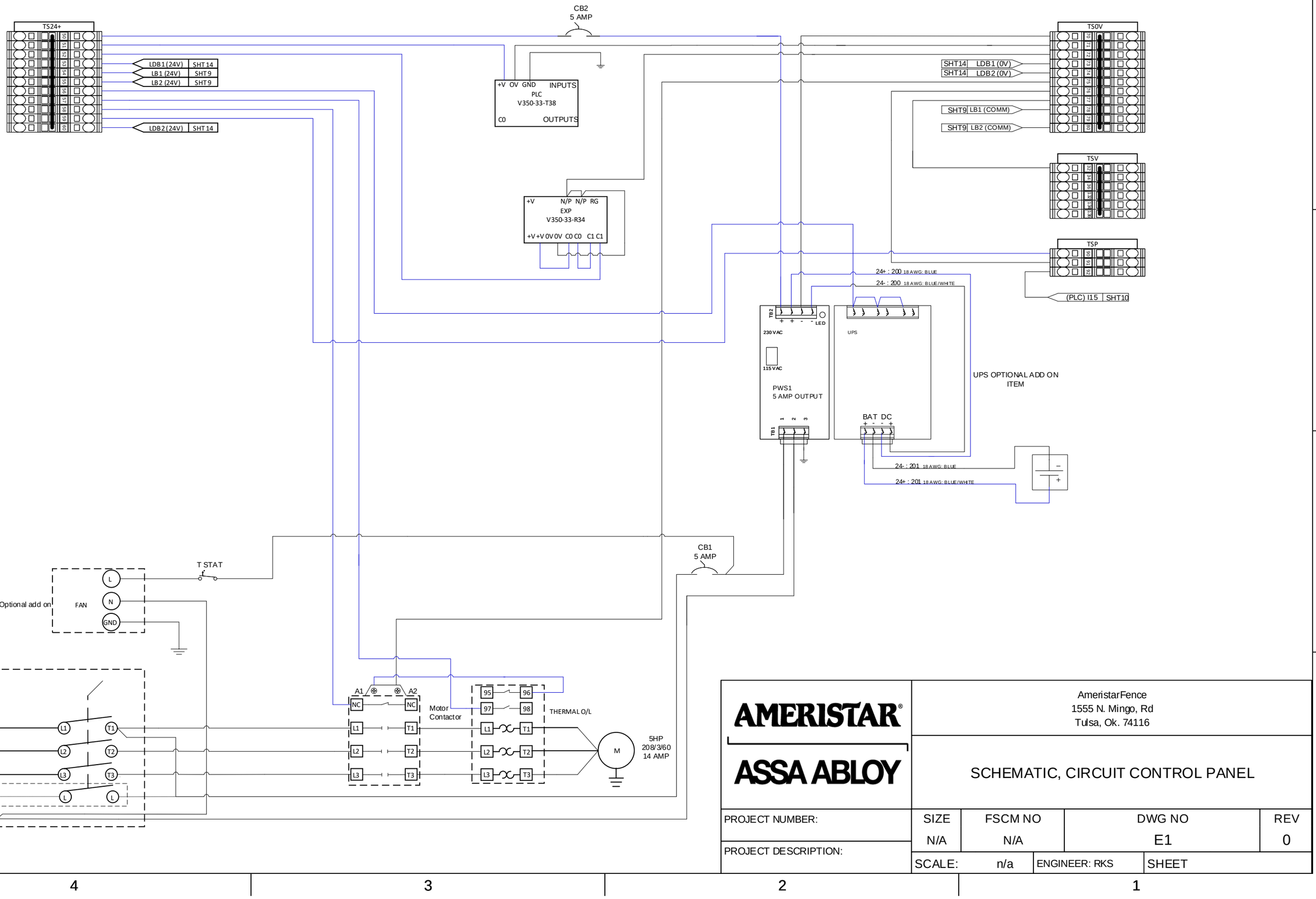
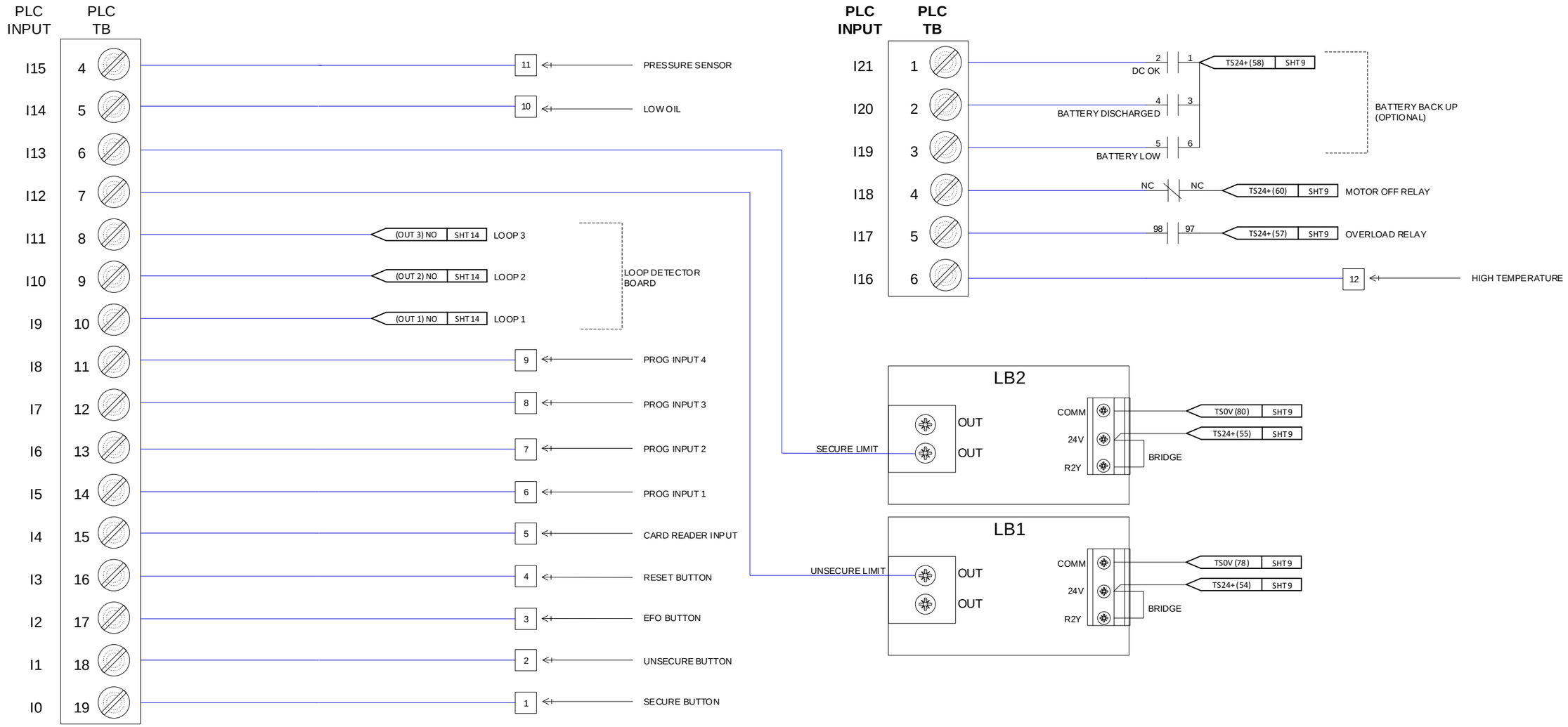
Tulsa, Ok. 74116

CONTROL PANEL - DOOR

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	EN7	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	



AMERISTAR® ASSA ABLOY	AmeristarFence 1555 N. Mingo, Rd Tulsa, Ok. 74116		
	SCHEMATIC, CIRCUIT CONTROL PANEL		
PROJECT NUMBER:	SIZE: N/A	FSCM NO: N/A	DWG NO: E1 / REV: 0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET



***NOTES:**

1. INPUTS TO PLC ARE TO BE 24VDC+
2. INPUT CURRENT CONSUMTION IS LESS THAN 110MA
3. SEE FIELD TERMINATION DETAIL (E-5) FOR CONSOLE WIRING
4. E-SECURE AND RESET INPUT ARE TO BE JUMPERED TOGETHER IN THE FIELD IF SINGLE BUTTONS ARE USED.

PROGRAMABLE INPUT OPTIONS:

1. SAFETY
2. CARD READER
3. AUTO CLOSE
4. SECURE BUTTON
5. UNSECURE BUTTON
6. ESECURE BUTTON
7. RESET BUTTON
8. GATE SECURE LIMIT
9. GATE UNSECURE LIMIT

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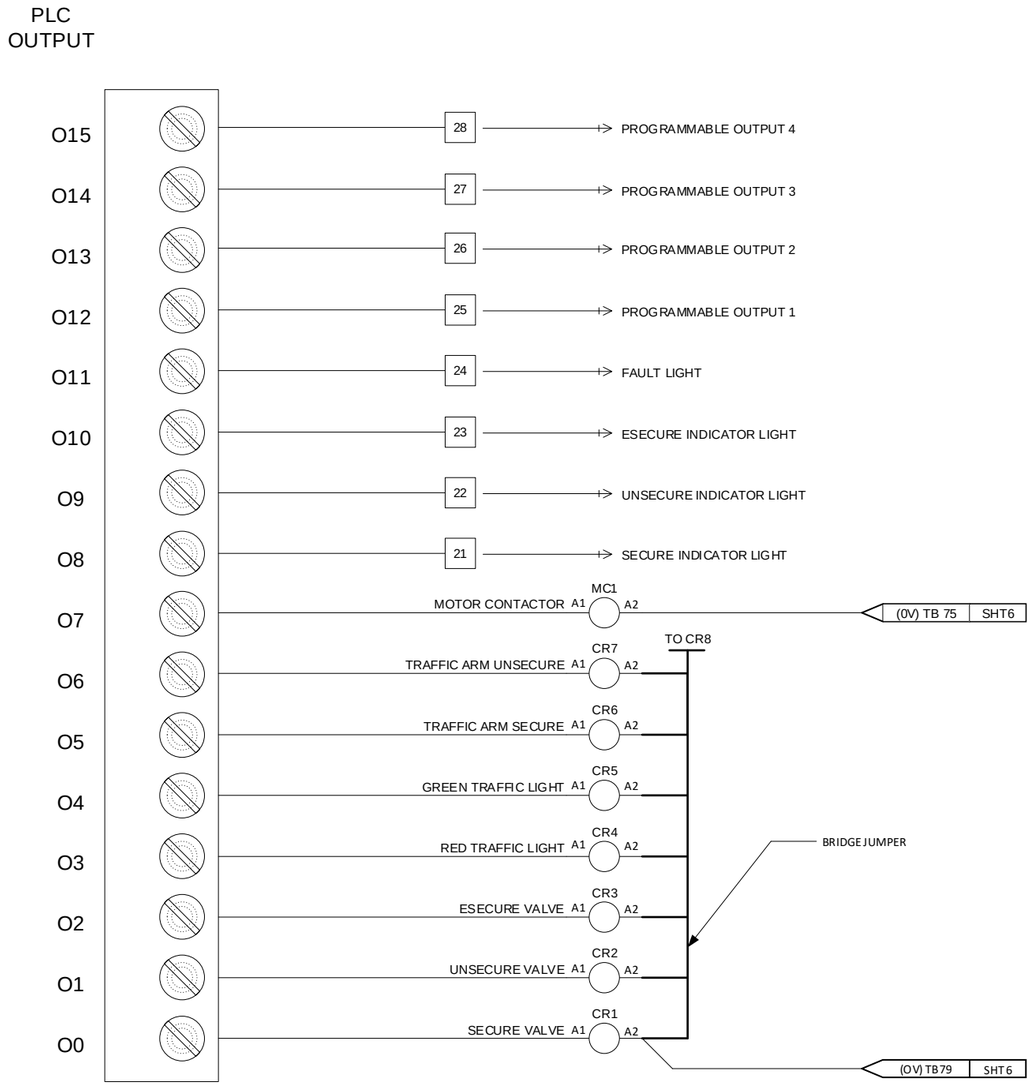
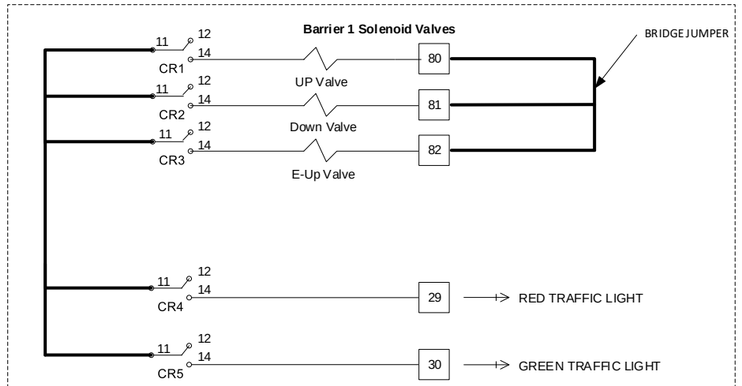
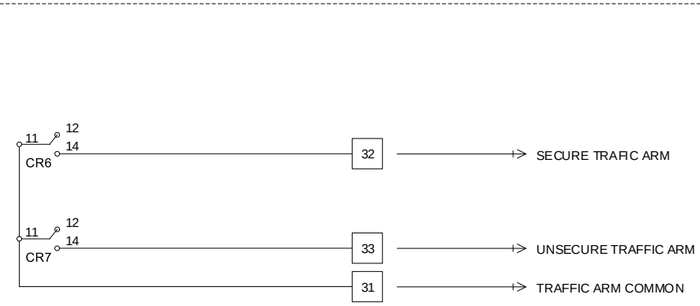
CIRCUIT CONTROL PANEL, INPUT INTERCONNECT

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	E2	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	





24 VDC Control Relay Detail



TRAFFIC ARM CONTROL RELAYS

PROGRAMABLE OUTPUT OPTIONS:
1. SECURE LIMIT
2. UNSECURE LIMIT
3. PULSE ON SECURE LIMIT
4. PULSE ON UNSECRE LIMIT
5. SECURE LIMIT AND CLOSING
6. UNSECURE LIMIT AND OPENING
7. LOOP 1
8. LOOP 2
9. LOOP 3
10 CLOSE GATE
11. UNSECURE GATE

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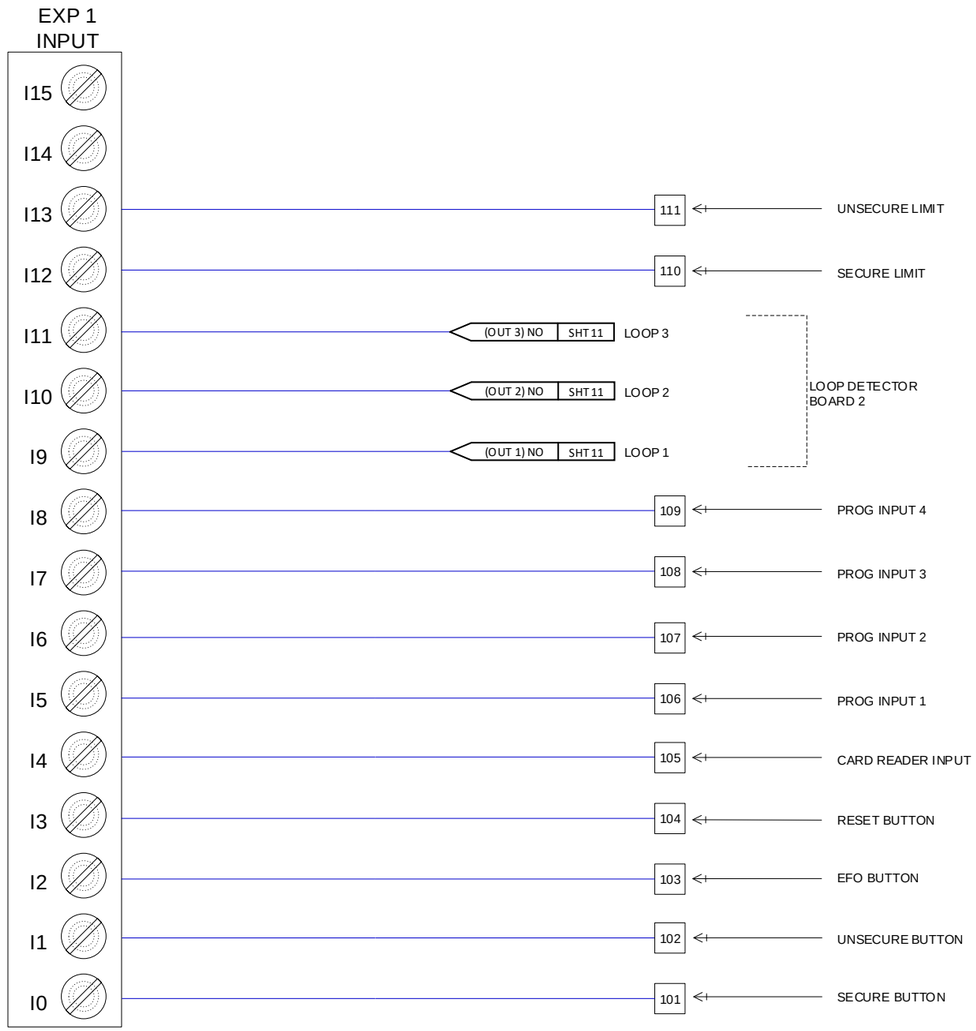
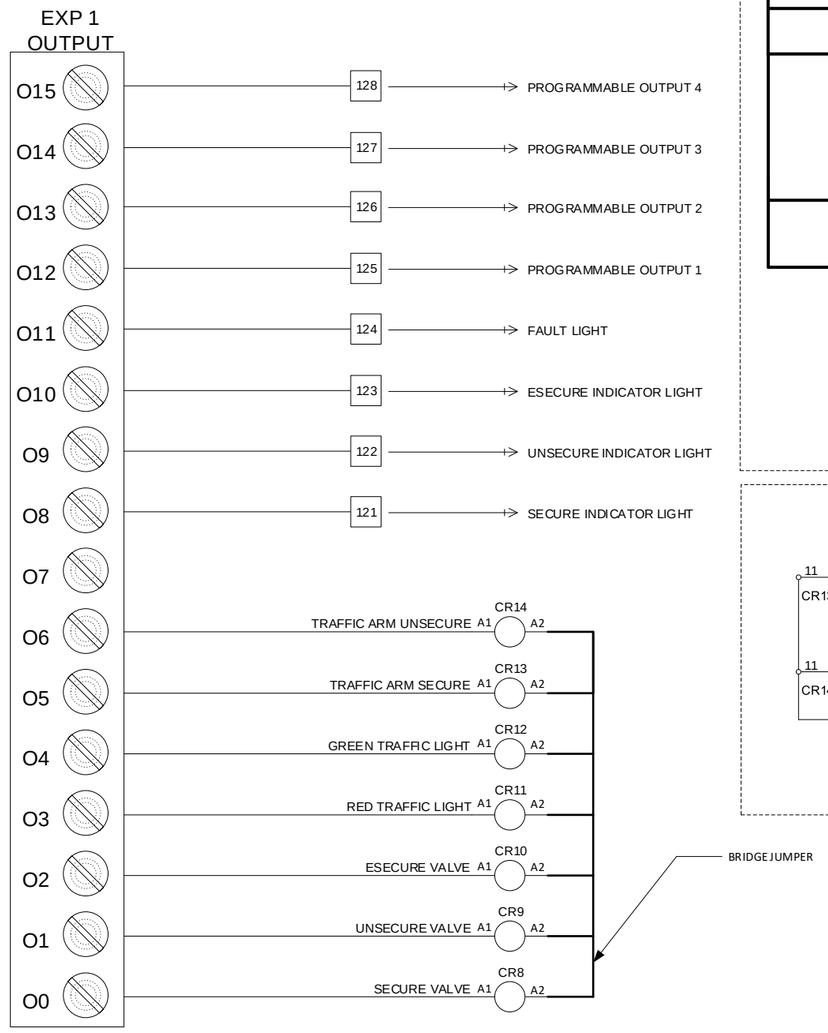
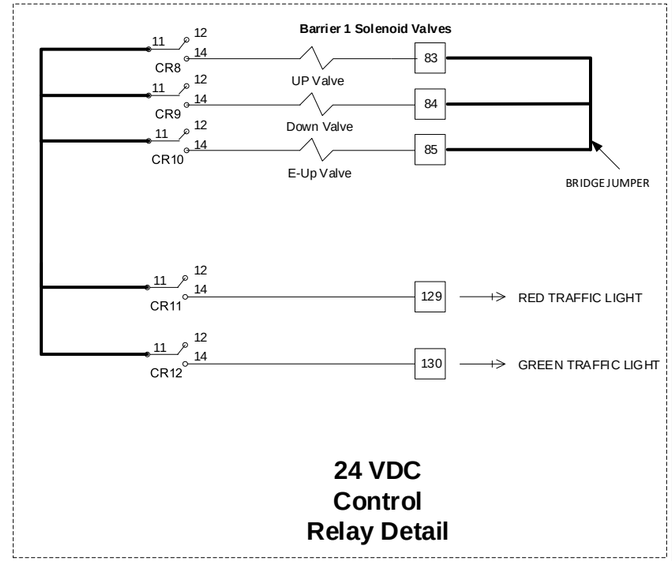
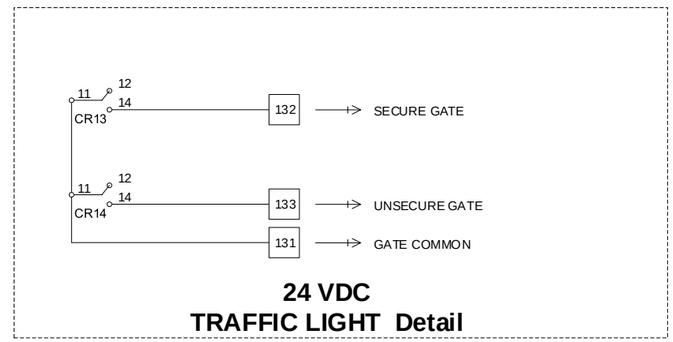
SCHEMATIC CONTROL PANEL, OUTPUT INTERCONNECT

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	E3	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	









ZONE 2 CONTROLS

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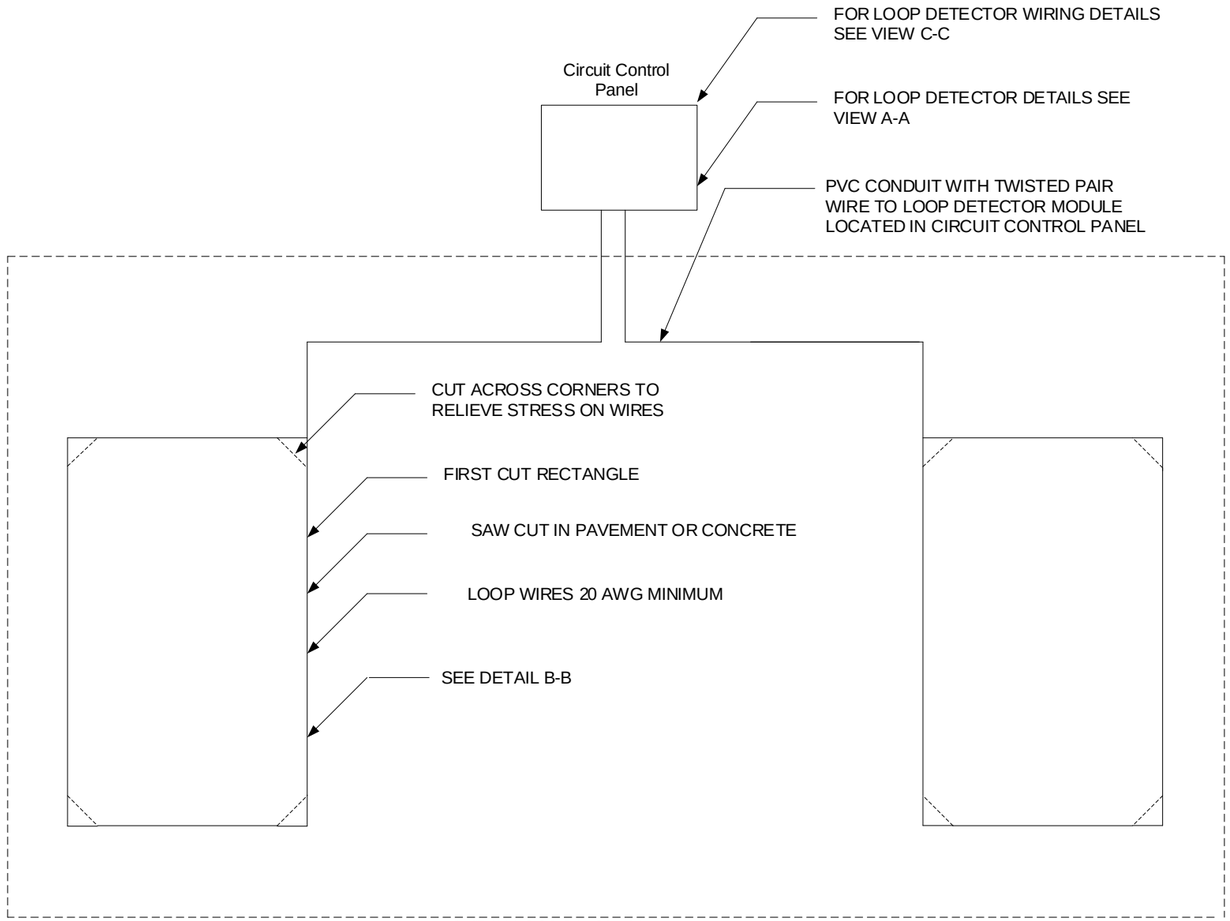
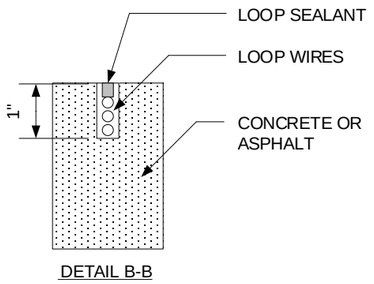
ZONE 2 EXP MODULE

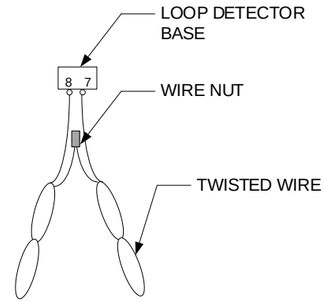
PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	E4	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	



CUT-IN LOOP DIAGRAM



DETAIL B-B



OPTIONAL FOR WIRING
LOOP IN SERIES

DETAIL C-C

NOTES:

1. JUNCTIONS ARE USED WITH CUT-IN EXIT LOOPS, OR WHEN PRE-FORMED LOOPS EXCEED 50 FEET FROM GATE, WIRE SPLICES SHOULD BE SOLDERED AND WATERPROOF.

2. WIRES NEED TO BE TWISTED AFTER LEAVING DRIVEWAY.

3. APPROXIMATE LOOP SIZES ARE AS FOLLOWS:
10 -15' WIDE DRIVEWAY 6'X4' LOOP
16'-18' WIDE DRIVEWAY 8'X4' LOOP
19'-22' WIDE DRIVEWAY 10'X4' LOOP
23'-26' WIDE DRIVEWAY 14'X4' LOOP

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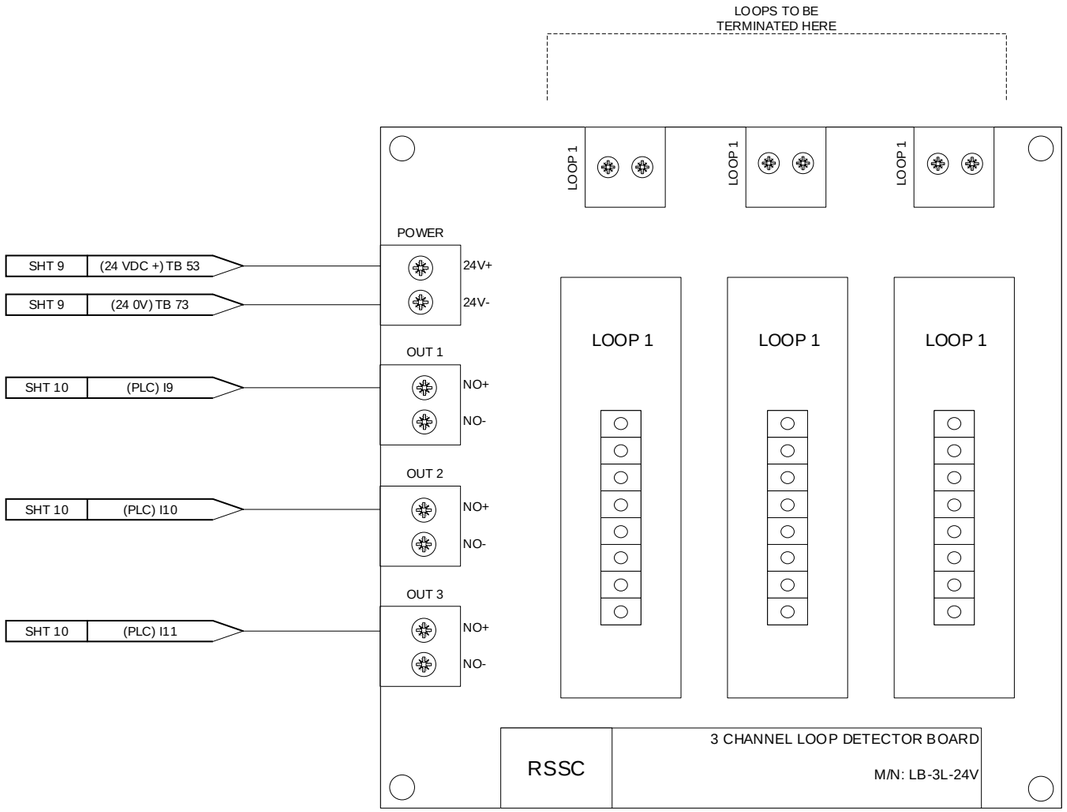
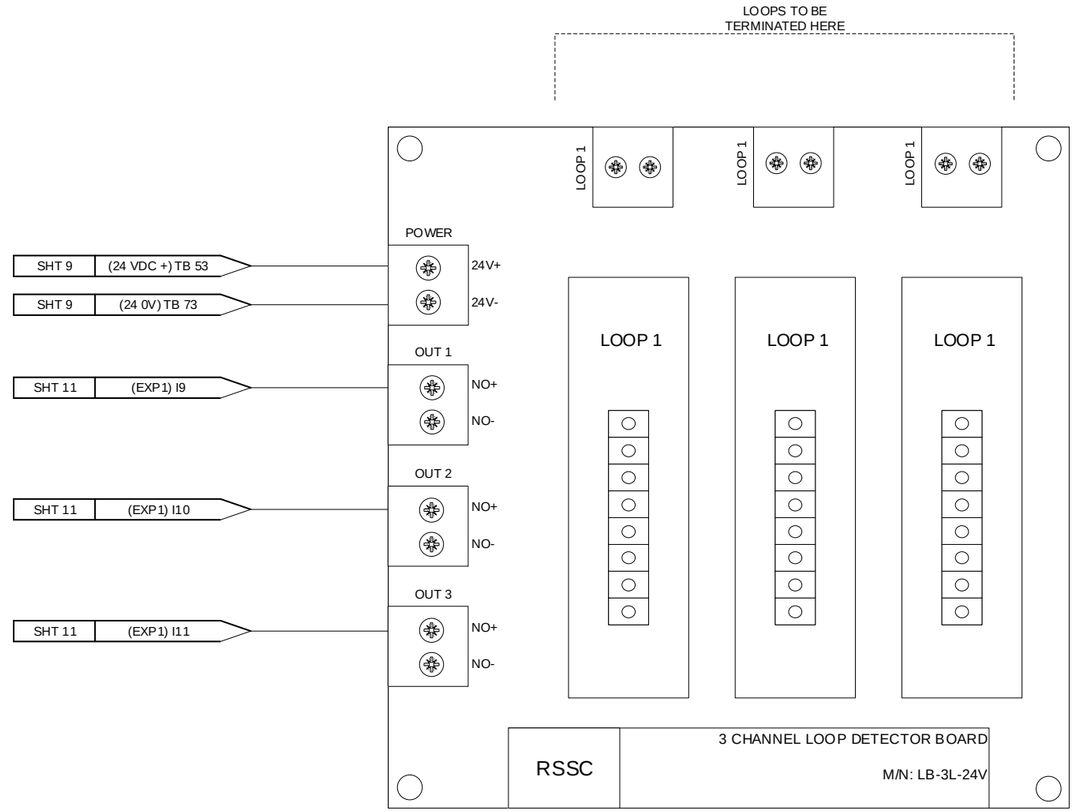
LOOP INSTRUCTIONS

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	E5	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	





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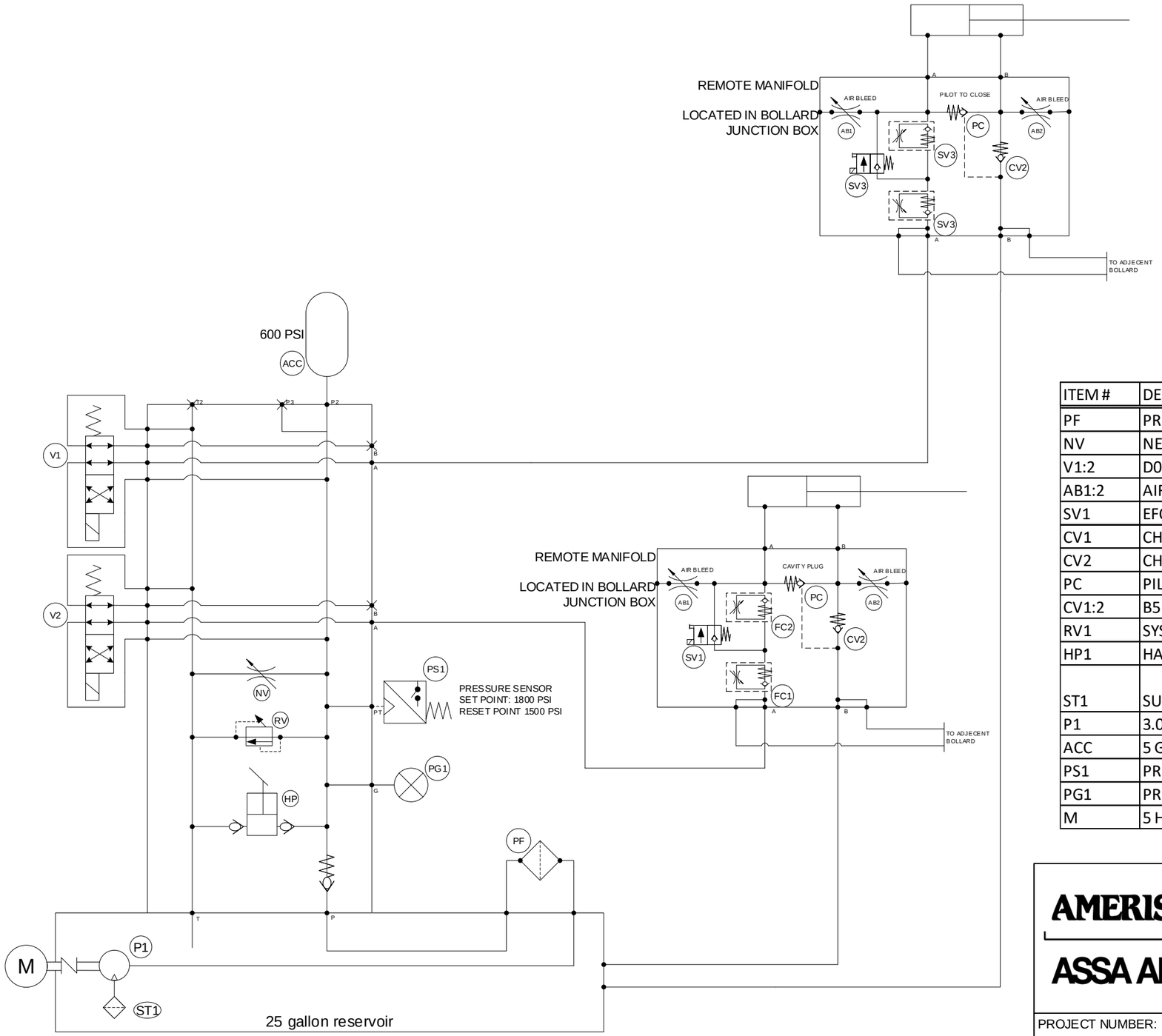
LOOP DETECTOR

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	E6	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	

*notes
1. SV WILL BE REOVED AND REPLACED WITH A CAVITY PLUG WHEN EFO OPERATION IS NOT INCORPORATED IN THE SYSTEM.



ITEM #	DESCRIPTION	PART NO.
PF	PRESSURE FILTER	P3000S1208V44000EN-G
NV	NEEDLE VALVE PRESSURE DUMP	NV08-20B-0-N
V1:2	D05 DETINTED DIRECTIONAL VALVE	SWH-G03-D2-D24-20-N
AB1:2	AIR BLEEDER VALVE	4ABV
SV1	EFO SOLENOID VALVE	SV12-20-0-N-00
CV1	CHECK VALVE	CV08-20-0-N-04
CV2	CHECK VALVE	CV10-20-0-N-15
PC	PILOT TO CLOSE VALVE	DF-CPD-04-0015
CV1:2	B5 CHECK VALVE	CV12-20-0-N-25
RV1	SYSTEM PRESSURE RELIEF VALVE	RV10-26A-0-N-30
HP1	HAND PUMP	HP10-21A-0-N-B
ST1	SUCTION STRAINER	SUS-068-N12-105-125-A-0RSSC
P1	3.0 GPM PUMP	2PE11.3D-R82S2
ACC	5 GALLON ACCUMULATOR	40-2129
PS1	PRESSURE TRANSMITTER	TDH33BG300003Q004
PG1	PRESSURE GAUGE	G25-SL3000-4LB
M	5 HP 3 PHASE MOTOR	00518ET3E184TC-S

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Hydraulic Bollard Schematic

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	H1	0
PROJECT DESCRIPTION:	SCALE: n/a	ENGINEER: RKS	SHEET	

REVISIONS				
PAGE	REV	DESCRIPTION	DATE	APPROVED

10.106.6
MASTER CONTROL
2 ZONE

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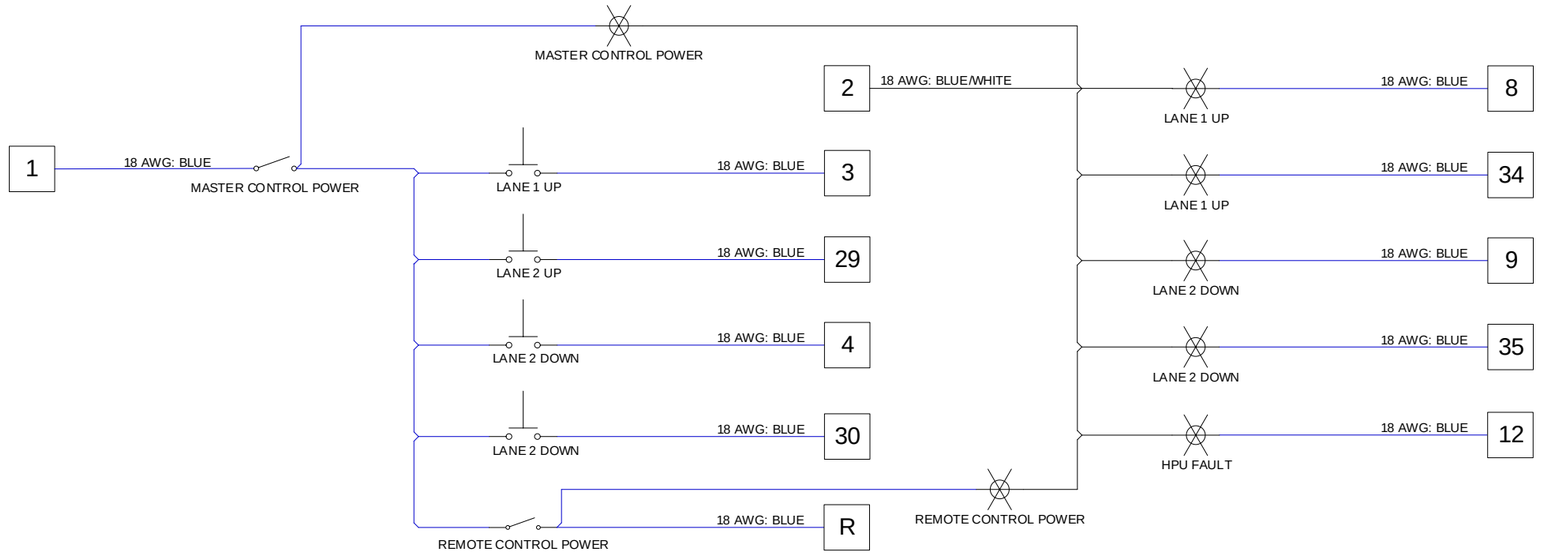
Cover Sheet

PROJECT NUMBER:

PROJECT DESCRIPTION:
ASP 2 ZONE MASTER NO EFO

SIZE	FSCM NO	DWG NO	REV
N/A	N/A	10.106.6 - 1	0

SCALE:	n/a	ENGINEER: RKS	SHEET	1 OF 4



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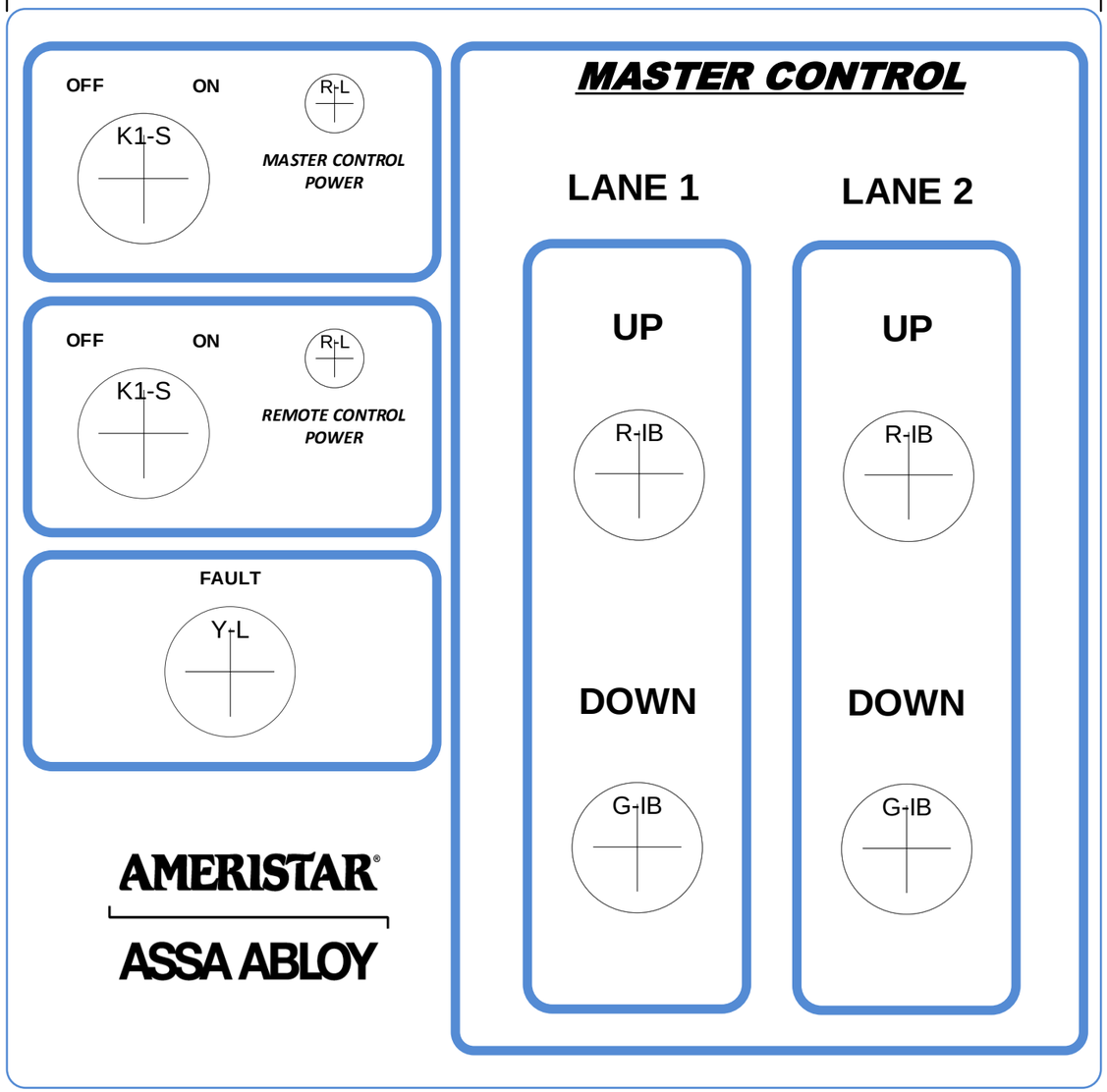
MASTER CONTROL SCHEMATIC

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	10.106.6 - 2	0
PROJECT DESCRIPTION: ASP 2 ZONE MASTER NO EFO	SCALE N/A	ENGINEER: RKS	SHEET 2 OF 4	



LEGEND:
1. R-IB: RED ILLUMINATED PUSHBUTTON
2. G-IB: GREEN ILLUMINATED PUSHBUTTON
3. R-M: RED ILLUMINATED MUSHROOM BUTTON
4. Y-L: YELLOW INDICATOR LIGHT
5. R-L: RED INDICATOR LIGHT
6. K1-S: STANDARD KEYED SWITCH MAINTAINED
7. K2-S: SPECIAL KEY SWITCH SPRING RETURNED

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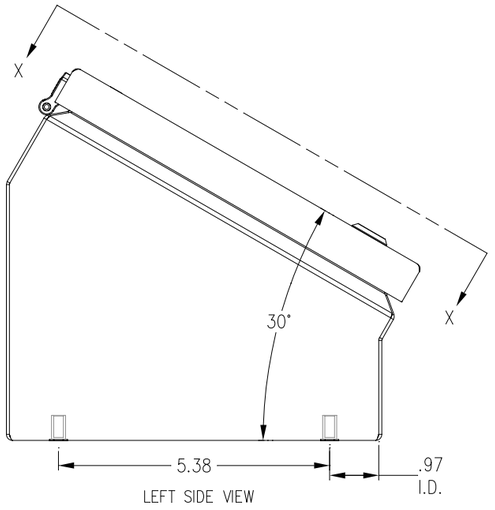
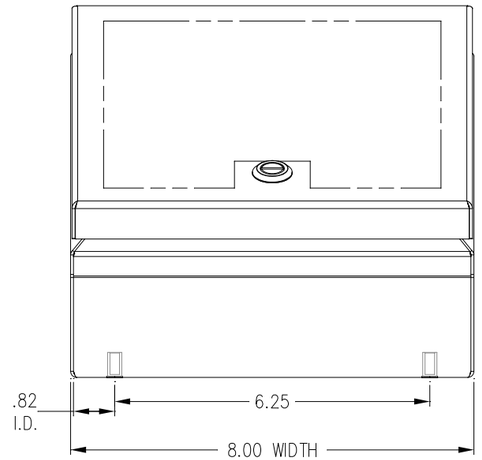
MASTER CONTROL CONSOLE

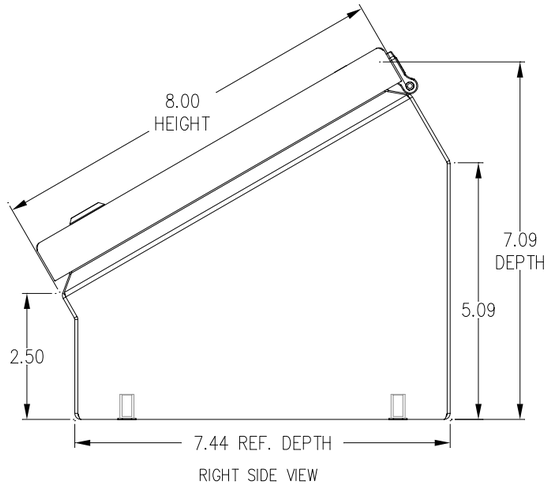
PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	10.106.6 - 3	0
PROJECT DESCRIPTION: ASP 2 ZONE MASTER NO EFO	SCALE N/A	ENGINEER: RKS	SHEET 3 OF 4	



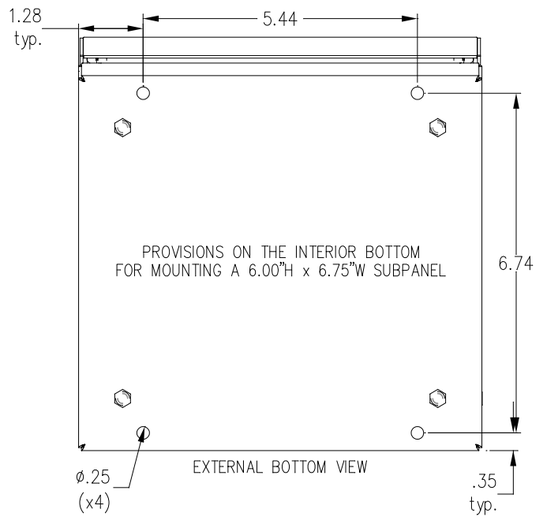
LEFT SIDE VIEW



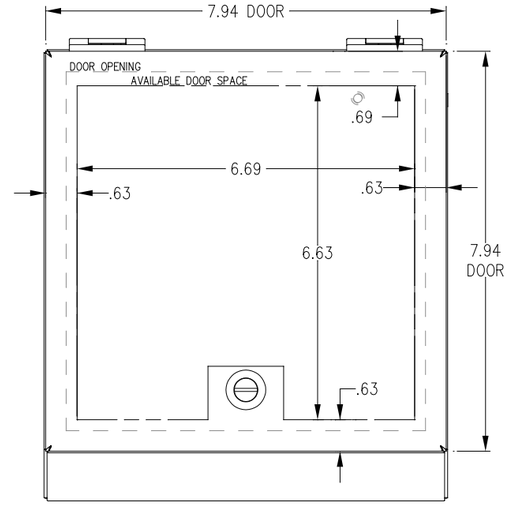
FRONT VIEW



RIGHT SIDE VIEW



EXTERNAL BOTTOM VIEW



SECTION X-X
SCALE 0.325

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MASTER CONTROL CONSOLE

PROJECT NUMBER:	SIZE	FSCM NO	DWG NO	REV
	N/A	N/A	10.106.6 - 4	0
PROJECT DESCRIPTION: ASP 2 ZONE MASTER NO EFO	SCALE N/A	ENGINEER: RKS	SHEET 4 OF 4	