

OVERHEIGHT VEHICLE DETECTION AND WARNING SYSTEMS 2009 - 2010



TRIGG
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Overview: OVERHEIGHT VEHICLE DETECTION AND WARNING SYSTEMS (OVDS)



What Does Trigg Industries OVDS Do?

- Detects overheight vehicles and warns drivers of an impending problem.
- Alerts and directs the driver via warning signs and warning bells to take corrective action.
- Provides secondary warning beyond existing signage in the interest of public safety.
- Reduces exposure to costs associated with incidents or accidents.
- Proven to minimize or eliminate the occurrence of accidents and incidents caused by overheight vehicles.

Industry Standard

- The standard for quality and performance in all environments for thirty-nine years.
- Integral to hundreds of state, county and municipal infrastructures coast to coast.
- System of choice for Boston Central Artery Tunnel Project, Cumberland Gap Tunnels, Queens Tunnel, Baltimore-Washington International Airport and 25 DOT's.
- We provide technical support and documentation from the planning stage through installation.

Applications

- Bridges
- Tunnels
- Railroads
- Airport Overhangs/Walkways
- Temporary Falsework
- Car Carriers
- Equipment Yards
- Parking Structures
- Logging Trucks
- Overpasses

Cost Benefit

One accident usually exceeds the cost of a complete detection and warning system. Trigg Industries OVDS adds an additional layer of protection and helps to minimize or eliminate costs associated with:

- Injury or loss of life
- Emergency Response
- Traffic Delays
- Administrative costs
- Structural Repair
- Insurance Premiums
- Dispute or Litigation
- Media Publicity

Highest Reliability and Quality Control Standards

Installed in some of the most adverse conditions worldwide. Proprietary cabinet design and internal environmental control allows continuous operation in fog, ice, snow, dust and heat. Systems meet ISO/IEC Guide 22 Compliance, CE Mark, NEMA 3R Cabinet Enclosure Rating, CALTRANS lightning and hi/lo voltage parameters. We provide extensive documentation and Factory Acceptance Testing protocols.

Innovation

The Trigg Industries Patented Z-Pattern® Red/Infrared dual beam array provides the most advanced ability to reject ambient light and virtually eliminates false overheight alarms. Fault Detection and Alert Function notifies Central Control Facility when system is operating in Single Eye Mode [temporary condition] or has experienced a line power failure. Double and Single Eye systems also offer Fault Detection and Alert Function.

Ease of Use

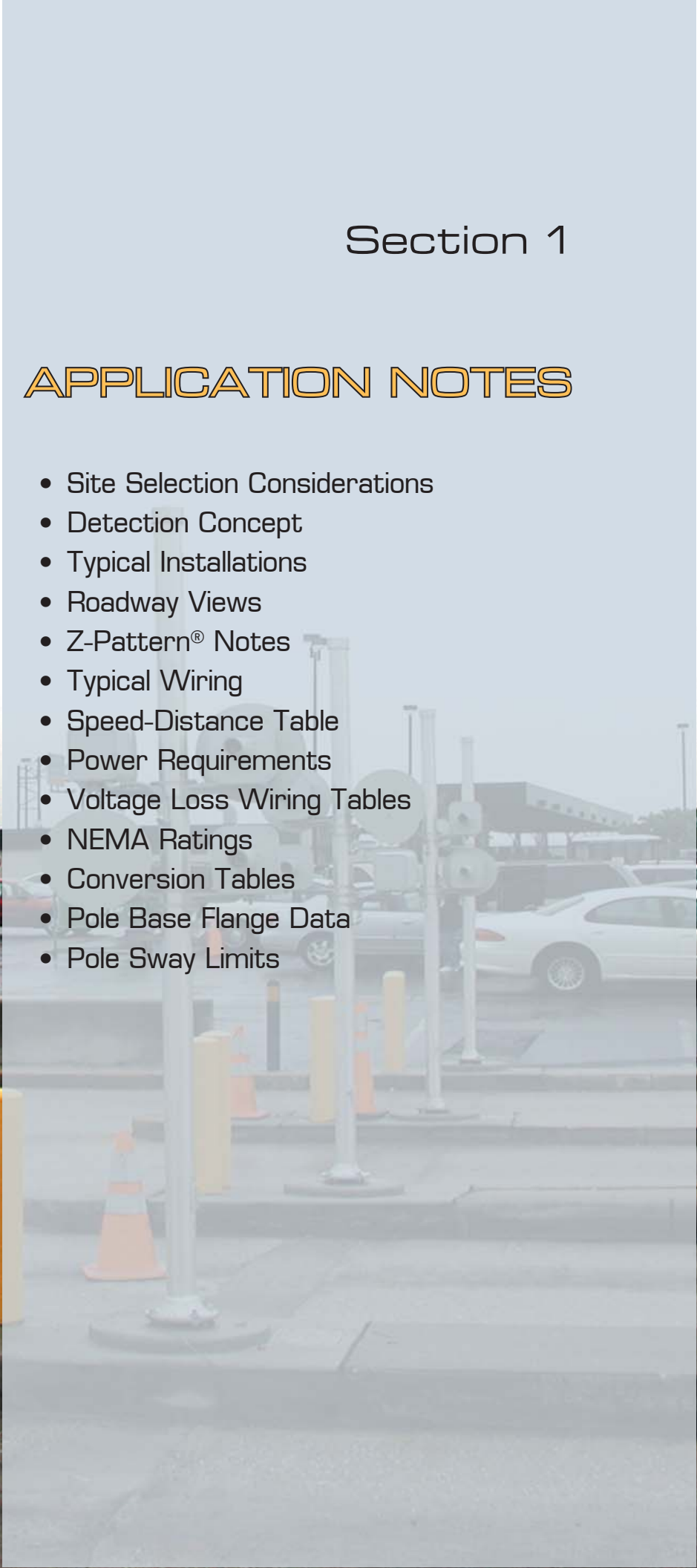
Trigg Industries provides specialized mounting brackets for all systems and all elements of the system that allow it to be attached to any sturdy structure. Installation instructions are direct and easy to follow.



Section 1

APPLICATION NOTES

- Site Selection Considerations
- Detection Concept
- Typical Installations
- Roadway Views
- Z-Pattern® Notes
- Typical Wiring
- Speed-Distance Table
- Power Requirements
- Voltage Loss Wiring Tables
- NEMA Ratings
- Conversion Tables
- Pole Base Flange Data
- Pole Sway Limits



Trigg Industries supplies complete systems, including detectors, warning signs, alarms, mounting poles and all needed accessories. We build to meet US and International AC power specifications, as well as Solar [DC] configurations.

Trigg Industries offers technical options to meet varying requirements and can provide cost effective solutions for virtually any overheight warning condition. Custom systems can be provided as needed.



TABLE 1: Site Selection Considerations

Consideration		Significance
1	What is the posted and practiced speed limit at the installation site?	Vehicle speed determines (in part) the distance from the detector the warning sign must be placed to provide sufficient time for drivers to react to directions given.
2	What exits, pull-offs or U-turns are available between the detector and obstruction?	Availability of such options must be taken into account as courses of actions for overheight vehicle drivers and directions given to them accordingly.
3	Will the detection system monitor one-way or two-way traffic across the roadway?	Determines whether system must be direction discerning.
4	What are the number of lanes in the direction of interest?	May further determine distance required between detection and warning sign/exit if lane changing is involved.
5	What is the height of the obstruction [clearance required] and is there the same clearance for each lane?	The shape and/or contour of the obstruction or roadway may require more than one OVDS to monitor multiple heights or axes.
6	Are there any weather or airport radars within 1/4 mile of the OVDS installation site?	Since both the Visible Red and Infrared detectors are made from silicone substrate, it may be possible to generate a false alarm if the detector is looking directly into the radar.
7	What will be the smallest sun angles encountered with respect to the detectors' line of site?	The Visible Red detectors need a 3° clearance from direct sunlight and the Infrared detectors require an 8° clearance.
8	Is there 115 VAC power available on both sides of the road at the installation site?	If AC power is not available, solar power may be an option. There can be a combination of both AC and solar power within the same system if necessary.
9	What is the desired alarm time?	This is the cumulative time requirement considering speed, distance, number of lanes and required driver response. Our systems offer 1-30 sec, 5-60 sec as a standard feature and custom times up to 5 minutes at no additional charge.
10	Is remote reporting of an overheight detection and/or fault condition required?	If so, this requirement dictates choice of system.
11	What are the local traffic patterns?	These may influence directions given to drivers in overheight situations.
12	Trigg Industries welcomes the opportunity to discuss any overheight application.	

Detection Concept

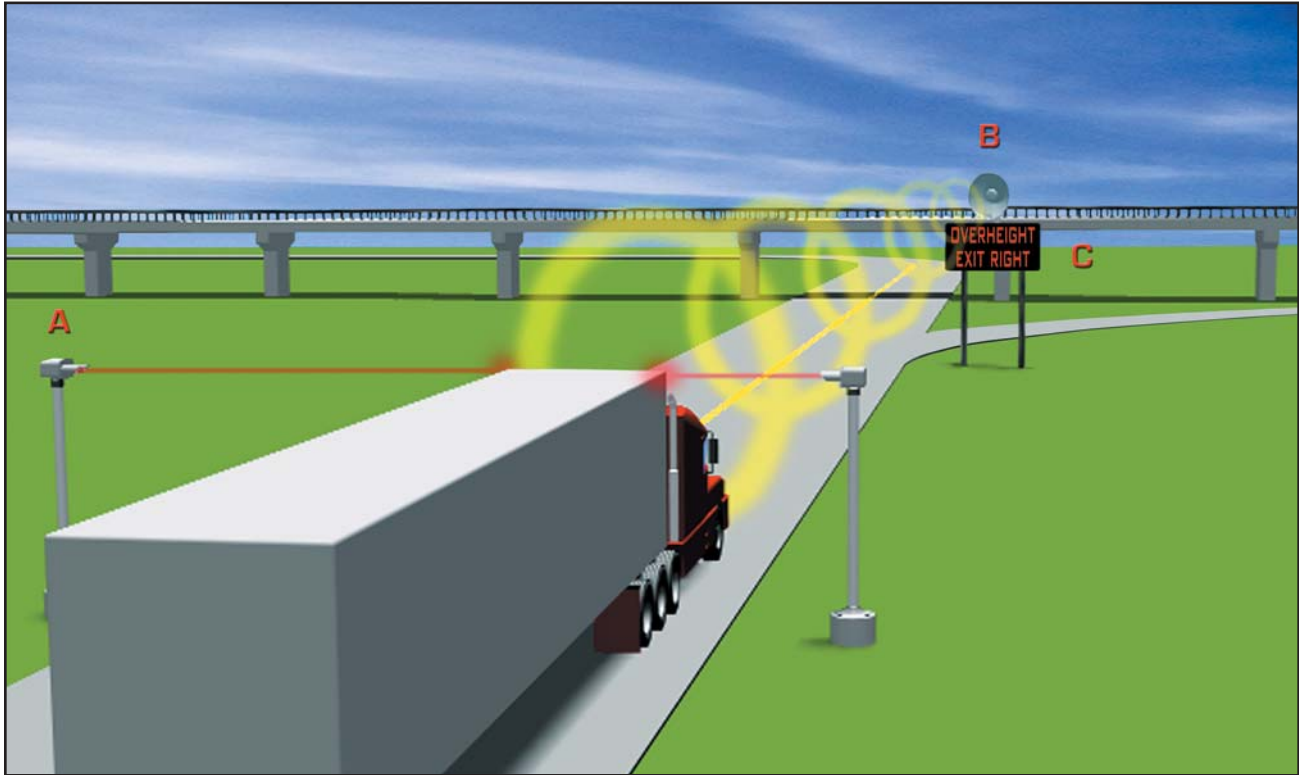





FIGURE 1: Detection Concept

- A**  Overheight vehicle is detected by OVDS.
- B**  Alarm Bell activates with Warning Sign. Parabolic shield focuses sound toward vehicle, drawing attention of driver to Warning Sign.
- C**  Warning Sign activates with Alarm Bell. Sign message alerts driver to overheight hazard and provides directions for appropriate response.

Typical Installations

- Bridges
- Tunnels
- Overpasses
- Temporary Falsework
- Railroad Tunnels
- Airport passenger dropoff overhangs and pedestrian walkways

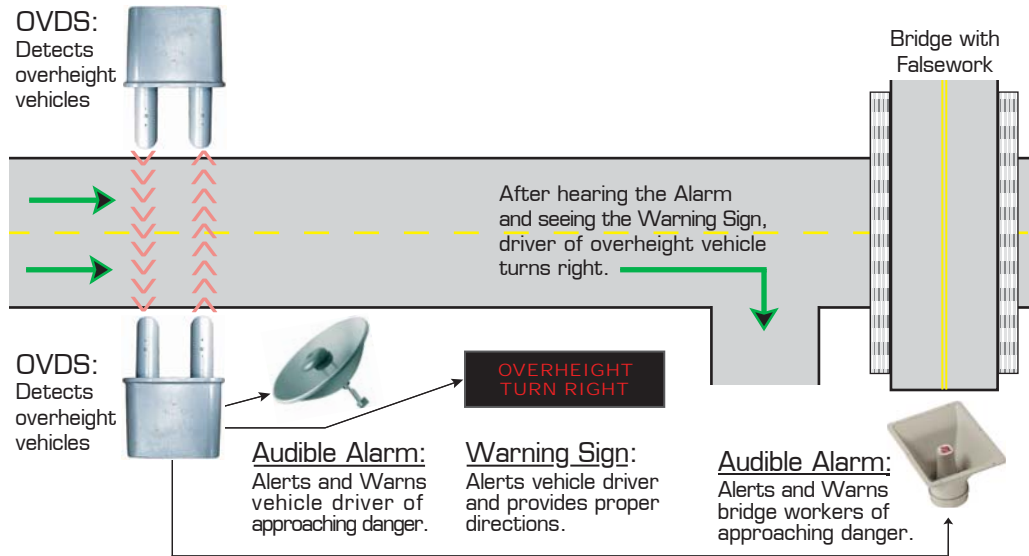


FIGURE 2: Bridge, Tunnel, Overpass, Falsework Installation

- Weigh Stations
- Load Height Verification for
 - Equipment Yards
 - Car Carriers

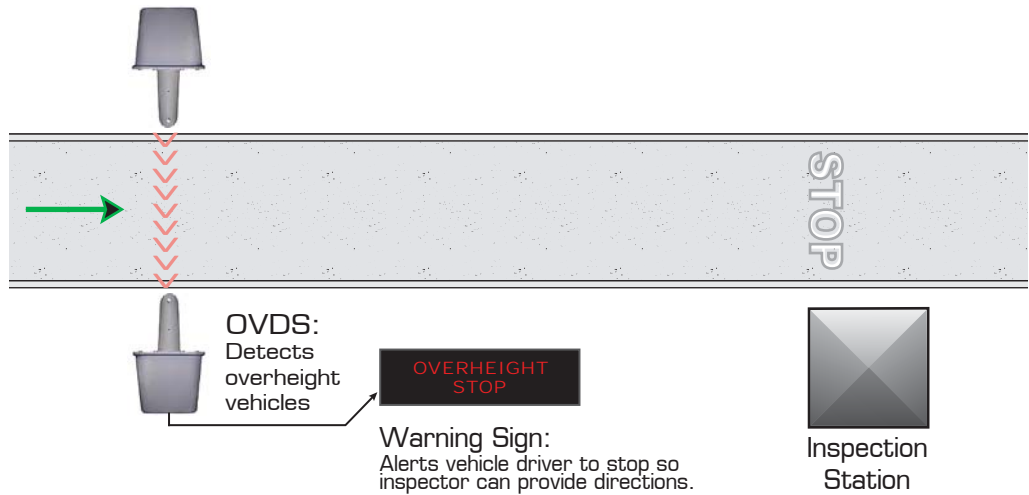


FIGURE 3: Weigh Station and Load Height Verification Installation

Metro Economy OVDS installed inside parking structure detecting a single height.



FIGURE 4: Entrance Monitoring

Dual Single Eye OVDS installed outside parking structure detecting two different heights.

EXAMPLE:

- If vehicle is detected by OVDS #1, driver is instructed by VMS to park where clearance is adequate.
- If vehicle is detected by OVDS #2, driver is instructed by VMS to stop and wait further direction.



FIGURE 5: Multi-level, Multi-height

If vehicle is overweight, the Variable Message Sign (VMS) displays a sequence of messages instructing driver where or where not to park. The gate can be delayed from opening while messages are displayed.

EXAMPLE:

- Message 1: "STOP"
- Message 2: "TOO TALL"

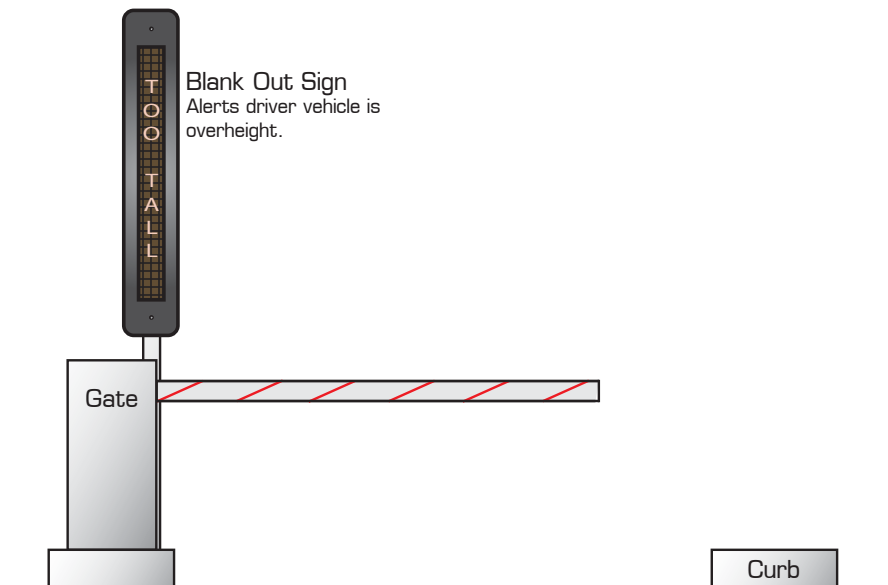


FIGURE 6: Gate Interface

Roadway Views

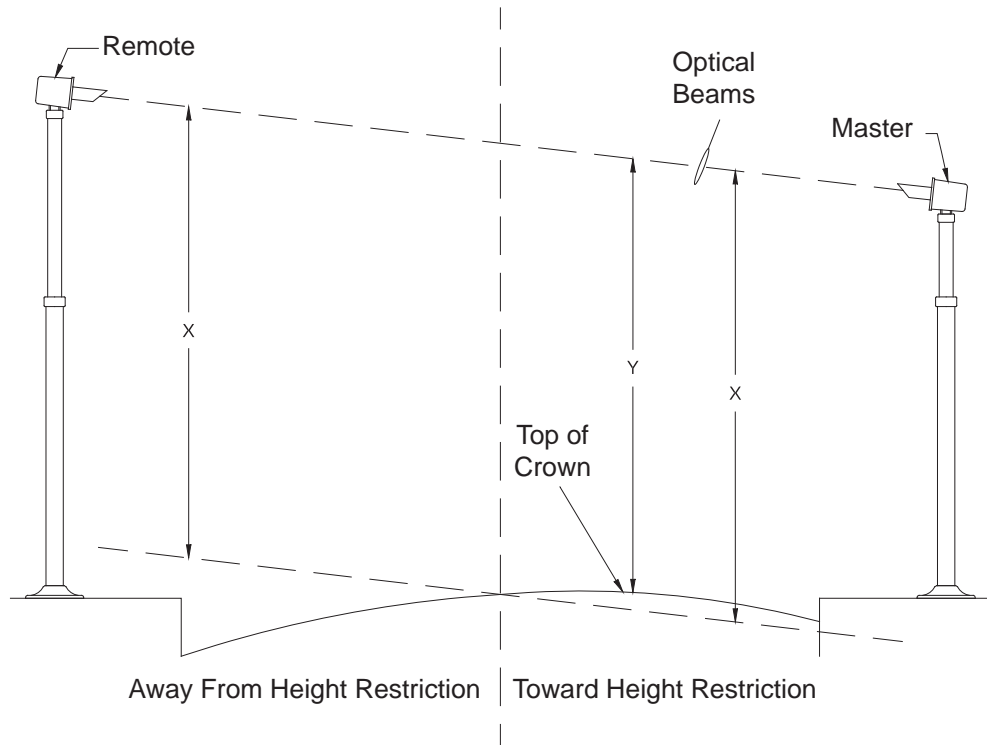


FIGURE 7: Cross Section of Roadway

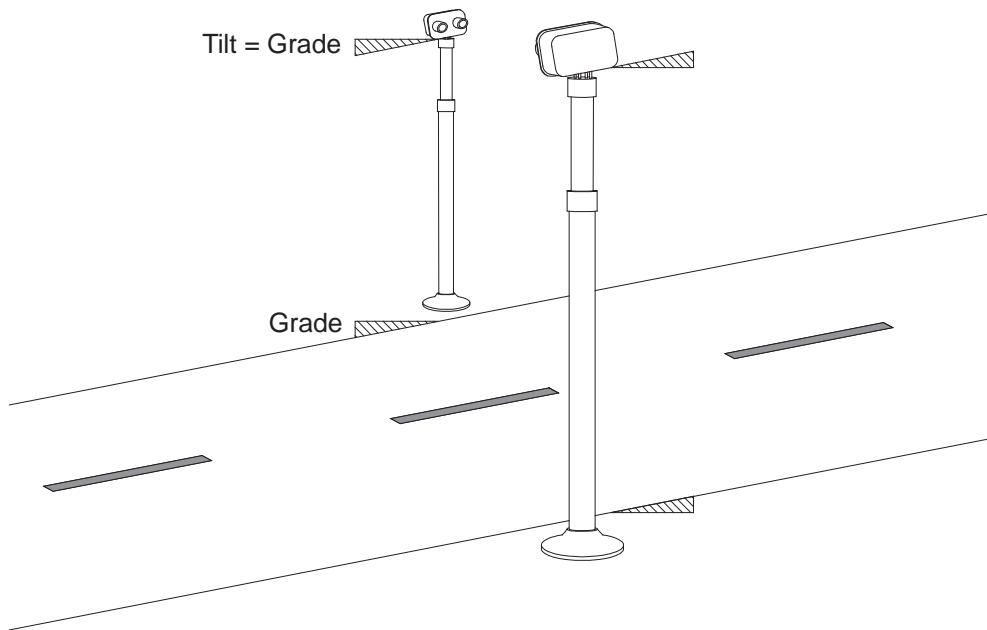


FIGURE 8: View Across Roadway

Z-Pattern® Design Notes

The Trigg Industries Z-Pattern® OVERHEIGHT VEHICLE DETECTION SYSTEM (OVDS) employs both a pulsed Visible Red and Infrared source/detector pair of eyes.

As shown in Figure 9, Z-Pattern® Concept, both Remote and Master cabinets contain a detector and pulsed source. All Control, Fault Detection and Alarm functions are contained in the Master cabinet. The Dual Beam Detection Mode provides for direction selection/discernment. Due to the Z-Pattern® design, it is necessary to provide a two-conductor shielded cable between the Remote cabinet and the Master cabinet for the Remote detection signal input.

Fault detection circuits switch the OVDS to Single Beam Detection Mode if one beam should fail or be affected by the sun or other outside interference. The system will return to the Dual Beam Detection Mode after the temporarily impaired beam is back in normal operation for approximately 90 seconds. There is no direction discernment in the Single Beam Detection Mode but overheight detection is maintained.

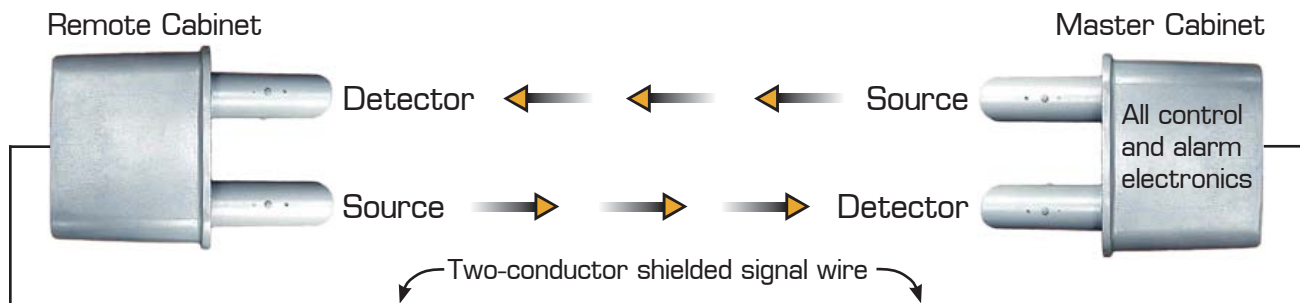


FIGURE 9: Z-Pattern® Concept

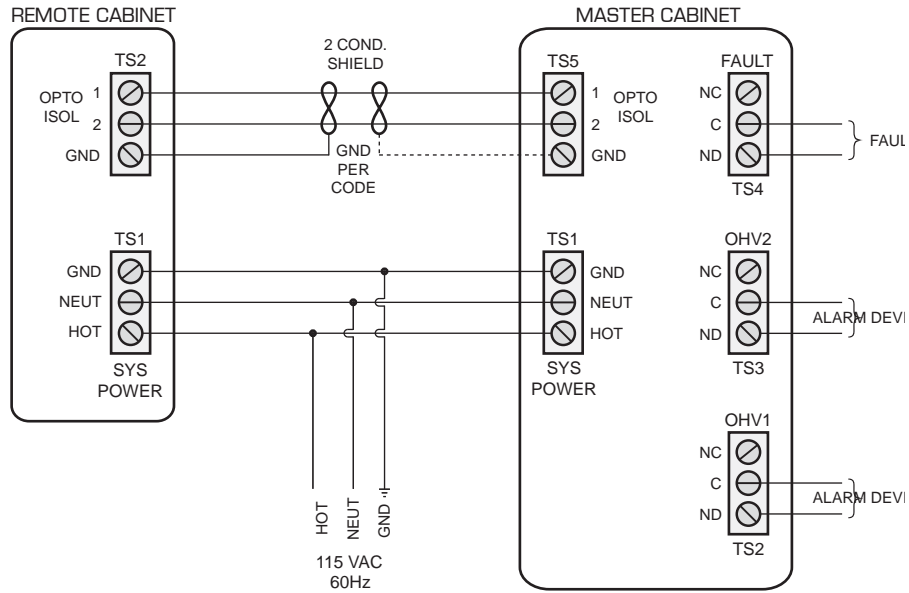
Z-Pattern® Installation Notes

If at all possible, position the cabinets so that the 'eyes' have a 10° angle from direct early morning or late afternoon sunlight.

Adjust the REMOTE and MASTER cabinet so the eyes match the slope and grade of the roadway on the side going toward the height restriction. See Figure 7 and Figure 8 on page 11.

The height of the detection zone should be adjusted down from the desired height until there are an excessive number of false alarms, then up until the false alarms disappear. This provides a practical adjustment for uneven roads.

Wiring Diagrams and Control Panels



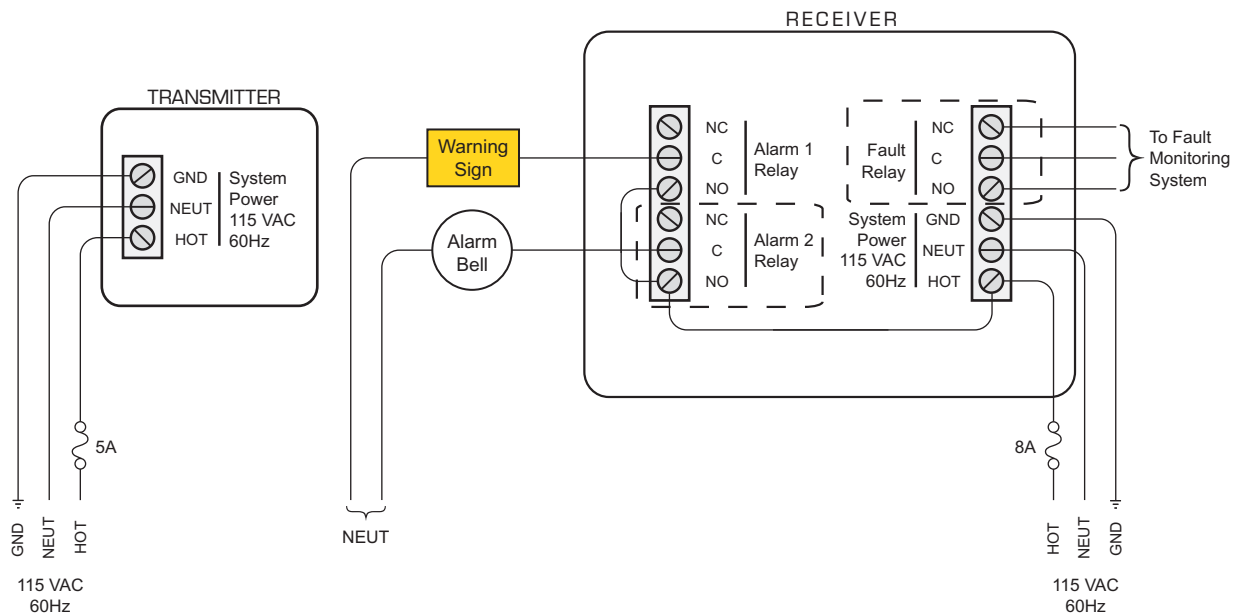
NOTES:

1. Remote reporting hardware and software supplied by others.
2. Remote - Master comm line (TS2 - TS5) is 2 conductor, 18 gauge, shielded, twisted pair.

FIGURE 10: Z-Pattern® Typical Wiring



FIGURE 11: Z-Pattern® Master Control Panel



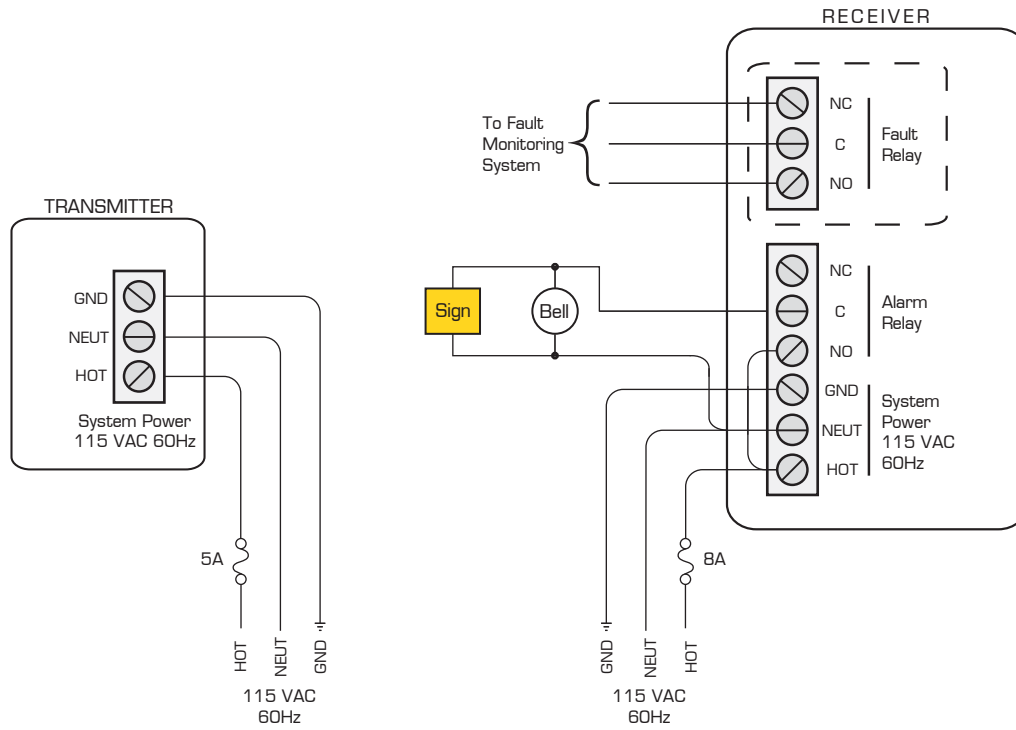
NOTES:

1. Dashed lines indicate features available with Fault Option.
2. External fuses / circuit breakers supplied by user.

FIGURE 12: Double Eye Typical Wiring



FIGURE 13: Double Eye Control Panel with Fault Option



NOTES:

1. Dashed line indicate features available with Fault Option.
2. External fuses / circuit breakers supplied by user.

FIGURE 14: Single Eye Typical Wiring



FIGURE 15: Single Eye Control Panel with Fault Option

TABLE 2: Speed, Distance and Travel Time

mph	kmh	ft/sec	Seconds									
			100 ft	200 ft	300 ft	400 ft	500 ft	600 ft	700 ft	800 ft	900 ft	1000 ft
			30.48 m	60.96 m	91.44 m	121.92 m	152.40 m	208.80 m	213.36 m	243.84 m	274.32 m	304.80 m
10.0	16.1	14.7	6.8	13.6	20.5	27.3	34.1	40.9	47.7	54.5	61.4	68.2
15.0	24.1	22.0	4.5	9.1	13.6	18.2	22.7	27.3	31.8	36.4	40.9	45.5
20.0	32.2	29.3	3.4	6.8	10.2	13.6	17.0	20.5	23.9	27.3	30.7	34.1
25.0	40.2	36.7	2.7	5.5	8.2	10.9	13.6	16.4	19.1	21.8	24.5	27.3
30.0	48.3	44.0	2.3	4.5	6.8	9.1	11.4	13.6	15.9	18.2	20.5	22.7
35.0	56.3	51.3	1.9	3.9	5.8	7.8	9.7	11.7	13.6	15.6	17.5	19.5
40.0	64.4	58.7	1.7	3.4	5.1	6.8	8.5	10.2	11.9	13.6	15.3	17.0
45.0	72.4	66.0	1.5	3.0	4.5	6.1	7.6	9.1	10.6	12.1	13.6	15.2
50.0	80.5	73.3	1.4	2.7	4.1	5.5	6.8	8.2	9.5	10.9	12.3	13.6
55.0	88.5	80.7	1.2	2.5	3.7	5.0	6.2	7.4	8.7	9.9	11.2	12.4
60.0	96.5	88.0	1.1	2.3	3.4	4.5	5.7	6.8	8.0	9.1	10.2	11.4
65.0	104.6	95.3	1.0	2.1	3.1	4.2	5.2	6.3	7.3	8.4	9.4	10.5
70.0	112.6	102.7	1.0	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.8	9.7
75.0	120.7	110.0	0.9	1.8	2.7	3.6	4.5	5.5	6.4	7.3	8.2	9.1
80.0	128.7	117.3	0.9	1.7	2.6	3.4	4.3	5.1	6.0	6.8	7.7	8.5
85.0	136.8	124.7	0.8	1.6	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0
90.0	144.8	132.0	0.8	1.5	2.3	3.0	3.8	4.5	5.3	6.1	6.8	7.6
95.0	152.9	139.3	0.7	1.4	2.2	2.9	3.6	4.3	5.0	5.7	6.5	7.2
100.0	160.9	146.7	0.7	1.4	2.0	2.7	3.4	4.1	4.8	5.5	6.1	6.8

NOTES:

To convert mph to kmh, multiply by 1.609.

To convert ft to m, multiply by .3048.

TABLE 3: System Power

System		Current [mA]		Watts @ 120 VAC			
		Static	Triggered	Static	Triggered	Heater	Total
3400	Master	80mA	110mA	9.6	12	52	64
	Remote	110mA	110mA	13	13	52	65
3401/3402/ 3403	Master	140mA	190mA	17	23	24	47
	Remote	100mA	100mA	12	12	24	36
3200	Transmitter	80mA	80mA	10	10	31	36
	Receiver	75mA	90mA	9	11	55	66
3110/3111	Transmitter	40mA	40mA	5	5	21	26
	Receiver with Fault	75mA	90mA	9	11	55	66
	Receiver w/o Fault	50mA	64mA	6	8	55	63
3310/3311	Transmitter	40mA	40mA	5	5	21	26
	Receiver with Fault	75mA	90mA	9	11	21	32
	Receiver w/o Fault	53mA	67mA	6	8	21	29
ME 301/305/ 310/315	Transmitter	37mA	37mA	4.5	4.5	0	4.5
	Receiver	44mA	51mA	5	6	0	6

TABLE 4: Voltage Loss - Copper Wire - 5 Amperes - 120VAC < 700 feet

Wire Gauge	Cable Length											
	100 feet		200 feet		300 feet		400 feet		500 feet		600 feet	
	Ω	V Loss	Ω	V Loss	Ω	V Loss	Ω	V Loss	Ω	V Loss	Ω	V Loss
1	0.0126	0.063	0.0253	0.126	0.0379	0.190	0.0506	0.252	0.0632	0.316	0.0758	0.379
2	0.0159	0.080	0.0319	0.159	0.0478	0.239	0.0637	0.319	0.0797	0.398	0.0956	0.478
3	0.0201	0.100	0.0402	0.201	0.0603	0.301	0.0804	0.402	0.1005	0.502	0.1205	0.603
4	0.0253	0.127	0.0507	0.253	0.0760	0.380	0.1013	0.507	0.1267	0.633	0.1520	0.760
5	0.0320	0.160	0.0639	0.320	0.0959	0.479	0.1278	0.639	0.1598	0.799	0.1917	0.959
6	0.0403	0.201	0.0806	0.403	0.1208	0.604	0.1611	0.806	0.2014	1.007	0.2417	1.208
7	0.0508	0.254	0.1016	0.508	0.1524	0.762	0.2032	1.016	0.2540	1.270	0.3048	1.524
8	0.0641	0.320	0.1281	0.641	0.1922	0.961	0.2562	1.281	0.3203	1.601	0.3843	1.922
9	0.0808	0.404	0.1615	0.808	0.2423	1.212	0.3231	1.615	0.4039	2.019	0.4846	2.423
10	0.1018	0.509	0.2036	1.018	0.3054	1.527	0.4072	2.036	0.5090	2.545	0.6018	3.054
11	0.1284	0.642	0.2568	1.284	0.3852	1.926	0.5136	2.568	0.6420	3.210	0.7704	3.852
12	0.1619	0.810	0.3238	1.619	0.4857	2.429	0.6476	3.238	0.8095	4.048	0.9714	4.857
13	0.2042	1.021	0.4084	2.042	0.6126	3.063	0.8168	4.084	1.0210	5.105	1.2252	6.126
14	0.2575	1.288	0.5150	2.575	0.7725	3.863	1.0300	5.150	1.2875	6.438	1.5450	7.725
15	0.3247	1.624	0.6494	3.247	0.9741	4.871	1.2988	6.494	1.6235	8.118	1.9482	9.741
16	0.4094	2.047	0.8188	4.094	1.2282	6.141	1.6376	8.188	2.0470	10.235	2.4564	12.282
17	0.5163	2.582	1.0326	5.163	1.5489	7.745	2.0652	10.326	2.5815	12.908	3.0978	15.489
18	0.6510	3.255	1.3020	6.510	1.9530	9.765	2.6040	13.020	3.2550	16.275	3.9060	19.530

TABLE 5: Voltage Loss - Copper Wire - 5 Amperes - > 700 feet - 120VAC

Wire Gauge	Cable Length											
	700 feet		800 feet		900 feet		1000 feet		1500 feet		2000 feet	
	Ω	V Loss	Ω	V Loss	Ω	V Loss	Ω	V Loss	Ω	V Loss	Ω	V Loss
1	0.0885	0.442	0.1011	0.506	0.1138	0.569	0.1264	0.632	0.1896	0.948	0.2528	1.264
2	0.1115	0.558	0.1274	0.637	0.1434	0.717	0.1593	0.797	0.2390	1.195	0.3186	1.593
3	0.1406	0.703	0.1607	0.804	0.1808	0.904	0.2009	1.005	0.3014	1.507	0.4018	2.009
4	0.1773	0.887	0.2026	1.013	0.2280	1.140	0.2533	1.267	0.3800	1.900	0.5066	2.533
5	0.2237	1.118	0.2556	1.278	0.2876	1.438	0.3195	1.598	0.4793	2.396	0.6390	3.195
6	0.2820	1.410	0.3222	1.611	0.3625	1.813	0.4028	2.014	0.6042	3.021	0.8056	4.028
7	0.3556	1.778	0.4064	2.032	0.4572	2.286	0.5080	2.540	0.7620	3.810	1.0160	5.080
8	0.4484	2.242	0.5124	2.562	0.5765	2.882	0.6405	3.203	0.9608	4.804	1.2810	6.405
9	0.5654	2.827	0.6462	3.231	0.7269	3.635	0.8077	4.039	1.2116	6.058	1.6154	8.077
10	0.7126	3.563	0.8144	4.072	0.9162	4.581	1.0180	5.090	1.5270	7.635	2.0360	10.180
11	0.8988	4.494	1.0272	5.136	1.1556	5.778	1.2840	6.420	1.9260	9.630	2.5680	12.840
12	1.1333	5.667	1.2952	6.476	1.4571	7.286	1.6190	8.095	2.4285	12.143	3.2380	16.190
13	1.4294	7.147	1.6336	8.168	1.8378	9.189	2.0420	10.210	3.0630	15.315	4.0840	20.420
14	1.8025	9.013	2.0600	10.300	2.3175	11.588	2.5750	12.875	3.8625	19.313	5.1500	25.750
15	2.2729	11.365	2.5976	12.988	2.9223	14.612	3.2470	16.235	4.8705	24.353	6.4940	32.470
16	2.8658	14.329	3.2752	16.376	3.6846	18.423	4.0940	20.470	6.1410	30.705	8.1880	40.940
17	3.6141	18.071	4.1304	20.652	4.6467	23.234	5.1630	25.815	7.7445	38.723	10.3260	51.630
18	4.5570	22.785	5.2080	26.040	5.8590	29.295	6.5100	32.550	9.7650	48.825	13.0200	65.100

TABLE 6: NEMA Ratings

Condition	Rating								
	1	3	3R	4	4X	6	6P	12	13
Incidental Contact with Enclosed Equipment	X	X	X	X	X	X	X	X	X
Indoor	X	X	X	X	X	X	X	X	X
Outdoor		X	X	X	X	X	X		
Falling Dirt	X	X	X	X	X	X	X	X	X
Dripping and Light Splashing Liquids		X	X	X	X	X	X	X	X
Rain, Sleet, Snow		X	X	X	X	X	X		
Circulating Dust, Lint, Fibers and Flyings		X		X	X	X	X	X	X
Settling Dust Lint, Fibers and Flyings		X		X	X	X	X	X	X
External Ice		X	X	X	X	X	X		
Hosedown and Splashing Water				X	X	X	X		
Oil and Coolant Seepage								X	X
Oil and Coolant Spraying and Splashing									X
Corrosive Agents					X		X		
Occasional Temporary Submersion						X	X		
Occasional Prolonged Submersion							X		

TABLE 7: Temperature Conversion

°F	°C	°F	°C	°F	°C
-55	-48	15	-9	85	29
-50	-46	20	-7	90	32
-45	-43	25	-4	95	35
-40	-40	30	-1	100	38
-35	-37	35	2	105	41
-30	-34	40	4	110	43
-25	-32	45	7	115	46
-20	-29	50	10	120	49
-15	-26	55	13	125	52
-10	-23	60	16	130	54
-5	-21	65	18	135	57
0	-18	70	21	140	60
5	-15	75	24	145	63
10	-12	80	27	150	66

TABLE 8: Linear Conversion < 12 inches

in	mm	cm	in	mm	cm
1	25.40	2.50	7	177.80	17.80
2	50.80	5.10	8	203.20	20.30
3	76.20	7.60	9	228.60	22.90
4	101.60	10.20	10	254.00	25.40
5	127.00	12.70	11	279.40	27.90
6	152.40	15.20	12	304.80	30.50

TABLE 9: Linear Conversion > 12 inches

ft	yd	m	ft	yd	m
1	0.3	0.3	70	23.3	21.3
2	0.6	0.6	80	26.6	24.4
3	1.0	1.0	90	30.0	27.4
4	1.3	1.2	100	33.3	30.5
5	1.6	1.5	200	66.7	61.0
6	2.0	1.8	300	100.0	91.4
7	2.3	2.1	400	133.3	121.9
8	2.6	2.4	500	166.6	152.4
9	3.0	2.7	600	200.0	182.8
10	3.3	3.1	700	233.3	213.4
20	6.6	6.1	800	266.7	243.8
30	10.0	9.1	900	300.0	274.3
40	13.3	12.2	1000	333.3	304.8
50	16.6	15.2	1500	500.0	457.2
60	20.0	18.3	2000	666.7	609.6

TABLE 10: Weight Conversion < 1 LB

oz	gm	oz	gm
1	28	9	255
2	57	10	283
3	85	11	312
4	113	12	340
5	142	13	369
6	170	14	397
7	198	15	425
8	227	16 (1 lb)	454

TABLE 11: Weight Conversion > 1 lb

lb	kg	lb	kg	lb	kg
1	0.454	40	18.16	600	272.4
2	0.908	45	20.43	700	317.8
3	1.362	50	22.70	800	363.2
4	1.816	55	24.97	900	408.6
5	2.270	60	27.24	1000	454.0
6	2.724	65	29.51	1100	499.4
7	3.178	70	31.78	1200	544.8
8	3.632	75	34.05	1300	590.2
9	4.086	100	45.40	1400	635.6
10	4.540	150	68.10	1500	681.0
15	6.810	200	90.80	1600	726.4
20	9.080	250	113.50	1700	771.8
25	11.350	300	136.20	1800	817.2
30	13.620	400	181.60	1900	862.6
35	15.890	500	227.00	2000	908.0

Pole Base Flange

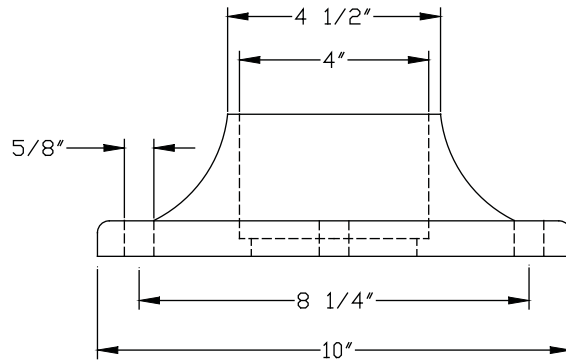


FIGURE 16: Side View

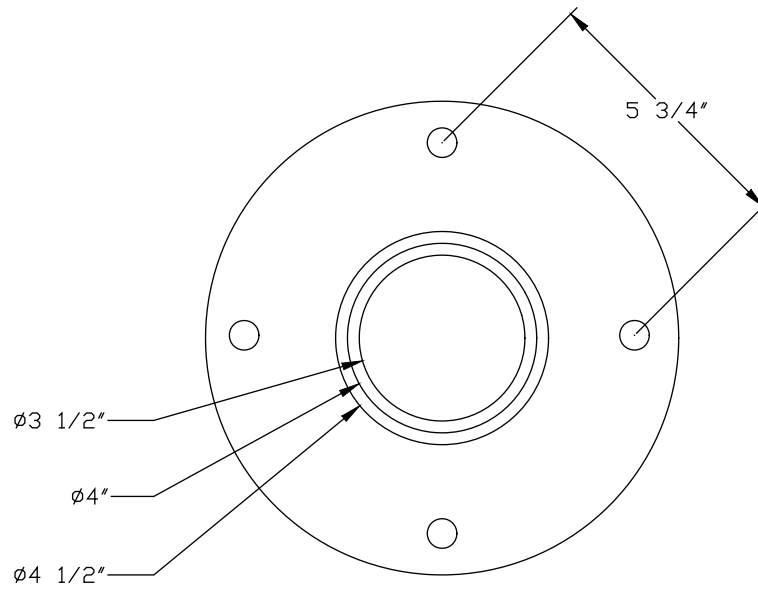
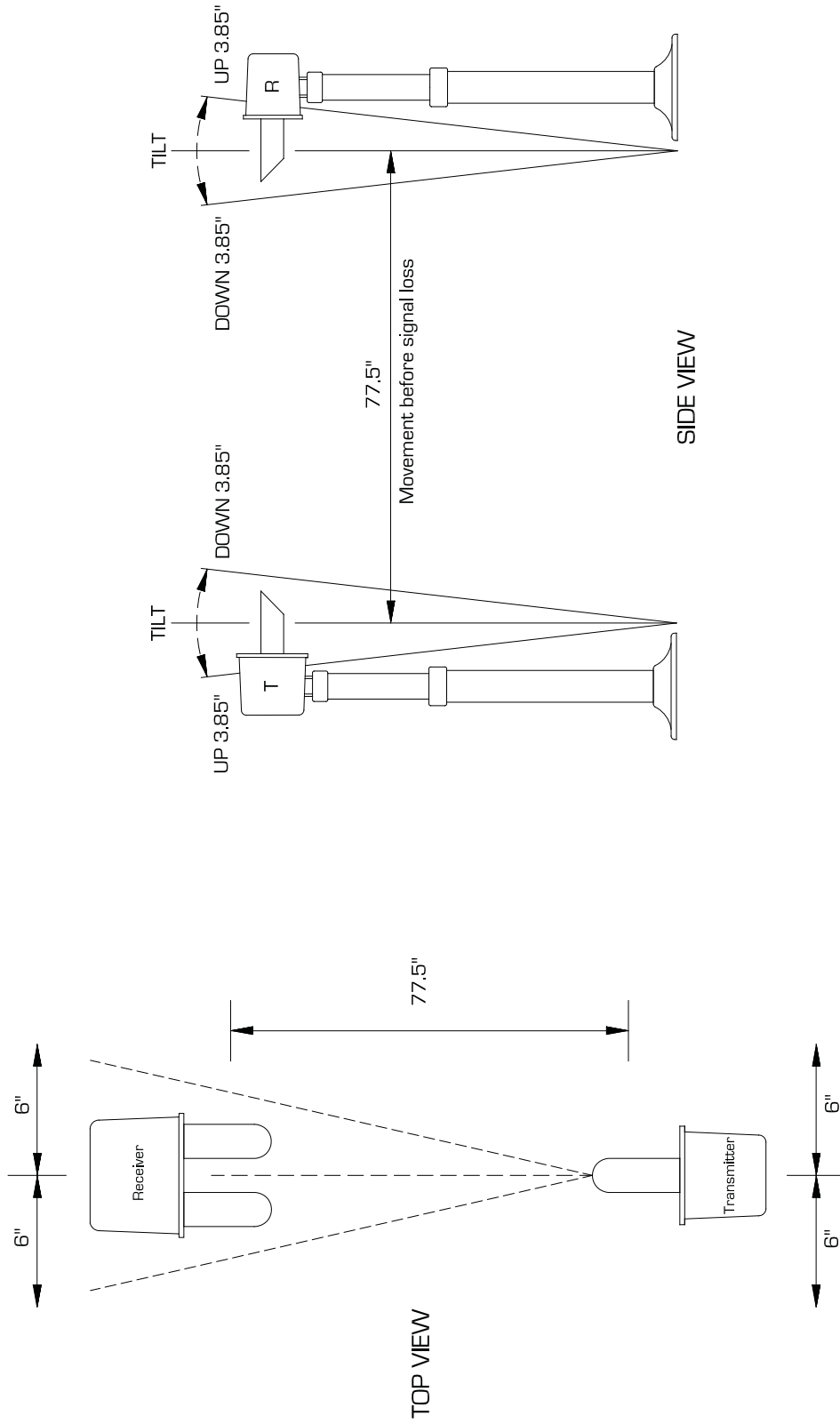


Figure 17: Top View

Typical Pole Sway Limits



Both Transmitter and Receiver can move approximately 6" horizontally before signal loss (False Alarm) occurs.

FIGURE 18: Typical Pole Sway Limits

Section 2

SYSTEMS AND SIGNS

Overheight Vehicle Detection Systems

Z-Pattern®

- Model 3400-Z
- Model 3401-Z / 3402-Z
- Model 3403-Z

Dual Beam

- Model DB-R/IR-3200

Double Eye

- Model DE-R/3110
- Model DE-IR/3111

Single Eye

- Model SE-R/3310
- Model SE-IR/3311

Metro Economy

- Model ME-R/301
- Model ME-R/305
- Model ME-R/310
- Model ME-R/315
- Model ME-IR/330

Signs

Blank-Out

- Model 3500 Series

Variable Message

- Model 5900 Series



Z-Pattern®



Double Eye



Single Eye



Metro Economy

TABLE 12: OVDS Model Matrix

OVDS MODEL MATRIX										
Model No.	FEATURES									
	Detection			Environmental		Direction	Alarm Time (Sec)		Options	
	Red	IR-A	IR-C	Heating	Cooling	Discerning	1 - 30	5 - 60	SE Mode	Fault Reporting
ME-R/301	X						X			
ME-R/305	X						X			
ME-R/310	X							* *		
ME-R/315	X							* *		
ME-IR/330							X			
SE-R/3310	X			X			X			X
SE-IR/3311		X		X			X			X
DE-R/3110	X			X		X	X		X	X
DE-IR/3111		X		X		X	X		X	X
DB-R/IR-3211		X		X		X	X		X	X
3400-Z	X	X		X	X	X	X		X	X
3401-Z*		X-L	X-R	X	X	X		X	X	X
3402-Z*		X-R	X-L	X	X	X		X	X	X
3403-Z	X	X		X	X	X		X	X	X

* Dual-System Configuration. Call for application assistance.
 ** Constant alarm with object detection.

LEGEND	
Symbol	Explanation
ME-R/IR	Metro Economy, Visible Red and Infrared
SE-R	Single Eye, Visible Red
SE-IR	Single Eye, Infrared
DE-R	Double Eye, Visible Red
DE-IR	Double Eye, Infrared
DB-R/IR	Dual Beam, Visible Red and Infrared
DE-Z	Double Eye, Z-Pattern® (Red and/or Infrared)
IR-A	" A " Modulation frequency (Infrared)
IR-C	" C " Modulation frequency (Infrared)
-L	Left (Eye orientation within cabinet as viewed behind Master)
-R	Right (Eye orientation within cabinet as viewed behind Master)

NOTES	
1.	All systems can be configured to operate with either 120 VAC or 240 VAC. Models 3401, 3402 and 3403 operate with both.
2.	All systems can be operated with 24 VDC solar power.
3.	Use -S after model number to denote solar powered version.
4.	Use -F after model number to denote fault option has been selected.

Specifications

Model # 3400-Z
 Double Eye Z-Pattern®*
 Visible Red / Infrared
 Overheight Vehicle Detection System



Remote



Master

* PATENTED
Z-Pattern®

INPUT POWER	115 VAC, +/- 10%, 50/60 Hz. Other options include 24 VDC solar or 240 VAC, +/- 10%, 50/60 Hz operation.
OUTPUT	Two Form C, dry relay contact closures for Overheight Alarm Functions. One Form C, dry relay contact closure for Fault Reporting. Contacts rated 240 VAC 10A, protected by 8A circuit breakers.
FAULT REPORTING	Factory configuration per customer selection of operational mode, loss of source/detector/power or total failure. See Options and Accessories section.
ALARM TIME	Adjustable by customer from 1 to 30 seconds.
ELECTRONICS	Sensors are NEMA 6P enclosure rated.
EFFECT OF AMBIENT LIGHT	Use of Dual Beam RED/IR Z-Pattern® provides automatic switch to Single Beam Detection Mode of Overheight Protection if the sun or other interference saturates one detector.
MAXIMUM RANGE	700 feet (213 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination.
DIRECTION SELECTION	Selection switch. No tools or adjustment required.
ALIGNMENT	Four LEDs and meter (GO-NOGO functions) provided for ease of alignment and testing.
REACTION SPEED	1 to 75 MPH (1 to 121 km/h) for a 2.5 inch (6.25 cm) diameter object 1 inch (2.5 cm) above the detection height. Custom speed/size available.
TEMPERATURE RANGE	-40° to +135° F (-40° to +57° C).
ENVIRONMENTAL CONTROL	Internal thermostat with heater and fan controls air flow which reduces moisture and maintains internal temperature during cold weather.
HOUSINGS	External housing is heavy ALMAG casting and sheet aluminum (not less than 1/8 inch or .318 cm thickness) for rugged durability and extended life. Cabinet design minimizes effects of vandalism and provides rigid mounting. NEMA 3R Certified.
MOUNTING	The pole cap serves as a mounting bracket and sighting base with our poles, or a three-Axis mount is available. See Options and Accessories section.
DIMENSIONS	Remote Cabinet: 12¾ x 16½ x 8½ inches (32 x 42 x 22 cm). Master Cabinet: 12¾ x 18¾ x 8½ inches (32 x 48 x 22 cm).
SHIPPING WEIGHT	60 lbs (27 kg).

Specifications

Model # 3401-Z
Model # 3402-Z
 Double Eye Z-Pattern®*
 Infrared / Infrared
 Overheight Vehicle Detection System



* PATENTED

Z-Pattern ®



Remote



Master

INPUT POWER	115 VAC, +/- 20%, 50/60 Hz. Other options include 24 VDC solar or 240 VAC, +/-10%, 50/60 Hz operation.
OUTPUT	Two Form C, dry relay contact closures for Overheight Alarm Functions. One Form C, dry relay contact closure for Fault Reporting. Contacts rated 240 VAC 10A, protected by 8A circuit breakers.
CERTIFICATIONS	CE Marking.
FAULT REPORTING	Factory configuration per customer selection of operational mode, loss of source/detector/power or total failure. See Options and Accessories section.
ALARM TIME	Adjustable by customer from 1 to 30 seconds.
ELECTRONICS	Sensors are NEMA 6P enclosure rated.
EFFECT OF AMBIENT LIGHT	Use of Dual Beam IR/IR Z-Pattern® provides automatic switch to Single Beam Detection Mode of Overheight Protection if the sun or other interference saturates one detector.
MAXIMUM RANGE	700 feet (213 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination.
DIRECTION SELECTION	Selection switch. No tools or adjustment required.
ALIGNMENT	Four LEDs and meter (GO-NOGO functions) provided for ease of alignment and testing.
REACTION SPEED	1 to 75 MPH (1 to 121 km/h) for a 2.5 inch (6.25 cm) diameter object 1 inch (2.5 cm) above the detection height. Custom speed/size available.
TEMPERATURE RANGE	-40° to +135° F (-40° to +57° C).
ENVIRONMENTAL CONTROL	Internal thermostat with heater and fan controls air flow which reduces moisture and maintains internal temperature during cold weather.
HOUSINGS	External housing is heavy ALMAG casting and sheet aluminum (not less than 1/8 inch or .318 cm thickness) for rugged durability and extended life. Cabinet design minimizes effects of vandalism and provides rigid mounting. NEMA 3R Certified.
MOUNTING	The pole cap serves as a mounting bracket and sighting base with our poles, or a three-Axis mount is available. See Options and Accessories section.
DIMENSIONS	Remote Cabinet: 12¾ x 16½ x 8½ inches (32 x 42 x 22 cm). Master Cabinet: 12¾ x 18¾ x 8½ inches (32 x 48 x 22 cm).
SHIPPING WEIGHT	60 lbs (27 kg).

Specifications

Model # 3403-Z
 Double Eye Z-Pattern®*
 Visible Red / Infrared
 Overheight Vehicle Detection System



* PATENTED

Z-Pattern®



Remote



Master

INPUT POWER	115 VAC, +/- 20%, 50/60 Hz. Other options include 24 VDC solar or 240 VAC, +/- 10%, 50/60 Hz operation.
OUTPUT	Two Form C, dry relay contact closures for Overheight Alarm Functions. One Form C, dry relay contact closure for Fault Reporting. Contacts rated 240 VAC 10A, protected by 8A circuit breakers.
CERTIFICATIONS	CE Marking.
FAULT REPORTING	Factory configuration per customer selection of operational mode, loss of source/detector/power or total failure. See Options and Accessories section.
ALARM TIME	Adjustable by customer from 5 to 60 seconds.
ELECTRONICS	Sensors are NEMA 6P enclosure rated.
EFFECT OF AMBIENT LIGHT	Use of Dual Beam RED/IR Z-Pattern® provides automatic switch to Single Beam Detection Mode of Overheight Protection if the sun or other interference saturates one detector.
MAXIMUM RANGE	700 feet (213 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination.
DIRECTION SELECTION	Selection switch. No tools or adjustment required.
ALIGNMENT	Four LEDs and meter (GO-NOGO functions) provided for ease of alignment and testing.
REACTION SPEED	1 to 75 MPH (1 to 121 km/h) for a 2.5 inch (6.25 cm) diameter object 1 inch (2.5 cm) above the detection height. Custom speed/size available.
TEMPERATURE RANGE	-40° to +135° F (-40° to +57° C).
ENVIRONMENTAL CONTROL	Internal thermostat with heater and fan controls air flow which reduces moisture and maintains internal temperature during cold weather.
HOUSINGS	External housing is heavy ALMAG casting and sheet aluminum (not less than 1/8 inch or .318 cm thickness) for rugged durability and extended life. Cabinet design minimizes effects of vandalism and provides rigid mounting. NEMA 3R Certified.
MOUNTING	The pole cap serves as a mounting bracket and sighting base with our poles, or a three-Axis mount is available. See Options and Accessories section.
DIMENSIONS	Remote Cabinet: 12¾ x 16½ x 8½ inches (32 x 42 x 22 cm). Master Cabinet: 12¾ x 18¾ x 8½ inches (32 x 48 x 22 cm).
SHIPPING WEIGHT	60 lbs (27 kg).

Specifications

Model # DB-R/IR-3200
 Dual Beam
 Overheight Vehicle Detection System



Transmitter



Receiver

INPUT POWER	115VAC +/- 10%. Other options available.
ALARM OUTPUT	Two dry relay contact closures, Form C, contacts rated 115VAC 10A and protected by 8A circuit breakers.
FAULT OUTPUT	Dry relay contact closure, Form C, contacts rated 115VAC 10A and protected by an 8A circuit breaker.
ALARM TIME	Adjustable by customer from 1 to 30 seconds. Other options available.
ELECTRONICS	Sensors are NEMA 6P enclosure rated. Printed circuit board for years of reliable operation.
EFFECT OF AMBIENT LIGHT	10,000 Foot Candles for Red Detector. Very high noise immunity for IR detector.
MAXIMUM RANGE	700 feet. Suggested maximum range of 200 feet to allow for bad weather and lens contamination.
DIRECTION SELECTION	Selection switch. No tools or adjustment required.
ALIGNMENT	Two Green LEDs and GO-NOGO meter provided for alignment. No special tools required.
REACTION SPEED	1mph to 75mph for a 2.5 inch diameter object 1 inch above the height of detection.
COUNTER	Records the number of activations.
TEMPERATURE RANGE	-40° F to +135° F.
ENVIRONMENTAL CONTROL	Internal thermostat controls air flow which reduces moisture and maintains internal temperature during cold weather.
HOUSINGS	External housing is heavy ALMAG casting and sheet aluminum (not less than 1/8 inch thickness) to minimize vandalism and provide for rigid mounting. The pole cap serves as the mounting bracket and sighting base when our poles are used.
DIMENSIONS	Transmitter / Receiver – 16 1/2" x 12 1/2 " x 8 3/4".
SHIPPING WEIGHT	45 lbs (20 kg).

Specifications

Model # DE-R/3110
 Double Eye Visible Red
 Overheight Vehicle Detection System

Model # DE-IR/3111
 Double Eye Infrared
 Overheight Vehicle Detection System



Transmitter



Receiver

INPUT POWER	115 VAC, +/- 10%, 50/60 Hz. Other options include 24 VDC solar or 240 VAC, +/- 10%, 50/60 Hz operation.
OUTPUT	Form C, dry relay contact closure, contacts rated 240 VAC 10A, protected by 8A circuit breaker. System switches to Single Eye mode upon loss of either detector.
FAULT REPORTING OPTION	Fault reporting output upon loss of power, transmitter failure or either eye blocked for approximately 13 seconds. Single Eye mode of operation implemented. See Options and Accessories section.
ALARM TIME	Adjustable by customer from 1 to 30 seconds. Custom alarm times available.
ELECTRONICS	Sensors are NEMA 6P enclosure rated. Electronic printed circuits for years of reliable operation.
EFFECT OF AMBIENT LIGHT	DE-R/3110: Sunlight immunity of 10,000 foot-candles. DE-IR/3111: Very high noise immunity.
MINIMUM RANGE	10 feet (3 m).
MAXIMUM RANGE	DE-R/3110: 800 feet (244 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination. DE-IR/3111: 700 feet (213 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination.
DIRECTION SELECTION	Selection switch. No tools or adjustment required.
ALIGNMENT	Two LEDs and meter (GO-NOGO functions) provided for alignment. No special tools required.
REACTION SPEED	1 to 75 MPH (1 to 121 km/h) for a 2.5 inch (6.25 cm) diameter object 1 inch (2.5 cm) above the detection height. Custom speed/size available.
COUNTER	Records the number of activations.
TEMPERATURE RANGE	-40° to +135° F (-40° to +57° C).
ENVIRONMENTAL CONTROL	Internal thermostat controls air flow which reduces moisture and maintains internal temperature during cold weather.
HOUSINGS	External housing is heavy ALMAG casting and sheet aluminum (not less than 1/8 inch or .318 cm thickness) for rugged durability and extended life. Cabinet design minimizes effects of vandalism and provides rigid mounting. The pole cap serves as a mounting bracket and sighting base with our poles. Meets NEMA 3R intent.
DIMENSIONS	Transmitter Cabinet: 15½ x 10 x 8¾ inches (39 x 25 x 22 cm). Receiver Cabinet: 12¾ x 16½ x 8½ inches (32 x 42 x 22 cm).
SHIPPING WEIGHT	45 lbs (20 kg).

Specifications

Model # SE-R/3310
Single Eye Visible Red
Overheight Vehicle Detection System

Model # SE-IR/3311
Single Eye Infrared
Overheight Vehicle Detection System



Transmitter



Receiver

INPUT POWER	115 VAC, +/- 10%, 50/60 Hz. Other options include 24 VDC solar or 240 VAC, +/- 10%, 50/60 Hz operation.
OUTPUT	Form C, dry relay contact closure, contacts rated 240 VAC 10A, protected by 8A circuit breaker.
FAULT REPORTING OPTION	Fault reporting output upon loss of power, source/detector failure or if beam is blocked for approximately 13 seconds. See Options and Accessories section.
ALARM TIME	Adjustable by customer from 1 to 30 seconds. Custom alarm times available.
ELECTRONICS	Sensors are NEMA 6P enclosure rated. Electronic printed circuits for years of reliable operation.
EFFECT OF AMBIENT LIGHT	SE-R/3310: Sunlight immunity of 10,000 foot-candles. SE-IR/3311: Very high noise immunity.
MINIMUM RANGE	6 feet (2 m).
MAXIMUM RANGE	SE-R/3310: 800 feet (244 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination. SE-IR/3311: 700 feet (213 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination.
ALIGNMENT	One LED and meter (GO-NOGO functions) provided for alignment. No special tools required.
REACTION SPEED	1 to 75 MPH (1 to 121 km/h) for a 2.5 inch (6.25 cm) diameter object 1 inch (2.5 cm) above the detection height. Custom speed/size available.
COUNTER	Records the number of activations.
TEMPERATURE RANGE	-40° to +135° F (-40° to +57° C).
ENVIRONMENTAL CONTROL	Internal thermostat controls air flow which reduces moisture and maintains internal temperature during cold weather.
HOUSINGS	External housing is heavy ALMAG casting and sheet aluminum (not less than 1/8 inch or .318 cm thickness) for rugged durability and extended life. Cabinet design minimizes effects of vandalism and provides rigid mounting. The pole cap serves as a mounting bracket and sighting base with our poles. Meets NEMA 3R intent.
DIMENSIONS	Transmitter Cabinet: 15½ x 10 x 8¾ inches (39 x 25 x 22 cm). Receiver Cabinet: 15½ x 10 x 8¾ inches (39 x 25 x 22 cm).
SHIPPING WEIGHT	40 lbs (18 kg).

Specifications

Model # ME-R/301
Single Eye Visible Red
Overheight Vehicle Detection System

Model # ME-R/305
Single Eye Visible Red
Overheight Vehicle Detection System



Transmitter



Receiver

INPUT POWER	115 VAC, +/- 10%, 50/60 Hz. Other options include autoranging DC supplies, 24 VDC solar or 240 VAC, +/-10%, 50/60 Hz operation.
OUTPUT	Two form C, dry relay contact closures. Contacts rated 250 VAC 5A, protected by 5A fuses.
ALARM TIME	Adjustable by customer from 2 to 30 seconds. Other times available on request.
EFFECT OF AMBIENT LIGHT	Sunlight immunity of 10,000 foot-candles.
MINIMUM RANGE	ME-R/301: 6 feet (2 m). ME-R/305: 1 foot (.3 m).
MAXIMUM RANGE	ME-R/301: 800 feet (244 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination. ME-R/305: 80 feet (24 m). Suggested maximum range 40 feet (12 m) to allow for bad weather and lens contamination.
ALIGNMENT	GO-NOGO green LED indicator provided for alignment. No special tools required.
REACTION SPEED	ME-R/301: 1 to 75 MPH (1 to 121 km/h) for a 2.5 inch (6.25 cm) diameter object 1 inch (2.5 cm) above the detection height. Custom speed/size available. ME-R/305: 1 to 11 MPH (1 to 17 km/h) for a 2 inch (5 cm) diameter object 1 inch (2.5 cm) above the detection height. Custom speed/size available.
TEMPERATURE RANGE	ME-R/301: -40° to +135° F (-40° to +57° C). ME-R/301-DC: -20° to +135° F (-29° to +57° C). ME-R/305: -4° to +135° F (-20° to +57° C). ME-R/305-DC: -4° to +135° F (-20° to +57° C).
HOUSINGS	Sensors are NEMA 6P enclosure rated. Electronics use heavy duty printed circuit board protected in a durable fiberglass NEMA 3 cabinet.
DIMENSIONS	EYE ASSEMBLY ME-R/301: 2¾ OD x 11 L inches (7 OD x 28 L cm). EYE ASSEMBLY ME-R/305: 2 ⁵ / ₁₆ OD x 8 L inches (6 OD x 20 L cm). ELECTRONICS HOUSING: 9 H x 9 W (plus 2 inches/5 cm for mounting tabs) x 4½ D inches (23 H x 23 W x 11 D cm). MOUNT: 6½ H x 4½ W (includes mount base) x 13¼ L inches (16.5 H x 11 W x 34 L cm).
SHIPPING WEIGHT	20 lbs (9 kg).

Specifications

Model # ME-R/310
Single Eye Visible Red
Object Detection System

Model # ME-R/315
Single Eye Visible Red
Object Detection System



Transmitter



Receiver

INPUT POWER	115 VAC, +/- 10%, 50/60 Hz. Other options include 240 VAC, +/-10%, 50/60 Hz operation.
OUTPUT	Two form C, dry relay contact closures. Contacts rated 250 VAC 10A, protected by 5A fuses.
ALARM TIME	Duration equal to time beam is broken.
EFFECT OF AMBIENT LIGHT	Sunlight immunity of 10,000 foot-candles.
MINIMUM RANGE	ME-R/310: 1 foot (.3 m). ME-R/315: 6 feet (2 m).
MAXIMUM RANGE	ME-R/310: 80 feet (24 m). Suggested maximum range 40 feet (12 m) to allow for bad weather and lens contamination. ME-R/315: 800 feet (244 m). Suggested maximum range 200 feet (61 m) to allow for bad weather and lens contamination.
ALIGNMENT	GO-NOGO green LED indicator provided for alignment. No special tools required.
REACTION SPEED	ME-R/310: 1 to 11 MPH (1 to 17 km/h) for a 2 inch (5 cm) diameter object 1 inch (2.5 cm) above the detection height. ME-R/315: 1 to 75 MPH (1 to 121 km/h) for a 2.5 inch (6.25 cm) diameter object 1 inch (2.5 cm) above the detection height
TEMPERATURE RANGE	ME-R/310: -4° to +135° F (-20° to +57° C). ME-R/315: -40° to +135° F (-40° to +57° C).
HOUSINGS	Sensors are NEMA 6P enclosure rated. Electronics use heavy duty printed circuit board protected in a durable fiberglass NEMA 3 cabinet.
DIMENSIONS	EYE ASSEMBLY ME-R/310: 2 ⁵ / ₁₆ OD x 8 L inches (6 OD x 20 L cm). EYE ASSEMBLY ME-R/315: 2 ³ / ₄ OD x 11 L inches (7 OD x 28 L cm). ELECTRONICS HOUSING: 9 H x 9 W (plus 2 inches/5.5 cm for mounting tabs) x 4 ¹ / ₂ D inches (23 H x 23 W x 11 D cm). MOUNT: 6 ¹ / ₂ H x 4 ¹ / ₂ W (includes mount base) x 13 ¹ / ₄ L inches (16.5 H x 11 W x 34 L cm).
SHIPPING WEIGHT	20 lbs (9 kg).

Specifications

Model # ME-IR/330
 Single Eye Infrared
 Overheight Vehicle Detection System



Transmitter



Receiver

INPUT POWER	117VAC, +/- 10%, 50/60HZ. Other options include Solar 24VDC or 230VAC, +/- 10%, 50/60HZ operation.
THREE OUTPUTS	Alternating Flasher, 120VAC, 5A fuses. Blankout Sign/Bell/Siren 120VAC, 5A fuse. Isolated Form C contact closure protected by a 5A fuse.
ALARM TIME	16 steps from .1 second to 120 minutes. Default range setting is 8 – 30 seconds.
ELECTRONICS	Sensors are IP76 enclosure rated.
EFFECT OF AMBIENT LIGHT	Field of view 2.4 degrees with 6-inch hood.
MAXIMUM RANGE	500 feet. Suggested maximum range of 125 feet to allow for bad weather and lens contamination.
ALIGNMENT	-NOGO Red LED indicator for alignment. No special tools required.
REACTION SPEED	1MPH to 45 MPH for a 2.5-inch diameter object 1 inch above the established height of detection.
TEMPERATURE RANGE	-13 to + 131 degrees F.
HOUSINGS	Electronics use heavy duty printed circuit board protected in a durable fiberglass NEMA 3 cabinet.
MOUNTS	Both source and detector eyes are installed on a two-axis mount for ease of alignment. The mounting bracket, approximately 10 inches long, can be installed on a wall or 4" diameter pole.
HOUSINGS	Fiberglass NEMA 3 enclosure approximately 13 H x 5 W x 11 D inches (33 H x 13 W x 28 D cm). Custom housings available.
SHIPPING WEIGHT	30 lbs (13.5 kg).

Specifications

Model # 3500-002R
 Series 3500
 Blank Out Sign
 LED Message Sign



3500-LED-002R

ELECTRICAL	Standard voltage 120VAC. Optional 9-36VDC, 240VAC. 0.29Amps at 120VAC. Integrated solid state power supply. UL/CUL approved for wet locations.
DIMENSIONS & CONSTRUCTION	18" H x 51" W x 6" D One-piece aluminum extruded cabinet.
FACE MATERIAL	Smoked Polycarbonate, impact resistant, 1/8" thick.
ILLUMINATION	Direct-view LED, Super bright, wide viewing angle LED's. Available in green, red, blue, amber and white LED's. Long life, up to 100,000+ hours.
FINISH	Duranodic Bronze.
MESSAGE	Two-line, 30° X 70° Red Oval LED, 6.0" outlined (double stroke LED's) high characters: "OVERHEIGHT STOP".

NOTE Character height available from 3.5" for parking garage applications to 18" high characters for highway applications. Over 40 versions available and custom wording can be accommodated.

Specifications**Model 5900-5x2-H**

Series 5900

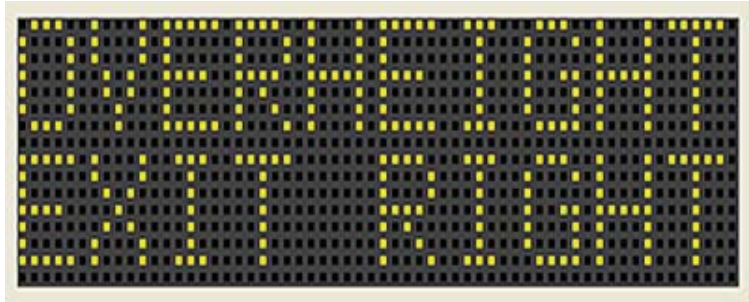
Variable Message Signs

Amber LED's

3 lines

11.2" high characters

10 characters per line

**DESCRIPTION**

10 modules arranged 5 x 2 horizontal, character size 12", sign about 102" x 36" x 8", weight about 205 lbs, 120VAC 10A with Controller. The Controller accepts a relay contact closure from an overheight vehicle detector to display the desired warning message. The default message is a "dot" in the lower left corner or the sign can be blank.

The Controller includes a solid state relay that provides 120VAC to activate a bell or siren. Also included is a solid state alternating flasher (120VAC) that can activate LED signals.

Other size signs are available.

Please contact Amy James for more information:

716B Blue Crab Road

Newport News, VA 23606

Tel 757.223.7522

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Section 3

ALARMS, OPTIONS & ACCESSORIES

Audible Alarms

- Model 3600 Direction Oriented Alarm Bell
- Model 3601 Vibrating Horn
- Model 3602 Electronic Siren
- Model 3603 Adaptabuzzer

Visual Alarms

- Model 3610 Light Duty Strobe
- Model 3611 Medium Duty Strobe
- Model 3612 Heavy Duty Strobe
- Model 3613 LED Signal
- Model 3614 Confirmation Light

RF Links

- Model RFL-1004 Medium Range
- Model RFL-1003 Long Range

Loop Detector Interface - Model TGL-2001

Solar - Model SELS-XXX

Mounts

- Model TGZ-M017 Three-Axis Mount
- Model TG-M018 Two-Axis Mount
- Model PMB-406 Pole Mount Bracket
- Model WMB-408 Wall Mount Bracket

Poles

- Model 3701 Telescoping
- Model 3702 Fixed Length

Control Box - Model TG-ENCL-01

Custom OVDS Options



Specifications

Model # 3600

Direction Oriented Alarm Bell

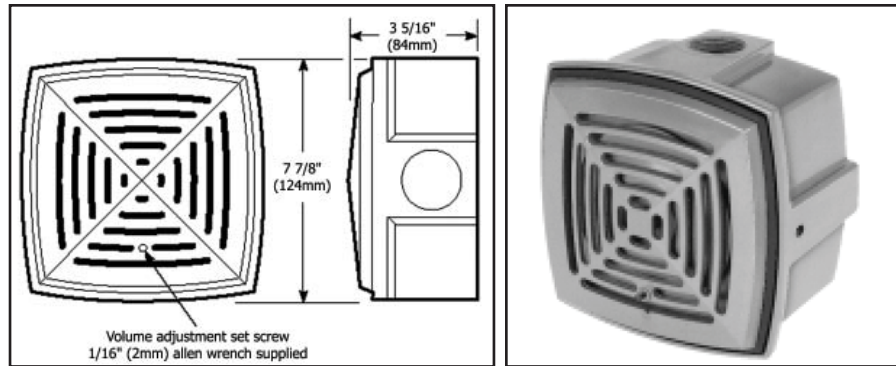


INPUT POWER	120 VAC, 50/60 Hz.
OUTPUT	Bells 101db at 10 feet (3 m) directed by parabolic shield. Sound reduced to 50 - 60% at sides and rear of bell by the parabolic shield, shield diameter: 38 inch (97 cm).
ADJUSTMENT	Adjustable mounting bracket provided. Other brackets provided as needed.
PARABOLA DIMENSIONS	38 inches (89 cm) in diameter.
ENVIRONMENTAL	All-weather, -31° to +151° F (-35° to +66° C).
CERTIFICATIONS	UL 464, CSA Certified.
SHIPPING WEIGHT	50 lbs (23 kg).

Distance From Parabolic Shield	Reading
10 feet (3.05 m)	+101 db
30 feet (9.15 m)	+90 db
70 feet (21.34 m)	+82 db
100 feet (30.48 m)	+76 db

Specifications

Model # 3601 Vibrating Horn



VOLTAGE	120 VAC, -20% / + 10%.
CURRENT	.13 Amp.
POWER	15.6 Watts.
POWER OPTIONS	12 VAC, 24 VAC, 240 VAC, 12 VDC, 24 VDC, 32 VDC, 48 VDC, 125 VDC.
db OUTPUT	Adjustable 78 to 102 db (@ 10 feet)(@ 3 meters).
DC COIL RESISTANCE	150 Ohms.
CERTIFICATIONS	NEMA 4X, UL Listed, FM Approved.
ENCLOSURE	NEMA 4X, die-cast weatherproof, corrosion resistant electrostatic heat flowed powder epoxy finish.
ALARM LIFE	400 Hours @ 50% Duty Cycle.
DIMENSIONS	7 ⁷ / ₈ H x 7 ⁷ / ₈ W x 3 ⁵ / ₁₆ D inches (20 H x 20 W x 3 cm).
WEIGHT	5 lbs (2 kg).

Specifications

Model # 3602 Electronic Siren



VOLTAGE	120 VAC.
CURRENT	210 mA.
POWER	25.2 Watts.
db OUTPUT	111dB @ 10 feet (3 m) / 121db @ 3 feet (.9 m).
TONES	Wail, Yelp, Horn.
TEMPERATURE RANGE	-31° to +161° F (-35° to 72° C).
ENCLOSURE	Type 3R when used with weatherproof box.
MOUNTING	Omni-Directional swivel.
DIMENSIONS	14½ H x 12 W x 8 inch D (6 H x 5 W x 3 D cm).
WEIGHT	8 lbs (18 kg).

Specifications

Model # 3603

Adaptabuzzer

Heavy duty indoor close-proximity alarm



VOLTAGE	120 VAC.
CURRENT	0.05 A.
POWER	6 Watts.
db OUTPUT	70 db @ 10 feet (3 m) (adjustable).
CERTIFICATIONS	UL Listed.
MOUNTING	Via universal Adaptaplate.
FINISH	Corrosion resistant heat flowed epoxy.
DIMENSIONS	5 ¹ / ₁₆ D (round) x 2 ¹ / ₄ H inch (13 D x 6 H cm).

Specifications

Model # 3610 Light Duty Strobe



VOLTAGE	120 VAC.
CURRENT	0.19A +/- 15%.
POWER	24 VA.
CERTIFICATIONS	UL Listed.
FLASH ENERGY	7.5 Joules, Typical.
FLASH RATE	60/Minute, Typical.
EFFECTIVE CANDELA	80 cd, Typical.
TEMPERATURE RANGE	-31° to +151° F (-35° to 66° C).
LENS COLOR	Amber, Blue, Clear and Red Durable.
MATERIAL	Base/Lens - High strength, high temperature G.E. Lexan.
DIMENSIONS	5 H x 6.2 W inch (13 H x 16 W cm).
MOUNTING	Pipe thread ½ inch (1.3 cm), surface mount or flange mount. Flash energy and flash rate are specified for double flash operation.
WEIGHT	2 lbs (.9 kg).

Specifications

Model # 3611 Medium Duty Strobe



VOLTAGE	120 VAC.
CURRENT	0.32 A.
POWER	38.4 Watts.
CERTIFICATIONS	NEMA 4X, UL Listed.
FLASH INTENSITY	580,000 Peak candle power.
FLASH RATE	80/Minute.
LAMP LIFE	10,000 hours.
LENS COLOR	Amber, Red, Blue and Clear.
ENCLOSURE/MATERIAL	Smooth outer Lexan lens, NEMA 4X, corrosion resistant, black polyurethane coated base, inner Fresnel lens.
DIMENSIONS	5½ D x 7 H inch (14 D x 18 H cm).
MOUNTING	½ inch (1.3 cm) pipe mount.

Specifications

Model # 3612 Heavy Duty Strobe



VOLTAGE	120 VAC.
CURRENT	0.1 A.
POWER	12 Watts.
FLASH RATE	65/Minute, single-flash (available in double flash).
CERTIFICATIONS	UL 1638 Listed, CSA Certified C22.2 No. 205.
PEAK CANDLE POWER	800,000 cd.
LENS COLOR	Amber, Red, Blue, Green, Magenta and Clear.
ENCLOSURE/MATERIAL	NEMA Type 4X, shatter resistant polycarbonate dome, immune to shock and vibration.
DIMENSIONS	8 $\frac{1}{16}$ D x 7 $\frac{7}{8}$ H inch (3 D x 18 H cm).
MOUNTING	Mount with $\frac{3}{4}$ inch [2 cm] conduit.
WEIGHT	5 lbs (2.3 kg).

Specifications

Model # 3613
LED Signal



TEMPERATURE RANGE	-40° to +165° F (-40° to +74° C).
TURN ON / TURN OFF TIME	75 mSec.
POWER	6 - 8 Watts.
CERTIFICATIONS	Conforms to MIL-STD-810F for blowing rain. Meets FCC Title 47, Subpart B, Section 15 Reg or elect noise.
LENS COLOR	Amber, Red and Green.
ENCLOSURE/MATERIAL	Aluminum housings (traffic signal heads). Hard coated polycarbonate lenses for abrasion resistance.

8 inch (20 cm) Signal Modules						
Color	CSA Approved	EPS Approved	Caltrans Approved	ITE VTSCH-2	Typ Watt @ 25° C	Min Luminosity Intensity (cd)
Red	X	X	X	X	6	133
Yellow	X		X		12	331
Green	X	X	X	X	8	267
Green	X	X	X	X	8	267
12 inch (30.5 cm) Signal Modules						
Color	CSA Approved	EPS Approved	Caltrans Approved	ITE VTSCH-2	Typ Watt @ 25° C	Min Luminosity Intensity (cd)
Red	X	X	X	X	6	339
Yellow	X		X		12	678
Yellow					18	1571
Green	X	X	X	X	14	678
Green	X	X	X	X	14	678

Specifications

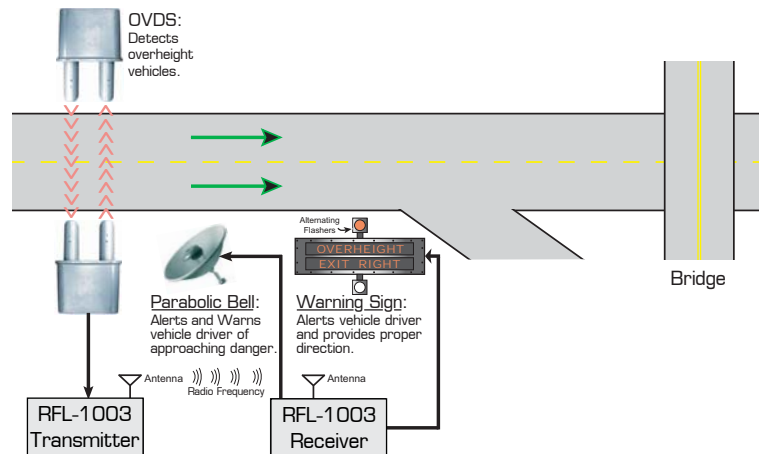
Model # 3614 Confirmation Light



VOLTAGE	120 VAC.
CURRENT	0.58 A.
POWER	69 Watts.
LENS COLOR	Green, Red, Blue and Clear.
MATERIAL/ENCLOSURE	UV Stabilized impact resistant polycarbonate.
DIMENSIONS	Approxiamately 4 D x 8½ H inch (10 D x 22 H cm).
MOUNTING	Universal SS clamp with 29 and 42 inch SS bands.
WEIGHT	5 lbs (2.3 kg).

Specifications

Model # RFL-1003
Long Range Radio Frequency Link



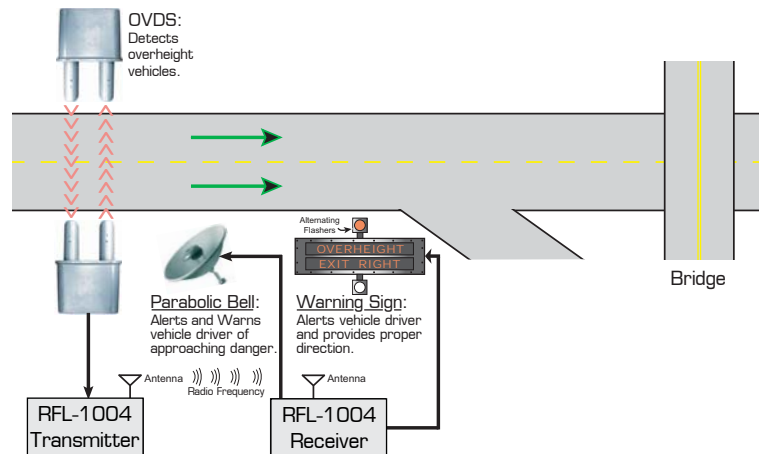
Features

- Wireless cost effective alternative to cable installation
- Antenna options for custom applications
- License-free 900 Mhz transmission
- Mobility - System can be portable

INPUT POWER	117VAC, +/- 10%, 50/60 Hz. Other options include 24VDC photovoltaic and 230VAC +/- 10% 50/60 Hz.
OUTPUT	Dry relay contact closures (Form C). Contacts rated 115VAC 5A, protected by 5A fuses.
FEATURES	Activated by overweight vehicle detection system or other equipment dry contact relay closure. Two separate input and output channels are available.
THROUGH-PUT	Approximately 1 second.
ELECTRONICS	Electronics uses DIN rail mounted modules for years of reliable operation.
FREQUENCY	900MHZ. Spread-spectrum implementation.
TEMPERATURE RANGE	-20 to +130 degrees F. (-29° to +54° C).
DOCUMENTATION	Operation and Maintenance Manual included.
ENCLOSURE	Fiberglass designed to meet the intent of NEMA 3R.
DIMENSIONS	Transmitter or Receiver Control Unit, approximately 15 x 12 x 6 inches (38 x 36 x 15 cm) , Onmi antenna 3 x 3 x 2 inches (8 x 8 x 5 cm), Yagi antenna 17 x 8 x 1 inches (43 x 20 x 3 cm).
SHIPPING WEIGHT	35 lbs (16 kg).

Specifications

Model # RFL-1004
Medium Range Radio Frequency Link



Features

- Wireless cost effective alternative to cable installation
- Antenna options for custom applications
- License-free 27.255 Mhz transmission
- Mobility - System can be portable

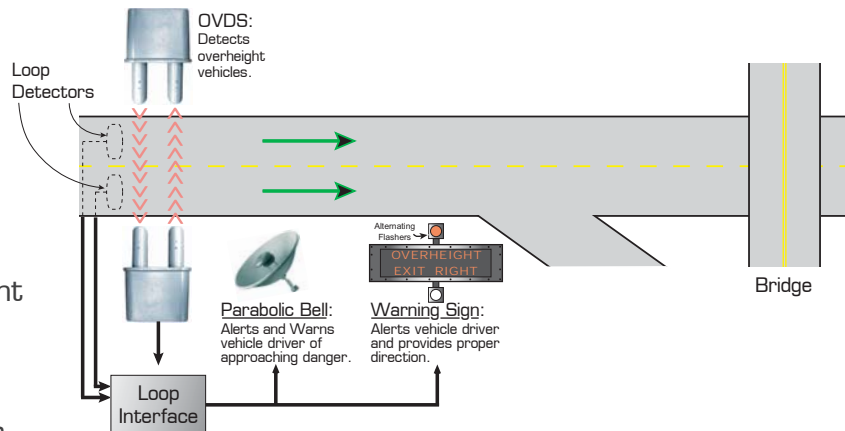
INPUT POWER	117VAC, +/-10%, 50/60 Hz. Options include 230VAC +/-10%, 50/60 Hz, or 12VDC Solar power.
STANDARD FUNCTIONS	Provides two sets of Form C, dry relay contacts, rated at 4A protected by 4A fuses to activate warning devices. Independent relay remains energized for 10 to 100 seconds as set by the user. Alternating flasher included.
FEATURES	Activated by overweight vehicle detection system or other equipment dry contact relay closure. Output 10W, frequency is 27.225MHz crystal, over 64,000 unique codes. Independent alarm relay adjustable from 10 to 100 seconds.
THROUGH-PUT	Approximately 1 second.
ELECTRONICS	Electronics uses solid state modules for years of reliable operation.
MAXIMUM RANGE	4 miles line-of-sight with 3' whip antenna. Approximately 1 mile line-of-sight with 8" rubber duck style antenna.
FREQUENCY	Output 10W, 27.255MHz, digital encoded, FSK modulated, over 64,000 unique codes.
ANTENNA	Antenna is tuned 27.255MHz ground plane with cable. Cable comes installed. Receiver electronics box must be mounted such that antenna is at least 4 inches from metal pole or mounting structure.
TEMPERATURE RANGE	-40° to +135° F (-40° to +57° C) with required heating or cooling packages per specific site.
DOCUMENTATION	Installation, Operation and Maintenance Manual included.
ENCLOSURE	Standard fiberglass or steel enclosure, or custom mounting.
DIMENSIONS	Standard enclosures approximately 20 W x 20 L x 6 D inches (51 W x 51 L x 15 D cm). Custom mountings as required.
SHIPPING WEIGHT	Standard enclosure approximately 25 lbs (11 kg). Custom weight as necessary.

Specifications

Model # TGL-2001 Loop Detector Interface

Features

- Eliminates False Alarms
- Internal Alarm time adjustment
- Accepts most loop detector outputs
- Easy Installation
- Internal loop hold adjustments



The Trigg Industries Loop Detector Interface insures that non-vehicular causes do not false-trigger overweight vehicle alarms. A loop detector (or detectors) in the roadway makes it possible to identify passage so that an overweight alarm is issued only when a vehicle is present. The interface is designed to accept a relay contact opening from a loop detector (or detectors) and a Trigg OVDS relay contact closure. The Model TGL-2001 includes a "Loop Hold" adjustment that allows for slower moving vehicles to be detected.

INPUT POWER	115 VAC +/- 10% Hz. Options include 24 VDC solar or 230 VAC +/- 10%, 50/60 Hz.
OUTPUT	Two Form C Dry relay contacts rated at 10A, protected by 8A fuses.
ALARM TIME	An Alarm Time adjustment is incorporated that allows a double-pole double-throw relay to be energized from 1 to 30 seconds upon receiving a valid alarm. This feature enables the OVDS Alarm Time to be set for a short time (1 - 2 seconds), which in turn, allows control over alarm time.
ELECTRONICS	Heavy duty printed circuit board, terminal strips with Phillips screw connections.
TEMPERATURE RANGE	-40° to +135° F (-40° to +57° C).
HOUSING	All electronics are enclosed in a durable fiberglass NEMA 3R rated cabinet. Cord grips/strain relief connectors are included for cable access. The enclosure need not be mounted near either the loop relay(s) or OVDS but we do not suggest more than 500 feet (152 m) of separation due to the possibility of noise pickup in the cabling. Use of shielded cable may be required in some applications.
SHIPPING WEIGHT	20 lbs (9 kg).

Specifications

Model # SELS-XXX

Solar Power Source

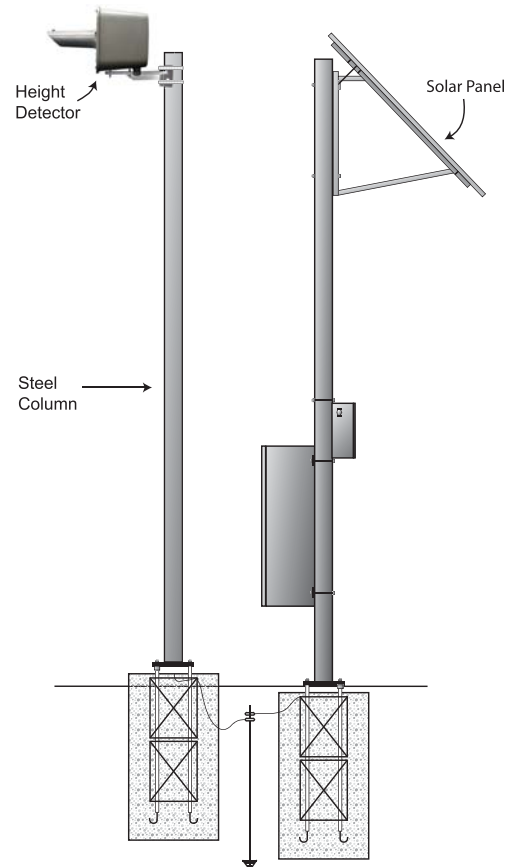
Features

- Cost effective alternative to cable installation
- Can mix AC/DC in installation
- 21 consecutive sunless days capacity standard
- Rechargeable by generator

All Trigg Industries Overheight Vehicle Detection Systems (OVDS) can be operated with solar power. The operating voltage is 24 Volts DC for both the Transmitter and Receiver units. Custom configured for each geographic location [at least 7 times US Department of Energy requirements].

The solar power system consists of a solar panel assembly, batteries and solar control electronics. A 24 VDC to 115 VAC inverter can be included to supply 115 VAC power for the Trigg Industries Warning Sign, Bell or other warning devices. The batteries, solar control electronics and inverter are mounted in vandal proof aluminum enclosures with inside the pole wiring. Mounting poles can be supplied or the customer can supply their own or use existing structures. Proper orientation of the solar panel assembly is necessary.

Solar power is a consideration where costs and/or substantial difficulties [trenching, right-of-way, etc.] are encountered in providing 115 VAC power to one or both sides of the roadway. The Trigg Industries OVDS can be operated by a combination of solar power and 115 VAC without system degradation.



OUTPUT	24 VDC.
ELECTRONICS	Enclosed in DOT grade stainless steel cabinet.
TEMPERATURE RANGE	- 40° to + 135° F (- 40° to + 57° C).
SHIPPING WEIGHT	Varies with system requirements.

Specifications

Model # TGZ-M017

Three-Axis Mount

Features

Enables independent axis adjustments to match difficult crowns and contours of the roadway.



ADJUSTMENT	Pan +/- 60°, Pitch +/- 40°, Roll +/- 40°.
DIMENSIONS	9 H X 8½ W X 3½ D inch (23 H x 22 W x 9 D cm).
CONSTRUCTION	Three-piece mount of 9 mm 5052 aluminum with stainless steel hardware.
FINISH	Medium gray enamel.
ATTACHMENT	Designed for pole-top or pole-mount bracket installations via 5/8 inch (1.6 cm) stainless steel bolt.
WEIGHT	4 lbs (2 kg) each. Two required per system.

Specifications

Model # TG-M018

Two-Axis Mount



ADJUSTMENT	Pan 360°, Pitch +/- 90°.
DIMENSIONS	5 H x 8.3 W x 5.9 D inch (12.7 H x 21 W x 15 D cm).
CONSTRUCTION	1.9 inch (4.8 cm) thick Type 5052H32 aluminum.
FINISH	Light gray polyester powder coat.
ATTACHMENT	Designed for pole-top or mount bracket installations via 5/8 inch (1.6 cm) stainless steel bolt.
WEIGHT	3 lbs (1.35 kg) each. Two required per system.

Specifications

Model # PMB-406

Pole Mount Bracket

ADJUSTMENT	Pan 360°, Pitch +15° / -13°, Roll +/- 25°.
DIMENSIONS	3½ H X 3½ W X 11 L inch (9 H x 9 W x 28 L cm).
CONSTRUCTION	Heavy ALMAG casting.
FINISH	Light gray enamel.
ATTACHMENT	Stainless steel bands or bolts. Adapts to any pole ≥ 3 inches diameter.
WEIGHT	2½ lbs (2 kg) each. Two required per system.

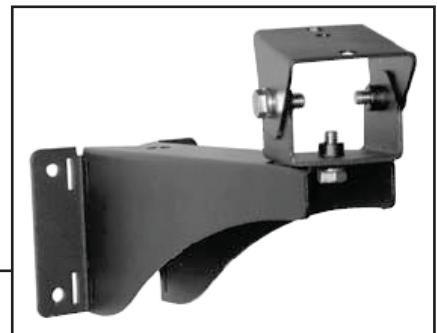


Specifications

Model # WMB-408

Wall Mount Bracket

ADJUSTMENT	Pan 360°, Pitch +/- 85°.
DIMENSIONS	6¼ H X 4⅝ W X 9½ D inch (15.6 H x 11.25 W x 26.9 D cm).
CONSTRUCTION	12 Gauge steel, supports 25 pounds.
FINISH	Durable black, textured powder coat finish.
ATTACHMENT	Designed for mounting to a flat wall (can attach to corners with adapter) or round pole (larger than 3 inches [7.6 cm] diameter) via bolts or steel bands.
WEIGHT	3 lbs (1.35 kg) each. Two required per system.



Specifications

Model # 3701

Telescoping Mounting Pole

Model # 3702

Fixed Length Mounting Pole

ADJUSTMENT	<p>3701: Telescopes 10½ to 16½ feet (3.2 to 5.1 m). Inner pole lock in place via 8 collar socket set screws.</p> <p>3702: Fixed length.</p>
DIMENSIONS	<p>Pole base flange - 10 inches (25 cm) Diameter X 2¾ inches (6.9 cm) High.</p> <p>Pole Height:</p> <p>3701: Collapsed - 10½ feet (3.2 m). Extended - 16½ feet (5.1 m).</p> <p>3702: 10 feet (3 m). Pole diameter - see construction.</p>
CONSTRUCTION	<p>Seamless round aluminum tube/pipe. Handhold centered 18 inches (46 cm) above the bottom of the shaft. Handhold cover secured in place by stainless steel screws. Base flange is one-piece cast aluminum socket with 8¼ inch (21 cm) bolt centers between four 5/8 inch (1.56 cm) through-holes.</p> <p>3701: Inside pole - 3½ inch (8.75 cm) OD w/.216 inch (.54 cm) wall, 6061 extruded seamless aluminum pipe. Outside pole - 4 inch (10 cm) OD w/.188 inch (.47 cm) wall, 6061 extruded seamless aluminum tube.</p> <p>3702: 4 inch (10 cm) OD w/.188 inch (.47 cm) wall, 6061 extruded seamless aluminum tube.</p>
FINISH	Brushed aluminum.
ATTACHMENT	Via pole base flange. Poles are complete with all hardware except base mounting bolts and nuts.
WEIGHT	<p>3701: 90 lbs (41 kg).</p> <p>3702: 60 lbs (27 kg).</p>



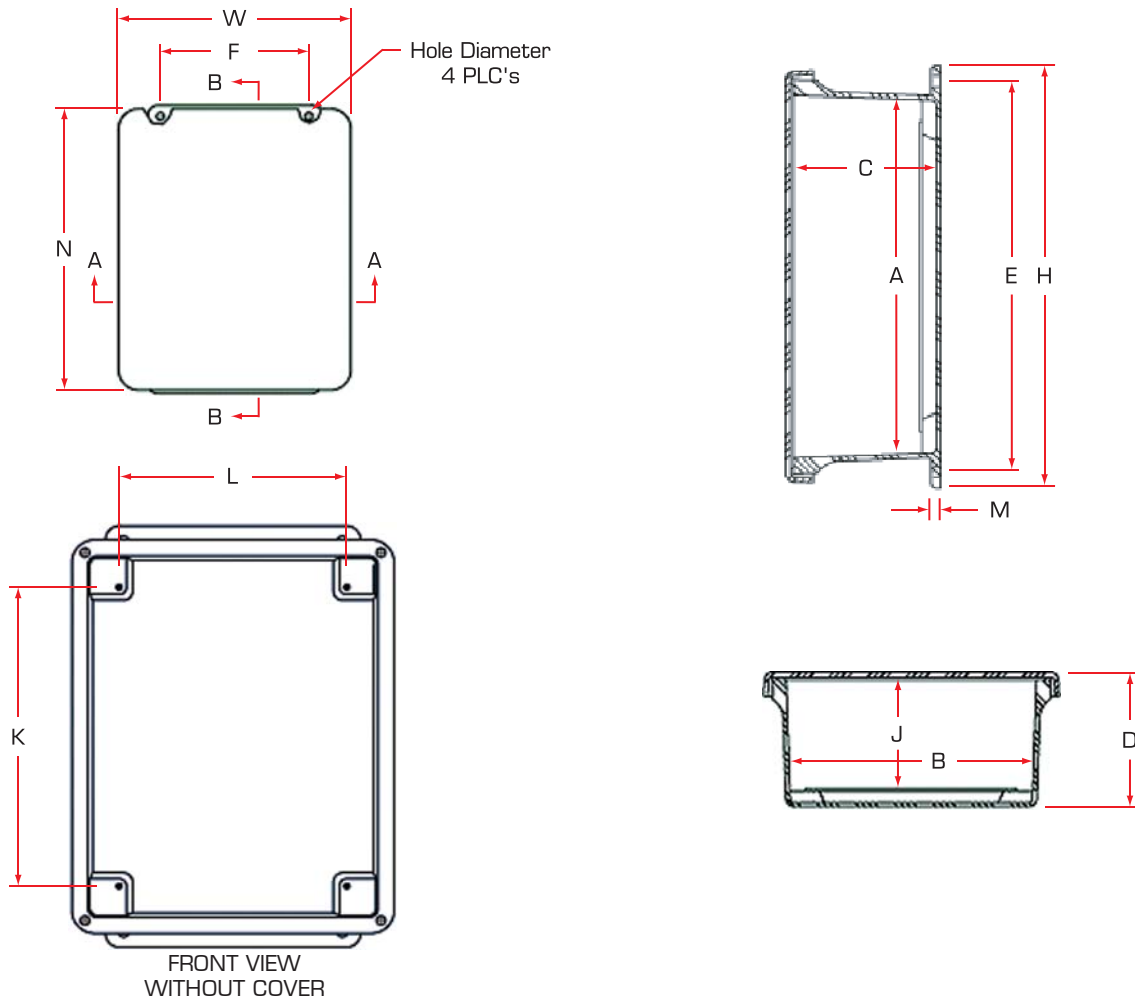
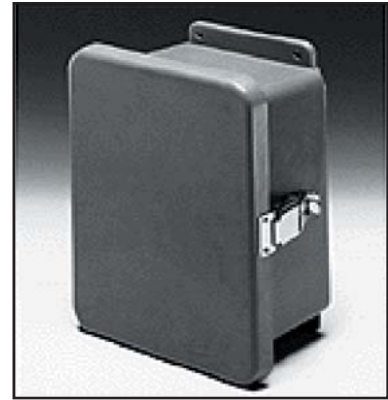
MODEL 3701

Specifications

Model # TG-ENCL-01
 Junction/Control Enclosure
 Overheight Vehicle Detection System

Features

- Compression molded, fiberglass reinforced polyester
- Memory retaining, continuous poured urethane door gasket
- Glacier Gray
- Integral mounting feet
- Padlock hasp or linklock latch available
- Stainless steel piano hinge



Overall HxWxD	Inside AxBxC	Mounting ExF	J	K	L	M	N	Hole Diameter	Wt.
11.62 x 9.41 x 4.25 inches (29.5 x 24 x 11 cm)	9.73 x 7.73 x 3.98 inches (25 x 20 x 10 cm)	10.75 x 6 inches (27 x 15 cm)	3.5 inches (9 cm)	8.25 inches (21 cm)	6.25 inches (16 cm)	0.25 inches (0.6 cm)	11.35 inches (29 cm)	0.31 inches (0.8 cm)	5 lbs (2.3 kg)

Custom OVDS Options

A large percentage of our OVDS orders are customized per customer specified criteria. The growing demand to meet constantly evolving challenges in the industry is reflected in the increasing requests to incorporate new capabilities into our OVDSs. Below are some of the more common features requested.

Custom Alarm Times

Each Overheight Vehicle Detection System Model has a standard “off-the-shelf” alarm timer. This timers can be modified to any practical length requested, adjustable by the customer on the system control panel.

Remote Counter

Most system models have event counters integral to their control panel. The system can be ordered with a remote counter option which relocates the counter to a separate customer provided or TI provided enclosure. The advantage of this option is the ease of access to the counter without the need for a means of elevating to the level of the OVDS system.

Sun Rejection Extension

These devices attach to the detector portion of the OVDS housing to extend the housing shielding from sunlight and/or reflected light to prevent false alarms. This is rarely required except in very unusual situations

Object Size Adjustment

This option provides for the adjustment of the size of the object the detection system will detect. It is adjustable by the customer on the face of the control panel and allows rejection of objects determined too small for consideration [ie. ski racks].

Custom Colors

The default cabinet color of our Overheight Vehicle Detection Systems is a very light gray [Fluoropolymer Premier Coatings are med-dark gray], however, the OVDS cabinets can be painted any color preferred. Custom colors must be designated at time of order.

Custom Mounts

Standard mounting of the OVDS is typically atop our Model 3701 telescoping poles or with our PMB-406 universal mount. If the specific installation requirements/location preclude these options, custom mounts can be designed for the specific installation site/application.

Application Designs

Custom system application design features, multi-system integration/interface and other system adaptations are reviewed and recommendations made on a case by case basis. Example: Configure OVDS to provide contact closure when a passing vehicle exceeds a customer selectable speed AND is above a predetermined height.

Section 4

WORKSHEET OF TECHNICAL CONSIDERATIONS FOR SPECIFICATION WRITERS



Preface

The purpose of this draft worksheet of specifications is to provide assistance and guidance to those preparing to provide warning, over and above those warnings required by state and federal law, to drivers of overheight vehicles or cargo loads.

The value of providing special warning to drivers of overheight vehicles is the prevention of accidents caused by driver error or inattention.

The most effective means found to date for providing special warning, is to individually alert the driver concerned and make them specifically aware that they will hit the low overhead object if they proceed.

In accidents caused by overheight vehicles, it is often the unoffending drivers and passengers of other vehicles, secondarily involved, that suffer the greatest injury. The fact that the driver of the overheight vehicle may be responsible and may pay for damages is of little importance in this event. The costs associated with the resolution of one accident even when involving a single vehicle generally exponentially exceed the cost of installing an Overheight Vehicle Detection and Warning System.

Answers to specific questions or assistance in planning solutions to exceptional problems is available on request from Trigg Industries.

Tel 757.223.7522

Fax 757.223.7317

info@triggindustries.com

www.triggindustries.com/contacts.htm



Preparation of Specifications

Suggestions to specification writer:

1. Read through these specifications, crossing out paragraphs and words that have no application to your problem.
2. Modify or add to the remaining text as your situation dictates.
3. Reread the final product to assure that all points are adequately covered in the manner prescribed by local law or practice.

Specifications

I. SCOPE

The design described herein is to prevent overheight vehicles/loads from striking the [bridge], [tunnel entrances], [etc.] by vehicles travelling [north-south bound], [east-west bound] on highway _____ in the direction(s) of _____ at point(s) _____.

Detection and warning items are to comply with [State] regulations and the [U.S. D.O.T. F.H.D. Manual of Uniform Traffic Control] devices. All items shall be located to provide warning early enough [in consideration of "practiced vehicle speed" at the site] to allow sufficient time for driver to react. There should be maximum safety for all drivers with minimum disruption of traffic flows.

II. GENERAL

All equipment shall be supplied to _____ for installation by _____. Each component of the equipment shall be accompanied by full instructions for installation, wiring, assurance of proper functional interface of components and other information needed for installation and functional testing.

III. OPERATIONAL REQUIREMENTS

A. [State] legal requirements shall be met by inspection of or installation of standard signs as required by _____ [list if necessary] _____. The necessary actions for this purpose shall be accomplished by _____.

B. Warning of drivers of vehicles specifically detected as being overheight for clearance of the overhead structure shall be as follows:

1. DETECTION - All overheight vehicles or vehicle loads traveling toward the above described structure shall be detected and specific individualized warning shall be given. Vehicles traveling away from the structure shall be ignored by the detection equipment. Detection of vehicles traveling toward the structure shall be counted and recorded on an electronic counting device. The detection system shall consist of visible red or infrared source(s) and spectrally matching detector(s) mounted on poles positioned on opposite sides of the approach roadway at a distance of ___ feet [___ meters] from the structure. The alignment and height of the visible red or infrared beam shall be preset to identify vehicles or loads of over ___ feet [___ meters], ___ inches [___ cm] above the roadway at the point of detection.

NOTE FOR SPECIFICATION WRITER - The specified height should be the lowest clearance between the road surface and the overhead structure, less either the clearance required by state law or the allowance required for clearance after vehicle bounce etc. has been considered plus the amount deemed necessary for settling or margin of error.

2. ATTRACTION OF DRIVER ATTENTION - Positive action shall be taken to attract the attention of the driver to the fact that the driver specifically will have an accident if the driver proceeds. The action must cause him to become alert to the extent that he reacts as instructed. Caution should be taken to cause the least possible disturbance to other motorists and to minimize the adverse effects of increased ambient sound or light in the area.
3. WARNING AND INSTRUCTIONS FOR DRIVERS - Warning and instructions to drivers of overheight vehicles shall be stated on the face of the warning sign and shall be illuminated internally, i.e., nature of danger "OVERHEIGHT" and action to be taken ["STOP" or "TURN RIGHT" or "EXIT RIGHT" or "USE RIGHT (LEFT) LANE," or "DO NOT ENTER" etc.] if the driver proceeds. The action must cause the driver to become alert to the extent that they react as instructed.

NOTE TO SPECIFICATION WRITER - If the instruction line on the sign is to read "STOP", there may be a need for an additional sign to instruct the driver on actions to take after they have stopped. This sign, if needed, should be located where the driver will see it unavoidably, after stopping. It should be in letters large enough for the driver to read but small enough not to attract the attention of drivers who are not involved. The theory behind the requirement for this sign is that the driver, who has been stopped, is possibly in a state of confusion and may act in such a way as to cause a new danger to other motorists.

IV. MATERIAL AND EQUIPMENT

A. GENERAL

1. Equipment is hereinafter referred to by manufacturer for the purpose of establishing standards of quality for Overheight Vehicle Detection and Warning Systems manufactured and/or supplied by Trigg Industries, are presently considered as acceptable when conditions of the drawings and specifications are met.

Products of other firms offered will be considered, subject to the Engineer's approval and will be based on the quality and capability of the substitutes compared to the equipment available from the above indicated supplier.

2. All equipment shall be constructed in a workmanlike manner and present a neat and finished appearance when completed. Proper operation of the equipment shall commence immediately after restoration of power.
3. Safety Features - NEMA 3R rated metallic equipment enclosures shall be provided with terminals for attachment of ground safety wire.

V. ENVIRONMENTAL CONDITIONS

A. METROLOGICAL CONDITIONS

The equipment shall operate and meet all of the requirements of this specification under the following atmospheric conditions:

Temperature	-40°F to 135°F [-40°C to 57°C].
Relative Humidity	0 to 100%.
Rain	2 inches per hour at 200 feet between source and detector.
Snow	Light snow.
Fog	200 foot visibility.
Wind Velocity	0 to 90 miles per hour [0 to 144 km per hour].

B. SUNLIGHT

The equipment shall operate properly when the sun is outside 10 degrees of the extended optical axes of the receiver unit in its installed configuration. If the above requirements cannot be met, the equipment will be deemed satisfactory if explicit installation information is given such that the rays of the sun cannot interfere with the proper operation of the equipment. This provision includes reflections from vehicles.

C. CLOUDS

The variation in light intensity caused by the shadow of passing clouds shall not interfere with the proper operation of the equipment.

VI. MECHANICAL REQUIREMENTS

A. DETECTOR UNIT

The detector unit electronics shall be solid state with printed circuit boards and regulated power supply. The unit shall be modular assembly type. It shall have an effective range of 10 feet [3 m] to 200 feet [38 m] with a reaction speed range of 1 MPH [1.61 km/h] to 75 MPH [121 km/h] for a 2½ inch [6.35 cm] diameter object 1 inch [3 cm] above the detection height.

It shall contain provisions for the elimination of the effect of ambient light and an internal environmental control element that reduces operational failure from fog, condensation and insects. Dimensions shall not exceed a maximum overall size of 19 x 15 x 10 inch [48 x 38 x 25 cm]. The housing shall be of cast Almag of not less than 1/8" thickness and shall be weather sealed. The mounting shall allow for directional adjustment and aiming after initial installation.

B. BORESIGHT

Two 1/8 inch [.32 cm] boresight holes are located at top-middle of each housing. Front and rear screws are installed in these holes so as to insure a weather tight enclosure, and should be removed to allow alignment of units. Looking through the boresight hole from rear of unit so as to see through the boresight hole in front of unit gives the installer a basic means of aiming the unit in the proper direction. Focusing the unit on opposite sides of the road in the center of the front boresight while looking through the rear boresight hole ensures that a general alignment is accomplished. This step should be done from

both transmitter and receiver unit locations. Fine tuning of alignment can then be done electronically.

C. ACCESS

The transmitter unit and the receiver unit shall each be provided with a barrier to protect the operating equipment. The enclosure shall maintain its structural integrity for the operational life of the equipment and shall allow ready access for control adjustment and electrical interconnection without the use of any tools except a phillips head screwdriver.

D. MOUNTING PROVISION

Each of the equipment units shall be provided with means for rigidly attaching the unit to a vertical cylindrical pole without requiring any machining operation. The attachment means shall not stress or deform the unit and shall prevent the movement of the unit in any direction by the force developed by wind. The mounting means shall allow adjustment of the vertical position on the pole. The mounting means for the transmitter unit and the receiver unit shall have the capability of adjusting the angular orientation of the optical axis in both the horizontal and vertical plane over an angular range of plus or minus five degrees from horizontal. The transmitter and receiver unit shall be mounted to detect the presence of vehicles that exceed the specified vertical height.

E. INTERNALLY ILLUMINATED BLANK-OUT SIGN(S)

Signs shall meet all electrical/electronic specifications stated in sub-paragraph IV.A.2 above and shall conform, in all essential elements, with the provisions of the U.S. D.O.T., F.H.A. Manual on Uniform Traffic Control Devices. Plastics on sign faces shall be protected by LEXAN™ or other material providing equal or greater defense against flying object damage or vandalism. Signs shall be activated and time controlled by the detection unit. Lighting shall be provided by high output fluorescent bulbs for message and incandescent bulbs with parabolic reflectors for arrows at the top and bottom of sign. Housing shall be within 10% of horizontal and vertical dimensions as defined (either rectangular or diamond shape) with reinforced aluminum capable of withstanding wind loading up to 90 MPH (144 km/h) and provided with a sun shield protecting the display. Letters and arrows shall be normally blanked out. When illuminated, arrows shall be amber in color, but can be made in any color specified.

F. LED BLANK-OUT SIGN(S)

Signs shall be modular amber LED arrays with a viewing angle of 30 degrees. The pixel luminance shall be such that the sign is viewable in direct sunlight. The LED modules shall be factory programmable with a custom message and character font within the parameters of the 8 inch by 14 inch pixel array. Pitch shall be at least 1 inch between pixels. Each pixel shall have at least 4 LEDs such that the failure of one LED will not cause total loss of the pixel. The sign enclosure shall be NEMA type 3R, fully front-serviceable aluminum. The sign shall be activated by the detection unit and will include an alternating flasher and relay for activating associated LED traffic heads or audible alarms. Than standard sign input power shall be 120VAC. The sign shall optionally provide input power of 240VAC or 12VDC for solar applications. Proper sign operation shall be sustained across a -40 to + 22°F temperature range. The sign shall be mounted using a double pole design and have a lifting means that facilitates installation.

G. VARIABLE MESSAGE SIGNS (VMS)

VMS devices shall be provided with either Amber, Red or Red/Green/Blue (full color display) full matrix LED's depending upon the application. Character height "rule of thumb" is generally 1" for every 50' of viewing distance required. The number of lines and message desired will determine the physical size of the VMS. Viewing angle is generally 30 degrees but a 70-degree viewing angle may sometimes be required. Photocell control for dimming based on ambient light shall be provided. The "Default" message may be blank or updated either locally at the VMS using a laptop computer or remotely via dial up/wireless modem, fiber optic link or network communication using a desktop computer. The controller between the VMS and OVDS or computer shall be NTCIP compliant. The overheight warning message shall have priority over the default message and shall be displayed for the duration of the Alarm Time setting in the OVDS detector. Software for VMS message control shall be Windows compatible. The VMS devices shall operate with a power of 120 VAC +/- 10% and a temperature range of -40 to +138 degrees F with internal fans for cooling. The VMS case shall have a NEMA 3R rating and be fully front-servicable. VMS devices may be pole(s) or wall mounted but the user is responsible for all on-site mounting.

H. PARABOLIC BELL ASSEMBLIES OR OTHER WARNING SOUND PRODUCING DEVICES

Shall be activated and time controlled by the Detection Unit. The Parabolic Bell is 38 inch (97 cm) in diameter and constructed of fiberglass. Electrical input shall be 120 VAC +/- 10%, at 50/60Hz. Parabolic Shields or other sound controlling directional devices shall be capable of withstanding wind loadings up to 90 MPH (144 km/h). Mounts shall be adjustable in vertical plane and adaptable for attachment as required herein.

I. UNIT MOUNTING POLES

Shaft - The shaft shall be a two piece, adjustable height, seamless, round aluminum tube. Poles shall include a handhole centered 18 inch (46 cm) above the bottom of the shaft. A cover, with stainless steel attachment screws, shall be provided for the handhole.

Base Flange - The base flange for the attachment of the shaft to the foundation shall be a one piece cast socket of aluminum alloy. Concrete footing and four anchor bolts shall be provided by _____.

Pole Fittings - Must be specifically designed to accommodate the overheight detector, bells, signs, etc. specified herein whether supplied by the manufacturer of electronic components or of the poles. Poles come in two styles: 10 feet (3 m) non adjusting or 10 - 16½ feet (3 - 5 m) adjusting (there are two pieces or shafts with this pole).

NOTE TO SPECIFICATIONS WRITER - Any sturdy pole or vertical structure can be used, including those already in position for other purposes. The above paragraph must be re-written to fit your plan keeping in mind the necessity for specifying how the equipment will be attached..

J. POWER AND SIGNAL CABLE CONNECTIONS

Power and signal cabling shall be provided between the receiver unit electronics and the junction box adjacent to the mounting pole foundation. Power for the receiver and transmitter units will be available at the junction box located adjacent to the mounting pole foundation and shall be made available by _____
[WHOM].

K. WIRING

See attached "OVERHEIGHT WARNING SYSTEM CABLE WIRING DIAGRAM" and the above quality and performance specifications.

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