

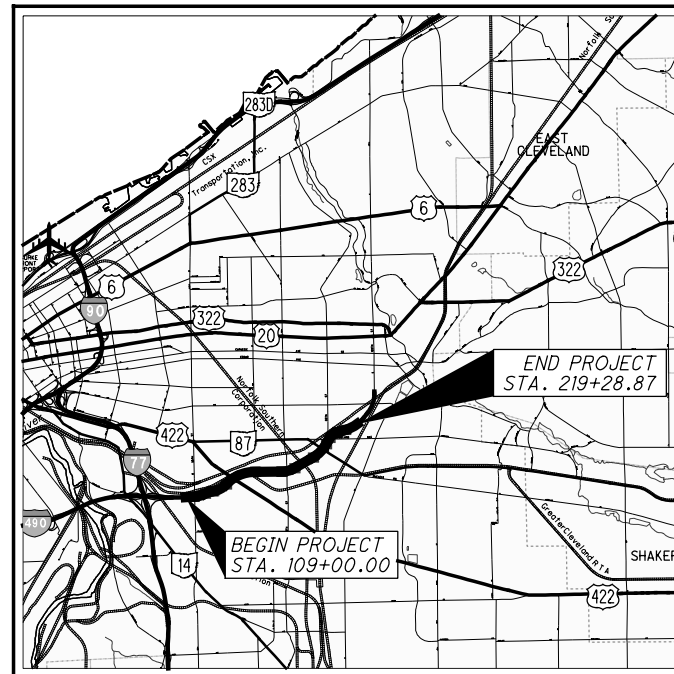
STATE OF OHIO

DEPARTMENT OF TRANSPORTATION

**CUY-IR490/ SR010-**  
**2.09 / 19.28**

CITY OF CLEVELAND

CUYAHOGA COUNTY



LOCATION MAP

LATITUDE: 41°29'08"      LONGITUDE: 81°37'22"



PORTION TO BE IMPROVED.....	_____
INTERSTATE HIGHWAY.....	_____
FEDERAL ROUTES.....	_____
STATE ROUTES.....	_____
COUNTY & TOWNSHIP ROADS.....	_____
OTHER ROADS.....	_____

DESIGN DESIGNATION

CURRENT ADT (2017) .....	35,820
DESIGN YEAR ADT (2020) .....	48,230
DESIGN HOURLY VOLUME (2020) .....	3,580
DIRECTIONAL DISTRIBUTION .....	58%
TRUCKS (24 HOUR B&C) .....	6%
DESIGN SPEED .....	40 MPH
LEGAL SPEED .....	35 MPH
DESIGN FUNCTIONAL CLASSIFICATION .....	URBAN PRINCIPAL ARTERIAL
NHS PROJECT .....	NO

## DESIGN EXCEPTIONS

NONE

<h2 style="text-align: center;">UNDERGROUND UTILITIES</h2> <p style="text-align: center;">CONTACT BOTH SERVICES TWO WORKING DAYS BEFORE YOU DIG.</p>	
 <p><b>OHIO Utilities Protection SERVICE</b></p> <p>(Non-members must be called directly)</p>	<p><i>Call Before You Dig</i></p> <p><b>1-800-362-2764</b></p>
<p style="text-align: center;"><b>OIL &amp; GAS PRODUCERS UNDERGROUND PROTECTION SERVICE</b></p> <p style="text-align: center;"><b>1-800-925-0988</b></p>	



*INDEX OF SHEETS:*

SEE SHEET 2

**BU-12**  
**TRAFFIC CONTROL:**  
**SIGNALS AND DUCT BANK**

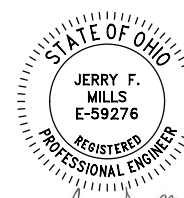
PLAN PREPARED BY:

ENGINEERS SEAL:



SIGNED: [Signature]  
DATE: 2019-06-04

ENGINEERS SEAL:



SIGNED: Jimmy F. Mills  
DATE: 2019-06-04

**Michael Baker**  
INTERNATIONAL

1111 SUPERIOR AVENUE EAST, SUITE 2300  
CLEVELAND, OHIO 44114



DYNOTEC, INC.  
2931 E. DUBLIN GRANVILLE ROAD, SUITE 200  
COLUMBUS, OH 43231



2421 REGINALD COURT  
POWELL OH 43065

[illegible]

## PROJECT DESCRIPTION

THIS PROJECT CONSISTS OF THE CONSTRUCTION OF 2.09 MILES OF A NEW TWO- TO THREE-LANE BOULEVARD FROM E. 55TH ST. TO E. 93RD ST. WORK INCLUDES PAVEMENT, RAILROAD, STRUCTURES, DRAINAGE, WATERWORK, LIGHTING, POWER DISTRIBUTION, TRAFFIC CONTROL, LANDSCAPING, AND ADJUSTMENT OF EXISTING UTILITIES.

### EARTH DISTURBED AREAS

PROJECT EARTH DISTURBED AREA: 87.2 ACRES  
ESTIMATED CONTRACTOR EARTH DISTURBED AREA: 0 ACRES  
NOTICE OF INTENT EARTH DISTURBED AREA: 87.2 ACRES  
(AREA SERVICED BY COMBINED SEWER)

## 2016 SPECIFICATIONS

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING CHANGES AND SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.


0	2019-06-04	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		

FEDERAL PROJECT NO.  
E140 (249)

PID NO.  
**96833**

CONSTRUCTION PROJECT NO. **17-3000**

RAILROAD INVOLVEMENT  
**NORFOLK SOUTHERN**  
**GCRTA**

-IR490/SR010-  
2.09 / 19.28

## RECORD PLANS

## RECORD PLANS

## RECORD PLANS







GUARANTEE

THE CONTRACTOR SHALL GUARANTEE THAT THE TRAFFIC CONTROL SYSTEM INSTALLED AS PART OF THIS CONTRACT SHALL OPERATE SATISFACTORILY FOR A PERIOD OF 90 DAYS FOLLOWING COMPLETION OF THE 10-DAY PERFORMANCE TEST. IN THE EVENT OF UNSATISFACTORY OPERATION THE CONTRACTOR SHALL CORRECT FAULTY INSTALLATIONS, MAKE REPAIRS AND REPLACE DEFECTIVE PARTS WITH NEW PARTS OF EQUAL OR BETTER QUALITY. EQUIPMENT, MATERIAL AND LABOR COST INCURRED IN CORRECTING AN UNSATISFACTORY OPERATION SHALL BE BORNE BY THE CONTRACTOR.

THE GUARANTEE SHALL COVER THE FOLLOWING ITEMS OF THE TRAFFIC CONTROL SYSTEM: CONTROLLERS, CABINETS AND ASSOCIATED EQUIPMENT, DETECTOR UNITS AND INTERCONNECTION ITEMS.

CUSTOMARY MANUFACTURER'S GUARANTEES FOR THE FOREGOING ITEMS SHALL BE TURNED OVER TO THE CITY OF CLEVELAND FOLLOWING ACCEPTANCE OF THE EQUIPMENT.

THE COST OF GUARANTEEING THE TRAFFIC CONTROL SYSTEM WILL BE INCIDENTAL TO AND INCLUDED IN THE CONTRACT UNIT PRICE OF THE VARIOUS ITEMS MAKING UP THE SYSTEM.

GROUNDING AND BONDING

THE REQUIREMENTS OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS (C&MS) AND THE HL AND TC SERIES OF STANDARD CONSTRUCTION DRAWINGS ARE MODIFIED AS FOLLOWS:

1. ALL METALLIC PARTS CONTAINING ELECTRICAL CONDUCTORS SHALL BE PERMANENTLY JOINED TO FORM AN EFFECTIVE GROUND FAULT CURRENT PATH BACK TO THE GROUNDED CONDUCTOR IN THE POWER SERVICE DISCONNECT SWITCH.

A. WHEN AN EQUIPMENT GROUNDING CONDUCTOR IS REQUIRED IN PLASTIC CONDUIT (725.05), THE INSTALLATION SHALL INCLUDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR IN ADDITION TO THE CONDUCTORS SPECIFIED.

B. METAL PULL BOX LIDS SHALL BE BONDED BY ATTACHMENT OF THE EQUIPMENT GROUNDING CONDUCTOR TO THE FRAME DIAGONAL AS PROVIDED ON HL-30.II.

C. IF MULTIPLE CONDUIT RUNS BEGIN AND END AT THE SAME POINTS, ONLY ONE EQUIPMENT GROUNDING CONDUCTOR IS REQUIRED.

D. IF AN EQUIPMENT GROUNDING CONDUCTOR IS NEEDED IN CONDUIT BETWEEN SIGNALIZED INTERSECTIONS FOR UNDERGROUND INTERCONNECT CABLE, THE GROUNDING SYSTEM FOR EACH SIGNALIZED INTERSECTION WILL BE SEPARATED ABOUT MIDWAY BETWEEN THE INTERSECTIONS.

E. THE MESSENGER WIRE AT SIGNALIZED INTERSECTIONS WILL BE USED AS THE CONDUCTIVE PATH FROM CORNER TO CORNER IF CONDUIT IS NOT PROVIDED UNDER THE ROADWAY. WHEN CONDUIT CONNECTS THE CORNERS OF AN INTERSECTION, AN EQUIPMENT GROUNDING CONDUCTOR SHALL BE USED IN THE CONDUIT.

2. CONDUITS.

THE 725.05 CONDUIT SHALL HAVE THE INSIDE AND OUTSIDE DIAMETERS OF THE CONDUIT DEBURRED AT ALL TERMINATION POINTS.

GROUNDING AND BONDING (CONTINUED)

3. WIRE FOR GROUNDING AND BONDING.

A. USE INSULATED, COPPER WIRE FOR THE EQUIPMENT GROUNDING CONDUCTOR. BONDING JUMPERS IN BOXES AND ENCLOSURES MAY BE BARE OR INSULATED COPPER WIRE. WIRE SIZE SHALL BE AS FOLLOWS:

I. USE SEVEN STRAND 4 AWG BETWEEN THE POWER SERVICE AND SUPPORTS, POLES, PEDESTALS, CONTROLLER OR FLASHER CABINETS.

II. USE A MINIMUM 8 AWG BETWEEN LOOP DETECTOR PULL BOXES AND THE FIRST CONDUIT THAT REQUIRES A LARGER SIZE AS SPECIFIED IN 3.A.I ABOVE.

III. THE INSULATION SHALL BE GREEN OR GREEN WITH YELLOW STRIPE(S). FOR 4 AWG OR LARGER, INSULATION MAY ALSO BE BLACK WITH GREEN TAPE/LABELS INSTALLED AT ALL ACCESS POINTS.

B. IN A HIGHWAY LIGHTING SYSTEM, THE EQUIPMENT GROUNDING CONDUCTOR SHALL BE THE SAME WIRE SIZE AS THE DUCT CABLE OR DISTRIBUTION CABLE CIRCUIT CONDUCTORS, WITH THE MINIMUM CONDUCTOR SIZE OF 4 AWG. BONDING JUMPERS WILL BE MINIMUM SIZE 4 AWG.

4. GROUND ROD

A. A SCHEDULE 40 PVC CONDUIT WILL BE USED IN FOUNDATIONS AND CONCRETE WALLS FOR THE GROUNDING CONDUCTOR (GROUND WIRE) RACEWAY TO THE GROUND ROD.

B. THE TYPICAL GROUNDING CONDUCTOR (GROUND WIRE) SHALL BE 4 AWG INSULATED, COPPER.

5. THE GREEN CONDUCTOR IN SIGNAL CABLES (CONDUCTOR #4) SHALL NOT BE USED TO SUPPLY POWER TO A SIGNAL INDICATION. IT WILL BE CONNECTED TO THE SIGNAL BODY AS AN EQUIPMENT GROUND IN ALUMINUM HEADS AND IT WILL BE UNUSED IN PLASTIC HEADS. UNUSED CONDUCTORS SHALL BE GROUNDED IN THE CABINET. TYPICAL USE OF CONDUCTORS IS AS FOLLOWS:

COND. NO.	COLOR	VEHICLE SIGNAL	PEDESTRIAN SIGNAL
1	BLACK	GREEN BALL	# 1 WALK
2	WHITE	AC NEUTRAL	AC NEUTRAL
3	RED	RED BALL	#1 DW/FDW
4	GREEN	EQUIP. GROUND	EQUIP. GROUND
5	ORANGE	YELLOW BALL	#2 DW/FDW
6	BLUE	GREEN ARROW	#2 WALK
7	WHITE/BLACK STRIPE	YELLOW ARROW	NOT USED

6. POWER SERVICE AND DISCONNECT SWITCH

A. AT THE POWER SERVICE LOCATION, THE GROUNDING CONDUCTOR (GROUND WIRE) FROM THE DISCONNECT SWITCH NEUTRAL (AC-) BAR TO THE GROUND ROD SHALL BE A CONTINUOUS, UNSPLICED CONDUCTOR. IF SPLICED, IT SHALL BE AN EXOTHERMIC WELD BUTT SPLICE.

B. THE SERVICE NEUTRAL (AC-) SHALL ONLY BE CONNECTED TO GROUND AT THE PRIMARY POWER SERVICE DISCONNECT SWITCH.

I. NEMA CONTROLLER CABINETS: IF A POWER SERVICE DISCONNECT SWITCH IS LOCATED BEFORE THE CONTROLLER CABINET, THE NEUTRAL (AC-) AND THE GROUNDING BARS IN THE CONTROLLER CABINET SHALL NOT BE CONNECTED TOGETHER AS SHOWN IN NEMA TS-2, FIGURE 5-4.

GROUNDING AND BONDING (CONTINUED)

II. IF SECONDARY DISCONNECT SWITCHES ARE CONNECTED AFTER THE PRIMARY DISCONNECT SWITCH, THE NEUTRAL (AC-) SHALL ONLY BE GROUNDED AT THE PRIMARY SWITCH. EQUIPMENT GROUNDING CONDUCTORS SHALL BE BROUGHT TO THE PRIMARY SWITCH BUT SHALL BE GROUNDED AT BOTH SECONDARY AND PRIMARY SWITCHES.

7. PAYMENT: ALL MATERIALS AND WORK REQUIRED TO COMPLETE THE EFFECTIVE GROUND FAULT CURRENT PATH SYSTEM ARE INCIDENTAL TO THE CONDUCTORS INSTALLED BY CONTRACT.

ITEM 625- PULL BOX. 725.06. AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF 625.II AND 725.07, THE FOLLOWING SHALL ALSO APPLY:

SIZE

13" X 24"

1. THE EXTERIOR DIMENSIONS AT THE TOP SHALL BE 13" X 24" (NOMINAL).

2. THE BOX SHALL BE 24" DEEP (NOMINAL) AND SHALL TAPER OUTWARD FROM THE TOP TO THE OPEN BOTTOM.

3. THE INSIDE DIMENSIONS AT THE BOTTOM SHALL BE 11-7/8" X 21-3/8" (MINIMUM).

4. THE BOX (WITHOUT COVER) SHALL WEIGH APPROXIMATELY 64 LBS.

5. THE COVER SHALL BE 13-3/4" X 23-1/4" X 2", AND SHALL WEIGH APPROXIMATELY 34 LBS.

17" X 30"

1. THE EXTERIOR DIMENSIONS AT THE TOP SHALL BE 17" X 30" (NOMINAL).

2. THE BOX SHALL BE 24" DEEP (NOMINAL) AND SHALL TAPER OUTWARD FROM THE TOP TO THE OPEN BOTTOM.

3. THE INSIDE DIMENSIONS AT THE BOTTOM SHALL BE 15-5/8" X 28-5/8" (MINIMUM).

4. THE BOX (WITHOUT COVER) SHALL WEIGH APPROXIMATELY 84 LBS.

5. THE COVER SHALL BE 17-1/2" X 30-1/2" X 2", AND SHALL WEIGH APPROXIMATELY 65 LBS.

24" X 36"

1. THE EXTERIOR DIMENSIONS AT THE TOP SHALL BE 24" X 36" (NOMINAL).

2. THE BOX SHALL BE 24" DEEP (NOMINAL) AND SHALL TAPER OUTWARD FROM THE TOP TO THE OPEN BOTTOM.

3. THE INSIDE DIMENSIONS AT THE BOTTOM SHALL BE 29-13/16" X 41" (MINIMUM).

4. THE BOX (WITHOUT COVER) SHALL WEIGH APPROXIMATELY 124 LBS.

5. THE COVER HALL BE 24" X 35-5/8" X 3", AND SHALL WEIGH APPROXIMATELY 137 LBS.

ITEM 625- PULL BOX. 725.06. AS PER PLAN (CONTINUED)

LOAD CAPACITY

THE BOX AND COVER SHALL BE CAPABLE OF SUPPORTING A LOAD OF 20,000 LBS, ON A 10" X 10" AREA, TESTED IN ACCORDANCE WITH WESTERN UNDERGROUND COMMITTEE GUIDE 3.6. THE COVER DEFLECTION SHALL NOT EXCEED 1/2" AT DESIGN LOAD. THE COVER AND BOX SHALL SHOW NO SIGNS OF DAMAGE AFTER TEN (10) CYCLES AT DESIGN LOAD.

MATERIAL AND CONSTRUCTION

THE BOX SHALL BE CONSTRUCTED OF FIBERGLASS REINFORCED POLYMER (FRP) WITH ISOPHTHALIT POLYESTER USING THE SPRAY-UP AND ROLL CONSTRUCTION METHOD. THE MATERIAL SHALL HAVE STABILIZERS TO RESIST ULTRAVIOLET (UV) DEGRADATION IN ACCORDANCE WITH ASTM D-790 AND ASTM D-11501-71, SECTION 6, PROCEDURE B. THE TOP RING OF THE BOX SHALL BE MADE OF POLYMER CONCRETE USING A POLYESTER BINDER WITH AGGREGATE FILLERS AND CHOPPED FIBERGLASS WITH A MINIMUM TENSILE STRENGTH OF 1900 PSI. THE RING SHALL HAVE THE SAME UV RESISTANCE AS THE FRP MATERIAL. THE THREADED INSERTS FOR THE COVER BOLTS SHALL BE STAINLESS STEEL.

THE COVER SHALL BE MADE WITH A THICK MOLDING COMPOUND (TMC) USING THE COMPRESSION MOLDING METHOD. THE TMC SHALL CONSIST OF A MINIMUM OF TEN PERCENT (10%) FIBERGLASS IN A CALCIUM CARBONATE AND POLYESTER RESIN MATRIX. THE COVER SHALL BE MARKED WITH THE WORD "TRAFFIC" IN 2" LETTERS, EMBOSSED INTO THE TMC, AND SHALL HAVE A NON-SKID SURFACE AND THE SAME UV RESISTANCE AS THE FRP MATERIAL.

THE COVER SHALL BE SECURED TO THE BOX USING TWO HEX HEAD STAINLESS STEEL BOLTS AND WASHERS WHICH SHALL ATTACH TO THREADED INSERTS IN THE BODY OF THE BOX.

CONDUIT OPENINGS

OPENINGS IN THE SIDE OF THE PULL BOX, WHICH ARE REQUIRED TO INSERT CONDUIT (INTO THE PULL BOX) SHALL BE DRILLED OR SAWN IN THE FIELD, ONCE THESE LOCATIONS HAVE BEEN DETERMINED. THE OPENINGS SHALL NOT EXCEED THE OUTSIDE DIAMETER OF THE CONDUIT BY MORE THAN FIVE PERCENT (5%). ALL OPENINGS IN THE SIDE OF THE PULL BOX SHALL BE THOROUGHLY GROUTED WITH CEMENT MORTAR AFTER PLACING THE CONDUIT.

NOTE

THE EXACT LOCATIONS OF PULL BOXES ARE TO BE STAKED AND CHECKED PRIOR TO PLACEMENT TO VERIFY CLEARANCE OF UNDERGROUND FACILITIES AND ANY ABOVE GROUND OBSTRUCTIONS. IF THERE ARE ANY CONFLICTS, THEY ARE TO BE ADJUSTED AS DIRECTED BY THE ENGINEER

PULL BOXES ARE TO BE PROVIDED A 4" DRAIN TO THE NEAREST STORM INLET, UNDER DRAIN OR OTHER SUITABLE OUTLET FROM THE PULL BOX. TWENTY (20) FEET OF 4" PVC CONDUIT SHALL BE USED AND SHALL BE INCLUDED.

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
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ITEM 632 – POWER SERVICE, AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF 632.24, THE FOLLOWING SHALL ALSO APPLY: UNDERGROUND ELECTRIC POWER SHALL BE OBTAINED FROM CPP, AS INDICATED. LOCATION AND USE OF THE POWER SOURCES SHALL BE CONFIRMED WITH THE POWER COMPANY, AS APPROPRIATE.

POWER SUPPLY SHALL BE 120V.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR REQUESTING AND SCHEDULING ANY INSPECTIONS THE POWER COMPANY MAY REQUIRE FOR THE POWER SERVICE HOOK UP. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE POWER COMPANY FOR THE ELECTRICAL SERVICE CONNECTION. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR SPLICE POWER CABLE INTO THE POWER COMPANY'S CIRCUITS. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY NECESSARY PERMITS AND THE PAYING OF ALL FEES. THE CONTRACTOR SHALL PAY ALL POWER CHARGES UNTIL THE SIGNALS ARE ACCEPTED BY THE CITY OF CLEVELAND.

AERIAL POWER SERVICE AND/OR SERVICE CABLES SHALL NOT BE ATTACHED TO MAST ARMS.

CONTRACTOR SHALL SUPPLY ALL MATERIALS AND LABOR FOR POWER SOURCE TIE-INS EXCEPT FOR FINAL SPLICE. THE FINAL SPLICE SHALL BE PERFORMED BY THE POWER COMPANY.

ALL NEW OR RELOCATED ELECTRIC SERVICE ENCLOSURES ARE TO BE INSPECTED BY A LICENSED INSPECTOR PRIOR TO CONNECTION TO A UTILITY DISTRIBUTION LINE. THE CONTRACTOR SHALL APPLY FOR ALL INSPECTIONS, PAY THE APPROPRIATE FEES, AND ADVISE ODOT AND THE CITY OF CLEVELAND OF THE TIME OF INSPECTIONS SO THAT THOSE AGENCIES MAY HAVE A REPRESENTATIVE IN ATTENDANCE. THIS INSPECTION IS NOT A SUBSTITUTE FOR FINAL INSPECTION BY ODOT AND THE CITY OF CLEVELAND, NOR DOES IT SUPERSEDE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS.

ITEM 632 – VEHICULAR SIGNAL HEAD, (LED) YELLOW, (BY TYPE) 12" LENS, 1-WAY, WITH BACKPLATE, AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF 632.06 AND 732.04, THE FOLLOWING SHALL ALSO APPLY:

1. LAMPS

- A. ALL LAMP UNITS SHALL BE THE 12-INCH SIZE.
- B. LED SIGNAL LAMP UNITS SHALL BE PROVIDED FOR ALL CIRCULAR RED, CIRCULAR YELLOW, CIRCULAR GREEN, RED ARROW, YELLOW ARROW AND GREEN ARROW INDICATIONS.
- C. ALL LAMP UNITS SHALL HAVE A FIVE (5) YEAR MINIMUM WARRANTY. THE WARRANTY SHALL BE TRANSFERRED TO THE CITY OF CLEVELAND AT THE COMPLETION OF THE PROJECT.

2. SIGNAL SECTIONS

- A. SIGNAL HEADS AND VISORS SHALL BE CONSTRUCTED OF POLYCARBONATE PLASTIC.
- B. THE SIGNAL HEAD HOUSING AND OUTSIDE OF VISOR SHALL BE YELLOW, AND THE INSIDE OF THE VISORS SHALL BE FLAT BLACK.

ITEM 632 – VEHICULAR SIGNAL HEAD, (LED) YELLOW, (BY TYPE) 12" LENS, 1-WAY, WITH BACKPLATE, AS PER PLAN (CONTINUED)

- C. ALL VISORS SHALL BE COWL VISORS (CUT-AWAY).
- D. PIPE, SPACERS AND FITTINGS CONSTRUCTED OF POLYCARBONATE PLASTIC MAY BE USED IN LIEU OF GALVANIZED STEEL OR ALUMINUM.
- E. PROPER EXTERIOR COLORS SHALL BE OBTAINED BY USE OF COLORED PLASTIC MATERIAL RATHER THAN PAINTING.

3. BACK PLATES

BACK PLATES SHALL BE PROVIDED WHERE SPECIFIED IN THE PLANS, IN ACCORDANCE WITH 732.22.

4. MOUNTING HARDWARE

- A. ALL SIGNAL HEADS SHALL BE RIGIDLY MOUNTED TO THE MAST ARM. THE SIGNAL HEAD MOUNTED ON HIGHEST PORTION OF THE MAST ARM (CLOSEST TO THE ROADWAY CENTERLINE, HIGHEST VERTICAL CLEARANCE) SHALL CENTER THE RED LENS IN FRONT OF AND IN LINE WITH THE MAST ARM. THE OTHER SIGNAL HEADS SHALL BE PLACED SO THAT THE RED BALLS OF ALL THE SIGNAL HEADS ARE HORIZONTALLY IN LINE WITH THE SIGNAL HEAD ON THE HIGHEST PORTION OF THE MAST ARM.
- B. A MINIMUM 17 FEET OF CLEARANCE SHALL BE PROVIDED UNDER ALL SIGNAL HEADS.
- C. ALL STRAPS, HARDWARE AND NUTS AND BOLTS SHALL BE GALVANIZED STEEL OR STAINLESS STEEL.
- D. THE ENTRANCE FITTING SHALL BE OF THE TRI-STUD DESIGN WITH SERRATED RINGS IN ORDER TO ACHIEVE POSITIVE LOCKING.
- E. USE OF DROP PIPES SHALL NOT BE PERMITTED.
- F. SIGNAL HEADS SHALL BE MOUNTED VERTICALLY. HORIZONTALLY MOUNTED SIGNALS SHALL NOT BE PERMITTED.

ITEM 632- PEDESTRIAN PUSH BUTTON, AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF 632.09 AND 732.06, THE FOLLOWING SHALL ALSO APPLY:

SIGNING FOR PEDESTRIAN PUSH BUTTONS SHALL BE R10-3e (R OR L) SIGNS, ONE (1) FOR EACH PEDESTRIAN PUSH BUTTON, WITH TYPE G SHEETING AND ALL MOUNTING HARDWARE INCLUDED. PAYMENT FOR ALL OF THE ABOVE SHALL BE INCLUDED IN THE CONTRACT PRICE FOR ITEM 632, PEDESTRIAN PUSH BUTTON, AS PER PLAN.

ITEM 632- PEDESTRIAN SIGNAL HEAD (LED), (COUNTDOWN), TYPE D2, AS PER PLAN

IN ADDITION THE THE REQUIREMENTS OF 632.08 AND 732.05, THE FOLLOWING SHALL ALSO APPLY:

- 1. THE LED LAMP UNIT SHALL DISPLAY THE SYMBOLS FOR THE UPRaised HAND OR THE WALKING PERSON. A COUNT-DOWN TIMER SHALL BE DISPLAYED DURING THE CLEARANCE INTERVAL.
- 2. SIGNAL HEADS AND VISORS SHALL BE CONSTRUCTED OF POLYCARBONATE PLASTIC.
- 3. PIPE, SPACERS AND FITTINGS CONSTRUCTED OF POLYCARBONATE PLASTIC MAY BE USED IN LIEU OF GALVANIZED STEEL OR ALUMINUM.

ITEM 632- PEDESTRIAN SIGNAL HEAD (LED), (COUNTDOWN), TYPE D2, AS PER PLAN (CONTINUED)

- 4. HOUSINGS SHALL BE BLACK. PROPER EXTERIOR COLORS SHALL BE OBTAINED BY USE OF COLORED PLASTIC MATERIAL RATHER THAN PAINTING.
- 5. ALL LAMP UNITS SHALL HAVE A FIVE (5) YEAR MINIMUM WARRANTY. THE WARRANTY SHALL BE TRANSFERRED TO THE CITY OF CLEVELAND AT THE COMPLETION OF THE PROJECT.
- 6. ATTACH PEDESTRIAN SIGNAL HEAD BRACKET ARMS TO THE POLES BY UTILIZING 1-1/2" BLIND HALF COUPLINGS WELDED INTO THE POLE. DO NOT FIELD INSTALL WIRING HOLES FOR PEDESTRIAN SIGNALS.

ITEM 632 – DETECTOR LOOP, AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF 632.11 AND 632.23, THE FOLLOWING SHALL ALSO APPLY:

- 1. ALL DETECTOR LOOPS SHALL BE INSTALLED IN THE SURFACE COURSE OF ALL PAVEMENT TYPES.
- 2. ALL DETECTOR LOOPS SHALL BE CENTERED IN THE LANE.
- 3. EACH DETECTOR LOOP SHALL BE CONNECTED TO ITS OWN DETECTOR UNIT.

LOOP DETECTOR UNITS

IN ADDITION THE REQUIREMENTS OF 632.10, 732.07, AND 732.08, THE FOLLOWING SHALL ALSO APPLY:

- 1. THE OUTPUT DEVICE SHALL BE A RELAY, AND ALL CONTACTS SHALL BE IN THE WIRING HARNESS.
- 2. THE UNIT SHALL BE SELF-TUNING.
- 3. THE UNIT SHALL BE A TWO-CHANNEL AMPLIFIER.
- 4. EACH UNIT SHALL BE LABELED TO CORRESPOND TO ITS PHASE AND DIRECTION.
- 5. DELAY INHIBIT SHALL BE CONNECTED ON ALL DETECTOR HARNESSES FOR THEIR RESPECTIVE PHASE GREENS.

ITEM 632- REMOVAL OF TRAFFIC SIGNAL INSTALLATION, AS PER PLAN

TRAFFIC SIGNAL INSTALLATIONS, INCLUDING SIGNAL HEADS, CABLE, MESSENGER WIRE, STRAIN POLES, PEDESTRIAN POLES, LUMINAIRES, CABINETS, CONTROLLERS, PULL BOXES, SIGNAL SUPPORT MOUNTED SIGNS, ETC. SHALL BE REMOVED IN ACCORDANCE WITH 625.21, 630.12, AND 632.26 AT THE FOLLOWING INTERSECTIONS:

- 1. E. 55TH ST AND I-490/BOWER AVE
- 2. E. 55TH ST AND FRANCIS AVE
- 3. BUCKEYE RD AND E. 89TH ST
- 4. WOODLAND AVE AND E. 89TH ST

PULL BOXES SHALL BE REMOVED ENTIRELY WITH BACK FILLING, RESTORATION OF SURFACES AND DISPOSAL OF SURPLUS MATERIAL.

ALL ABANDONED CABLES SHALL BE REMOVED FROM AERIAL SPANS, CONDUIT, AND PULL BOXES. DIRECT BURIED CABLES MAY BE ABANDONDED IN PLACE. THE CONTRACTOR SHALL DISPOSE OF ALL REMOVED CABLES.

ITEM 632- REMOVAL OF TRAFFIC SIGNAL INSTALLATION, AS PER PLAN (CONTINUED)

THE CONTRACTOR SHALL NOTIFY ODOT AND THE CITY OF CLEVELAND 48 HOURS PRIOR TO THE REMOVAL OF ANY EXISTING TRAFFIC SIGNAL EQUIPMENT. ALL REMOVALS SHALL BE PERFORMED IN THE PRESENCE OF A DESIGNATED REPRESENTATIVE OF ODOT. ITEMS SHALL NOT BE REMOVED UNTIL A NEW OR TEMPORARY INSTALLATION IS IN OPERATION, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

REMOVED ITEMS AS INDICATED BY CITY STAFF SHALL BE RETURNED TO THE CITY OF CLEVELAND TO THE FOLLOWING LOCATION:

TRAFFIC SIGNAL UNIT  
4150 E. 49TH ST. BLDG. #4  
CLEVELAND, OH 44105

ITEMS TO BE RETURNED SHALL INCLUDE TRAFFIC SIGNAL HEADS, CONTROLLERS, PEDESTRIAN PUSH BUTTONS, PEDESTRIAN SIGNAL HEADS, CABINETS, PEDESTRIAN POLES, AND LUMINAIRES. OTHER MATERIALS SHALL BE DISPOSED OF BY THE CONTRACTOR. THE CONTRACTOR SHALL NOTIFY CITY OF CLEVELAND-TRAFFIC AND STORE THE MATERIALS ON SITE, SUITABLY PROTECTED, AT A DESIGNATED LOCATION FOR INSPECTION BY CITY STAFF WITHIN FIVE (5) BUSINESS DAYS OF NOTIFICATION BY THE CONTRACTOR. CITY STAFF WILL INDICATE WHICH REMOVED ITEMS WILL BE RETURNED TO THEIR FACILITY. THE CONTRACTOR WILL DELIVER THESE REMOVED ITEMS TO THE CITY FACILITY. THE CONTRACTOR MAY DISPOSE OF MATERIALS THAT ARE NOT INDICATED FOR RETURN WITHIN THE FIVE-DAY TIMEFRAME.

POINTS OF CONTACT FOR TRAFFIC SIGNALS

POINTS OF CONTACT FOR COORDINATION OF TRAFFIC SIGNAL WORK ARE:

ANDY CROSS  
CITY OF CLEVELAND  
DIVISION OF TRAFFIC ENGINEERING  
601 LAKESIDE AVENUE  
CLEVELAND, OHIO 44114  
(216) 664-3197  
ACROSS@CITY.CLEVELAND.OH.US

CHRIS HIRZEL  
DEPARTMENT OF PUBLIC UTILITIES  
CLEVELAND PUBLIC POWER  
1300 LAKESIDE AVENUE  
CLEVELAND, OHIO 44114  
(216) 664-3922  
CHIRZEL@CPP.ORG

TED RADER  
CLEVELAND ELECTRIC ILLUMINATING COMPANY  
6896 MILLER ROAD  
BRECKSVILLE, OHIO 44141  
(440) 546-8738  
RADERT@FIRSTENERGYCORP.COM

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
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**ITEM 632- SIGNAL SUPPORT, TYPE TC 81.21, AS PER PLAN**  
**ITEM 632- PEDESTAL, 8', TRANSFORMER BASE, AS PER PLAN**  
**ITEM 632- PEDESTAL, 16', TRANSFORMER BASE, AS PER PLAN**

FURNISH SIGNAL POLES AND MAST ARMS WHICH COMPLY WITH 632.15 AND 732.11, BUT DO NOT FURNISH POLES OR MAST ARMS THAT CONSIST OF STRAIGHT SECTIONS WITH A TAPERED EFFECT ACCOMPLISHED BY THE USE OF REDUCERS. FURNISH POLES THAT ARE CONSTRUCTED OF SINGLE SECTION TRUE CONTINUOUS TAPERED TUBES, AND MAST ARMS THAT ARE CONSTRUCTED OF ONE OR TWO SECTION TRUE CONTINUOUS TAPERED TUBES, AS SHOWN ON STANDARD CONSTRUCTION DRAWING TC-81.21.

SIGNAL SUPPORTS SHALL COMPLY WITH CITY OF CLEVELAND STANDARD SPECIFICATIONS. SIGNAL SUPPORTS SHALL BE PAINTED DARK BRONZE, FEDERAL COLOR NUMBER F-283. ALL SUPPORTS SHALL BE HOT-DIP GALVANIZED PRIOR TO PAINTING.

IN ADDITION TO THE REQUIREMENTS OF SPECIFICATION 632, SIGNAL SUPPORTS AND PEDESTALS SHALL BE PAINTED IN ACCORDANCE WITH THE FOLLOWING:

1. POWDER COATING - DARK BRONZE
  - A. SURFACE PREPARATION - THE EXTERIOR STEEL SURFACE SHALL BE BLAST CLEANED TO STEEL STRUCTURES PAINTING COUNCIL SURFACE PREPARATION SPECIFICATION NO. 6 (SSPC-SP6) REQUIREMENTS UTILIZING CAST STEEL ABRASIVES CONFORMING TO THE SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) RECOMMENDED PRACTICE J827. THE BLAST METHOD USED IS A RECIRCULATING, CLOSED CYCLE CENTRIFUGAL WHEEL SYSTEM WITH ABRASIVE CONFORMING TO SAE SHOT NUMBER S280.
  - B. INTERIOR COATING - INTERIOR SURFACES (POLE SHAFTS ONLY) AT THE BASE END FOR A LENGTH OF APPROXIMATELY 2.0 FEET SHALL BE MECHANICALLY CLEANED AND COATED WITH A ZINC RICH EPOXY POWDER. THE COATING SHALL BE ELECTROSTATICALLY APPLIED AND CURED IN A GAS FIRED CONVECTION OVEN BY HEATING THE STEEL SUBSTRATE TO A MINIMUM OF 350 DEGREES FAHRENHEIT AND A MAXIMUM OF 400 DEGREES FAHRENHEIT.
  - C. EXTERIOR COATING - ALL THE EXTERIOR SURFACES SHALL BE COATED WITH A URETHANE OR TRIGLYCIDYL ISOCYANURATE (TGIC) POLYESTER POWDER TO A MINIMUM FILM THICKNESS OF 2.0 MILS (0.0029#32). THE COATING SHALL BE ELECTROSTATICALLY APPLIED AND CURED IN A GAS FIRED CONVECTION OVEN BY HEATING THE STEEL SUBSTRATE TO A MINIMUM OF 350 DEGREES FAHRENHEIT. THE THERMOSETTING POWDER RESIN SHALL PROVIDE BOTH INTERCOAT AS WELL AS SUBSTRATE FUSION ADHESION THAT MEETS 5A OR 5B CLASSIFICATIONS OF ASTM D3359.

2. COMBINATION COATING GALVANIZED - POWDER TOP COAT COLOR: DARK BRONZE
  - A. SURFACE PREPARATION - PRIOR TO BEING INCORPORATED INTO AN ASSEMBLED PRODUCT, STEEL PLATES 3/4 INCHES OR MORE IN THICKNESS SHALL BE BLAST CLEANED WHEN REQUIRED TO REMOVE ROLLED-IN MILL SCALE, IMPURITIES AND NON-METALLIC FOREIGN MATERIALS. AFTER ASSEMBLY, ALL WELD FLUX SHALL BE MECHANICALLY REMOVED. THE IRON OR STEEL PRODUCT SHALL BE DEGREASED BY IMMERSION IN AN AGITATED 4.5% - 6.0% CONCENTRATED CAUSTIC SOLUTION ELEVATED TO A TEMPERATURE RANGING FROM 150 DEGREES FAHRENHEIT TO 190 DEGREES FAHRENHEIT.

**ITEM 632- SIGNAL SUPPORT, TYPE TC 81.21, AS PER PLAN**  
**ITEM 632- PEDESTAL, 8', TRANSFORMER BASE, AS PER PLAN**  
**ITEM 632- PEDESTAL, 16', TRANSFORMER BASE, AS PER PLAN**  
**(CONTINUED)**

IT SHALL NEXT BE RINSED CLEAN FROM ANY RESIDUAL EFFECTS OF THE CAUSTIC OR ACID SOLUTIONS BY IMMERSION IN A CIRCULATING FRESH WATER BATH. FINAL PREPARATION SHALL BE ACCOMPLISHED BY IMMERSION IN CONCENTRATED ZINC AMMONIUM CHLORIDE FLUX SOLUTION HEATED TO 130 DEGREES FAHRENHEIT. THE SOLUTION'S ACIDITY CONTENT SHALL BE MAINTAINED BETWEEN 4.5-5.0 pH. THE ASSEMBLY SHALL BE AIR-DRIED TO REMOVE ANY MOISTURE REMAINING IN THE FLUX COAT AND/OR TRAPPED WITHIN THE PRODUCT.

- B. ZINC COATING - THE PRODUCT SHALL BE HOT-DIP GALVANIZED TO THE REQUIREMENTS OF EITHER ASTM A123 (FABRICATED PRODUCTS) OR ASTM A153 (HARDWARE ITEMS) BY IMMERSION IN A MOLTEN BATH OF PRIME WESTERN GRADE ZINC MAINTAINED BETWEEN 810 DEGREES FAHRENHEIT AND 850 DEGREES FAHRENHEIT. THE ENTIRE PRODUCT SHALL BE TOTALLY IMMERSED WITH NO PART OF IT PROTRUDING OUT OF THE ZINC (NO DOUBLE DIPPING). THIS IS TO LIMIT A RISK OF TRAPPED CONTAMINATES CONTAINING CHLORIDES AND REDUCE THE RISK OF BARE SPOTS (BARE SPOTS CAN OCCUR WHEN FLUX ON THE STEEL SURFACE IS BURNED AWAY BY HEAT OF THE FIRST DIP). MAXIMUM ALUMINUM CONTENT OF THE BATH SHALL BE 0.01%. FLUX ASH SHALL BE SKIMMED FROM THE BATH SURFACE PRIOR TO IMMERSION AND EXTRACTION OF THE PRODUCT TO ASSURE A DEBRIS FREE ZINC COATING.
- C. EXTERIOR COATING - ALL GALVANIZED EXTERIOR SURFACES SHALL BE COATED WITH A URETHANE OR TRIGLYCIDYL ISOCYANURATE (TGIC) POLYESTER POWDER TO A MINIMUM FILM THICKNESS OF 2.0 MILS (0.002"). PRIOR TO APPLICATION, THE SURFACES TO BE POWDER COATED SHALL BE MECHANICALLY ETCHED BY BRUSH BLASTING (REF. SSPC-SP7) AND THE ZINC COATED SUBSTRATE PREHEATED TO 450 DEGREES FAHRENHEIT FOR A MINIMUM OF ONE HOUR IN A GAS FIRED CONVECTION OVEN. THE COATING SHALL BE ELECTROSTATICALLY APPLIED AND CURED IN A GAS FIRE CONVECTION OVEN BY HEATING THE ZINC COATED SUBSTRATE TO A MINIMUM OF 350 DEGREES FAHRENHEIT AND A MAXIMUM OF 400 DEGREES FAHRENHEIT. THE THERMOSETTING POWDER RESIN SHALL PROVIDE BOTH INTERCOAT AS WELL AS SUBSTRATE FUSION ADHESION THAT MEETS 5A OR 5B CLASSIFICATION OF ASTM D3559.

MINIMUM CLEARANCE FROM OVERHEAD ELECTRIC WIRES SHALL COMPLY WITH REQUIREMENTS OF THE NATIONAL ELECTRIC SAFETY CODE, RULE 232, AND THE REQUIREMENTS OF THE LOCAL POWER COMPANIES PROVIDING ELECTRICAL SERVICE.

DUE TO THE POSSIBILITY OF CONFLICT WITH EXISTING OR PROPOSED UNDERGROUND OBSTRUCTIONS (INCLUDING THE POSSIBILITY OF UNRECORDED OBSTRUCTIONS) WHICH COULD AFFECT THE LOCATION OF THE FOUNDATIONS FOR THESE ITEMS, AND CONSEQUENTLY, THE DESIGN OF THE VARIOUS SUPPORTS, AND/OR ARMS, DO NOT PLACE FINAL ORDERS FOR THESE ITEMS UNTIL THE FOUNDATIONS HAVE BEEN INSTALLED.

**ITEM 632 - SIGNAL SUPPORT FOUNDATION, AS PER PLAN**

IN ADDITION TO THE REQUIREMENTS OF 632.14 AND STANDARD CONSTRUCTION DRAWING TC-21.20, INSTALL A 14' SIGNAL SUPPORT FOUNDATION FOR SP-3 AT THE INTERSECTION OF O.C. BLVD AND E. 79TH ST.

**ITEM 632- INTERCONNECT CABLE, 6 PAIR, NO. 19 SOLID, REA (PE-39), AS PER PLAN**

IN ADDITION TO THE REQUIREMENTS OF 632.23 AND 732.19, THE FOLLOWING REQUIREMENTS SHALL APPLY:

INTERCONNECT FOR UNDERGROUND CONNECTIONS SHALL BE PROVIDED IN ONE OF THE TWO CONDUITS IN DUCT BANK DESIGNATED FOR TRAFFIC USE. CONDUIT SHALL INCLUDE TONE/WIRE AND/OR PULL CORD.

INTERCONNECT SHALL BE PROVIDED BY CONTINUOUS, TWISTED-PAIR CABLE BETWEEN CONTROLLERS. SPLICING IS NOT ALLOWED.

**ITEM 632- CABLE AND WIRE, AS PER PLAN**

IN ADDITION TO THE REQUIREMENTS OF 632.23 AND 732.19, THE FOLLOWING REQUIREMENTS SHALL APPLY:

A MINIMUM LENGTH OF 4-FOOT SLACK SHALL BE PROVIDED FOR ALL CABLE ENDS IN PULL BOXES.

**ITEM 633- CONTROLLER UNIT, TYPE TS2/A2, WITH CABINET, TYPE TS2, AS PER PLAN**

IN ADDITION TO THE REQUIREMENTS OF 633.07, 633.08, 733.02 AND 733.03, THE FOLLOWING REQUIREMENTS SHALL APPLY:

THE CONTRACTOR SHALL FURNISH AND INSTALL AN ACTUATED, 8-PHASE, SOLID STATE DIGITAL MICROPROCESSOR TYPE CONTROLLER WITH SECONDARY COORDINATOR, MENU DRIVEN PROMPTS, INTERNAL TBC, TELEMETRY UNIT, AND ALL OTHER ACCESSORIES THAT ARE NECESSARY TO MAKE THE CONTROLLER COMPLETELY FUNCTIONAL AND OPERATION AT EACH OF THE SIGNALIZED INTERSECTIONS WHERE A NEW CONTROLLER IS REQUIRED. THE CONTROLLERS SHALL BE SHELF-MOUNTED. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY EQUIPMENT WITHIN THE CONTROLLER CABINETS TO COMPLY WITH ODOT AND CITY OF CLEVELAND STANDARDS AND PROVIDE A FULLY FUNCTIONAL CABINET CAPABLE OF RUNNING THE INTERSECTION AS REQUIRED.

THE CONTROLLERS SHALL BE THE CURRENT MODEL OF SIEMENS' EAGLE TS-2 TYPE 1 CONTROLLERS. THE CONTROLLERS SHALL BE INSTALLED IN EAGLE TS-2 TYPE 1 M-36 CABINETS (GROUND-MOUNTED).

CONTROLLERS AND CABINETS SHALL INCLUDE THE FOLLOWING FEATURES:

1. THE FOLLOWING SWITCHES SHALL BE MOUNTED ON THE SWITCH PANEL IN THE CABINET:
  - A. RUN / STOP TIME
  - B. CONTROLLER TIME POWER
  - C. COORDINATION / FREE
  - D. DETECTOR TEST
  - E. FLASH CONTROL

**ITEM 633- CONTROLLER UNIT, TYPE TS2/A2, WITH CABINET, TYPE TS2, AS PER PLAN (CONTINUED)**

2. THE FOLLOWING SWITCHES SHALL BE ACCESSIBLE VIA A POLICE PANEL DOOR:
  - A. SIGNAL SHUTDOWN
  - B. FLASH CONTROL
  - C. MANUAL PUSH BUTTON AND 10-FOOT EXTENSION CORD
  - D. AUTOMATIC / MANUAL TRANSFER
3. A SERVICE LAMP WITH DOOR ACTIVATED ON / OFF SWITCH.
4. A RISER WITH A MINIMUM HEIGHT OF 12 INCHES SHALL BE INSTALLED AT THE BASE CONTROLLER CABINET IN ACCORDANCE WITH C&MS 733.04, PART A. THE RISER SHALL BE PAID FOR UNDER ITEM 633 - CABINET RISER, AS PER PLAN.
5. THE CABINET DOOR SHALL BE KEYED WITH A CORBIN #2 LOCK.
6. LIGHTNING PROTECTION SHALL BE PROVIDED.
7. THE CONTROLLERS SHALL BE PRE-PROGRAMMED WITH ALL CURRENT SETTINGS.
8. ALL CONTROLLER CABINETS SHALL BE CAPABLE OF RUNNING A MINIMUM OF EIGHT (8) VEHICLE PHASES WITH FOUR (4) PEDESTRIAN PHASES AND FOUR (4) OVERLAPS WITH A MINIMUM OF 16 LOAD SWITCH BAYS.
9. TRAFFIC CONTROL EQUIPMENT SHALL COMPLY WITH C&MS 633 AND 733.
10. CABINETS SHALL BE PAINTED DARK BRONZE, FEDERAL COLOR NUMBER F-283 USING THE PROCESS DESCRIBED IN ITEM 632 - SIGNAL SUPPORT, TYPE TC 81.21, AS PER PLAN.
11. ALL TRAFFIC SIGNAL INSTALLATIONS SHALL BE DESIGNED AND EQUIPPED FOR APPROACH MONITORING. IF A TWO-PHASE SIGNAL IS USED, A DUAL RING CONTROLLER AND CABINET WIRING UTILIZING PHASES 2+6 AND 4+8 SHALL BE FURNISHED AND INSTALLED.
12. TWO-CHANNEL, RACK-MOUNTED DETECTOR UNITS SHALL BE PROVIDED FOR EACH LOOP DETECTOR.

**ITEM 633- CABINET RISER, AS PER PLAN**

IN ADDITION TO THE REQUIREMENTS OF 632.09 AND 733.04, THE FOLLOWING REQUIREMENTS SHALL APPLY:

RISERS SHALL BE PAINTED DARK BRONZE, FEDERAL COLOR NUMBER F-283 USING THE PROCESS DESCRIBED IN ITEM 632 - SIGNAL SUPPORT, TYPE TC 81.21, AS PER PLAN.

**ITEM 625 - PLASTIC CAUTION TAPE, AS PER PLAN**

IN ADDITION TO THE REQUIREMENTS OF 625.20 AND 725.22, THE PLASTIC CAUTION TAPE SHALL HAVE THE WORDS "TRAFFIC - ELECTRIC" IN BLACK CAPITAL LETTERS, ONE SIDE ONLY.

**CONTINUOUS INTERSECTION SIGNALIZATION**

SIGNALIZED TRAFFIC CONTROL OPERATIONS SHALL BE MAINTAINED AT ALL TIMES BY USE OF EXISTING, TEMPORARY OR NEW TRAFFIC SIGNALS.

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		







SHEET	LOCATION	625	625	625	625	625	625	625	625	625	632	632	632	632	632	632	632	632	632	632	632	632	632	632
		CONDUIT, 2", 725.051	CONDUIT, 3", 725.051	CONDUIT, 4", 725.051	TRENCH, 36" DEEP	PULL BOX, MISC.: 725.06, 13" X 24"	PULL BOX, MISC.: 725.06, 17" X 30"	PULL BOX, MISC.: 725.06, 24" X 36"	GROUND ROD	PLASTIC CAUTION TAPE, AS PER PLAN	VEHICULAR SIGNAL HEAD, (LED) YELLOW, 3-SECTION, 12" LENS, 1-WAY, WITH BACKPLATE, AS PER PLAN	VEHICULAR SIGNAL HEAD, (LED) YELLOW, 5-SECTION, 12" LENS, 1-WAY, WITH BACKPLATE, AS PER PLAN	PEDESTRIAN SIGNAL HEAD (LED), (COUNTDOWN), TYPE D2, AS PER PLAN	COVERING OF VEHICULAR SIGNAL HEAD	PEDESTRIAN PUSHBUTTON, AS PER PLAN	DETECTOR LOOP, AS PER PLAN	LOOP DETECTOR UNIT, AS PER PLAN	SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG	SIGNAL CABLE, 9 CONDUCTOR, NO. 14 AWG	SIGNAL SUPPORT FOUNDATION	SIGNAL SUPPORT FOUNDATION, AS PER PLAN	PEDESTAL FOUNDATION	LOOP DETECTOR LEAD-IN CABLE	POWER SERVICE, AS PER PLAN
		FT	FT	FT	FT	EACH	EACH	EACH	EACH	FT	EACH	EACH	EACH	EACH	EACH	EACH	EACH	FT	FT	EACH	EACH	EACH	FT	EACH
9	E. 55TH ST. & QUADRANT RD.	318	326	22	475	2	4	1	7	475	4	2	6	6	6	6	6	1,666		3		3	556	1
13	O.C. BLVD. & QUADRANT RD.	278	481	30	485	2	3	1	5	485	9	1		10		8	8	1,162		3		1	1,792	1
17	O.C. BLVD & KINSMAN RD.	398	745	22	745	4	3	1	9	745	9	4	8	13	8	14	14	3,508		4		4	3,014	1
21	O.C. BLVD & E. 75TH ST.	341	740	26	675	4	4	1	9	675	6	4	8	10	8	12	12	2,871		4		4	2,630	1
TOTALS CARRIED TO TRAFFIC SIGNAL GENERAL SUMMARY		1,335	2,292	100	2,380	12	14	4	30	2,380	28	11	22	39	22	40	40	9,207	0	14	0	12	7,992	4
SHEET	LOCATION	632	632	632	632	632	632	632	632	632	632	632	632	633	633	633	633							
		SIGNAL SUPPORT, TYPE TC-81.21, DESIGN 2, AS PER PLAN	SIGNAL SUPPORT, TYPE TC-81.21, DESIGN 3, AS PER PLAN	SIGNAL SUPPORT, TYPE TC-81.21, DESIGN 4, AS PER PLAN	SIGNAL SUPPORT, TYPE TC-81.21, DESIGN 11, AS PER PLAN	SIGNAL SUPPORT, TYPE TC-81.21, DESIGN 12, AS PER PLAN	SIGNAL SUPPORT, TYPE TC-81.21, DESIGN 13, AS PER PLAN	SIGNAL SUPPORT, TYPE TC-81.21, DESIGN 14, AS PER PLAN	SIGNAL SUPPORT, MECHANICAL DAMPER FOR TC-81.21 MAST ARM (GREATER THAN 59' IN LENGTH)	PEDESTAL, 8', TRANSFORMER BASE, AS PER PLAN	PEDESTAL, 16', TRANSFORMER BASE, AS PER PLAN	REMOVAL OF TRAFFIC SIGNAL INSTALLATION, AS PER PLAN	SIGNALIZATION, MISC., SECURITY SURVEILLANCE SYSTEM	CONTROLLER UNIT, TYPE TS2/A2, WITH CABINET, TYPE TS2, AS PER PLAN	CABINET RISER, AS PER PLAN	CABINET FOUNDATION	CONTROLLER WORK PAD							
		EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH							
9	E. 55TH ST. & QUADRANT RD.	1		1		1				3		1	1	1	1	1	1							
13	O.C. BLVD. & QUADRANT RD.	1			2						1		1	1	1	1	1							
17	O.C. BLVD & KINSMAN RD.		2				1	1	1	1	3		1	1	1	1	1							
21	O.C. BLVD & E. 75TH ST.				1	1	1	1	1	4			1	1	1	1	1							
TOTALS CARRIED TO TRAFFIC SIGNAL GENERAL SUMMARY		2	2	1	3	2	2	2	2	8	4	1	4	4	4	4	4							
		1	2019-06-19	DC009																				
		0	2019-06-04	RFC																				
		NO.	DATE	DESCRIPTION																				
		ISSUE RECORD																						







NOTES:

1. FOR STREET NAME SIGN DETAILS, SEE BU-26.
2. FOR INTERCONNECT DETAILS SEE SHEETS 39 - 41.
3. THE CONTRACTOR SHALL ENSURE THAT ALL SIGNAL FACES ARE CLEARLY VISIBLE TO ALL ON-COMING VEHICLES; CLEAR OF ANY OBSTRUCTIONS ONCE MOUNTED TO THE MAST ARMS.
4. CONDUIT DEPTH SHALL BE 36" MINIMUM.

(2)-3" CONDUIT WITH (4)-7/C AND (2)-2/C, IN TRENCH = 99'

PB-4

(1)-2" CONDUIT WITH (2)-2/C, IN TRENCH = 30'

PB-3

(1)-2" CONDUIT WITH (2)-7/C IN TRENCH = 21'

SP-1, TYPE TC-81.21, DESIGN 4 WITH 38' MAST ARM, (1) PED. SIGNAL HEAD, AND (1) PED. PUSHBUTTON "P6A" STA. 11+21.0, 33.3' LT

(1)-2" CONDUIT WITH (2)-7/C, IN TRENCH = 116'

PB-6

(1)-2" CONDUIT WITH (2)-7/C, IN TRENCH = 5'

SP-2, TYPE TC-81.21, DESIGN 2 WITH 31' MAST ARM, (1) PED. SIGNAL HEAD AND (1) PED. PUSHBUTTON "P2A" STA. 10+22.0, 33.3' LT

PULLBOX TABLE

PULL BOX #	STATION	SIDE	OFFSET	SIZE (IN.)
PB-1	11+27.0	RT	60.4'	24 x 36
PB-2	11+06.4	RT	95.5'	13 x 24
PB-3	11+41.4	LT	37.6'	17 x 30
PB-4	11+71.5	LT	37.6'	13 x 24
PB-5	10+49.9	RT	85.0'	17 x 30
PB-6	10+25.4	LT	37.1'	17 x 30
PB-7	11+11.2	RT	77.1'	17 x 30
-	-	-	-	-

PS-1, 8' PEDESTAL WITH (1) PED. SIGNAL HEAD AND (1) PED. PUSHBUTTON "P6B" STA. 11+31.0, 49.9' RT

POWER SOURCE STA. 11+38.6, 58.2' RT.

(1)-2" CONDUIT WITH (1)-7/C, IN TRENCH = 11'

(1)-2" CONDUIT W/ (2)-7/C AND (1)-2" CONDUIT W/ (1)-CAT 5E IN TRENCH = 6'

PB-1

(1)-2" CONDUIT W/ (1)-POWER IN TRENCH = 25'

SP-3, TYPE TC-81.21, DESIGN 12 WITH 48' MAST ARM, (1) PTZ SURVEILLANCE CAMERA, (1) PED. PUSHBUTTON "P8A" AND (1) PED. SIGNAL HEAD STA. 11+23.1, 55.5' RT

(2)-4" CONDUIT W/ (9)-7/C AND (2)-2/C, (1)-2" CONDUIT W/ (1)-CAT 5E IN TRENCH = 11'

TS-2 TYPE 1 CONTROLLER IN TS-2 TYPE 1 M-36 CABINET W/ (1) NETWORK SWITCH FOR PTZ SURVEILLANCE CAMERA STA. 11+26.0, 71.1' RT

(1)-2" CONDUIT WITH (2)-7/C AND (4)-2/C, IN TRENCH = 15'

(1)-3" CONDUIT W/ (1)-INT (PAID BY INTERCONNECT) IN TRENCH = 21' (PAID BY INTERCONNECT)

PB-7

PULLBOX PAID BY INTERCONNECT

(1)-2" CONDUIT WITH (4)-2/C, IN TRENCH = 19'

PB-2

(2)-3" CONDUIT WITH (2)-7/C IN TRENCH = 64'

PULLBOX PAID BY INTERCONNECT

PB-5

(1)-2" CONDUIT WITH (1)-7/C IN TRENCH = 20'

PS-2, 8' PEDESTAL WITH (1) PED. SIGNAL HEAD AND (1) PED. PUSHBUTTON "P8B" STA. 10+43.1, 65.5' RT

(1)-2" CONDUIT WITH (1)-7/C IN TRENCH = 58'

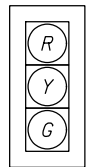
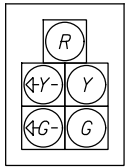
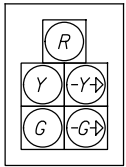
PS-3, 8' PEDESTAL WITH (1) PED. SIGNAL HEAD, AND (1) PED. PUSHBUTTON "P2B" STA. 10+13.2, 38.6' RT

NOTE:

\* - THE CONTRACTOR SHALL VERIFY THE STREET NAME WITH THE CITY OF CLEVELAND PRIOR TO FABRICATION OF THE SIGN.

SIGNAL TYPES

ALL SIGNAL HEADS SHALL HAVE 12" LED LENSES. SIGNAL HEADS SHALL BE YELLOW WITH BACKPLATES. SIGNAL HEAD VISORS SHALL BE POLYCARBONATE PLASTIC, CUT-AWAY TYPE AND BE FLAT BLACK ON THE INSIDE.



PEDESTRIAN HEADS (LED, COUNTDOWN, TYPE D2)

STREET NAME SIGNS

E. 55 St



\* Quadrant



PEDESTRIAN SIGNS



R10-3e

3 - LEFT ARROW (SP-1, SP-3, PS-2)  
3 - RIGHT ARROWS (SP-2, PS-1, PS-3)

LEGEND

	PROP	EXIST
TRAFFIC SIGNAL, 3 UNIT HEAD, 12"		
TRAFFIC SIGNAL, 3 UNIT HEAD, 12" WITH ARROWS		
TRAFFIC SIGNAL, 4 OR 5 UNIT HEAD, 12"		
SIGNAL SUPPORT POLE		
PEDESTRIAN SIGNAL		
PEDESTRIAN PUSH BUTTON		
PEDESTAL SUPPORT		
LUMINAIRE, CONVENTIONAL		
CONTROLLER CABINET AND WORK PAD (TS-2)		
TRAFFIC PULL BOX		
PTZ CAMERA		
DETECTOR LOOP		
DETECTION ZONE		
PROPOSED CONDUIT		

NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-06-04	RFC
ISSUE RECORD		



SIGNAL TIMING CHART

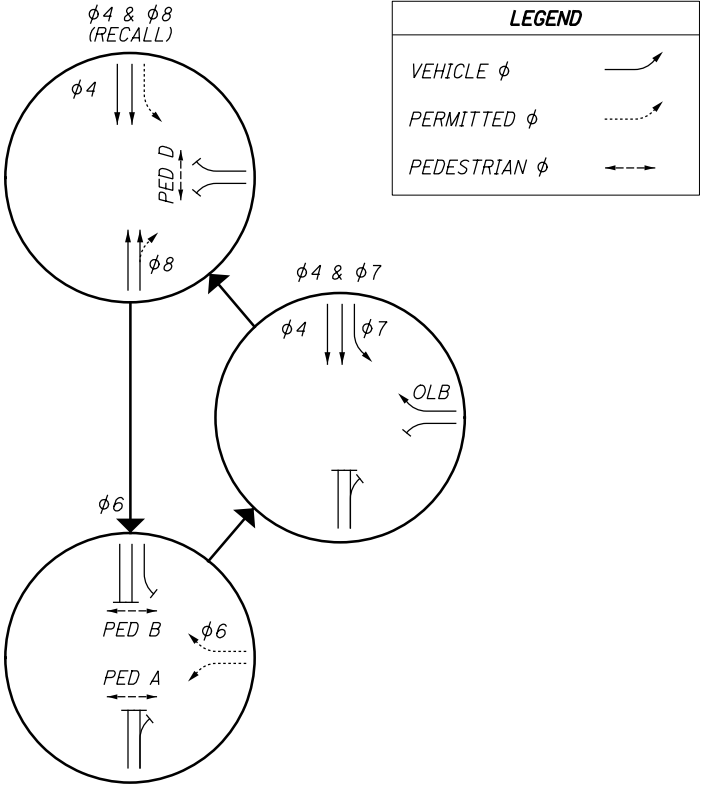
INTERSECTION: E. 55TH ST. / QUADRANT RD.									
MAINTAINING AGENCY: CITY OF CLEVELAND									
START UP  START IN: ALL RED TIME FOR FLASH OR ALL RED: 5 FIRST PHASE(S): 4 + 8 COLOR DISPLAYED: GREEN		DUAL ENTRY: YES		PHASES: 4, 8					
		REST IN RED:		RING 1 - RING 2 -					
		OVERLAP		A	B	C	D		
		PHASES		-	7	-	-		
INTERVAL OR FEATURE		CONTROLLER MOVEMENT NO.							
INTERSECTION MOVEMENT (PHASE)		1	2	3	4	5	6	7	8
DIRECTION		-	-	-	SB	-	WB	SBL	NB
MINIMUM GREEN (INITIAL) (SEC.)		-	-	-	20	-	10	7	20
ADDED INITIAL *(SEC./ACTUATION)		-	-	-	-	-	-	-	-
MAXIMUM INITIAL (SEC.)		-	-	-	-	-	-	-	-
PASSAGE TIME (PRESET GAP) (SEC.)		-	-	-	-	-	3	3	-
TIME BEFORE REDUCTION *(SEC.)		-	-	-	-	-	-	-	-
MINIMUM GAP *(SEC.)		-	-	-	-	-	-	-	-
TIME TO REDUCE *(SEC.)		-	-	-	-	-	-	-	-
MAXIMUM GREEN I (SEC.)		-	-	-	60	-	40	20	60
MAXIMUM GREEN II (SEC.)		-	-	-	-	-	-	-	-
YELLOW CHANGE (SEC.)		-	-	-	4	-	3	3.2	4
ALL RED CLEARANCE (SEC.)		-	-	-	1	-	2	1.6	1
WALK (SEC.)		-	-	-	-	-	7	-	7
PEDESTRIAN CLEARANCE (SEC.)		-	-	-	-	-	16	-	16
RECALL	MAXIMUM (ON/OFF)	-	-	-	ON	-	-	-	ON
	MINIMUM (ON/OFF)	-	-	-	-	-	-	-	-
	PEDESTRIAN (ON/OFF)	-	-	-	-	-	-	-	-
MEMORY (ON/OFF)		-	-	-	-	-	-	-	-

\*VOLUME DENSITY CONTROLS

NOTES:

- ENABLE  $\phi 7$  DETECTOR SWITCHING TO ALLOW  $\phi 7$  TO EXTEND  $\phi 4$  &  $\phi 8$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- COUNTDOWN PEDESTRIAN SIGNALS SHALL GO TO ZERO ON YELLOW PER OMUTCD FIGURE 4E-2.
- ALL DETECTOR DELAYS SHALL BE PLACED IN THE CONTROLLER.

PHASING DIAGRAM



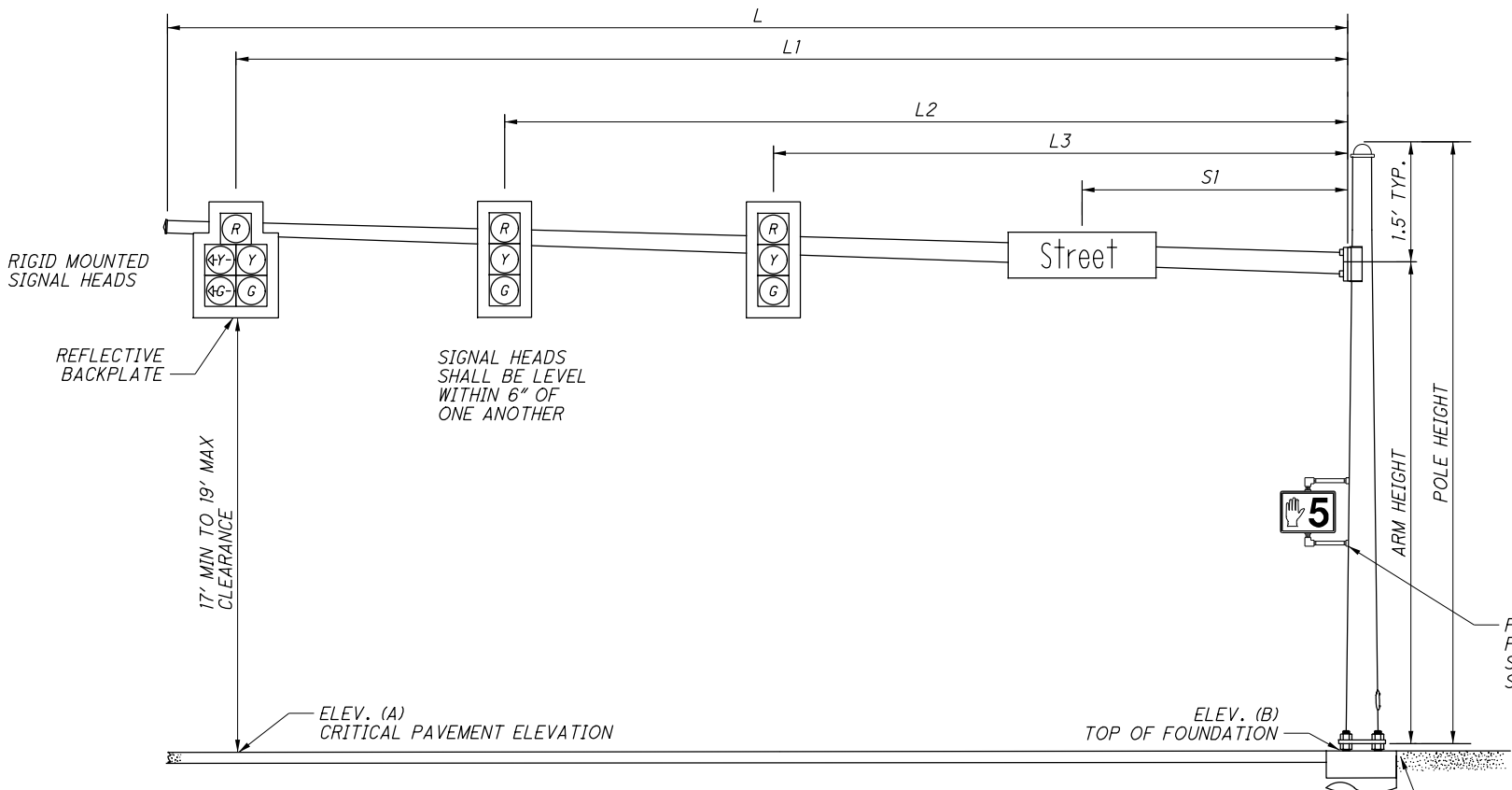
TRAFFIC SIGNAL DETECTOR CHART

LOOP DESIGNATION	LOOP CONFIGURATION **	SIZE (FT.)	PULSE OR PRESENCE	DELAY PROGRAMMED IN CONTROLLER (SEC.)	EXTENSION PROGRAMMED IN CONTROLLER (SEC.)	CONNECT TO DETECTOR UNIT (UNIT-CHANNEL)	ASSOCIATED CONTROLLER PHASE
L1A	P	20 x 6	PRESENCE	3	-	1-1	6
L1B	P	10 x 6	PRESENCE	0	-	2-1	6
-	-	-	-	-	-	-	-
L6A	P	20 x 6	PRESENCE	8	-	3-1	6
L6B	P	10 x 6	PRESENCE	0	-	4-1	6
L7A	P	20 x 6	PRESENCE	0	-	5-1	7
L7B	P	10 x 6	PRESENCE	0	-	6-1	7
-	-	-	-	-	-	-	-

\*\* CONFIGURATION: POWERHEAD (P); PER TC-82.10

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		





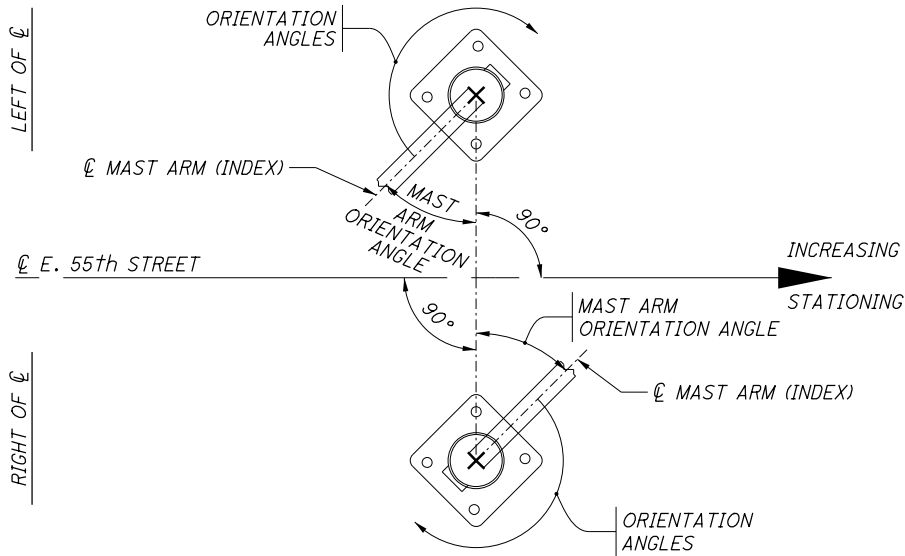
**SIGNAL SUPPORT ELEVATION**  
**(TYPICAL)**

THIS DIAGRAM IS A TYPICAL LAYOUT FOR PLACEMENT OF ITEMS ON MAST ARM. CONTRACTOR SHALL REFER TO TABLE BELOW WITH DISTANCES ALONG MAST ARM FOR SPECIFIC PLACEMENT, EACH VARY BY APPROACH.

**MAST ARM TABLE**

SUPPORT NO.	STATION	OFFSET	ELEVATION		DESIGN TYPE	DESIGN NO.	SIGNAL SUPPORT DETAILS										ORIENTATION ANGLES FROM MAST ARM					
			A	B			POLE HEIGHT	ARM HEIGHT *	L	L1	L2	L3	S1	-	-	MAST ARM A ANGLE	PEDESTRIAN SIGNAL	PEDESTRIAN BUTTON	-	-	HANDHOLE	CABLE ENTRANCE 12" FROM TOP
							FT	FT	FT	FT	FT	FT	FT	FT	FT	DEG	DEG	DEG	-	-	DEG	DEG
SP-1	11+21.0	33.3' LT	667.90	667.60	TC-81.21	4	22.5	21.0	38	35	23	-	15	-	-	90	180	180	-	-	180	-
SP-2	10+22.0	33.3' LT	668.15	668.26	TC-81.21	2	22.5	21.0	32	28	17	-	10	-	-	0	90	90	-	-	180	-
SP-3	11+23.1	55.5' RT	667.38	667.01	TC-81.21	12	22.5	21.0	48	45	33	-	23	-	-	0	0	180	-	-	180	-
PS-1	11+31.0	49.9' RT	-	667.14	PEDESTAL	-	8	-	-	-	-	-	-	-	-	-	90	90	-	-	270	-
PS-2	10+43.1	65.5' RT	-	667.04	PEDESTAL	-	8	-	-	-	-	-	-	-	-	-	0	0	-	-	180	-
PS-3	10+13.2	38.6' RT	-	668.13	PEDESTAL	-	8	-	-	-	-	-	-	-	-	-	85	90	-	-	265	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\* - FIELD VERIFY ACTUAL ELEVATIONS PRIOR TO ORDERING SIGNAL SUPPORTS.



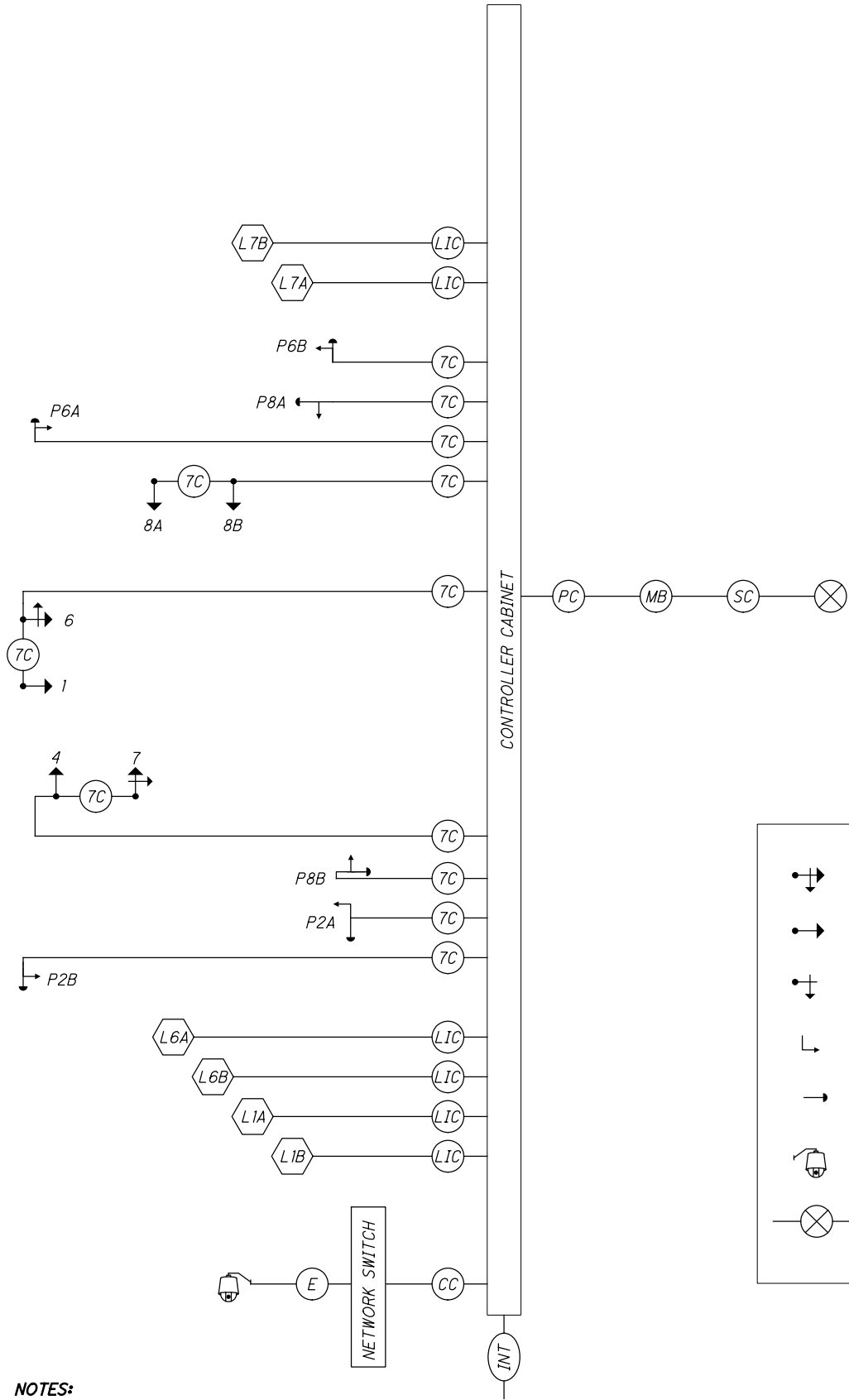
**POLE ORIENTATION**

TOP OF SIGNAL SUPPORT AND PEDESTAL FOUNDATIONS SHALL BE LEVEL WITH THE SIDEWALK ELEVATION WHERE ADA LANDINGS ARE ADJACENT; ELSEWHERE, FOUNDATIONS SHALL BE 2" (± 1") ABOVE GRADE PER TC-21.20

1	2024-09-10	RECORD DRAWINGS
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ISSUE RECORD		



WIRING DIAGRAM



NOTES:

- FOR LOCATIONS WITH LEFT TURN LANES RUN 7C FOR POTENTIAL PT/PM LT PHASE IF INITIAL DESIGN IS FOR PERMITTED ONLY.
- OVERLAPS SHALL BE WIRED TO THE APPROPRIATE LOAD SWITCHES AS PER THE FIELD HOOKUP CHART AND CONFIGURED IN THE CONTROLLER SOFTWARE PER THE SIGNAL TIMING CHART.

FIELD WIRING HOOK-UP CHART

SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH	SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH		
1 (WB LT)	R	φ6R	R	7 (SB LT)	R	φ4R	Y		
	Y	φ6Y			Y	φ4Y			
	G	φ6G			G	φ4G			
	—	—			←Y—	φ7Y			
	—	—			←G—	φ7G			
—	—	—	—	8A & 8B (NB)	R	φ8R	Y		
—	—	Y			φ8Y				
—	—	G			φ8G				
—	—	—		—	—	—	—	—	
—	—	—				—	—		
—	—	—	—			—			
—	—	—	—			—	—		—
	—	—					—		—
	—	—		—	—				
				PEDESTRIAN MOVEMENTS					
4 (SB)	R	φ4R	Y	P2A-P2B SOUTH	W	φ6 PED/LS 10 G	OUT		
	Y	φ4Y		DW	φ6 PED/LS 10 R				
	G	φ4G		—	—	—	—		
6 (WB RT)	R	φ6R	R	P6A-P6B NORTH	W	φ6 PED/LS 10 G	OUT		
	Y	φ6Y			DW	φ6 PED/LS 10 R			
	G	φ6G		P8A-P8B EAST	W	φ8 PED/LS 11 G	OUT		
	—Y→	φ7Y			DW	φ8 PED/LS 11 R			
	—G→	φ7G		OVERLAPS					
—	—	—	OLB	—Y→	φ7Y/LS 12 Y	OUT			
—	—			—G→	φ7G/LS 12 G				
—	—		—	—	—	—	—		
LS = LOAD SWITCH				—	—	—	—		

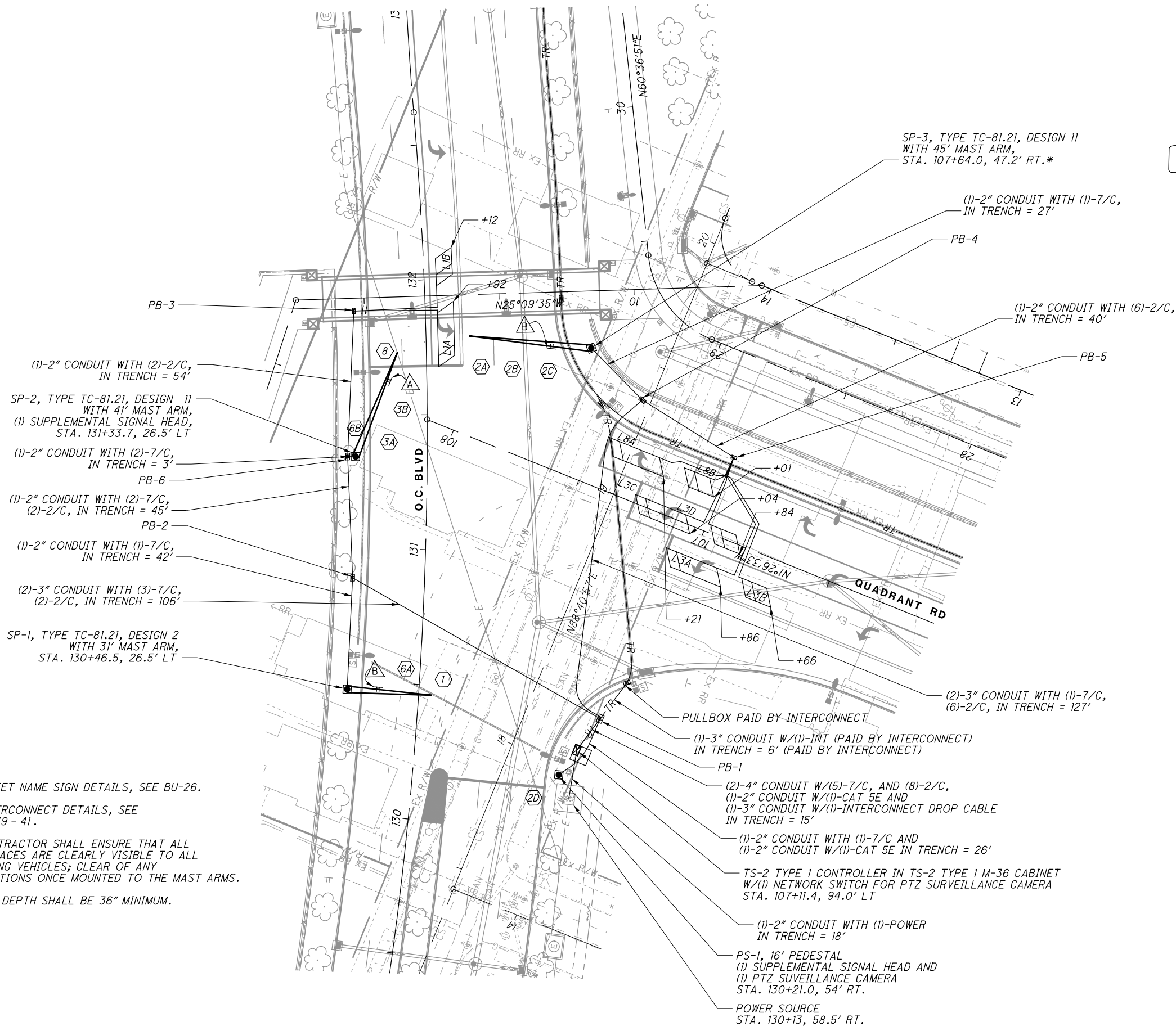
LEGEND

	5 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		2/C NO. 14 AWG (LEAD-IN CABLE)		POWER CABLE, 2 CONDUCTOR, NO. 6 AWG
	3 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG		METER BASE
	3 SECTION VEHICULAR SIGNAL HEAD, TURN ARROWS 1-WAY		INTERCONNECT CABLE		3 CONDUCTOR, NO. 14 AWG
	PEDESTRIAN SIGNAL HEAD		SERVICE CABLE, 3 CONDUCTOR, NO. 6 AWG		
	PEDESTRIAN PUSH BUTTON		ETHERNET CABLE, CAT 5E, ARMORED		
	PTZ CAMERA				
	POWER SOURCE				

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ISSUE RECORD		



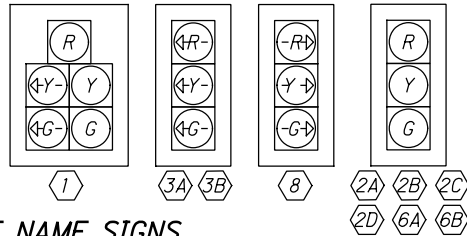
- NOTES:
- FOR STREET NAME SIGN DETAILS, SEE BU-26.
  - FOR INTERCONNECT DETAILS, SEE SHEETS 39 - 41.
  - THE CONTRACTOR SHALL ENSURE THAT ALL SIGNAL FACES ARE CLEARLY VISIBLE TO ALL ON-COMING VEHICLES; CLEAR OF ANY OBSTRUCTIONS ONCE MOUNTED TO THE MAST ARMS.
  - CONDUIT DEPTH SHALL BE 36" MINIMUM.



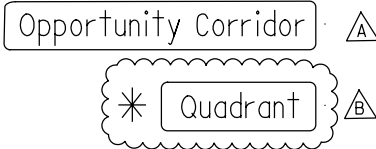
NOTE:  
\* - THE CONTRACTOR SHALL VERIFY THE STREET NAME WITH THE CITY OF CLEVELAND PRIOR TO FABRICATION OF THIS SIGN.

SIGNAL HEADS

ALL SIGNAL HEADS SHALL HAVE 12" LED LENSES. SIGNAL HEADS SHALL BE YELLOW WITH BLACK BACKPATES. SIGNAL HEAD VISORS SHALL BE POLYCARBONATE, CUTAWAY TYPE AND BE FLAT BLACK ON THE INSIDE.



STREET NAME SIGNS



LEGEND

	PROP
TRAFFIC SIGNAL, 3 UNIT HEAD, 12"	
TRAFFIC SIGNAL, 3 UNIT HEAD, 12" WITH ARROWS	
TRAFFIC SIGNAL, 4 OR 5 UNIT HEAD, 12"	
SIGNAL SUPPORT POLE	
LUMINAIRE, CONVENTIONAL	
CONTROLLER CABINET AND WORK PAD (TS-2)	
TRAFFIC PULL BOX	
DETECTOR LOOP	
PROPOSED CONDUIT	
PTZ CAMERA	

PULLBOX TABLE

PULL BOX #	STATION	SIDE	OFFSET	SIZE (IN.)
PB-2	130+88.9	LT	26.5'	17 x 30
PB-1 *	107+09.7	LT	78.9'	24 x 36
PB-3	131+89.5	LT	26.5'	13 x 24
PB-4 *	107+39.2	RT	36.4'	17 x 30
PB-5 *	107+00	RT	29.5'	13 x 24
PB-6	131+33.7	LT	29.5'	17 x 30
-	-	-	-	-
-	-	-	-	-

\* - ITEM STATIONED FROM QUADRANT CENTERLINE

NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-06-04	RFC
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SIGNAL TIMING CHART

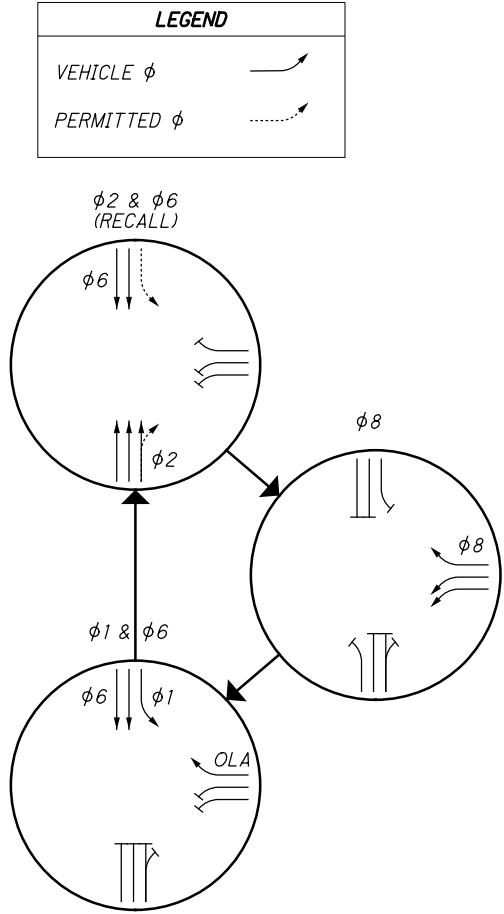
INTERSECTION: O.C. BLVD. / QUADRANT RD.										
MAINTAINING AGENCY: CITY OF CLEVELAND										
START UP  START IN: ALL RED TIME FOR FLASH OR ALL RED: 5 FIRST PHASE(S): 2 + 6 COLOR DISPLAYED: GREEN			DUAL ENTRY: YES		PHASES: 2, 6					
			REST IN RED:		RING 1 -		RING 2 -			
			OVERLAP				A	B	C	D
			PHASES				1	-	-	-
INTERVAL OR FEATURE			CONTROLLER MOVEMENT NO.							
INTERSECTION MOVEMENT (PHASE)			1	2	3	4	5	6	7	8
DIRECTION			WBL	EB	-	-	-	WB	-	NB
MINIMUM GREEN (INITIAL) (SEC.)			7	20	-	-	-	20	-	10
ADDED INITIAL *(SEC./ACTUATION)			-	-	-	-	-	-	-	-
MAXIMUM INITIAL (SEC.)			-	-	-	-	-	-	-	-
PASSAGE TIME (PRESET GAP) (SEC.)			3	-	-	-	-	3	-	3
TIME BEFORE REDUCTION *(SEC.)			-	-	-	-	-	-	-	-
MINIMUM GAP *(SEC.)			-	-	-	-	-	-	-	-
TIME TO REDUCE *(SEC.)			-	-	-	-	-	-	-	-
MAXIMUM GREEN I (SEC.)			20	60	-	-	-	60	-	40
MAXIMUM GREEN II (SEC.)			-	-	-	-	-	-	-	-
YELLOW CHANGE (SEC.)			3.4	4.4	-	-	-	4.4	-	3
ALL RED CLEARANCE (SEC.)			1.9	1.6	-	-	-	1.6	-	2.8
WALK (SEC.)			-	-	-	-	-	-	-	-
PEDESTRIAN CLEARANCE (SEC.)			-	-	-	-	-	-	-	-
RECALL	MAXIMUM (ON/OFF)		-	ON	-	-	-	ON	-	-
	MINIMUM (ON/OFF)		-	-	-	-	-	-	-	-
	PEDESTRIAN (ON/OFF)		-	-	-	-	-	-	-	-
MEMORY (ON/OFF)			-	-	-	-	-	-	-	-

\*VOLUME DENSITY CONTROLS

NOTES:

- ENABLE  $\phi 1$  DETECTOR SWITCHING TO ALLOW  $\phi 1$  TO EXTEND  $\phi 6$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- COUNTDOWN PEDESTRIAN SIGNALS SHALL GO TO ZERO ON YELLOW PER OMUTCD FIGURE 4E-2.
- ALL DETECTOR DELAYS SHALL BE PLACED IN THE CONTROLLER.

PHASING DIAGRAM



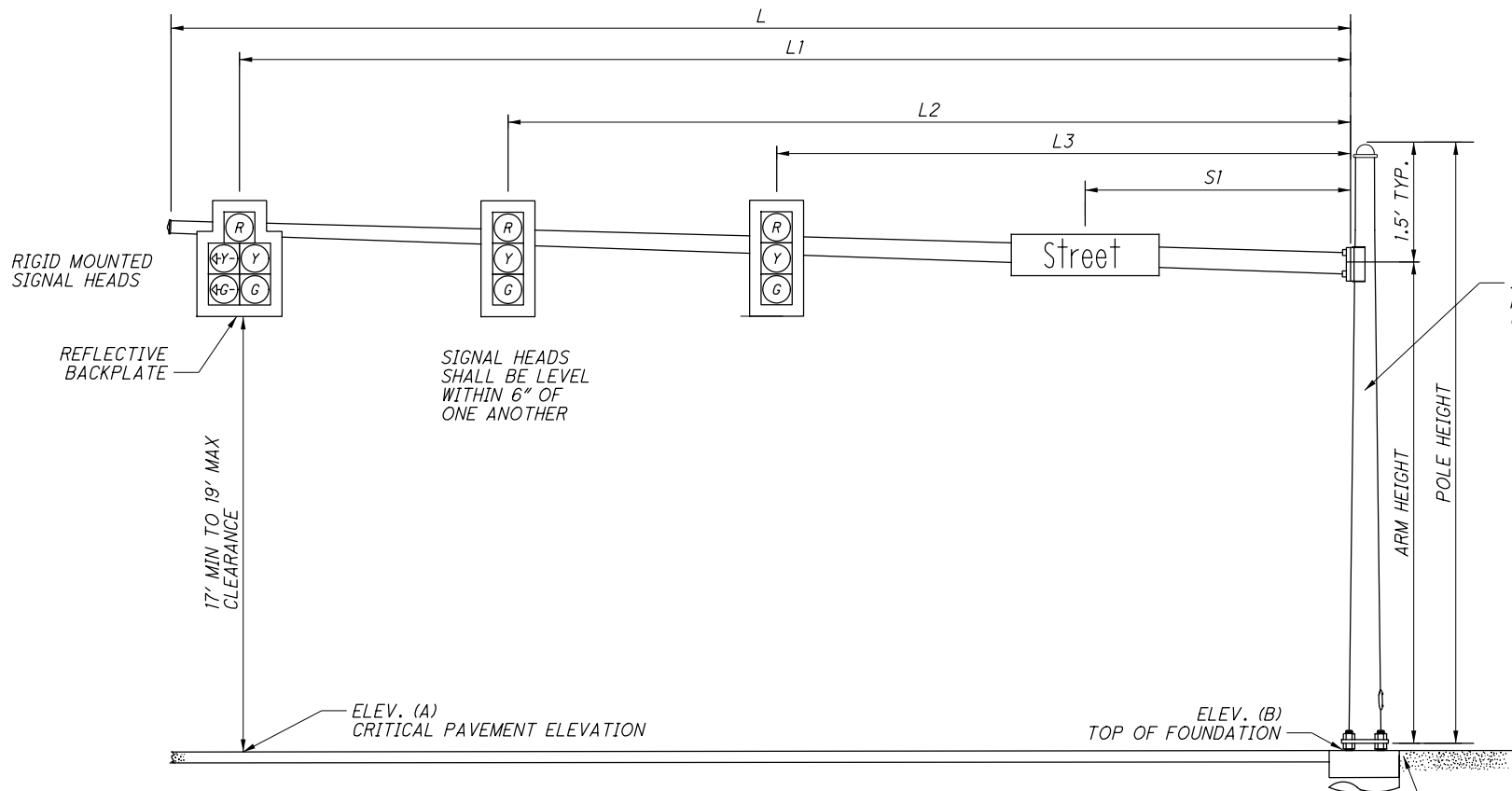
TRAFFIC SIGNAL DETECTOR CHART

LOOP DESIGNATION	LOOP CONFIGURATION **	SIZE (FT.)	PULSE OR PRESENCE	DELAY PROGRAMMED IN CONTROLLER (SEC.)	EXTENSION PROGRAMMED IN CONTROLLER (SEC.)	CONNECT TO DETECTOR UNIT (UNIT-CHANNEL)	ASSOCIATED CONTROLLER PHASE
L1A	P	6 X 20	PRESENCE	0	-	1-1	$\phi 1$
L1B	P	6 X 10	PRESENCE	0	-	2-1	$\phi 1$
L3A	P	6 X 20	PRESENCE	0	-	3-1	$\phi 8$
L3B	P	6 X 10	PRESENCE	0	-	4-1	$\phi 8$
L3C	P	6 X 20	PRESENCE	0	-	5-1	$\phi 8$
L3D	P	6 X 10	PRESENCE	0	-	6-1	$\phi 8$
L8A	P	6 X 20	PRESENCE	8	-	7-1	$\phi 8$
L8B	P	6 X 10	PRESENCE	0	-	8-1	$\phi 8$

\*\* CONFIGURATION: POWERHEAD (P); PER TC-82.10

0	2019-06-04	RFC
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ISSUE RECORD		





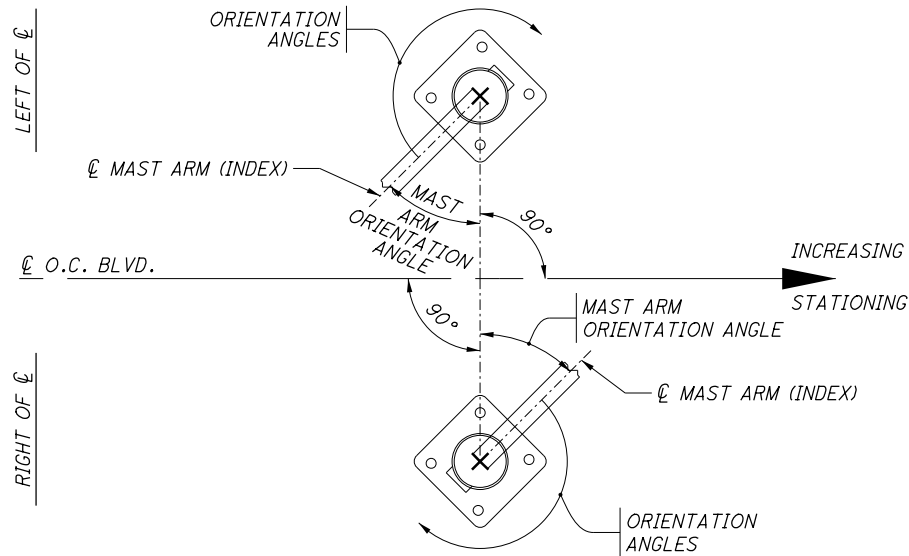
**SIGNAL SUPPORT ELEVATION**  
**(TYPICAL)**

THIS DIAGRAM IS A TYPICAL LAYOUT FOR PLACEMENT OF ITEMS ON MAST ARM. CONTRACTOR SHALL REFER TO TABLE BELOW WITH DISTANCES ALONG MAST ARM FOR SPECIFIC PLACEMENT, EACH VARY BY APPROACH.

**MAST ARM TABLE**

SUPPORT NO.	STATION	OFFSET	ELEVATION		SIGNAL SUPPORT DETAILS												MAST ARM A ANGLE	ORIENTATION ANGLES FROM MAST ARM							
			A	B	DESIGN TYPE	DESIGN NO.	POLE HEIGHT	ARM HEIGHT *	L	L1	L2	L3	S1	-	-	SUPPLEMENTAL SIGNAL HEAD		.	HANDHOLE	CABLE ENTRANCE 12" FROM TOP					
SP-1	130+46.5	26.5' LT	646.53	647.05	TC-81.21	2	22.5	21.0	32	28	17	-	11	-	-	0	-	-		180	-				
PS-1	130+21.0	54.0' RT	-	-	PEDESTAL	-	16.0	-	-	-	-	-	-	-	-	-	-	-		180	-				
SP-2	131+33.7	26.5' LT	649.90	649.46	TC-81.21	11	22.5	21.0	41	38	22	8	30	-	-	293	67	-		180	-				
SP-3	107+64.0	47.2' RT	650.07	649.92	TC-81.21	11	22.5	21.0	45	42	30	19	12	-	-	7	-	-		180	-				

\* - FIELD VERIFY ACTUAL ELEVATIONS PRIOR TO ORDERING SIGNAL SUPPORTS.



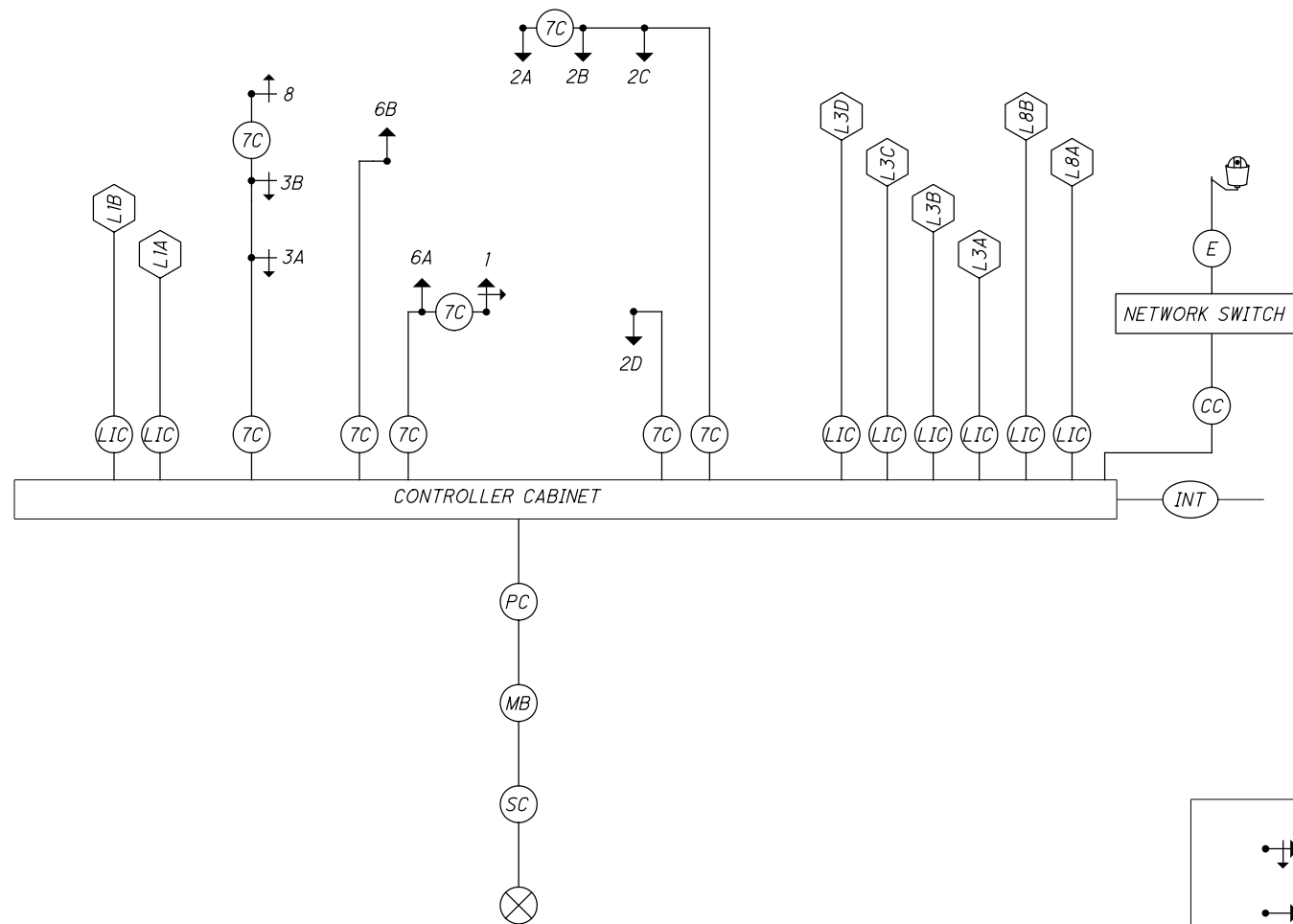
**POLE ORIENTATION**

TOP OF SIGNAL SUPPORT AND PEDESTAL FOUNDATIONS SHALL BE LEVEL WITH THE SIDEWALK ELEVATION WHERE ADA LANDINGS ARE ADJACENT; ELSEWHERE, FOUNDATIONS SHALL BE 2" (± 1") ABOVE GRADE PER TC-21.20

1	2024-09-10	RECORD DRAWINGS
0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		






















### WIRING DIAGRAM



## FIELD WIRING HOOK-UP CHART

SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH	SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH
1  (WB LT)	R	ϕ 6R	Y	-	-	-	-
	Y	ϕ 6Y			-	-	
	G	ϕ 6G			-	-	
	←Y—	ϕ 1Y			-	-	
	←G—	ϕ 1G			-	-	
2A, 2B, 2C & 2D  (EB)	R	ϕ 2R	Y	8  (NB RT)	—R→	ϕ 8R	R
	Y	ϕ 2Y			—Y→	ϕ 8Y	
	G	ϕ 2G			—G→	ϕ 8G	
	-	-			-	-	-
	-	-			-	-	
-	-	-	-	-	-	-	
	-	-			-	-	
	-	-			-	-	
	-	-			PEDESTRIAN MOVEMENTS		
	-	-			-	-	-
3A & 3B  (NB LT)	←R—	ϕ 8R	R	-	-	-	-
	←Y—	ϕ 8Y		-	-	-	-
	←G—	ϕ 8G		-	-	-	-
-	-	-	-	-	-	-	-
	-	-		-	-	-	-
	-	-		-	-	-	-
	-	-		-	-	-	-
	-	-		-	-	-	-
				OVERLAPS			
6A & 6B  (WB)	R	ϕ 6R	Y	OLA	—Y→	ϕ1Y/LS 14 Y	OUT
	Y	ϕ 6Y			—G→	ϕ1G/LS 14 G	
	G	ϕ 6G		-	-	-	-
LS = LOAD SWITCH				-	-	-	-

LEGEND

	5 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		INTERCONNECT CABLE
	3 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		PHOTOELECTRIC CELL
	3 SECTION VEHICULAR SIGNAL HEAD, TURN ARROWS 1-WAY		POWER SOURCE
	PEDESTRIAN SIGNAL HEAD		SERVICE CABLE, 3 CONDUCTOR, NO. 6 AWG
	PEDESTRIAN PUSH BUTTON		POWER CABLE, 2 CONDUCTOR, NO. 6 AWG
	LUMINAIRE, CONVENTIONAL, 150 WATT, HPS, 120 VOLT, AS PER PLAN		SIGNAL SUPPORT POLE NO. --
	2/C NO. 14 AWG (LEAD-IN CABLE)		METER BASE
	SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG		ETHERNET CABLE, CAT 5E, ARMORED
	VIDEO CAMERA CABLE		3 CONDUCTOR, NO. 14 AWG
	PTZ CAMERA		

**NOTES:**

- FOR LOCATIONS WITH LEFT TURN LANES  
RUN 7C FOR POTENTIAL PT/PM LT PHASE IF  
INITIAL DESIGN IS FOR PERMITTED ONLY.
- OVERLAPS SHALL BE WIRED TO THE APPROPRIATE  
LOAD SWITCHES AS PER THE FIELD HOOKUP CHART  
AND CONFIGURED IN THE CONTROLLER SOFTWARE  
PER THE SIGNAL TIMING CHART.

0	2019-06-04	RFC
<b>NO.</b>	<b>DATE</b>	<b>DESCRIPTION</b>
<b>ISSUE RECORD</b>		



PULL BOX #	STATION	SIDE	OFFSET	SIZE (IN.)
PB-1	150+27.4	RT	75.2'	24 x 36
PB-2	149+67.2	LT	54.4'	17 x 30
PB-3	150+73.3	LT	50.0'	17 x 30
PB-4	151+41.0	RT	93.9'	17 x 30
PB-5	149+77.0	LT	99.4'	13 x 24
PB-6	149+46.4	RT	48.1'	13 x 24
PB-7	151+47.0	LT	32.4'	13 x 24
PB-8	13+84.4	LT	25.2'	13 x 24
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

PULLBOX TABLE

PB-5  
PS-5, TYPE 16' PEDESTAL, WITH  
(1) SUPPLEMENTAL SIGNAL HEAD  
STA. 149+82.43, 89.20' LT  
(1)-2" CONDUIT WITH (3)-2/C,  
IN TRENCH = 46'  
(1)-2" CONDUIT WITH (1)-7/C,  
IN TRENCH = 36'  
PS-1, 8', WITH  
(1) PED. PUSHBUTTON "P6A"  
AND (1) PED. SIGNAL HEAD  
STA. 149+74.7, 66.7' LT  
(1)-2" CONDUIT WITH (1)-7/C  
IN TRENCH = 15'  
PB-2  
(1)-2" CONDUIT WITH (2)-7/C,  
IN TRENCH = 6'  
SP-1, TYPE TC-81.21, DESIGN 13 WITH  
58' MAST ARM, (1) PED. SIGNAL HEAD  
AND (1) PED. PUSHBUTTON "P4A"  
STA. 149+62.6, 50.7' LT

PULLBOX PAID BY INTERCONNECT  
(1)-3" CONDUIT W/(1)-INT (PAID BY INTERCONNECT  
IN TRENCH = 7' (PAID BY INTERCONNECT)

PS-2 PEDESTAL, 8', WITH  
(1) PED. SIGNAL HEAD AND  
(1) PED. PUSHBUTTON "P4B"  
STA. 150+02.1, 60.8' RT

(1)-2" CONDUIT WITH (1)-7/C,  
IN TRENCH = 20'

TS-2 TYPE 1 CONTROLLER IN TS-2 TYPE 1  
M-36 CABINET W/(1) NETWORK  
SWITCH FOR PTZ SURVEILLANCE  
CAMERA STA. 150+16, 76.0' RT

(1)-2" CONDUIT W/(1)-POWER  
IN TRENCH = 10'

(2)-4" CONDUIT WITH (15)-7/C, (13)-2/C,  
(1)-2" CONDUIT W/(1)-CAT 5E AND  
(1)-3" CONDUIT W/(1)-INTERCONNECT  
DROP CABLE, IN TRENCH = 11'

(1)-2" CONDUIT W/(2)-7/C AND  
(1)-2" CONDUIT W/(1)-CAT 5E, IN TRENCH = 18'

SP-2, TYPE TC-81.21, DESIGN 3 WITH  
37' MAST ARM, (1) PTZ CAMERA,  
(1) PED. PUSHBUTTON "P2A" AND (1) PED.  
SIGNAL HEAD STA. 150+33.3, 92.7' RT

SP-3, TYPE TC-81.21,  
DESIGN 3 WITH 37' MAST ARM,  
(1) PED. SIGNAL HEAD AND  
(1) PED. PUSHBUTTON "P6B"  
STA. 150+56.8, 63.8' LT

(2)-3" CONDUIT WITH (4)-7/C  
AND (2)-2/C IN TRENCH = 110'

(1)-2" CONDUIT WITH (2)-7/C,  
IN TRENCH = 21'

PB-3  
(1)-2" CONDUIT WITH (2)-7/C,  
IN TRENCH = 20'

PS-3 TYPE 16' PEDESTAL, WITH  
(1) SUPPLEMENTAL SIGNAL HEAD,  
(1) PED. SIGNAL HEAD AND  
(1) PED. PUSHBUTTON "P8A"  
STA. 150+90.7, 41.0' LT

(1)-2" CONDUIT WITH (2)-2/C,  
IN TRENCH = 77'

MECHANICAL DAMPER

SP-4, TYPE TC-81.21, DESIGN 14 WITH  
68' MAST ARM WITH MECHANICAL DAMPER,  
(1) PED. SIGNAL HEAD AND  
(1) PED. PUSHBUTTON "P8B"  
STA. 151+40.1, 72.8' RT

(1)-2" CONDUIT WITH (2)-7/C  
IN TRENCH = 21'

PB-4  
(1)-2" CONDUIT WITH (2)-7/C  
IN TRENCH = 13'

PS-4, TYPE 16' PEDESTAL, WITH  
(1) SUPPLEMENTAL SIGNAL HEAD,  
(1) PED. PUSHBUTTON "P2B"  
AND (1) PED. SIGNAL HEAD  
STA. 151+29.4, 91.8' RT

(1)-2" CONDUIT WITH (6)-2/C  
IN TRENCH = 29'

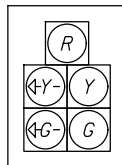
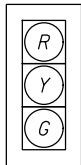
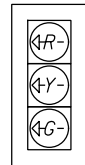
PB-8

(2)-3" CONDUIT WITH (4)-7/C  
AND (6)-2/C IN TRENCH = 114'

POWER SOURCE  
STA. 150+21, 84.4' RT

SIGNAL HEADS

ALL SIGNAL HEADS SHALL HAVE 12" LED LENSES.  
SIGNAL HEADS SHALL BE YELLOW WITH BACKPLATES.  
SIGNAL HEAD VISORS SHALL BE POLYCARBONATE PLASTIC,  
CUT-AWAY TYPE AND BE FLAT BLACK ON THE INSIDE.



PEDESTRIAN HEADS  
(LED, COUNTDOWN,  
TYPE D2)

STREET NAME SIGNS

Opportunity Corridor

Kinsman

PEDESTRIAN SIGNS



R10-3e  
3 - LEFT ARROWS  
SP-1, SP-2, PS-3  
5 - RIGHT ARROWS  
PS-1, PS-2, SP-3, SP-4, PS-4

NOTES:

- FOR STREET NAME SIGN DETAILS, SEE BU-26.
- FOR INTERCONNECT DETAILS, SEE SHEETS 39 - 41.
- THE CONTRACTOR SHALL ENSURE THAT ALL SIGNAL FACES ARE CLEARLY VISIBLE TO ALL ON-COMING VEHICLES; CLEAR OF ANY OBSTRUCTIONS ONCE MOUNTED TO THE MAST ARMS.
- CONDUIT DEPTH SHALL BE 36" MINIMUM.

LEGEND

TRAFFIC SIGNAL, 3 UNIT HEAD, 12"	PROP
TRAFFIC SIGNAL, 3 UNIT HEAD, 12" WITH ARROWS	
TRAFFIC SIGNAL, 4 OR 5 UNIT HEAD, 12"	
SIGNAL SUPPORT POLE	
PEDESTRIAN SIGNAL	
PEDESTRIAN PUSH BUTTON	
PEDESTAL SUPPORT	
LUMINAIRE, CONVENTIONAL	
CONTROLLER CABINET AND WORK PAD (TS-2)	
TRAFFIC PULL BOX	
PTZ CAMERA	
DETECTOR LOOP	
DETECTION ZONE	
PROPOSED CONDUIT	

NO.	DATE	DESCRIPTION
2	2024-09-10	RECORD DRAWINGS
1	2019-06-19	DC009
0	2019-06-04	RFC
		ISSUE RECORD



SIGNAL TIMING CHART

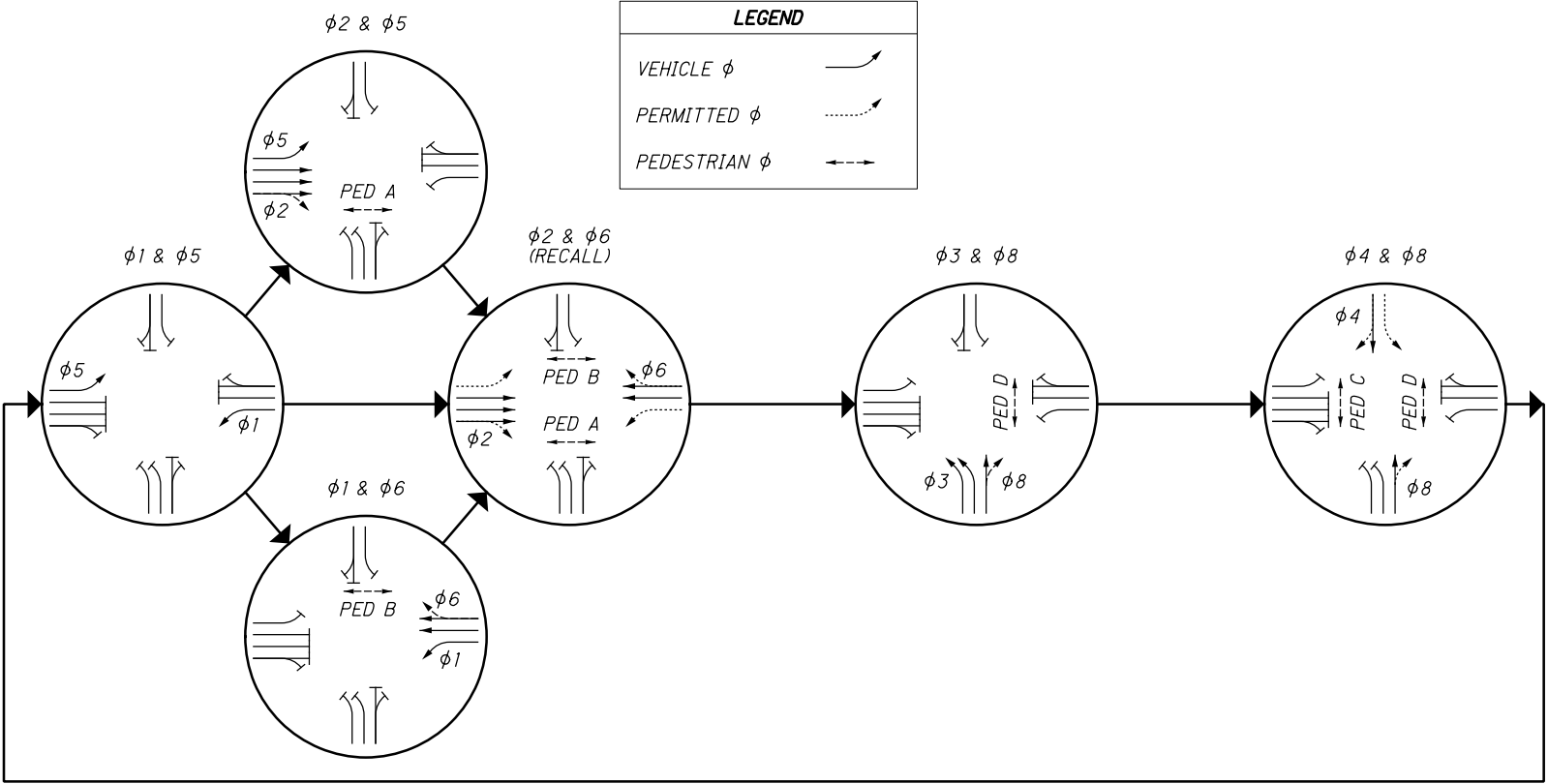
INTERSECTION: O.C. BLVD. / KINSMAN RD.									
MAINTAINING AGENCY: CITY OF CLEVELAND									
<u>START UP</u>		DUAL ENTRY: YES		PHASES:		2, 6, 4, 8			
		REST IN RED:		RING 1		RING 2			
START IN:	ALL RED	OVERLAP			A	B	C	D	
TIME FOR FLASH OR ALL RED:	5								
FIRST PHASE(S):	2 + 6	PHASES							
COLOR DISPLAYED:	GREEN				-	-	-	-	
INTERVAL OR FEATURE		CONTROLLER MOVEMENT NO.							
INTERSECTION MOVEMENT (PHASE)		1	2	3	4	5	6	7	8
DIRECTION		WBL	EB	NBL	SB	EBL	WB	SBL	NB
MINIMUM GREEN (INITIAL) (SEC.)		7	20	7	10	7	20	7	10
ADDED INITIAL *(SEC./ACTUATION)		-	-	-	-	-	-	-	-
MAXIMUM INITIAL (SEC.)		-	-	-	-	-	-	-	-
PASSAGE TIME (PRESET GAP) (SEC.)		3	-	3	3	3	-	3	3
TIME BEFORE REDUCTION *(SEC.)		-	-	-	-	-	-	-	-
MINIMUM GAP *(SEC.)		-	-	-	-	-	-	-	-
TIME TO REDUCE *(SEC.)		-	-	-	-	-	-	-	-
MAXIMUM GREEN I (SEC.)		20	60	20	40	20	60	20	40
MAXIMUM GREEN II (SEC.)		-	-	-	-	-	-	-	-
YELLOW CHANGE (SEC.)		3	4.1	3.2	4.1	3	4.1	3.2	4.1
ALL RED CLEARANCE (SEC.)		2	1.3	3.5	1.7	2	1.3	3.5	1.7
WALK (SEC.)		-	8	-	12	-	7	-	8
PEDESTRIAN CLEARANCE (SEC.)		-	19	-	23	-	14	-	26
RECALL	MAXIMUM (ON/OFF)	-	ON	-	-	-	ON	-	-
	MINIMUM (ON/OFF)	-	-	-	-	-	-	-	-
	PEDESTRIAN (ON/OFF)	-	-	-	-	-	-	-	-
MEMORY (ON/OFF)		-	-	-	-	-	-	-	-

\*VOLUME DENSITY CONTROLS

NOTES:

- COUNTDOWN PEDESTRIAN SIGNALS SHALL GO TO ZERO ON YELLOW PER OMUTCD FIGURE 4E-2.

PHASING DIAGRAM



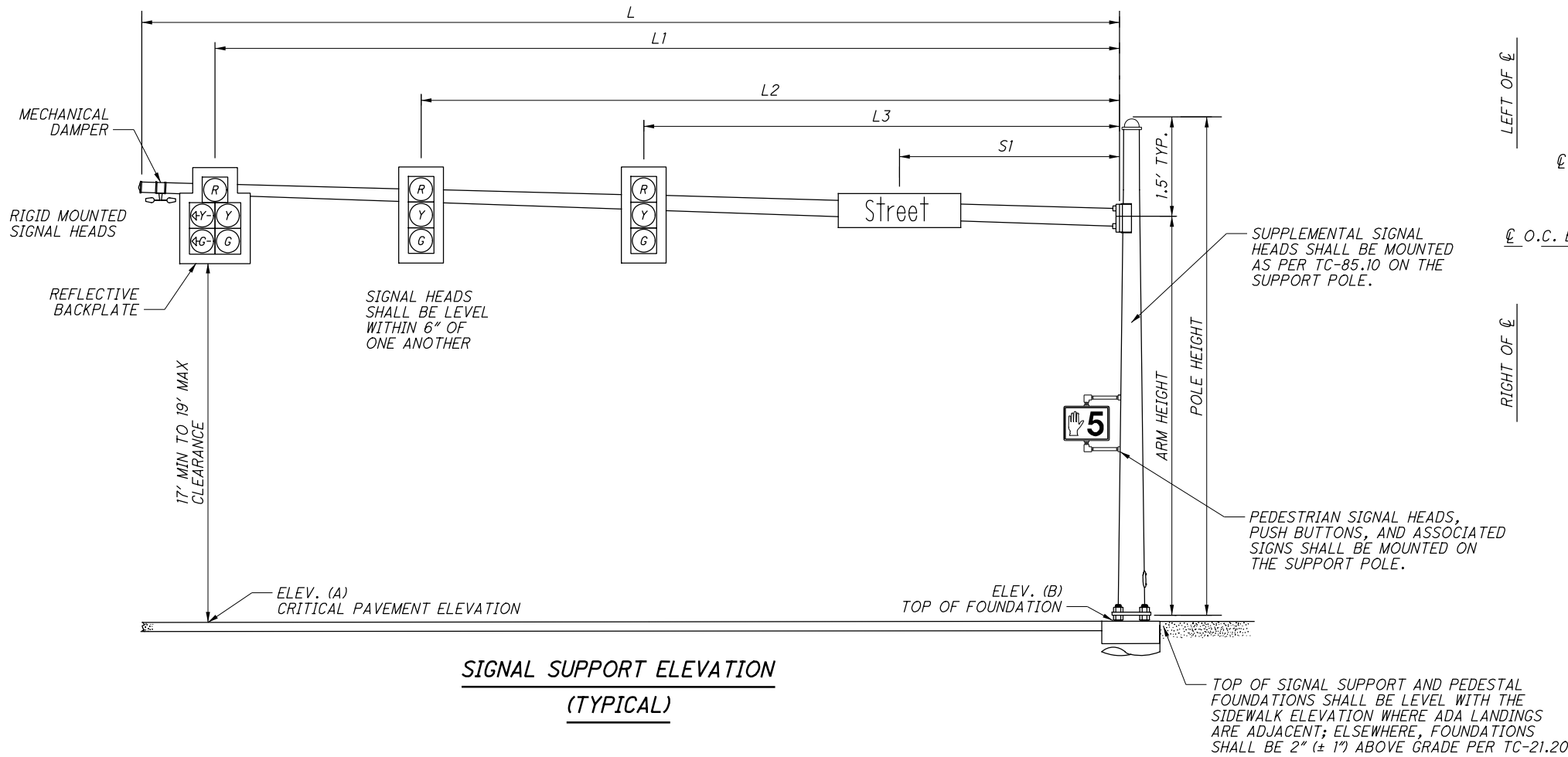
TRAFFIC SIGNAL DETECTOR CHART

LOOP DESIGNATION	LOOP CONFIGURATION **	SIZE (FT.)	PULSE OR PRESENCE	DELAY PROGRAMMED IN CONTROLLER (SEC.)	EXTENSION PROGRAMMED IN CONTROLLER (SEC.)	CONNECT TO DETECTOR UNIT (UNIT-CHANNEL)	ASSOCIATED CONTROLLER PHASE
L1A	P	6 x 20	PRESENCE	3	-	1-1	$\phi 1$
L1B	P	6 x 10	PRESENCE	0	-	2-1	$\phi 1$
L3A	P	6 x 20	PRESENCE	0	-	3-1	$\phi 3$
L3B	P	6 x 10	PRESENCE	0	-	4-1	$\phi 3$
L3C	P	6 x 20	PRESENCE	0	-	5-1	$\phi 3$
L3D	P	6 x 10	PRESENCE	0	-	6-1	$\phi 3$
L4A	P	6 x 10	PRESENCE	0	-	7-1	$\phi 4$
L4B	P	6 x 20	PRESENCE	8	-	8-1	$\phi 4$
L4C	P	6 x 10	PRESENCE	0	-	9-1	$\phi 4$
L5A	P	6 x 20	PRESENCE	3	-	10-1	$\phi 5$
L5B	P	6 x 10	PRESENCE	0	-	11-1	$\phi 5$
L8A	P	6 x 20	PRESENCE	8	-	12-1	$\phi 8$
L8B	P	6 x 10	PRESENCE	0	-	13-1	$\phi 8$
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

\*\* CONFIGURATION: POWERHEAD (P); PER TC-82.10

1	2024-09-10	RECORD DRAWINGS
0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		





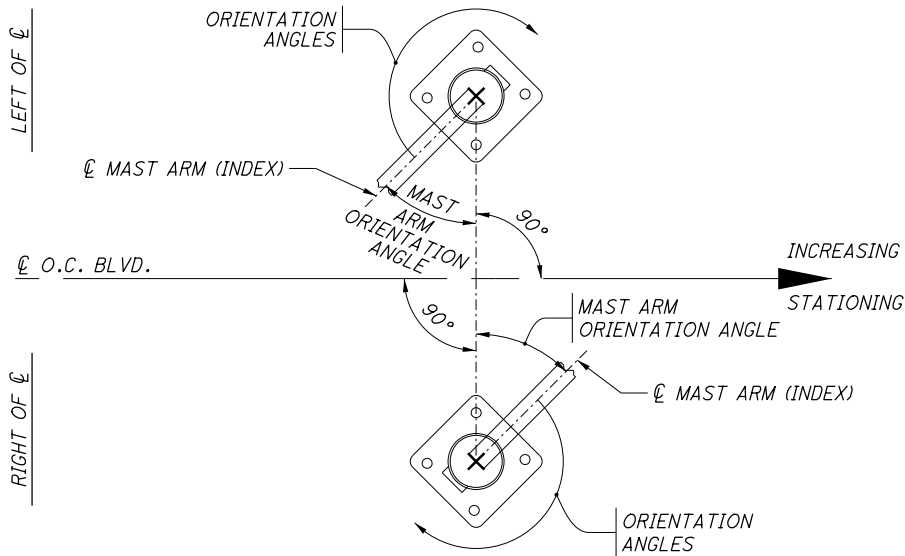
SIGNAL SUPPORT ELEVATION  
(TYPICAL)

THIS DIAGRAM IS A TYPICAL LAYOUT FOR PLACEMENT OF ITEMS ON MAST ARM. CONTRACTOR SHALL REFER TO TABLE BELOW WITH DISTANCES ALONG MAST ARM FOR SPECIFIC PLACEMENT, EACH VARY BY APPROACH.

MAST ARM TABLE

SUPPORT NO.	STATION	OFFSET	ELEVATION		SIGNAL SUPPORT DETAILS													MAST ARM A ANGLE	ORIENTATION ANGLES FROM MAST ARM					
			A	B	DESIGN TYPE	DESIGN NO.	POLE HEIGHT	ARM HEIGHT *	L	L1	L2	L3	L4	S1	-	OFFSET DISTANCE TO MECHANICAL DAMPER	PEDESTRIAN SIGNAL		PEDESTRIAN BUTTON	SUPPLEMENTAL SIGNAL HEAD	-	HANDHOLE	CABLE ENTRANCE 12" FROM TOP	
SP-1	149+62.6	50.7' LT	675.77	675.76	TC-81.21	13	22.5	21.0	60	55	37.5	25.5	-	19	-	-	340	90	277	-	-	180	-	
SP-2	150+33.3	92.7' RT	675.91	676.64	TC-81.21	3	22.5	21.0	38	37	22	-	-	10	-	-	68	295	293	-	-	180	-	
SP-3	150+56.8	63.8' LT	676.09	676.54	TC-81.21	3	22.5	21.0	38	36	28	19	11	5	-	-	68	112	113	-	-	180	-	
SP-4	151+40.1	72.8' RT	675.65	675.88	TC-81.21	14	22.5	21.0	70	65	52	40	-	24	-	67	336	90	90	-	-	180	-	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
PS-1	149+74.7	66.7' LT	-	676.27	PEDESTAL	-	8	-	-	-	-	-	-	-	-	-	-	180	0	-	-	69	-	
PS-2	150+02.1	60.8' RT	-	676.42	PEDESTAL	-	8	-	-	-	-	-	-	-	-	-	-	69	270	-	-	249	-	
PS-3	150+90.7	41.0' LT	-	676.37	PEDESTAL	-	16	-	-	-	-	-	-	-	-	-	-	66	277	0	-	246	-	
PS-4	151+29.4	91.8' RT	-	676.16	PEDESTAL	-	16	-	-	-	-	-	-	-	-	-	-	359	11	-	-	65	-	
PS-5	149+82.4	89.2' RT	-	676.42	PEDESTAL	-	16	-	-	-	-	-	-	-	-	-	-	-	-	245	-	71	-	

\* - FIELD VERIFY ACTUAL ELEVATIONS PRIOR TO ORDERING SIGNAL SUPPORTS.

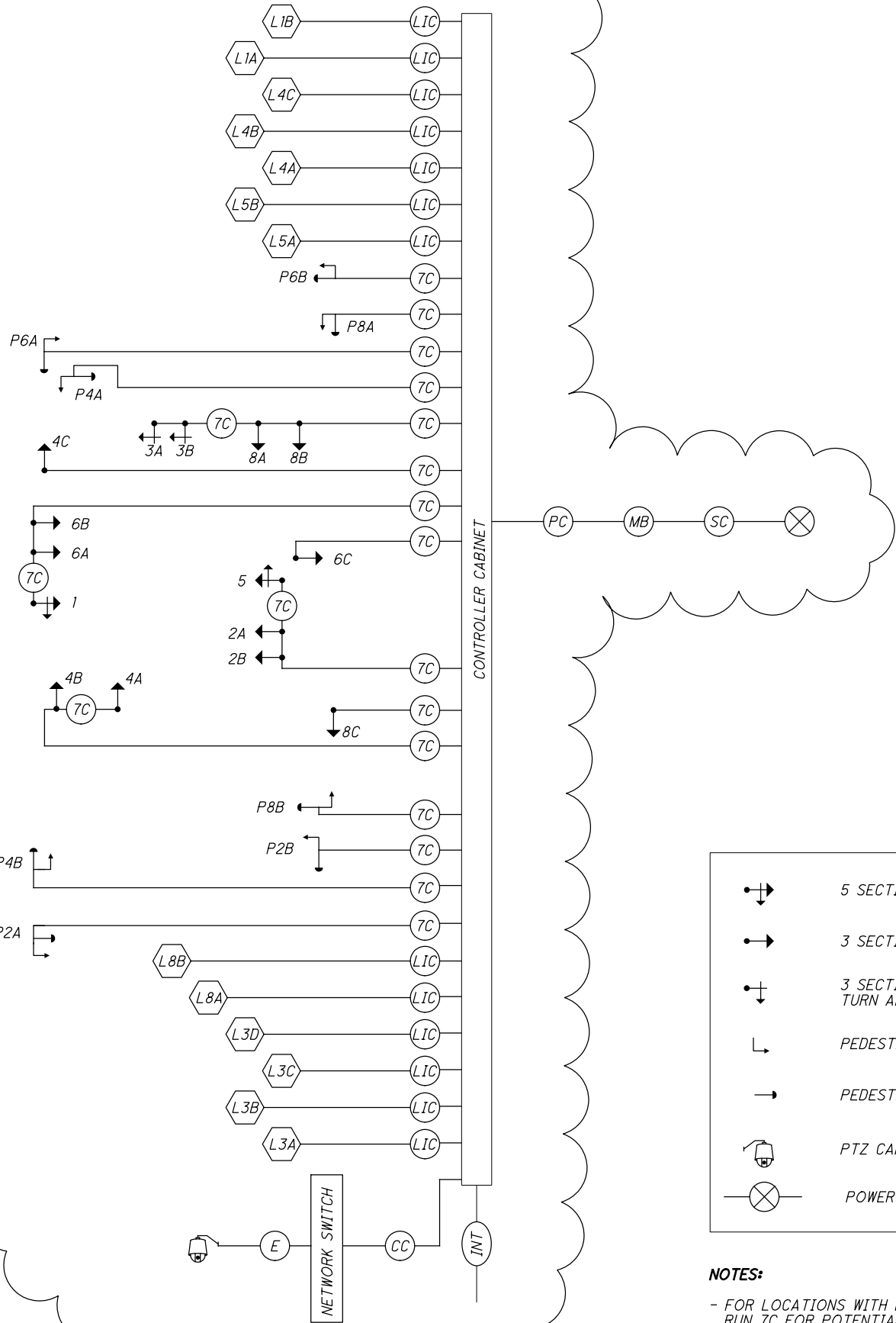


POLE ORIENTATION

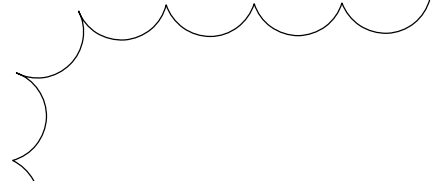
2	2024-09-10	RECORD DRAWINGS
1	2019-06-19	DC009
0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



WIRING DIAGRAM



FIELD WIRING HOOK-UP CHART

SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH	SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH
1 (WB LT)	R	φ6R	Y	8A, 8B & 8C (NB)	R	φ8R	R
	Y	φ6Y			Y	φ8Y	
	G	φ6G			G	φ8G	
	←Y—	φ1Y			PEDESTRIAN MOVEMENTS		
	←G—	φ1G		P2A-P2B SOUTH	W	φ2 PED/LS 12 G	OUT
2A & 2B (EB)	R	φ2R	Y	P4A-P4B WEST	DW	φ2 PED/LS 12 R	
	Y	φ2Y			W	φ4 PED/LS 13 G	OUT
	G	φ2G			DW	φ4 PED/LS 13 R	
3A & 3B (NB LT)	←R—	φ3R	R	P6A-P6B NORTH	W	φ6 PED/LS 10 G	OUT
	←Y—	φ3Y			DW	φ6 PED/LS 10 R	
	←G—	φ3G			P8A-P8B EAST	W	φ8 PED/LS 11 G
4A, 4B & 4C (SB)	R	φ4R	R	-	DW	φ8 PED/LS 11 R	
	Y	φ4Y			OVERLAPS		
	G	φ4G			-	-	-
5 (EB LT)	R	φ2R	Y		-	-	-
	Y	φ2Y			-	-	
	G	φ2G			-	-	-
	←Y—	φ5Y			-	-	-
	←G—	φ5G			-	-	-
6A, 6B & 6C (WB)	R	φ6R	Y		-	-	
	Y	φ6Y			-	-	
	G	φ6G			-	-	
LS = LOAD SWITCH							

LEGEND

	5 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		LUMINAIRE, CONVENTIONAL, 150 WATT, HPS, 120 VOLT, AS PER PLAN		SERVICE CABLE, 3 CONDUCTOR, NO. 6 AWG
	3 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		2/C NO. 14 AWG (LEAD-IN CABLE)		POWER CABLE, 2 CONDUCTOR, NO. 6 AWG
	3 SECTION VEHICULAR SIGNAL HEAD, TURN ARROWS 1-WAY		SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG		SIGNAL SUPPORT POLE NO. ...
	PEDESTRIAN SIGNAL HEAD		INTERCONNECT CABLE		METER BASE
	PEDESTRIAN PUSH BUTTON		ETHERNET CABLE, CAT 5E, ARMORED		3 CONDUCTOR, NO. 14 AWG
	PTZ CAMERA				
	POWER SOURCE				

NOTES:

- FOR LOCATIONS WITH LEFT TURN LANES RUN 7C FOR POTENTIAL PT/PM LT PHASE IF INITIAL DESIGN IS FOR PERMITTED ONLY.
- OVERLAPS SHALL BE WIRED TO THE APPROPRIATE LOAD SWITCHES AS PER THE FIELD HOOKUP CHART AND CONFIGURED IN THE CONTROLLER SOFTWARE PER THE SIGNAL TIMING CHART.

TRAFFIC SIGNAL PLAN DETAILS

O.C. BLVD. & KINSMAN RD.

CUY-IR490/ SR010-

2.09 / 19.28

RECORD PLANS

RECORD PLANS

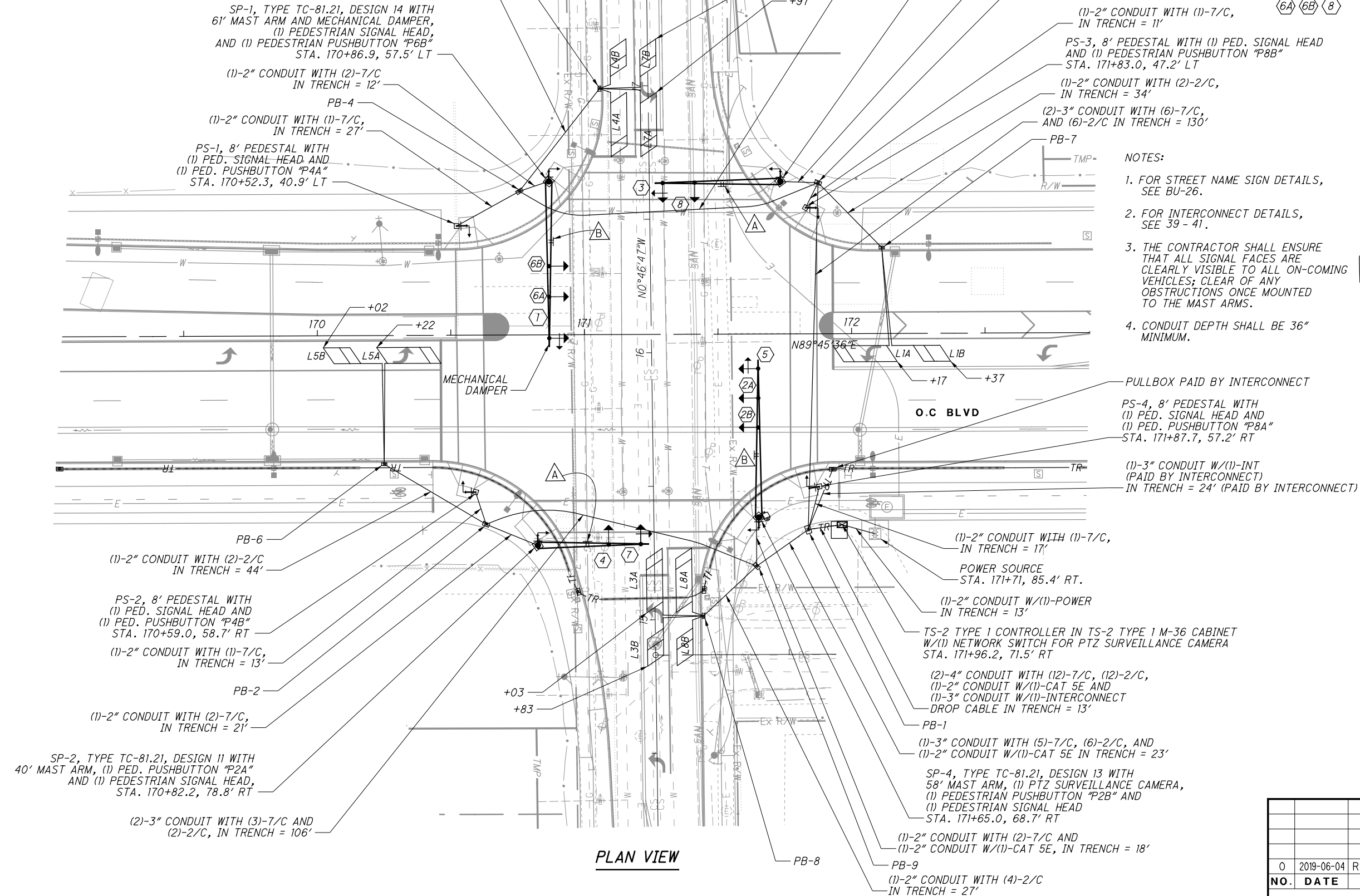
CALCULATED  
WCB  
CHECKED  
JFM

NO.	DATE	DESCRIPTION
1	2024-09-10	RECORD DRAWINGS
0	2019-06-04	RFC
ISSUE RECORD		



PULLBOX TABLE

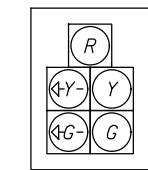
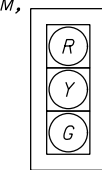
PULL BOX #	STATION	SIDE	OFFSET	SIZE (IN.)
PB-1	171+83.5	RT	73.3'	24 x 36
PB-2	170+62.9	RT	70.8'	17 x 30
PB-3	171+87.7	LT	56.6'	17 x 30
PB-4	170+75.9	LT	53.8'	17 x 30
PB-5	171+06.1	LT	92.1'	13 x 24
PB-6	170+24.8	RT	48.2'	13 x 24
PB-7	172+11.5	LT	32.2'	13 x 24
PB-8	171+44.2	RT	105.5'	13 x 24
PB-9	171+64.1	RT	87.0'	17 x 30
-	-	-	-	-



PLAN VIEW

SIGNAL HEADS

ALL SIGNAL HEADS SHALL HAVE 12" LED LENSES.  
SIGNAL HEADS SHALL BE YELLOW WITH BACKPLATES.  
SIGNAL HEAD VISORS SHALL BE POLYCARBONATE PLASTIC,  
CUT-AWAY TYPE AND BE FLAT BLACK ON THE INSIDE.



PEDESTRIAN HEADS  
(LED, COUNTDOWN,  
TYPE D2)

PEDESTRIAN SIGNS



R10-3e

5 - LEFT ARROWS  
(SP-1, PS-1, PS-2, PS-3, PS-4)  
3 - RIGHT ARROWS  
(SP-2, SP-3, SP-4)

STREET NAME SIGNS

Opportunity Corridor

E. 75 St

LEGEND

	PROP
TRAFFIC SIGNAL, 3 UNIT HEAD, 12"	
TRAFFIC SIGNAL, 4 OR 5 UNIT HEAD, 12"	
SIGNAL SUPPORT POLE	
PEDESTRIAN SIGNAL	
PEDESTRIAN PUSH BUTTON	
PEDESTAL SUPPORT	
LUMINAIRE, CONVENTIONAL	
CONTROLLER CABINET AND WORK PAD (TS-2)	
TRAFFIC PULL BOX	
PTZ CAMERA	
DETECTOR LOOP	
DETECTION ZONE	
PROPOSED CONDUIT	

NO.	DATE	DESCRIPTION
0	2019-06-04	RFC
ISSUE RECORD		



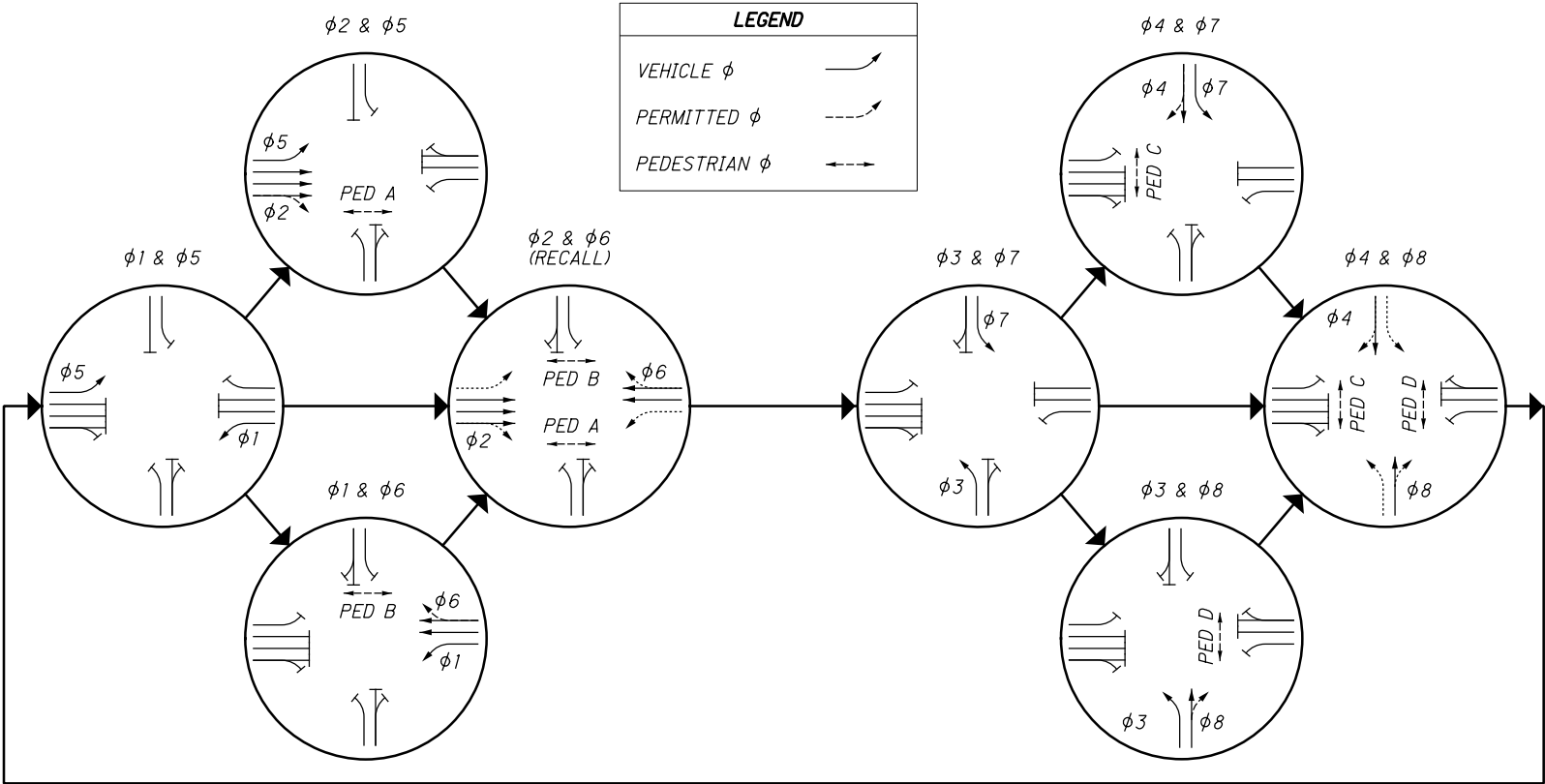
SIGNAL TIMING CHART

INTERSECTION: O.C. BLVD. / E. 75TH ST.			MAINTAINING AGENCY: CITY OF CLEVELAND							
START UP  START IN: ALL RED TIME FOR FLASH OR ALL RED: 5 FIRST PHASE(S): 2 + 6 COLOR DISPLAYED: GREEN			DUAL ENTRY: YES		PHASES: 2, 6, 4, 8					
			REST IN RED: RING 1		RING 2					
			OVERLAP			A	B	C	D	
			PHASES			-	-	-	-	
INTERVAL OR FEATURE			CONTROLLER MOVEMENT NO.							
INTERSECTION MOVEMENT (PHASE)			1	2	3	4	5	6	7	8
DIRECTION			WBL	EB	NBL	SB	EBL	WB	SBL	NB
MINIMUM GREEN (INITIAL) (SEC.)			7	20	7	10	7	20	7	10
ADDED INITIAL *(SEC./ACTUATION)			-	-	-	-	-	-	-	-
MAXIMUM INITIAL (SEC.)			-	-	-	-	-	-	-	-
PASSAGE TIME (PRESET GAP) (SEC.)			3	-	3	3	3	-	3	3
TIME BEFORE REDUCTION *(SEC.)			-	-	-	-	-	-	-	-
MINIMUM GAP *(SEC.)			-	-	-	-	-	-	-	-
TIME TO REDUCE *(SEC.)			-	-	-	-	-	-	-	-
MAXIMUM GREEN I (SEC.)			20	60	20	40	20	60	20	40
MAXIMUM GREEN II (SEC.)			-	-	-	-	-	-	-	-
YELLOW CHANGE (SEC.)			3.2	4.1	3	3.4	3.2	4.1	3	3.4
ALL RED CLEARANCE (SEC.)			2.5	1.4	3.2	1.9	2.5	1.4	3.2	1.9
WALK (SEC.)			-	7	-	7	-	7	-	8
PEDESTRIAN CLEARANCE (SEC.)			-	16	-	21	-	15	-	22
RECALL	MAXIMUM (ON/OFF)	-	ON	-	-	-	ON	-	-	
	MINIMUM (ON/OFF)	-	-	-	-	-	-	-	-	
	PEDESTRIAN (ON/OFF)	-	-	-	-	-	-	-	-	
MEMORY (ON/OFF)			-	-	-	-	-	-	-	
*VOLUME DENSITY CONTROLS										

NOTES:

- ENABLE  $\phi 1$  &  $\phi 5$  DETECTOR SWITCHING TO ALLOW  $\phi 1$  &  $\phi 5$  TO EXTEND  $\phi 2$  &  $\phi 6$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- ENABLE  $\phi 3$  &  $\phi 7$  DETECTOR SWITCHING TO ALLOW  $\phi 3$  &  $\phi 7$  TO EXTEND  $\phi 4$  &  $\phi 8$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- COUNTDOWN PEDESTRIAN SIGNALS SHALL GO TO ZERO ON YELLOW PER OMUTCD FIGURE 4E-2.

PHASING DIAGRAM



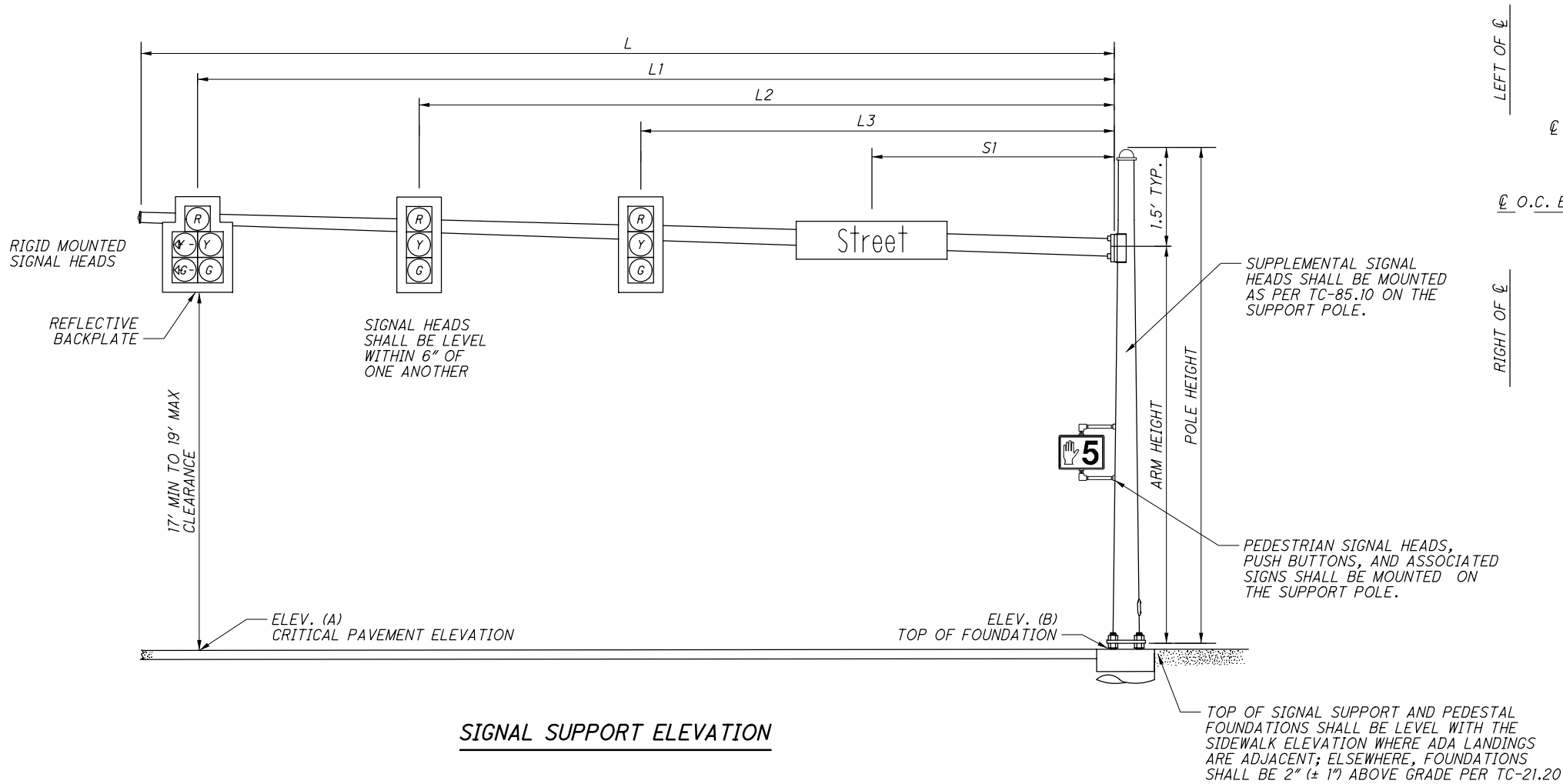
TRAFFIC SIGNAL DETECTOR CHART

LOOP DESIGNATION	LOOP CONFIGURATION **	SIZE (FT.)	PULSE OR PRESENCE	DELAY PROGRAMMED IN CONTROLLER (SEC.)	EXTENSION PROGRAMMED IN CONTROLLER (SEC.)	CONNECT TO DETECTOR UNIT (UNIT-CHANNEL)	ASSOCIATED CONTROLLER PHASE
L1A	P	6 x 20	PRESENCE	3	-	1-1	$\phi 1$
L1B	P	6 x 10	PRESENCE	0	-	2-1	$\phi 1$
L3A	P	6 x 20	PRESENCE	3	-	3-1	$\phi 3$
L3B	P	6 x 10	PRESENCE	0	-	4-1	$\phi 3$
L4A	P	6 x 20	PRESENCE	8	-	5-1	$\phi 4$
L4B	P	6 x 10	PRESENCE	0	-	6-1	$\phi 4$
L5A	P	6 x 20	PRESENCE	0	-	7-1	$\phi 5$
L5B	P	6 x 10	PRESENCE	0	-	8-1	$\phi 5$
L7A	P	6 x 20	PRESENCE	3	-	9-1	$\phi 7$
L7B	P	6 x 10	PRESENCE	0	-	10-1	$\phi 7$
L8A	P	6 x 20	PRESENCE	8	-	11-1	$\phi 8$
L8B	P	6 x 10	PRESENCE	0	-	12-1	$\phi 8$

\*\* CONFIGURATION: POWERHEAD (P); PER TC-82.10

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		





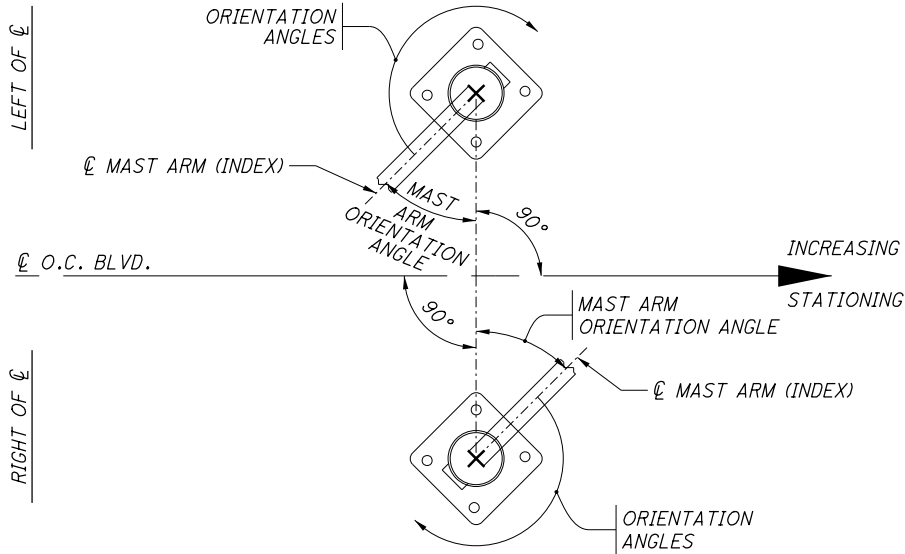
SIGNAL SUPPORT ELEVATION

THIS DIAGRAM IS A TYPICAL LAYOUT FOR PLACEMENT OF ITEMS ON MAST ARM. CONTRACTOR SHALL REFER TO TABLE BELOW WITH DISTANCES ALONG MAST ARM FOR SPECIFIC PLACEMENT, EACH VARY BY APPROACH.

MAST ARM TABLE

SUPPORT NO.	STATION	OFFSET	ELEVATION		SIGNAL SUPPORT DETAILS											MAST ARM A ANGLE	ORIENTATION ANGLES FROM MAST ARM				
			A	B	DESIGN TYPE	DESIGN NO.	POLE HEIGHT	ARM HEIGHT *	L	L1	L2	L3	S1	OFFSET DISTANCE TO MECHANICAL DAMPER	PEDESTRIAN SIGNAL		PEDESTRIAN BUTTON	SUPPLEMENTAL SIGNAL HEAD	HANDHOLE		
SP-1	170+86.9	57.5'LT	679.16	679.75	TC-81.21	14	22.5	21.0	61	58	42.5	31	22	60	0	180	180	-	180		
SP-2	170+82.2	78.8'RT	679.38	679.40	TC-81.21	11	22.5	21.0	40	37	25		17	-	90	270	90	-	180		
SP-3	171+73.6	57.1'LT	679.75	679.71	TC-81.21	12	22.5	21.0	48	44	32		22	-	90	90	90	-	180		
SP-4	171+65.0	68.7'RT	680.65	680.31	TC-81.21	13	22.5	21.0	60	55	44	33	23	-	0	180	180	-	180		
PS-1	170+52.3	40.9'LT	-	679.01	PEDESTAL	-	8	-	-	-	-	-	-	-	-	270	270	-	90		
PS-2	170+59.0	58.7'RT	-	678.88	PEDESTAL	-	8	-	-	-	-	-	-	-	-	270	270	-	90		
PS-3	171+83.0	47.2'LT	-	681.30	PEDESTAL	-	8	-	-	-	-	-	-	-	-	270	270	-	90		
PS-4	171+87.7	57.2'RT	-	680.98	PEDESTAL	-	8	-	-	-	-	-	-	-	-	270	260	-	90		

\* - FIELD VERIFY ACTUAL ELEVATIONS PRIOR TO ORDERING SIGNAL SUPPORTS.

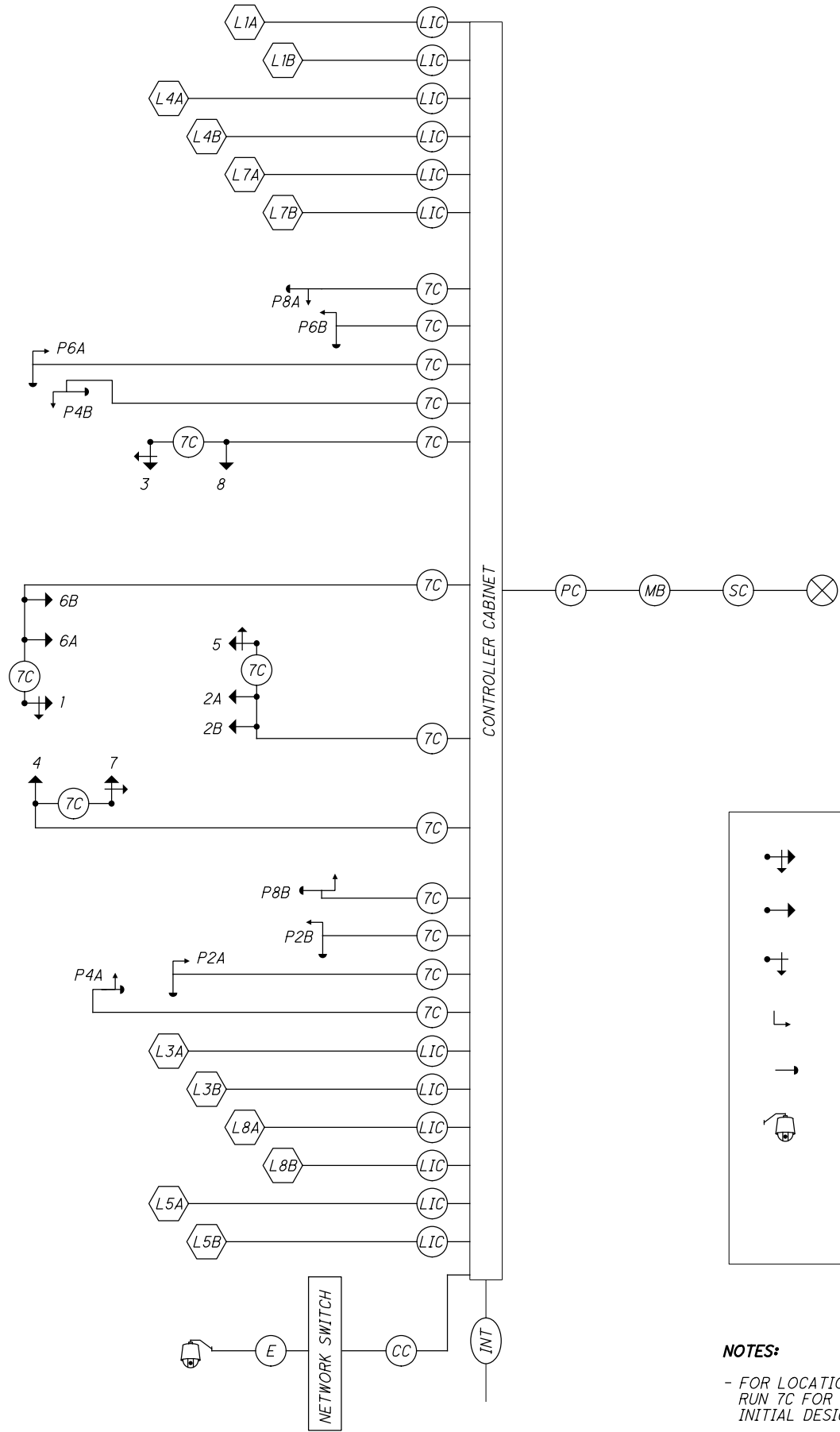


POLE ORIENTATION

1	2024-09-10	RECORD DRAWINGS
0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



WIRING DIAGRAM



FIELD WIRING HOOK-UP CHART

SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH	SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH
1  (WB LT)	R	φ 6R	Y	7  (SB LT)	R	φ 4R	R
	Y	φ 6Y			Y	φ 4Y	
	G	φ 6G			G	φ 4G	
	←Y—	φ 1Y			←Y—	φ 7Y	
	←G—	φ 1G			←G—	φ 7G	
2A & 2B  (EB)	R	φ 2R	Y	8  (NB)	R	φ 8R	R
	Y	φ 2Y			Y	φ 8Y	
	G	φ 2G			G	φ 8G	
	—	—		—	—	—	
—	—	—	—				
3  (NB LT)	R	φ 8R	R	—	—		—
	Y	φ 8Y			—		—
	G	φ 8G			—	—	
	←Y—	φ 3Y			PEDESTRIAN MOVEMENTS		
4  (SB)	R	φ 4R	R	P2A-P2B SOUTH	W DW	φ 2 PED/LS 12 G φ 2 PED/LS 12 R	OUT
	Y	φ 4Y		P4A-P4B WEST	W DW	φ 4 PED/LS 13 G φ 4 PED/LS 13 R	OUT
	G	φ 4G		P6A-P6B NORTH	W DW	φ 6 PED/LS 11 G φ 6 PED/LS 11 R	OUT
5  (EB LT)	R	φ 2R	Y	P8A-P8B EAST	W DW	φ 8 PED/LS 10 G φ 8 PED/LS 10 R	OUT
	Y	φ 2Y			OVERLAPS	—	—
	G	φ 2G		—			
	←Y—	φ 5Y			—	—	—
←G—	φ 5G	—	—	—			
6A & 6B (WB)	R				φ 6R	Y	—
	Y	φ 6Y	—	—	—		
	G	φ 6G	—	—	—		
LS = LOAD SWITCH				—	—	—	—

LEGEND

- 5 SECTION VEHICULAR SIGNAL HEAD, 1-WAY
- 3 SECTION VEHICULAR SIGNAL HEAD, 1-WAY
- 3 SECTION VEHICULAR SIGNAL HEAD, TURN ARROWS 1-WAY
- PEDESTRIAN SIGNAL HEAD
- PEDESTRIAN PUSH BUTTON
- PTZ CAMERA

- LUMINAIRE, CONVENTIONAL, 150 WATT, HPS, 120 VOLT, AS PER PLAN
- 2/C NO. 14 AWG (LEAD-IN CABLE)
- SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG
- VIDEO CAMERA CABLE
- INTERCONNECT CABLE
- PHOTOELECTRIC CELL
- ETHERNET CABLE, CAT 5E, ARMORED
- POWER SOURCE

- SERVICE CABLE, 3 CONDUCTOR, NO. 6 AWG
- POWER CABLE, 2 CONDUCTOR, NO. 6 AWG
- SIGNAL SUPPORT POLE NO. --
- METER BASE
- 3 CONDUCTOR, NO. 14 AWG

NOTES:

- FOR LOCATIONS WITH LEFT TURN LANES RUN 7C FOR POTENTIAL PT/PM LT PHASE IF INITIAL DESIGN IS FOR PERMITTED ONLY.
- OVERLAPS SHALL BE WIRED TO THE APPROPRIATE LOAD SWITCHES AS PER THE FIELD HOOKUP CHART AND CONFIGURED IN THE CONTROLLER SOFTWARE PER THE SIGNAL TIMING CHART.

0	2019-06-04	RFC
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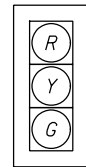
LEGEND

TRAFFIC SIGNAL, 3 UNIT HEAD, 12"	PROP
TRAFFIC SIGNAL, 5 UNIT HEAD, 12"	
SIGNAL SUPPORT POLE	
PTZ CAMERA	
PEDESTRIAN SIGNAL	
PEDESTRIAN PUSHBUTTON	
PEDESTAL SUPPORT	
CONTROLLER CABINET (TS-2 TYPE 1 M-36) AND WORK PAD	
TRAFFIC PULL BOX	
DETECTION ZONE	

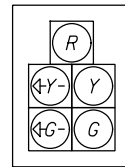
PULLBOX TABLE

PULL BOX #	STATION	SIDE	OFFSET	SIZE (IN.)
PB-1	179+95.9	RT	80.6	24 x 36
PB-2	179+66.8	RT	48.1	13 x 24
PB-3	179+91.2	RT	57.3	13 x 24
PB-4	180+38.3	LT	65.0	17 x 30
PB-5	180+63.7	LT	105.2	13 x 24
PB-6	181+15.3	RT	75.1	17 x 30
PB-7	180+79.3	RT	119.5	13 x 24
PB-8	181+40.0	LT	60.2	17 x 30
PB-9	181+74.0	LT	32.1	13 x 24

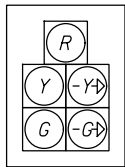
SIGNAL HEADS



2A, 2B, 4A,  
4B, 6A, 6B



1, 3,  
5, 7



8A, 8B



PEDESTRIAN HEADS  
(LED, COUNTDOWN,  
TYPE D2)

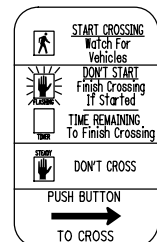
ALL VEHICULAR SIGNAL HEADS SHALL BE 12" LED WITH BACKPLATES WITH CUTAWAY VISORS. THEY SHALL BE CONSTRUCTED OF POLYCARBONATE PLASTIC. THE SIGNAL HEAD HOUSING AND OUTSIDE OF VISOR SHALL BE YELLOW, AND THE INSIDE OF THE VISOR SHALL BE FLAT BLACK.

STREET NAME SIGNS

② Opportunity Corridor

③ E. 79 St

SIGNS



R10-3E  
9" X 15"  
4 - LEFT ARROWS  
4 - RIGHT ARROWS

①

NOTES:

- FOR STREET NAME SIGNS ② AND ③ SEE BU-26.
- FOR INTERCONNECT DETAILS SEE SHEETS 39 - 41 .
- THE CONTRACTOR SHALL ENSURE THAT ALL SIGNAL FACES ARE CLEARLY VISIBLE TO ALL ON-COMING VEHICLES; CLEAR OF ANY OBSTRUCTIONS ONCE MOUNTED TO THE MAST ARMS.
- CONDUIT DEPTH SHALL BE 36" MINIMUM.

NO.	DATE	DESCRIPTION
0	2019-06-04	RFC
ISSUE RECORD		

CUY-IR490/ SR010-

2.09 / 19.28

25  
41

TRAFFIC SIGNAL PLAN

O.C. BLVD. & E. 79TH ST.

RECORD PLANS

RECORD PLANS

RECORD PLANS





SIGNAL TIMING CHART

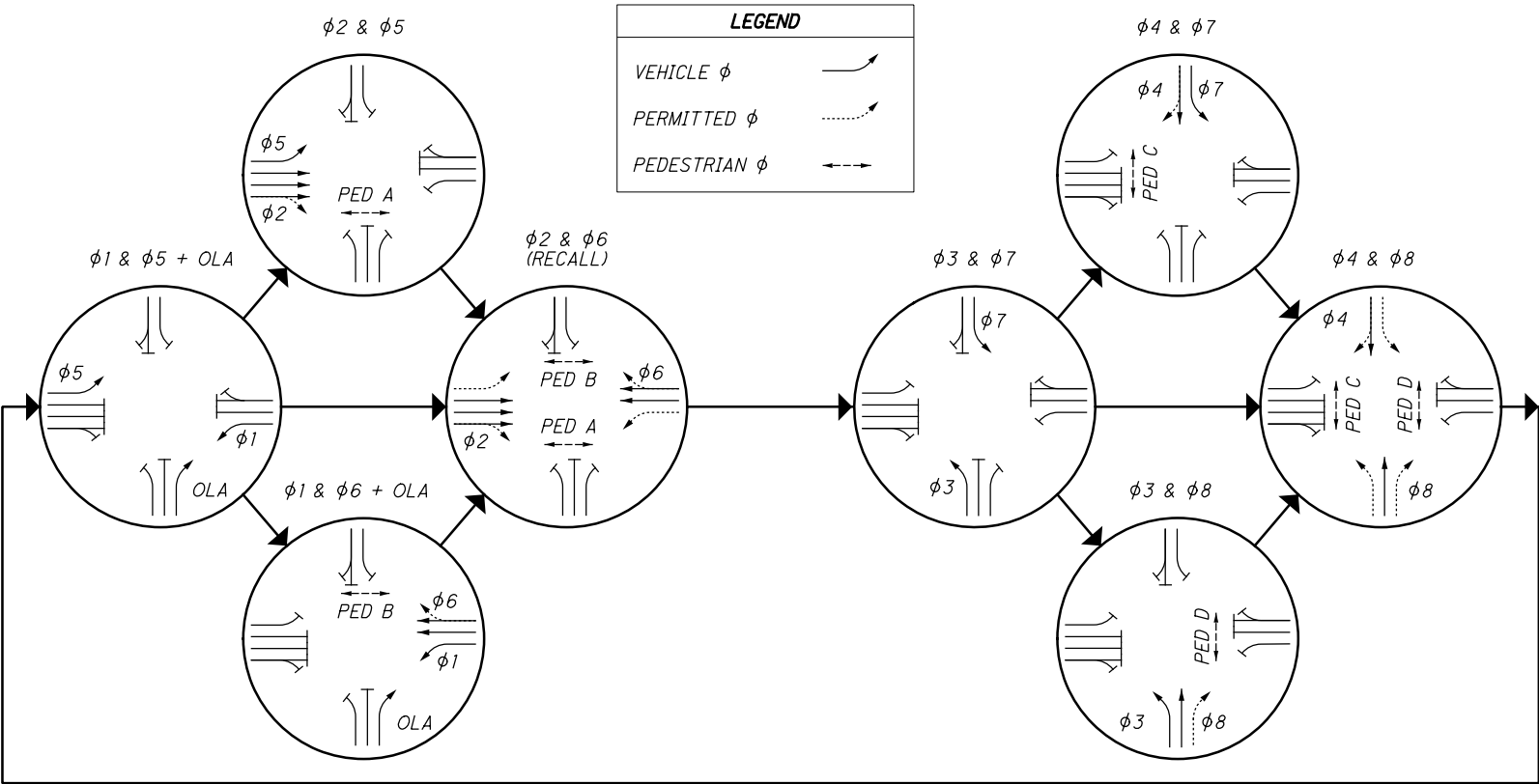
INTERSECTION: O.C. BLVD. / E. 79TH ST.										
MAINTAINING AGENCY: CITY OF CLEVELAND										
START UP  START IN: ALL RED TIME FOR FLASH OR ALL RED: 5 FIRST PHASE(S): 2 + 6 COLOR DISPLAYED: GREEN			DUAL ENTRY: YES		PHASES: 2, 6, 4, 8					
			REST IN RED:		RING 1 -		RING 2 -			
			OVERLAP			A	B	C	D	
			PHASES			1	-	-	-	
INTERVAL OR FEATURE			CONTROLLER MOVEMENT NO.							
INTERSECTION MOVEMENT (PHASE)			1	2	3	4	5	6	7	8
DIRECTION			WBL	EB	NBL	SB	EBL	WB	SBL	NB
MINIMUM GREEN (INITIAL) (SEC.)			7	20	7	10	7	20	7	10
ADDED INITIAL *(SEC./ACTUATION)			-	-	-	-	-	-	-	-
MAXIMUM INITIAL (SEC.)			-	-	-	-	-	-	-	-
PASSAGE TIME (PRESET GAP) (SEC.)			3	-	3	3	3	-	3	3
TIME BEFORE REDUCTION *(SEC.)			-	-	-	-	-	-	-	-
MINIMUM GAP *(SEC.)			-	-	-	-	-	-	-	-
TIME TO REDUCE *(SEC.)			-	-	-	-	-	-	-	-
MAXIMUM GREEN I (SEC.)			20	60	20	40	20	60	20	40
MAXIMUM GREEN II (SEC.)			-	-	-	-	-	-	-	-
YELLOW CHANGE (SEC.)			3.2	4.1	3	3.4	3.2	4.1	3	3.4
ALL RED CLEARANCE (SEC.)			2.7	1	1.9	2.1	2.7	1	1.9	2.1
WALK (SEC.)			-	7	-	7	-	7	-	8
PEDESTRIAN CLEARANCE (SEC.)			-	17	-	22	-	14	-	22
RECALL	MAXIMUM (ON/OFF)		-	ON	-	-	-	ON	-	-
	MINIMUM (ON/OFF)		-	-	-	-	-	-	-	-
	PEDESTRIAN (ON/OFF)		-	-	-	-	-	-	-	-
MEMORY (ON/OFF)			-	-	-	-	-	-	-	-

\*VOLUME DENSITY CONTROLS

NOTES:

- ENABLE  $\phi 1$  &  $\phi 5$  DETECTOR SWITCHING TO ALLOW  $\phi 1$  &  $\phi 5$  TO EXTEND  $\phi 2$  &  $\phi 6$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- ENABLE  $\phi 3$  &  $\phi 7$  DETECTOR SWITCHING TO ALLOW  $\phi 3$  &  $\phi 7$  TO EXTEND  $\phi 4$  &  $\phi 8$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- COUNTDOWN PEDESTRIAN SIGNALS SHALL GO TO ZERO ON YELLOW PER OMUTCD FIGURE 4E-2.

PHASING DIAGRAM



TRAFFIC SIGNAL DETECTOR CHART

LOOP DESIGNATION	LOOP CONFIGURATION**	SIZE (FT.)	PULSE OR PRESENCE	DELAY PROGRAMMED IN CONTROLLER (SEC.)	EXTENSION PROGRAMMED IN CONTROLLER (SEC.)	CONNECT TO DETECTOR UNIT (UNIT-CHANNEL)	ASSOCIATED CONTROLLER PHASE
L1A	P	6 x 20	PRESENCE	3	-	1-1	1
L1B	P	6 x 10	PRESENCE	0	-	2-1	1
L3A	P	6 x 20	PRESENCE	3	-	3-1	3
L3B	P	6 x 10	PRESENCE	0	-	4-1	3
L4A	P	6 x 20	PRESENCE	8	-	5-1	4
L4B	P	6 x 10	PRESENCE	0	-	6-1	4
L5A	P	6 x 20	PRESENCE	0	-	7-1	5
L5B	P	6 x 10	PRESENCE	0	-	8-1	5
L7A	P	6 x 20	PRESENCE	3	-	9-1	7
L7B	P	6 x 10	PRESENCE	0	-	10-1	7
L8A	P	6 x 20	PRESENCE	0	-	11-1	8
L8B	P	6 x 10	PRESENCE	0	-	12-1	8
L8C	P	6 x 20	PRESENCE	8	-	13-1	8
L8D	P	6 x 10	PRESENCE	0	-	14-1	8

\*\* CONFIGURATION: POWERHEAD (P); PER TC-82.10

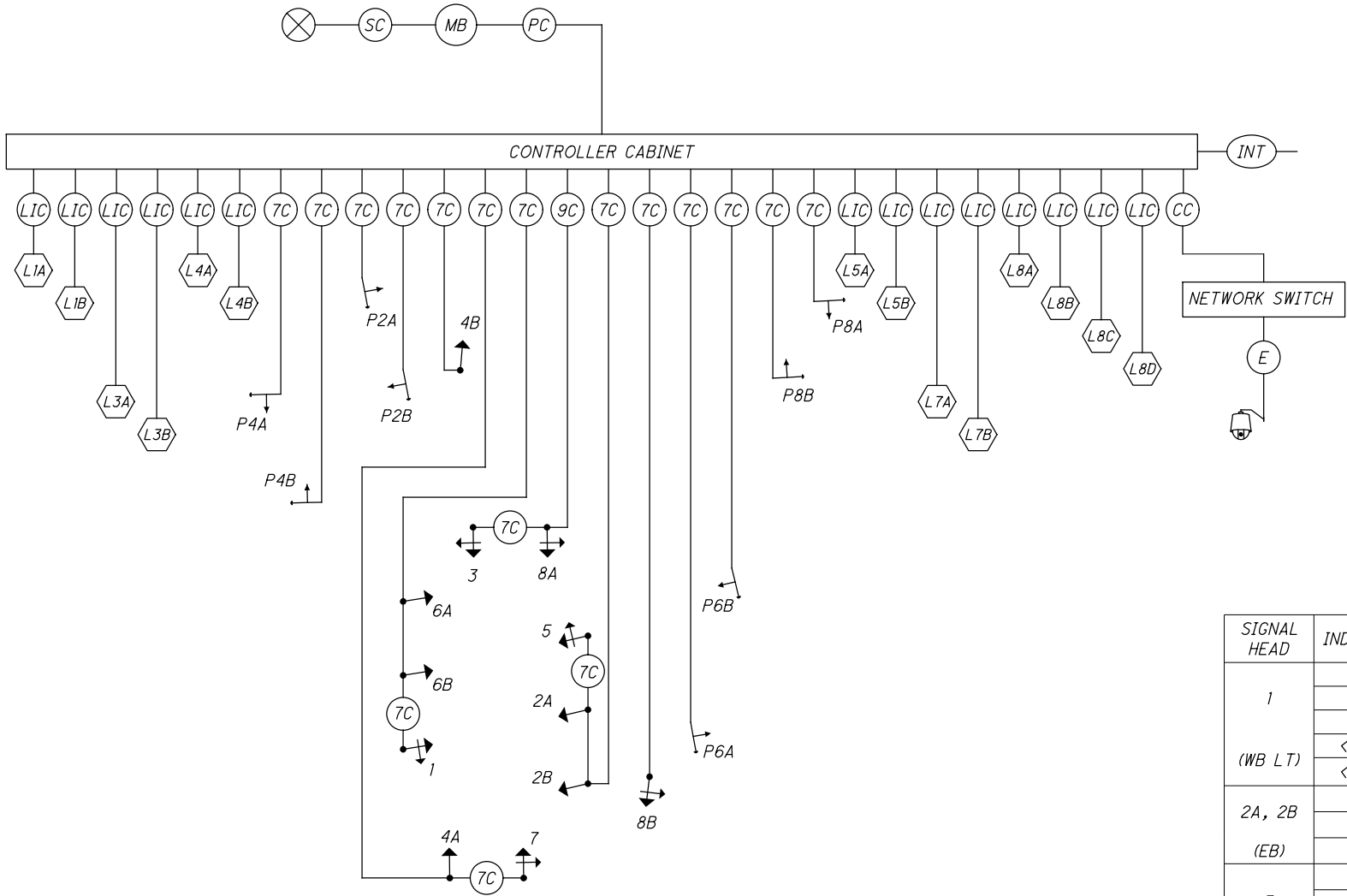
0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		







WIRING DIAGRAM



LEGEND

	5 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		2 CONDUCTOR, NO. 14 AWG (LEAD-IN CABLE)
	3 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		ETHERNET CABLE, CAT 5E
	PEDESTRIAN SIGNAL HEAD		PTZ CAMERA CABLE, 3 CONDUCTOR, NO. 14 AWG
	PEDESTRIAN PUSH BUTTON		POWER SOURCE
	PTZ CAMERA		SERVICE CABLE, 3 CONDUCTOR, NO. 6 AWG
	SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG		POWER CABLE, 2 CONDUCTOR, NO. 6 AWG
	INTERCONNECT CABLE		METER BASE

FIELD WIRING HOOK-UP CHART

SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH	SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH	
1  (WB LT)	R	φ6R	Y	7  (SB LT)	R	φ4R	R	
	Y	φ6Y			Y	φ4Y		
	G	φ6G			G	φ4G		
	<--Y---	φ1Y			<--Y---	φ7Y		
	<--G---	φ1G			<--G---	φ7G		
2A, 2B  (EB)	R	φ2R	Y	8A, 8B  (NB RT)	R	φ8R	R	
	Y	φ2Y			Y	φ8Y		
	G	φ2G			G	φ8G		
3  (NB LT)	R	φ8R	R		---	Y-->		φ1Y/LS 14 Y
	Y	φ8Y			---	G-->		φ1G/LS 14 G
	G	φ8G		PEDESTRIAN MOVEMENTS				
	<--Y---	φ3Y		P2A-P2B SOUTH	W	φ2 PED/LS 10 G	OUT	
	<--G---	φ3G			DW	φ2 PED/LS 10 R		
4A, 4B  (SB)	R	φ4R	R	P4A-P4B WEST	W	φ4 PED/LS 11 G	OUT	
	Y	φ4Y			DW	φ4 PED/LS 11 R		
	G	φ4G		P6A-P6B NORTH	W	φ6 PED/LS 12 G	OUT	
5  (EB LT)	R	φ2R	Y		DW	φ6 PED/LS 12 R		
	Y	φ2Y		P8A-P8B EAST	W	φ8 PED/LS 13 G	OUT	
	G	φ2G			DW	φ8 PED/LS 13 R		
	<--Y---	φ5Y		OVERLAPS				
	<--G---	φ5G		OLA	---	Y-->	φ1Y/LS 14 Y	OUT
6A, 6B  (WB)	R	φ6R	Y		---	G-->	φ1G/LS 14 G	
	Y	φ6Y						
	G	φ6G						
LS = LOAD SWITCH								

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ISSUE RECORD		



LEGEND

TRAFFIC SIGNAL,  
3 UNIT HEAD, 12"

TRAFFIC SIGNAL,  
5 UNIT HEAD, 12"

SIGNAL SUPPORT POLE

PTZ CAMERA

PEDESTRIAN SIGNAL

PEDESTRIAN PUSHBUTTON

PEDESTAL SUPPORT

CONTROLLER CABINET  
(TS-2 TYPE 1 M-36)  
AND WORK PAD

TRAFFIC PULL BOX

DETECTION ZONE

PROP



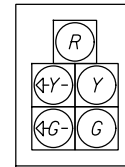
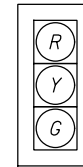
PULLBOX TABLE

PULL BOX #	STATION	SIDE	OFFSET	SIZE (IN.)
PB-1	204+76.0	RT	88.8	24 x 36
PB-2	204+59.3	RT	111.8	13 x 24
PB-3	205+08.6	LT	32.1	13 x 24
PB-4	204+77.3	LT	56.9	17 x 30
PB-5	203+76.0	RT	80.9	17 x 30
PB-6	203+27.1	RT	48.1	13 x 24
PB-7	203+50.5	LT	60.2	17 x 30
PB-8	203+76.5	LT	97.5	13 x 24

NOTES:

- FOR STREET NAME SIGNS (B) AND (C) SEE BU-26.
- FOR INTERCONNECT DETAILS SEE SHEETS 39-41.
- THE CONTRACTOR SHALL ENSURE THAT ALL SIGNAL FACES ARE CLEARLY VISIBLE TO ALL ON-COMING VEHICLES; CLEAR OF ANY OBSTRUCTIONS ONCE MOUNTED TO THE MAST ARMS.
- CONDUIT DEPTH SHALL BE 36" MINIMUM.

SIGNAL HEADS



2A, 2B, 4A, 4B,  
6A, 6B, 8A, 8B

1, 3,  
5, 7

PEDESTRIAN HEADS  
(LED, COUNTDOWN,  
TYPE D2)

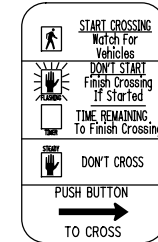
ALL VEHICULAR SIGNAL HEADS SHALL BE 12" LED WITH BACKPLATES WITH CUTAWAY VISORS. THEY SHALL BE CONSTRUCTED OF POLYCARBONATE PLASTIC. THE SIGNAL HEAD HOUSING AND OUTSIDE OF VISOR SHALL BE YELLOW, AND THE INSIDE OF THE VISOR SHALL BE FLAT BLACK.

STREET NAME SIGNS

(B) Opportunity Corridor

(C) Buckeye Rd

SIGNS



R10-3E  
9" X 15"  
3 - LEFT ARROWS  
5 - RIGHT ARROWS

NO.	DATE	DESCRIPTION
0	2019-06-04	RFC
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SIGNAL TIMING CHART

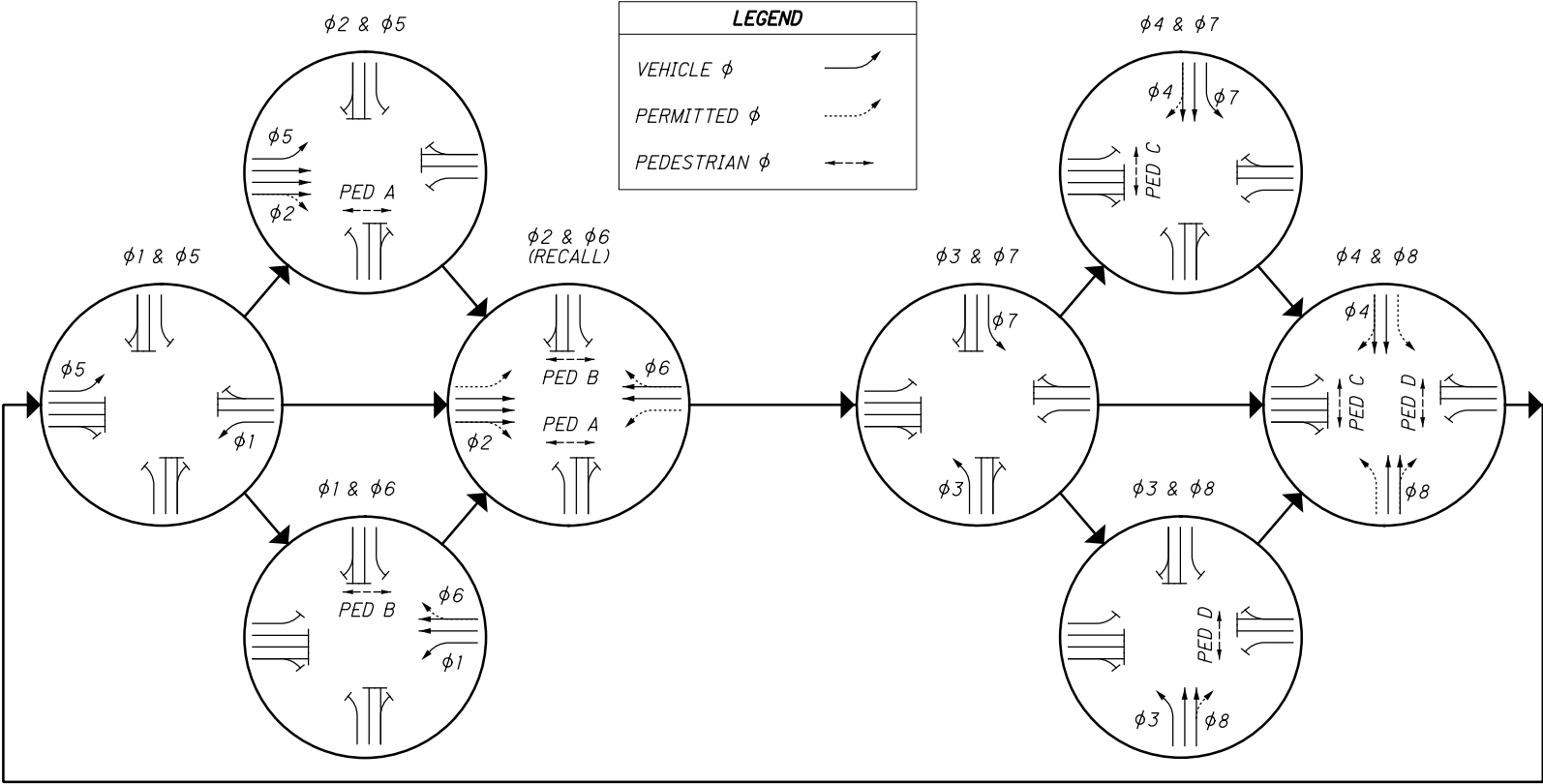
INTERSECTION: O.C. BLVD. / BUCKEYE RD.											
MAINTAINING AGENCY: CITY OF CLEVELAND											
START UP  START IN: ALL RED TIME FOR FLASH OR ALL RED: 5 FIRST PHASE(S): 2 + 6 COLOR DISPLAYED: GREEN				DUAL ENTRY: YES		PHASES: 2, 6, 4, 8					
				REST IN RED:		RING 1		RING 2			
				OVERLAP				A	B	C	D
				PHASES				-	-	-	-
INTERVAL OR FEATURE				CONTROLLER MOVEMENT NO.							
INTERSECTION MOVEMENT (PHASE)				1	2	3	4	5	6	7	8
DIRECTION				WBL	EB	NBL	SB	EBL	WB	SBL	NB
MINIMUM GREEN (INITIAL) (SEC.)				7	20	7	10	7	20	7	10
ADDED INITIAL *(SEC./ACTUATION)				-	-	-	-	-	-	-	-
MAXIMUM INITIAL (SEC.)				-	-	-	-	-	-	-	-
PASSAGE TIME (PRESET GAP) (SEC.)				3	-	3	3	3	-	3	3
TIME BEFORE REDUCTION *(SEC.)				-	-	-	-	-	-	-	-
MINIMUM GAP *(SEC.)				-	-	-	-	-	-	-	-
TIME TO REDUCE *(SEC.)				-	-	-	-	-	-	-	-
MAXIMUM GREEN I (SEC.)				20	60	20	40	20	60	20	40
MAXIMUM GREEN II (SEC.)				-	-	-	-	-	-	-	-
YELLOW CHANGE (SEC.)				3.2	4.1	3.2	4.1	3.2	4.1	3.2	4.1
ALL RED CLEARANCE (SEC.)				2.1	1	2.5	1.3	2.1	1	2.5	1.3
WALK (SEC.)				-	7	-	8	-	7	-	8
PEDESTRIAN CLEARANCE (SEC.)				-	17	-	23	-	17	-	23
RECALL	MAXIMUM (ON/OFF)	-	ON	-	-	-	ON	-	-		
	MINIMUM (ON/OFF)	-	-	-	-	-	-	-	-		
	PEDESTRIAN (ON/OFF)	-	-	-	-	-	-	-	-		
MEMORY (ON/OFF)		-	-	-	-	-	-	-	-		

\*VOLUME DENSITY CONTROLS

NOTES:

- ENABLE  $\phi 1$  &  $\phi 5$  DETECTOR SWITCHING TO ALLOW  $\phi 1$  &  $\phi 5$  TO EXTEND  $\phi 2$  &  $\phi 6$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- ENABLE  $\phi 3$  &  $\phi 7$  DETECTOR SWITCHING TO ALLOW  $\phi 3$  &  $\phi 7$  TO EXTEND  $\phi 4$  &  $\phi 8$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- COUNTDOWN PEDESTRIAN SIGNALS SHALL GO TO ZERO ON YELLOW PER OMUTCD FIGURE 4E-2.

PHASING DIAGRAM



TRAFFIC SIGNAL DETECTOR CHART

LOOP DESIGNATION	LOOP CONFIGURATION**	SIZE (FT.)	PULSE OR PRESENCE	DELAY PROGRAMMED IN CONTROLLER (SEC.)	EXTENSION PROGRAMMED IN CONTROLLER (SEC.)	CONNECT TO DETECTOR UNIT (UNIT-CHANNEL)	ASSOCIATED CONTROLLER PHASE
L1A	P	6 x 20	PRESENCE	3	-	1-1	1
L1B	P	6 x 10	PRESENCE	0	-	2-1	1
L3A	P	6 x 20	PRESENCE	3	-	3-1	3
L3B	P	6 x 10	PRESENCE	0	-	4-1	3
L4A	P	6 x 20	PRESENCE	8	-	5-1	4
L4B	P	6 x 10	PRESENCE	0	-	6-1	4
L4C	P	6 x 20	PRESENCE	0	-	7-1	4
L4D	P	6 x 10	PRESENCE	0	-	8-1	4
L5A	P	6 x 20	PRESENCE	0	-	9-1	5
L5B	P	6 x 10	PRESENCE	0	-	10-1	5
L7A	P	6 x 20	PRESENCE	3	-	11-1	7
L7B	P	6 x 10	PRESENCE	0	-	12-1	7
L8A	P	6 x 20	PRESENCE	0	-	13-1	8
L8B	P	6 x 10	PRESENCE	0	-	14-1	8
L8C	P	6 x 20	PRESENCE	8	-	15-1	8
L8D	P	6 x 10	PRESENCE	0	-	16-1	8

\*\* CONFIGURATION: POWERHEAD (P); PER TC-82.10

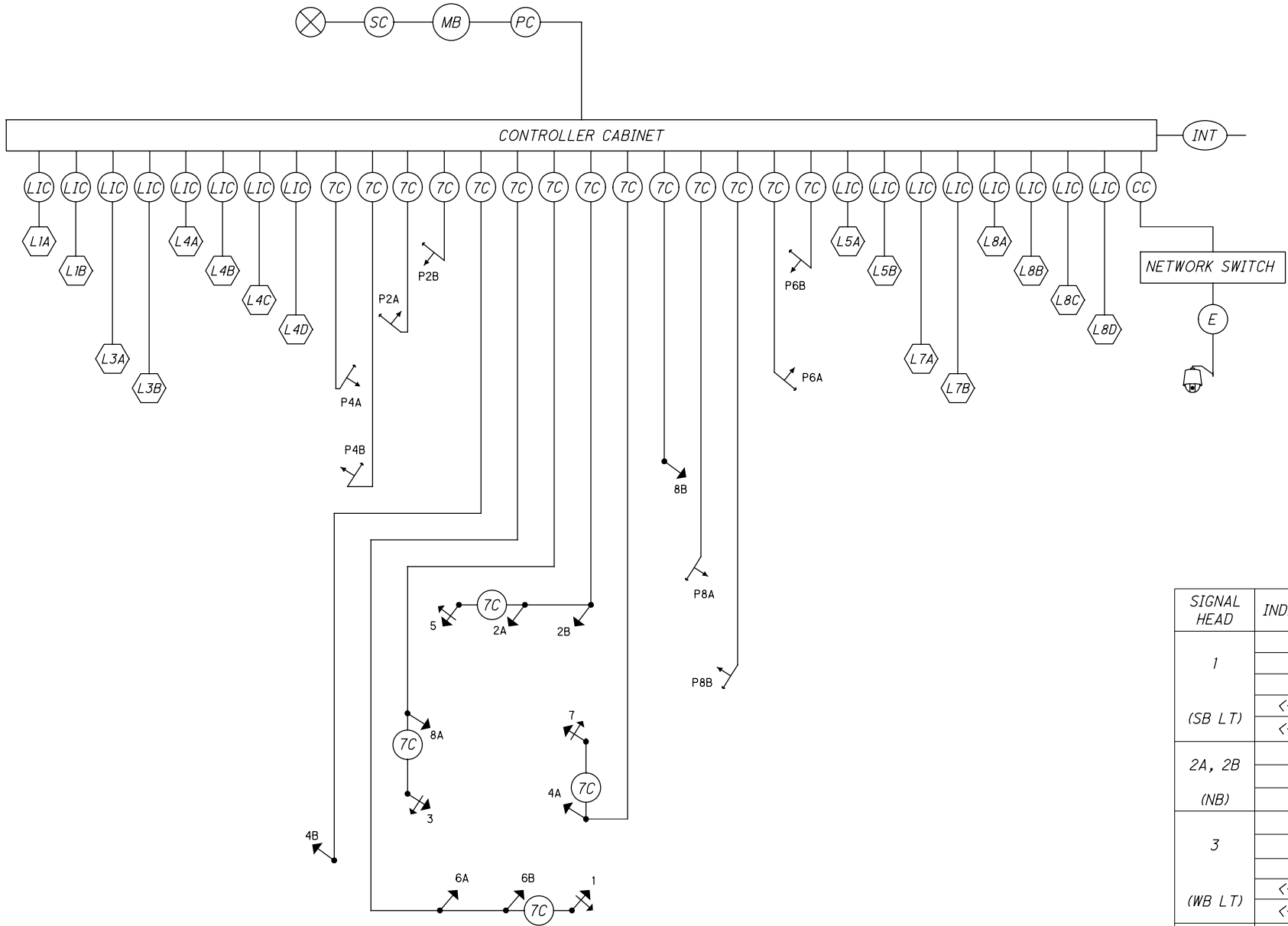
0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		







WIRING DIAGRAM



LEGEND

	5 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		2 CONDUCTOR, NO. 14 AWG (LEAD-IN CABLE)
	3 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		ETHERNET CABLE, CAT 5E
	PEDESTRIAN SIGNAL HEAD		PTZ CAMERA CABLE, 3 CONDUCTOR, NO. 14 AWG
	PEDESTRIAN PUSH BUTTON		POWER SOURCE
	PTZ CAMERA		SERVICE CABLE, 3 CONDUCTOR, NO. 6 AWG
	SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG		POWER CABLE, 2 CONDUCTOR, NO. 6 AWG
	INTERCONNECT CABLE		METER BASE

FIELD WIRING HOOK-UP CHART

SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH	SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH	
1  (SB LT)	R	φ6R	Y	6A, 6B  (SB)	R	φ6R	Y	
	Y	φ6Y			Y	φ6Y		
	G	φ6G			G	φ6G		
	<--Y---	φ1Y		7	R	φ4R	R	
	<--G---	φ1G			Y	φ4Y		
		G	φ4G					
2A, 2B  (NB)	R	φ2R	Y	(EB LT)	<--Y---	φ7Y		
	Y	φ2Y			<--G---	φ7G		
	G	φ2G						
3  (WB LT)	R	φ8R	R	8A, 8B  (WB)	R	φ8R	R	
	Y	φ8Y			Y	φ8Y		
	G	φ8G			G	φ8G		
	<--Y---	φ3Y		PEDESTRIAN MOVEMENTS				
	<--G---	φ3G		P2A-P2B	W	φ2 PED/LS 10 G	OUT	
4A, 4B  (EB)	R	φ4R	EAST	DW	φ2 PED/LS 10 R			
	Y	φ4Y	P4A-P4B SOUTH	W	φ4 PED/LS 11 G	OUT		
	G	φ4G		DW	φ4 PED/LS 11 R			
5  (NB LT)	R	φ2R	Y	P6A-P6B WEST	W	φ6 PED/LS 12 G	OUT	
	Y	φ2Y			DW	φ6 PED/LS 12 R		
	G	φ2G		P8A-P8B NORTH	W	φ8 PED/LS 13 G	OUT	
	<--Y---	φ5Y			DW	φ8 PED/LS 13 R		
	<--G---	φ5G						
LS = LOAD SWITCH								

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



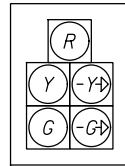
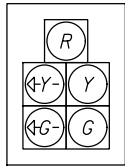
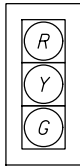
LEGEND

TRAFFIC SIGNAL, 3 UNIT HEAD, 12"	→
TRAFFIC SIGNAL, 5 UNIT HEAD, 12"	→
SIGNAL SUPPORT POLE	■
PTZ CAMERA	📹
PEDESTRIAN SIGNAL	→
PEDESTRIAN PUSHBUTTON	→
PEDESTAL SUPPORT	□
CONTROLLER CABINET (TS-2 TYPE 1 M-36) AND WORK PAD	☒
TRAFFIC PULL BOX	☒
DETECTION ZONE	▭
MECHANICAL DAMPER	✂

NOTES:

- FOR STREET NAME SIGNS (B) AND (C) SEE BU-26.
- FOR INTERCONNECT DETAILS SEE SHEETS 39-41.
- THE CONTRACTOR SHALL ENSURE THAT ALL SIGNAL FACES ARE CLEARLY VISIBLE TO ALL ON-COMING VEHICLES; CLEAR OF ANY OBSTRUCTIONS ONCE MOUNTED TO THE MAST ARMS.
- CONDUIT DEPTH SHALL BE 36" MINIMUM.

SIGNAL HEADS



2A, 4A, 4B, 4C, 6A, 6B, 6C, 8A, 8B, 8C

1, 3, 5, 7

2B

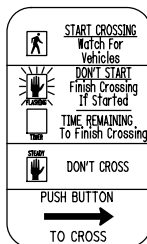
PEDESTRIAN HEADS  
(LED, COUNTDOWN,  
TYPE D2)

ALL VEHICULAR SIGNAL HEADS SHALL BE 12" LED WITH BACKPLATES WITH CUTAWAY VISORS. THEY SHALL BE CONSTRUCTED OF POLYCARBONATE PLASTIC. THE SIGNAL HEAD HOUSING AND OUTSIDE OF VISOR SHALL BE YELLOW, AND THE INSIDE OF THE VISOR SHALL BE FLAT BLACK.

PULLBOX TABLE

PULL BOX #	STATION	SIDE	OFFSET	SIZE (IN.)
PB-1	210+86.2	RT	58.3	24 x 36
PB-2	210+51.5	RT	71.0	17 x 30
PB-3	209+98.4	RT	48.2	13 x 24
PB-4	209+92.8	LT	61.9	17 x 30
PB-5	210+11.6	LT	94.8	13 x 24
PB-6	212+18.6	RT	104.5	13 x 24
PB-7	212+31.1	RT	84.6	17 x 30
PB-8	211+92.1	RT	47.1	17 x 30
PB-9	211+96.5	LT	33.2	13 x 24
PB-10	211+36.3	LT	53.9	17 x 30

SIGNS



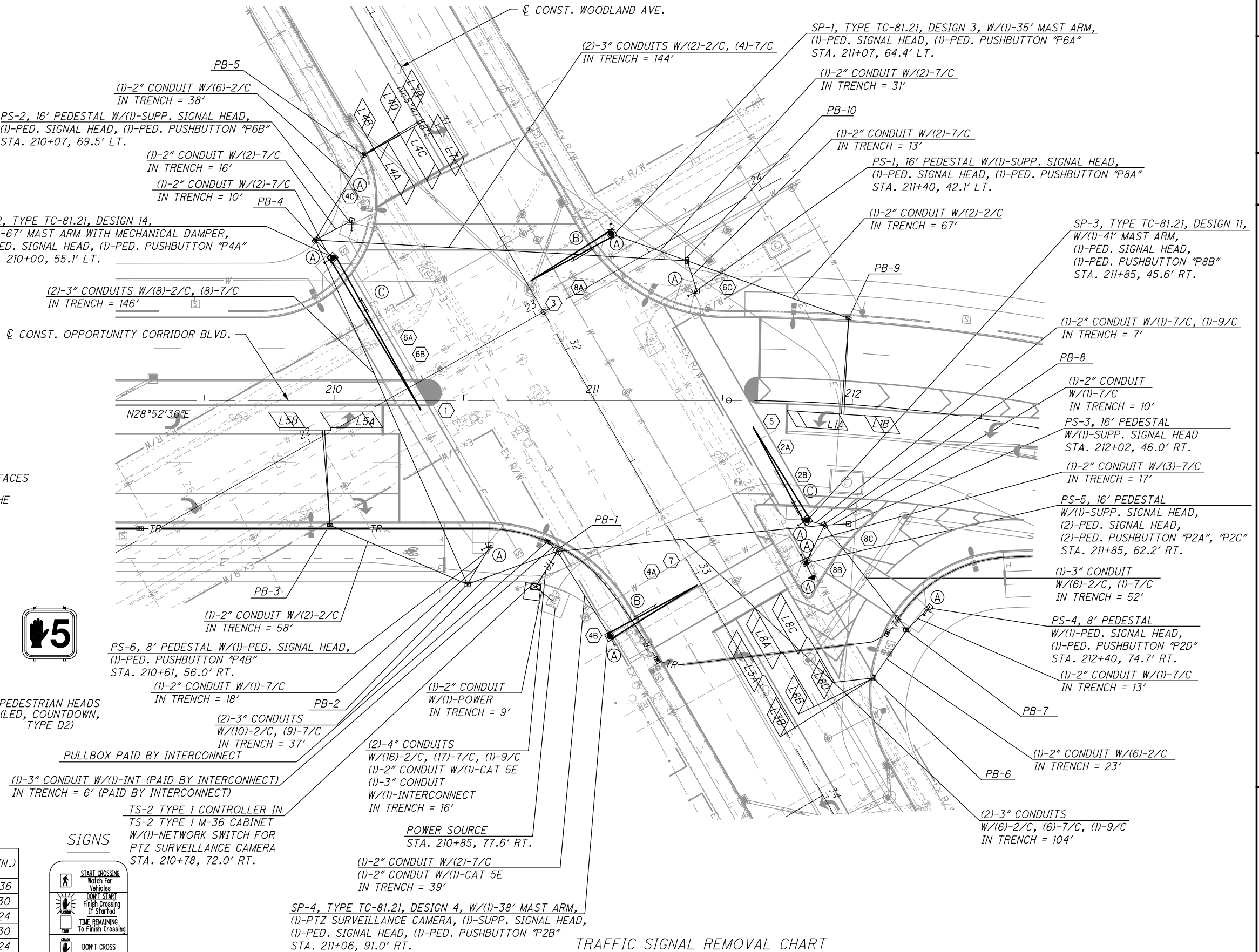
R10-3E  
9" X 15"  
4 - LEFT ARROWS  
6 - RIGHT ARROWS

(A)

STREET NAME SIGNS

(B) Opportunity Corridor

(C) Woodland Ave



TRAFFIC SIGNAL REMOVAL CHART

QUANTITY	REMOVED ITEM DESCRIPTION	DELIVERED	DISPOSED
1	CABINET W/CONTROLLER EQUIPMENT	X	
1	DISCONNECT SWITCH	X	
LUMP	SIGNAL CABLE AND MESSENGER WIRE		X
2	VEHICULAR SIGNAL HEAD	X	
1	STRAIN POLE		X

NO.	DATE	DESCRIPTION
0	2019-06-04	RFC
ISSUE RECORD		



SIGNAL TIMING CHART

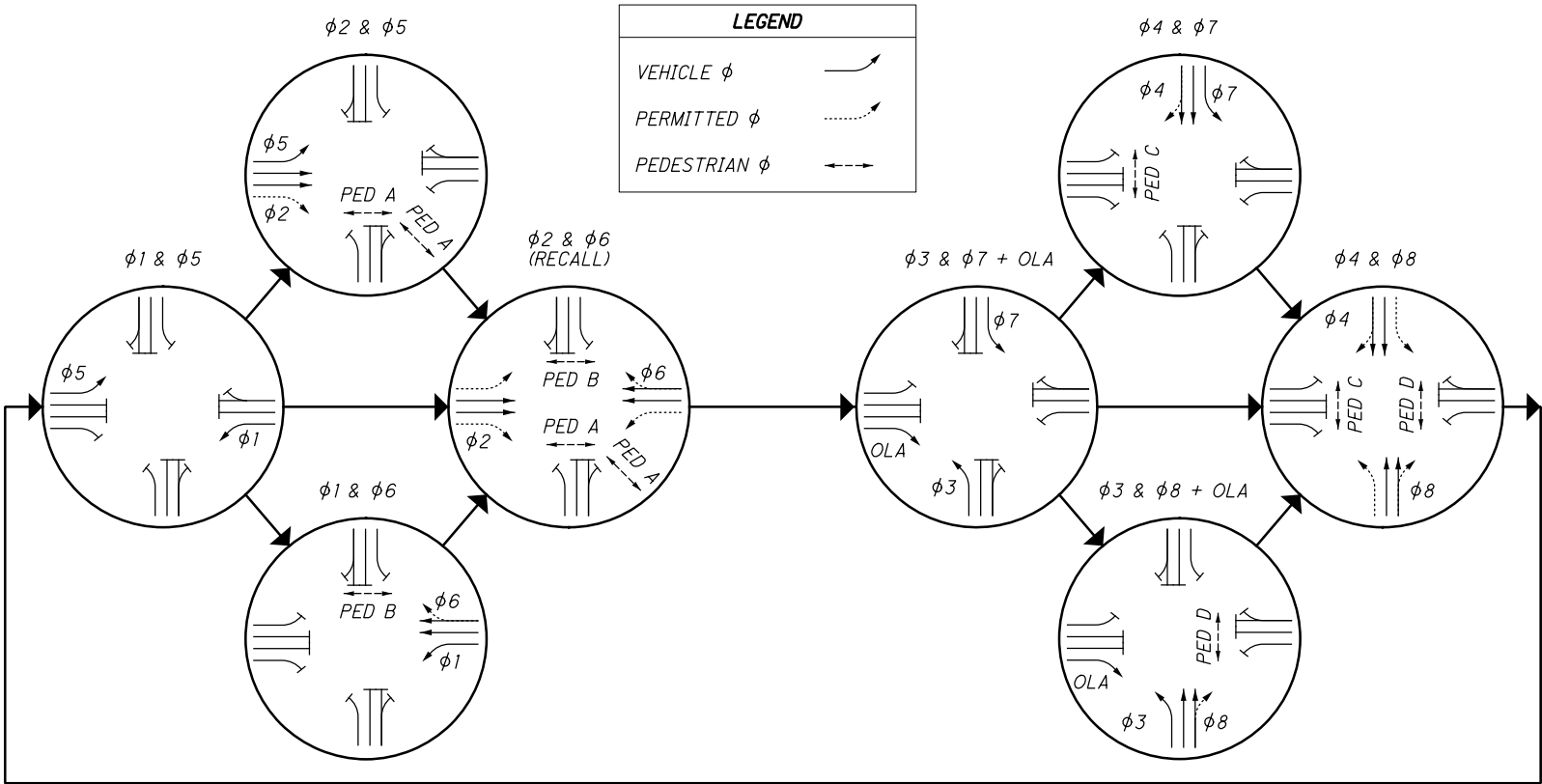
INTERSECTION: O.C. BLVD. / WOODLAND AVE.										
MAINTAINING AGENCY: CITY OF CLEVELAND										
<u>START UP</u>  START IN: ALL RED TIME FOR FLASH OR ALL RED: 5 FIRST PHASE(S): 2 + 6 COLOR DISPLAYED: GREEN			DUAL ENTRY: YES		PHASES: 2, 6, 4, 8					
			REST IN RED:		RING 1		RING 2			
			OVERLAP				A	B	C	D
			PHASES				3	-	-	-
INTERVAL OR FEATURE			CONTROLLER MOVEMENT NO.							
INTERSECTION MOVEMENT (PHASE)			1	2	3	4	5	6	7	8
DIRECTION			WBL	EB	NBL	SB	EBL	WB	SBL	NB
MINIMUM GREEN (INITIAL) (SEC.)			7	20	7	10	7	20	7	10
ADDED INITIAL *(SEC./ACTUATION)			-	-	-	-	-	-	-	-
MAXIMUM INITIAL (SEC.)			-	-	-	-	-	-	-	-
PASSAGE TIME (PRESET GAP) (SEC.)			3	-	3	3	3	-	3	3
TIME BEFORE REDUCTION *(SEC.)			-	-	-	-	-	-	-	-
MINIMUM GAP *(SEC.)			-	-	-	-	-	-	-	-
TIME TO REDUCE *(SEC.)			-	-	-	-	-	-	-	-
MAXIMUM GREEN I (SEC.)			20	60	20	40	20	60	20	40
MAXIMUM GREEN II (SEC.)			-	-	-	-	-	-	-	-
YELLOW CHANGE (SEC.)			3.2	4.1	3.2	4.1	3.2	4.1	3.2	4.1
ALL RED CLEARANCE (SEC.)			2	1.3	3.6	1.5	2	1.3	3.6	1.5
WALK (SEC.)			-	8	-	8	-	7	-	8
PEDESTRIAN CLEARANCE (SEC.)			-	14	-	27	-	20	-	21
RECALL	MAXIMUM (ON/OFF)		-	ON	-	-	-	ON	-	-
	MINIMUM (ON/OFF)		-	-	-	-	-	-	-	-
	PEDESTRIAN (ON/OFF)		-	-	-	-	-	-	-	-
MEMORY (ON/OFF)			-	-	-	-	-	-	-	-

\*VOLUME DENSITY CONTROLS

NOTES:

- ENABLE  $\phi 1$  &  $\phi 5$  DETECTOR SWITCHING TO ALLOW  $\phi 1$  &  $\phi 5$  TO EXTEND  $\phi 2$  &  $\phi 6$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- ENABLE  $\phi 3$  &  $\phi 7$  DETECTOR SWITCHING TO ALLOW  $\phi 3$  &  $\phi 7$  TO EXTEND  $\phi 4$  &  $\phi 8$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- COUNTDOWN PEDESTRIAN SIGNALS SHALL GO TO ZERO ON YELLOW PER OMUTCD FIGURE 4E-2.

PHASING DIAGRAM



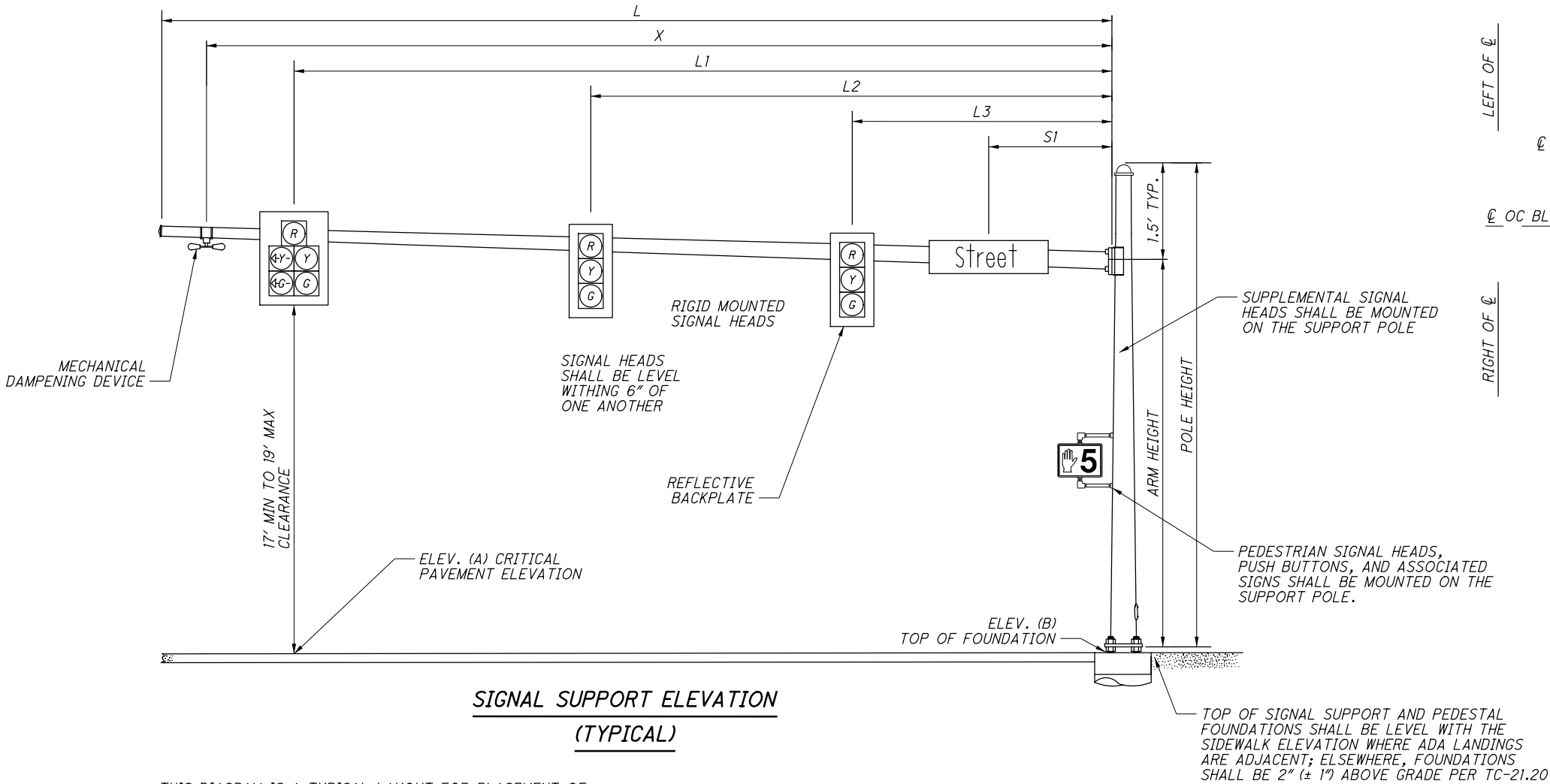
TRAFFIC SIGNAL DETECTOR CHART

LOOP DESIGNATION	LOOP CONFIGURATION**	SIZE (FT.)	PULSE OR PRESENCE	DELAY PROGRAMMED IN CONTROLLER (SEC.)	EXTENSION PROGRAMMED IN CONTROLLER (SEC.)	CONNECT TO DETECTOR UNIT (UNIT-CHANNEL)	ASSOCIATED CONTROLLER PHASE
L1A	P	6 x 20	PRESENCE	3	-	1-1	1
L1B	P	6 x 10	PRESENCE	0	-	2-1	1
L3A	P	6 x 20	PRESENCE	3	-	3-1	3
L3B	P	6 x 10	PRESENCE	0	-	4-1	3
L4A	P	6 x 20	PRESENCE	8	-	5-1	4
L4B	P	6 x 10	PRESENCE	0	-	6-1	4
L4C	P	6 x 20	PRESENCE	0	-	7-1	4
L4D	P	6 x 10	PRESENCE	0	-	8-1	4
L5A	P	6 x 20	PRESENCE	0	-	9-1	5
L5B	P	6 x 10	PRESENCE	0	-	10-1	5
L7A	P	6 x 20	PRESENCE	3	-	11-1	7
L7B	P	6 x 10	PRESENCE	0	-	12-1	7
L8A	P	6 x 20	PRESENCE	0	-	13-1	8
L8B	P	6 x 10	PRESENCE	0	-	14-1	8
L8C	P	6 x 20	PRESENCE	8	-	15-1	8
L8D	P	6 x 10	PRESENCE	0	-	16-1	8

\*\* CONFIGURATION: POWERHEAD (P); PER TC-82.10

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		





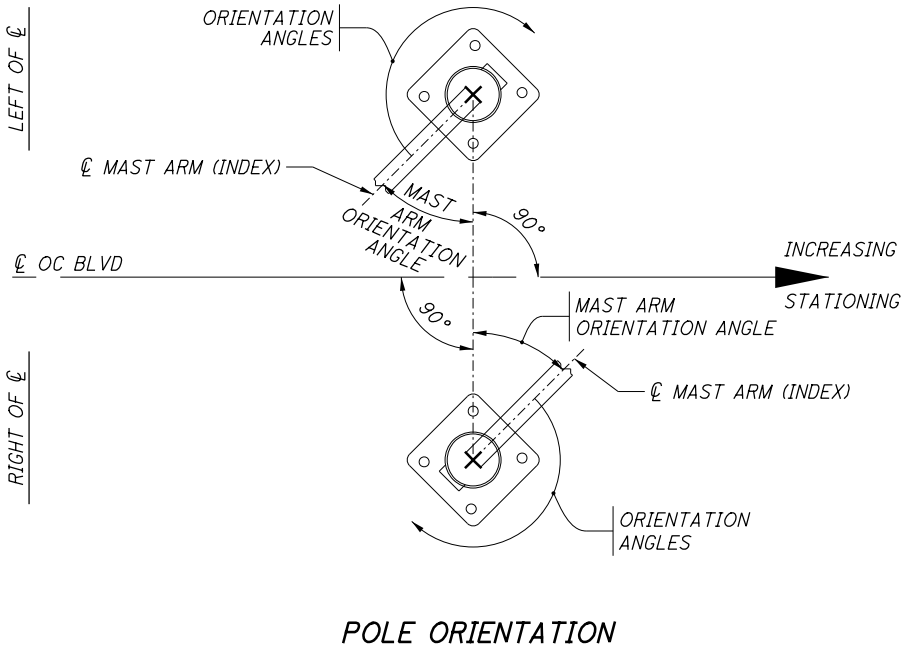
**SIGNAL SUPPORT ELEVATION**  
**(TYPICAL)**

THIS DIAGRAM IS A TYPICAL LAYOUT FOR PLACEMENT OF ITEMS ON MAST ARM. CONTRACTOR SHALL REFER TO TABLE BELOW WITH DISTANCES ALONG MAST ARM FOR SPECIFIC PLACEMENT, EACH VARY BY APPROACH.

**MAST ARM TABLE**

SUPPORT NO.	STATION	OFFSET	ELEVATION		SIGNAL SUPPORT DETAILS												ORIENTATION ANGLES FROM MAST ARM							
			A	B	DESIGN TYPE	DESIGN NO.	POLE HEIGHT	ARM HEIGHT *	L	L1	L2	L3		S1	OFFSET DISTANCE TO MECHANICAL DAMPER, X	MAST ARM A ANGLE		PEDESTRIAN SIGNAL 1	PEDESTRIAN BUTTON 1	PEDESTRIAN SIGNAL 2	PEDESTRIAN BUTTON 2	SUPPLEMENTAL SIGNAL HEAD	HANDHOLE	
SP-1	211+07	64.4' LT	696.59	697.35	TC-81.21	3	22	20.5	38	31.53	20.53	-	-	12.39	FT	DEG		DEG	DEG	-	-	-	180	
SP-2	210+00	55.1' LT	695.69	696.76	TC-81.21	14	21	19.5	70	63.59	45.69	32.41	-	20.62	66	330		89	89	-	-	-	180	
SP-3	211+85	45.6' RT	695.79	695.64	TC-81.21	11	23	21.5	41	37.26	24.56	11.87	-	5.33		327		270	270	-	-	-	180	
SP-4	211+06	91.0' RT	694.35	694.82	TC-81.21	4	22	20.5	38	34.69	23.68	-	-	15.63		60		92	92	-	-	272	180	
PS-1	211+40	42.1' LT	-	-	PEDESTAL	-	16	-	-	-	-	-	-	-		-		63	63	-	-	288	108	
PS-2	210+07	69.5' LT	-	-	PEDESTAL	-	16	-	-	-	-	-	-	-		-		0	0	-	-	154	334	
PS-3	212+02	46.0' RT	-	-	PEDESTAL	-	16	-	-	-	-	-	-	-		-		-	-	-	-	176	356	
PS-4	212+40	74.7' RT	-	-	PEDESTAL	-	8	-	-	-	-	-	-	-		-		206	206	-	-	-	26	
PS-5	211+85	62.2' RT	-	-	PEDESTAL	-	16	-	-	-	-	-	-	-		-		329	329	27	27	150	180	
PS-6	210+61	56.0' RT	-	-	PEDESTAL	-	8	-	-	-	-	-	-	-		-		243	243	-	-	-	63	

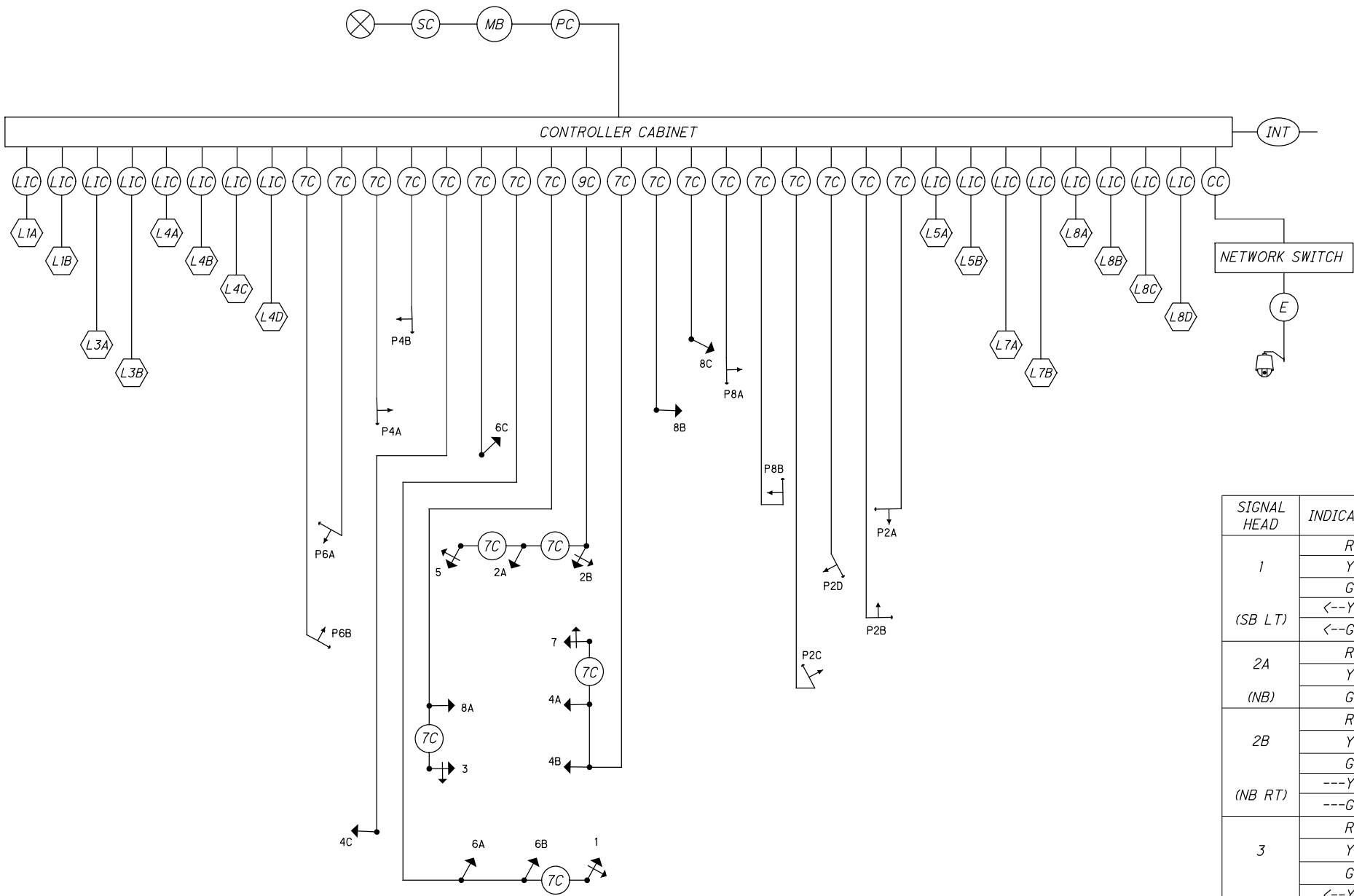
\*FIELD VERIFY ACTUAL ELEVATIONS PRIOR TO ORDERING SIGNAL SUPPORTS.



1	2024-09-10	RECORD DRAWINGS
0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



WIRING DIAGRAM



LEGEND

	5 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		2 CONDUCTOR, NO. 14 AWG (LEAD-IN CABLE)
	3 SECTION VEHICULAR SIGNAL HEAD, 1-WAY		ETHERNET CABLE, CAT 5E
	PEDESTRIAN SIGNAL HEAD		PTZ CAMERA CABLE, 3 CONDUCTOR, NO. 14 AWG
	PEDESTRIAN PUSH BUTTON		POWER SOURCE
	PTZ CAMERA		SERVICE CABLE, 3 CONDUCTOR, NO. 6 AWG
	SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG		POWER CABLE, 2 CONDUCTOR, NO. 6 AWG
	INTERCONNECT CABLE		METER BASE

FIELD WIRING HOOK-UP CHART

SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH	SIGNAL HEAD	INDICATION	FIELD TERMINAL	FLASH			
1  (SB LT)	R	φ 6R	Y	6A, 6B, 6C (SB)	R	φ 6R	Y			
	Y	φ 6Y			Y	φ 6Y				
	G	φ 6G			G	φ 6G				
	<--Y---	φ 1Y		7	R	φ 4R	R			
	<--G---	φ 1G			Y	φ 4Y				
2A  (NB)	R	φ 2R	Y		(EB LT)	G		φ 4G		
	Y	φ 2Y				<--Y---		φ 7Y		
	G	φ 2G		<--G---		φ 7G				
	2B  (NB RT)	R		φ 2R		Y	8A, 8B, 8C (WB)	R	φ 8R	R
		Y		φ 2Y				Y	φ 8Y	
G		φ 2G	G	φ 8G						
				PEDESTRIAN MOVEMENTS						
3  (WB LT)		R	φ 8R	R	P2A-P2B			W	φ 2 PED/LS 10 G	OUT
	Y	φ 8Y	EAST		DW	φ 2 PED/LS 10 R				
	G	φ 8G	P2C-P2D		W	φ 2 PED/LS 11 G	OUT			
	<--Y---	φ 3Y	EAST		DW	φ 2 PED/LS 11 R				
	<--G---	φ 3G	P4A-P4B		W	φ 4 PED/LS 12 G	OUT			
4A, 4B, 4C (EB)	R	φ 4R	R	P6A-P6B	W	φ 6 PED/LS 13 G		OUT		
	Y	φ 4Y		WEST	DW	φ 6 PED/LS 13 R				
	G	φ 4G		P8A-P8B	W	φ 8 PED/LS 14 G	OUT			
	5  (NB LT)	R		φ 2R	Y	NORTH		DW	φ 8 PED/LS 14 R	
		Y		φ 2Y		OVERLAPS				
G		φ 2G	OLA	<--Y-->		φ 3Y/LS 15 Y	OUT			
<--Y---		φ 5Y		<--G-->		φ 3G/LS 15 G				
<--G---		φ 5G	-	-		-	-			
LS = LOAD SWITCH				-	-	-	-			

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		







SIGNAL TIMING CHART

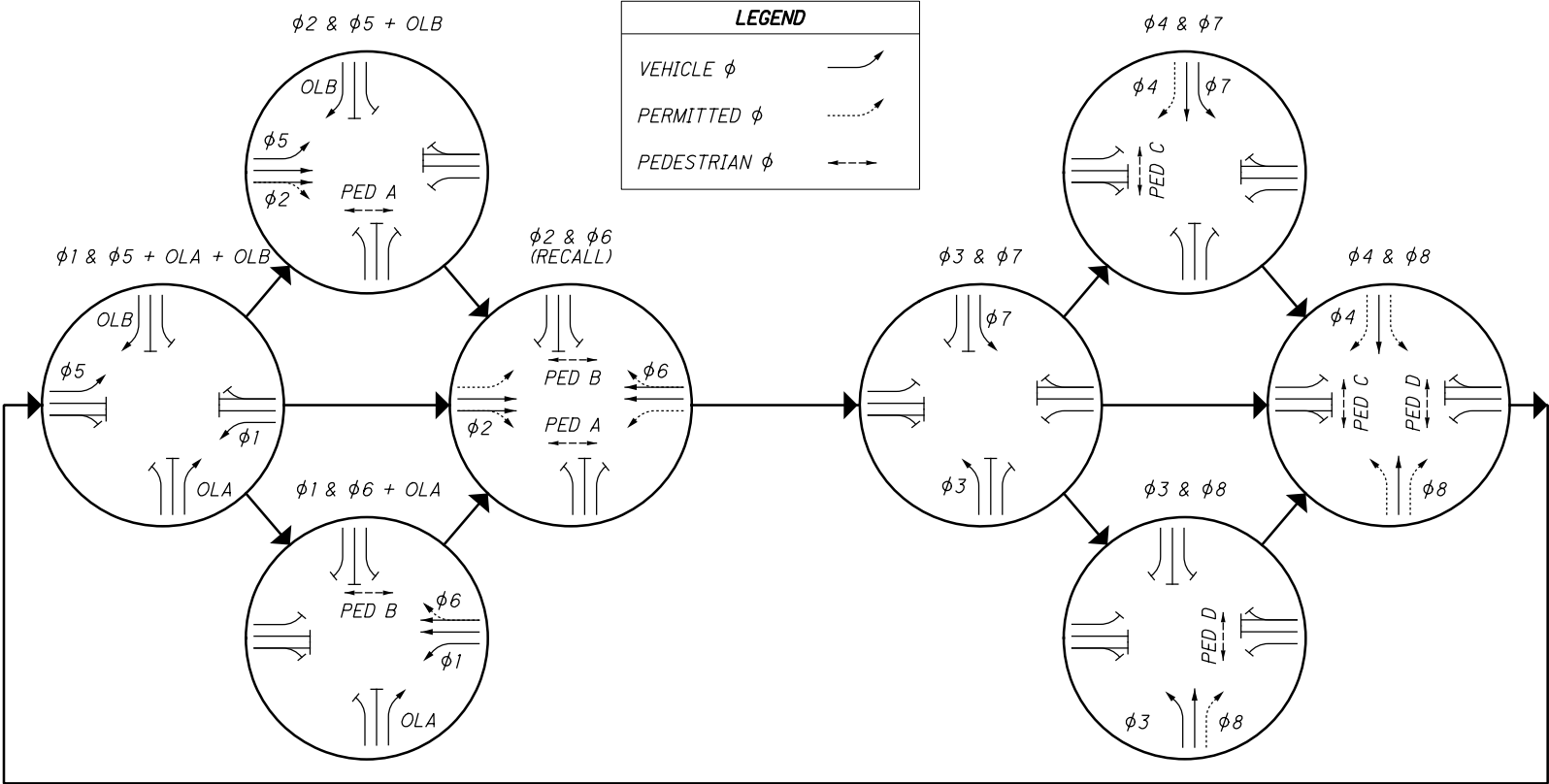
INTERSECTION: O.C. BLVD. / E. 93RD ST.										
MAINTAINING AGENCY: CITY OF CLEVELAND										
START UP  START IN: ALL RED TIME FOR FLASH OR ALL RED: 5 FIRST PHASE(S): 2 + 6 COLOR DISPLAYED: GREEN			DUAL ENTRY: YES		PHASES: 2, 6, 4, 8					
			REST IN RED:		RING 1 -		RING 2 -			
			OVERLAP			A	B	C	D	
			PHASES			1	5	-	-	
INTERVAL OR FEATURE			CONTROLLER MOVEMENT NO.							
INTERSECTION MOVEMENT (PHASE)			1	2	3	4	5	6	7	8
DIRECTION			WBL	EB	NBL	SB	EBL	WB	SBL	NB
MINIMUM GREEN (INITIAL) (SEC.)			7	20	7	10	7	20	7	10
ADDED INITIAL *(SEC./ACTUATION)			-	-	-	-	-	-	-	-
MAXIMUM INITIAL (SEC.)			-	-	-	-	-	-	-	-
PASSAGE TIME (PRESET GAP) (SEC.)			3	-	3	3	3	-	3	3
TIME BEFORE REDUCTION *(SEC.)			-	-	-	-	-	-	-	-
MINIMUM GAP *(SEC.)			-	-	-	-	-	-	-	-
TIME TO REDUCE *(SEC.)			-	-	-	-	-	-	-	-
MAXIMUM GREEN I (SEC.)			20	60	20	40	20	60	20	40
MAXIMUM GREEN II (SEC.)			-	-	-	-	-	-	-	-
YELLOW CHANGE (SEC.)			3.2	4.1	3.2	4.1	3.2	4.1	3.2	4.1
ALL RED CLEARANCE (SEC.)			2.6	1	1.3	1.1	2.6	1	1.3	1.1
WALK (SEC.)			-	7	-	7	-	7	-	7
PEDESTRIAN CLEARANCE (SEC.)			-	16	-	18	-	17	-	18
RECALL	MAXIMUM (ON/OFF)		-	ON	-	-	-	ON	-	-
	MINIMUM (ON/OFF)		-	-	-	-	-	-	-	-
	PEDESTRIAN (ON/OFF)		-	-	-	-	-	-	-	-
MEMORY (ON/OFF)			-	-	-	-	-	-	-	-

\*VOLUME DENSITY CONTROLS

NOTES:

- ENABLE  $\phi 1$  &  $\phi 5$  DETECTOR SWITCHING TO ALLOW  $\phi 1$  &  $\phi 5$  TO EXTEND  $\phi 2$  &  $\phi 6$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- ENABLE  $\phi 3$  &  $\phi 7$  DETECTOR SWITCHING TO ALLOW  $\phi 3$  &  $\phi 7$  TO EXTEND  $\phi 4$  &  $\phi 8$  WHEN ALLOCATED GREEN TIME FOR LEFT TURN PHASES ARE EXHAUSTED.
- COUNTDOWN PEDESTRIAN SIGNALS SHALL GO TO ZERO ON YELLOW PER OMUTCD FIGURE 4E-2.

PHASING DIAGRAM



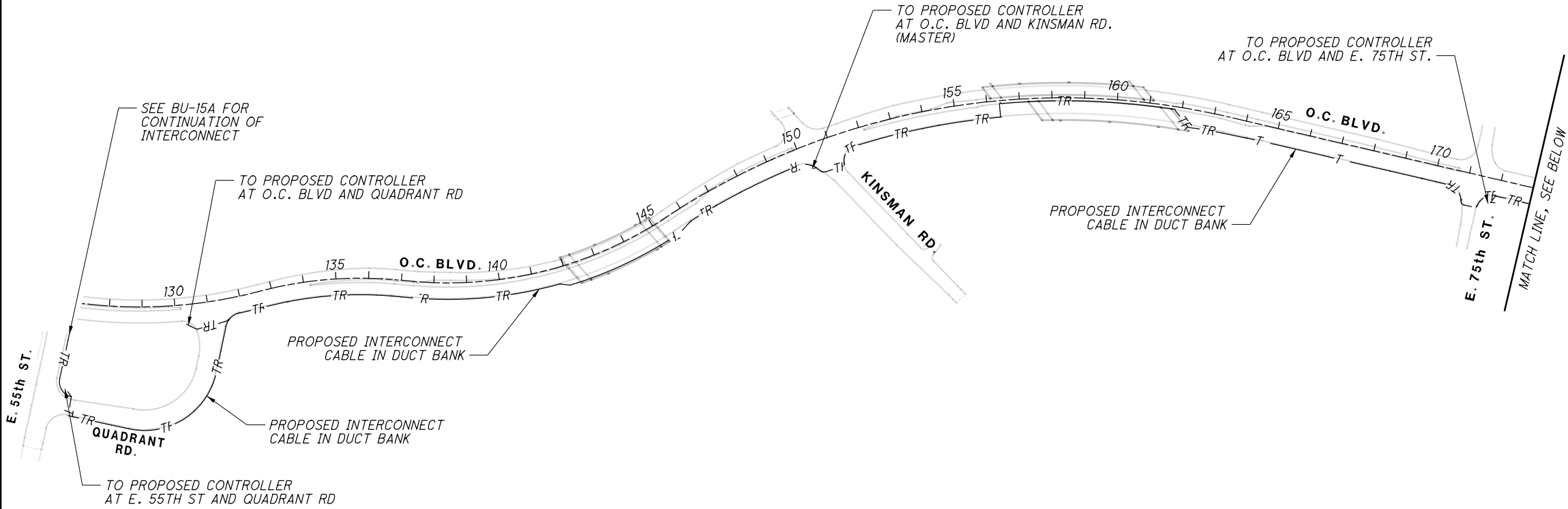
TRAFFIC SIGNAL DETECTOR CHART

LOOP DESIGNATION	LOOP CONFIGURATION**	SIZE (FT.)	PULSE OR PRESENCE	DELAY PROGRAMMED IN CONTROLLER (SEC.)	EXTENSION PROGRAMMED IN CONTROLLER (SEC.)	CONNECT TO DETECTOR UNIT (UNIT-CHANNEL)	ASSOCIATED CONTROLLER PHASE
L5A	P	6 x 20	PRESENCE	0	-	15-1	5
L5B	P	6 x 10	PRESENCE	0	-	16-1	5

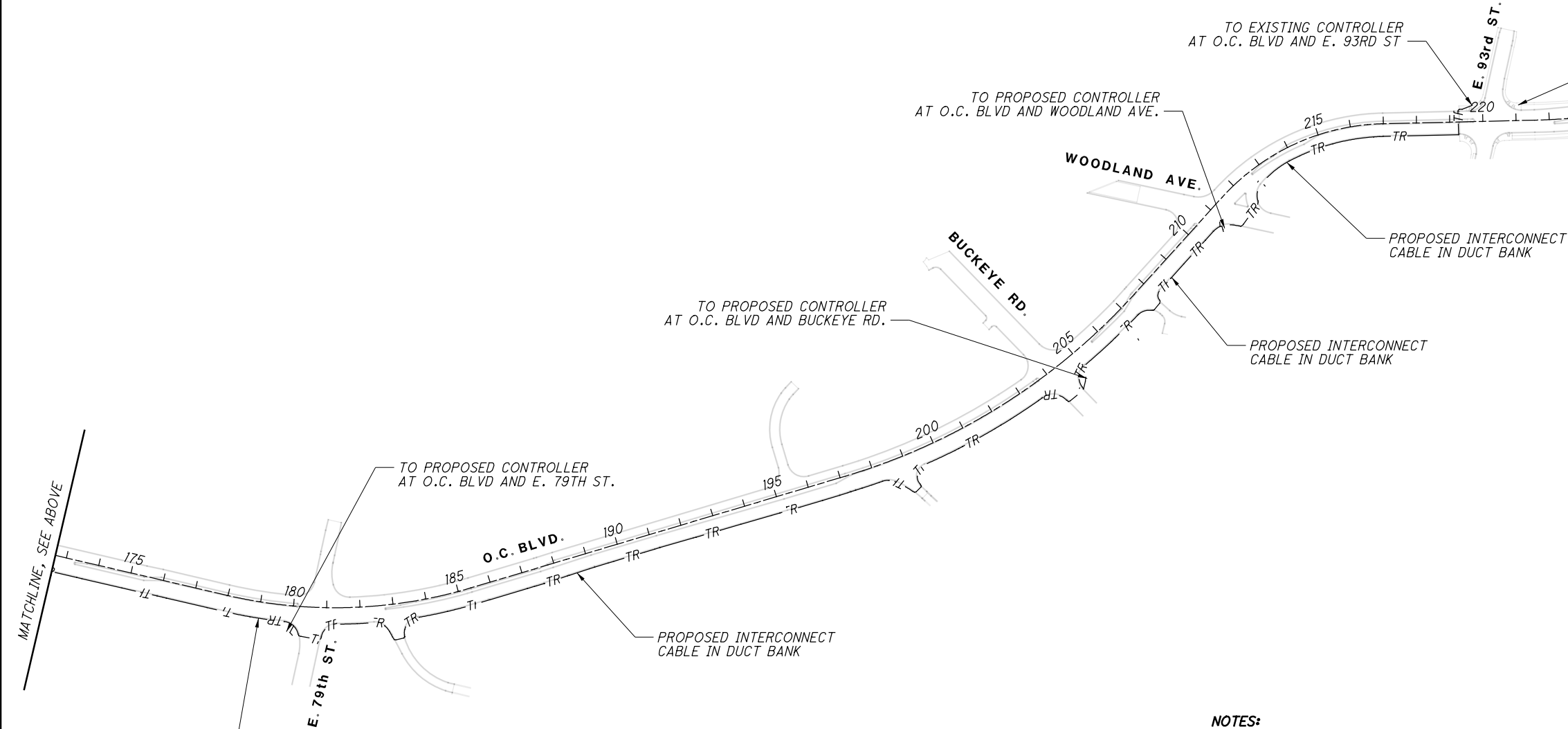
\*\* CONFIGURATION: POWERHEAD (P); PER TC-82.10

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		





PULL BOX #	STATION	SIDE	OFFSET	SIZE (IN.)
PB-1	100+83.50	LT	32.5'	17 x 30
PB-2	100+86.99	RT	26.5'	17 x 30
PB-3	103+29.95	RT	26.5'	17 x 30
PB-4	105+50.38	RT	26.5'	17 x 30
PB-5	107+05.46	LT	62.9'	17 x 30
PB-6	107+52.81	RT	29.5'	17 x 30
PB-7	131+91.50	RT	50.3'	17 x 30
PB-8	134+47.93	RT	50.9'	17 x 30
PB-9	137+06.28	RT	50.5'	17 x 30
PB-10	139+47.48	RT	50.5'	17 x 30
PB-11	141+77.67	RT	51.6'	17 x 30
PB-12	146+01.06	RT	52.1'	17 x 30
PB-13	147+86.47	RT	49.5'	17 x 30
PB-14	150+34.31	RT	73.9'	17 x 30
PB-15	150+49.04	RT	93.3'	17 x 30
PB-16	151+23.01	RT	95.5'	17 x 30
PB-17	152+62.31	RT	50.5'	17 x 30
PB-18	155+18.18	RT	50.5'	17 x 30
PB-19	156+39.87	RT	50.5'	17 x 30
PB-19A	156+41.12	RT	6.6'	17 x 30
PB-19B	161+78.35	RT	7.7'	17 x 30
PB-19C	162+30.41	RT	55.9'	17 x 30
PB-20	164+03.58	RT	50.8'	17 x 30
PB-21	166+53.35	RT	49.5'	17 x 30
PB-22	169+03.35	RT	49.5'	17 x 30
PB-23	170+97.39	RT	96.2'	17 x 30
PB-24	171+44.42	RT	95.8'	17 x 30
PB-25	171+92.73	RT	50.8'	17 x 30

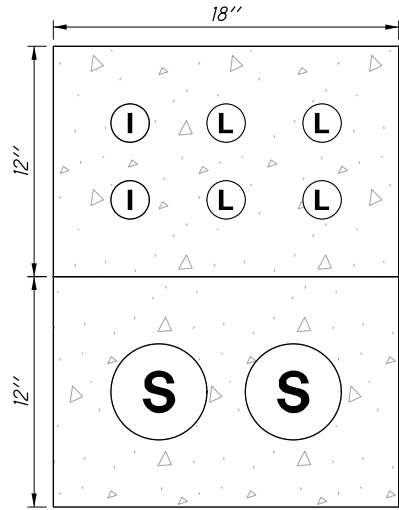
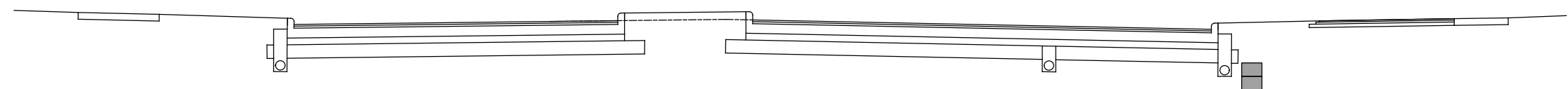


PULL BOX #	STATION	SIDE	OFFSET	SIZE (IN.)
PB-26	173+59.96	RT	50.3'	17 x 30
PB-27	176+09.63	RT	49.5'	17 x 30
PB-28	178+57.54	RT	49.5'	17 x 30
PB-29	180+04.97	RT	59.9'	17 x 30
PB-30	180+21.83	RT	87.6'	17 x 30
PB-31	180+83.64	RT	94.9'	17 x 30
PB-32	181+89.60	RT	49.5'	17 x 30
PB-33	182+90.93	RT	105.6'	17 x 30
PB-34	183+21.64	RT	102.0'	17 x 30
PB-35	184+77.05	RT	50.5'	17 x 30
PB-36	187+24.84	RT	50.5'	17 x 30
PB-37	189+74.67	RT	46.5'	17 x 30
PB-38	192+24.61	RT	47.6'	17 x 30
PB-39	194+69.60	RT	50.0'	17 x 30
PB-40	197+09.80	RT	50.0'	17 x 30
PB-41	198+92.25	RT	114.4'	17 x 30
PB-42	199+16.83	RT	103.9'	17 x 30
PB-43	200+48.43	RT	49.5'	17 x 30
PB-44	202+35.58	RT	49.5'	17 x 30
PB-45	204+02.59	RT	104.7'	17 x 30
PB-46	204+58.66	RT	103.2'	17 x 30
PB-47	206+09.05	RT	50.5'	17 x 30
PB-48	207+59.16	RT	73.8'	17 x 30
PB-49	207+94.26	RT	72.3'	17 x 30
PB-50	209+25.08	RT	49.5'	17 x 30
PB-51	210+82.36	RT	54.5'	17 x 30
PB-52	211+24.65	RT	100.3'	17 x 30
PB-53	212+22.69	RT	86.7'	17 x 30
PB-54	214+22.62	RT	38.5'	17 x 30
PB-55	216+87.77	RT	38.5'	17 x 30
PB-56	219+25.95	RT	38.5'	17 x 30

- NOTES:
- SEE SHEET 40 FOR DUCT BANK DETAILS.
  - MASTER CONTROLLER AT O.C. BLVD AND KINSMAN RD.
  - SEE SHEET 41 FOR COORDINATION TIMING PLANS.

NO.	DATE	DESCRIPTION
1	2021-05-18	DC056
0	2019-06-04	RFC
ISSUE RECORD		





4 - 2" CONDUITS (LIGHTING = "L")  
2 - 2" CONDUITS (SIGNAL INTERCONNECT = "I")  
2 - 5" CONDUITS (SUPPLEMENTAL = "S")

DUCT BANK DETAILS:

2" SPACING BETWEEN CONDUITS (MIN.)  
3" COVER ALL SIDES (MIN.)  
36" BELOW FINISHED GRADE (MIN.)

PULL BOX DETAILS:

NO PULL BOXES ON BRIDGES  
MAXIMUM 250' SPACING AT ALL OTHER LOCATIONS  
17" X 30" PULL BOXES

BRIDGE DETAILS:

KINGSBURY: 4 - 2" CONDUITS UNDER RIGHT SIDEWALK (2 STREET LIGHTING & 2 SIGNAL INTERCONNECT)  
BLUE/GREEN EASTBOUND: 4 - 2" CONDUITS UNDER RIGHT SIDEWALK (2 STREET LIGHTING & 2 SIGNAL INTERCONNECT)

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



COORDINATION TIMING CHART

PHASE	SPLITS (G+Y+AR) IN SECONDS								CYCLE LENGTH (SEC)	OFFSET 1 (SEC)	OFFSET 2 (SEC)
	1	2	3	4	5	6	7	8			
DIRECTION	-	-	-	SB	-	WB	SBL	NB			
PLAN NO.	E. 55TH ST./QUADRANT RD.										
1	-	-	-	68	-	32	22	46	100	77	-
2	-	-	-	84	-	36	16	68	120	1	-
3	-	-	-	68	-	32	24	44	100	19	-

PHASE	SPLITS (G+Y+AR) IN SECONDS								CYCLE LENGTH (SEC)	OFFSET 1 (SEC)	OFFSET 2 (SEC)
	1	2	3	4	5	6	7	8			
DIRECTION	WBL	EB	-	-	-	WB	-	NB			
PLAN NO.	O.C. BLVD./QUADRANT RD.										
1	20	61	-	-	-	81	-	19	100	65	-
2	27	73	-	-	-	100	-	20	120	91	-
3	21	57	-	-	-	78	-	22	100	66	-

PHASE	SPLITS (G+Y+AR) IN SECONDS								CYCLE LENGTH (SEC)	OFFSET 1 (SEC)	OFFSET 2 (SEC)
	1	2	3	4	5	6	7	8			
DIRECTION	WBL	EB	NBL	SB	EBL	WB	SBL	NB			
PLAN NO.	O.C. BLVD./KINSMAN RD.										
1	12	33	14	41	12	33	14	41	100	0	-
2	12	53	14	41	12	53	14	41	120	0	-
3	12	33	14	41	12	33	14	41	100	0	-

PHASE	SPLITS (G+Y+AR) IN SECONDS								CYCLE LENGTH (SEC)	OFFSET 1 (SEC)	OFFSET 2 (SEC)
	1	2	3	4	5	6	7	8			
DIRECTION	WBL	EB	NBL	SB	EBL	WB	SBL	NB			
PLAN NO.	O.C. BLVD./E. 75TH ST.										
1	13	38	13.5	35.5	13	38	13.5	35.5	100	59	-
2	13	58	13.5	35.5	13	58	13.5	35.5	120	48	-
3	13	38	13.5	35.5	13	38	13.5	35.5	100	59	-

PHASE	SPLITS (G+Y+AR) IN SECONDS								CYCLE LENGTH (SEC)	OFFSET 1 (SEC)	OFFSET 2 (SEC)
	1	2	3	4	5	6	7	8			
DIRECTION	WBL	EB	NBL	SB	EBL	WB	SBL	NB			
PLAN NO.	O.C. BLVD./E. 79TH ST.										
1	13	39.5	12	35.5	13	39.5	12	35.5	100	41	-
2	13	59.5	12	35.5	13	59.5	12	35.5	120	59	-
3	16	36.5	12	35.5	13	39.5	12	35.5	100	40	-

PHASE	SPLITS (G+Y+AR) IN SECONDS								CYCLE LENGTH (SEC)	OFFSET 1 (SEC)	OFFSET 2 (SEC)
	1	2	3	4	5	6	7	8			
DIRECTION	WBL	EB	NBL	SB	EBL	WB	SBL	NB			
PLAN NO.	O.C. BLVD./BUCKEYE RD.										
1	12.5	38	13	36.5	12.5	38	13	36.5	100	95	-
2	12.5	58	13	36.5	12.5	58	13	36.5	120	105	-
3	12.5	38	13	36.5	12.5	38	13	36.5	100	94	-

PHASE	SPLITS (G+Y+AR) IN SECONDS								CYCLE LENGTH (SEC)	OFFSET 1 (SEC)	OFFSET 2 (SEC)
	1	2	3	4	5	6	7	8			
DIRECTION	WBL	EB	NBL	SB	EBL	WB	SBL	NB			
PLAN NO.	O.C. BLVD./WOODLAND AVE.										
1	12.5	32.5	14	41	12.5	32.5	14	41	100	7	-
2	12.5	52.5	14	41	12.5	52.5	14	41	120	117	-
3	12.5	32.5	14	41	12.5	32.5	14	41	100	0	-

PHASE	SPLITS (G+Y+AR) IN SECONDS								CYCLE LENGTH (SEC)	OFFSET 1 (SEC)	OFFSET 2 (SEC)
	1	2	3	4	5	6	7	8			
DIRECTION	WBL	EB	NBL	SB	EBL	WB	SBL	NB			
PLAN NO.	O.C. BLVD./E. 93RD ST.										
1	13	45	11.5	30.5	25	33	11.5	30.5	100	42	-
2	13	61.5	11.5	34	38	36.5	11.5	34	120	31	-
3	13	45	11.5	30.5	21	37	11.5	30.5	100	38	-

PHASE	SPLITS (G+Y+AR) IN SECONDS								CYCLE LENGTH (SEC)	OFFSET 1 (SEC)	OFFSET 2 (SEC)
	1	2	3	4	5	6	7	8			
DIRECTION	-	-	-	-	-	-	-	-			
PLAN NO.	O.C. BLVD./QUINCY AVE										
1	13.5	34	13.5	39	13.5	34	13.5	39	100	81	-
2	13.5	47	13.5	46	13.5	47	13.5	46	120	73	-
3	16.5	31	13.5	39	13.5	34	13.5	39	100	92	-

COORDINATION TIMING PLANS

DAY(S) OF WEEK	PLAN NAME	HOURS	CYCLE/SPLIT/OFFSET	CYCLE LENGTH (SEC)
1	AVERAGE	0:00 - 24:00	1/1/1	100
2-6	AVERAGE	0:00 - 6:00	1/1/1	100
2-6	AM PEAK	6:00 - 9:00	2/2/2	120
2-6	AVERAGE	9:00 - 15:00	1/1/1	100
2-6	PM PEAK	15:00 - 18:00	3/3/3	100
2-6	AVERAGE	18:00 - 24:00	1/1/1	100
7	AVERAGE	0:00 - 24:00	1/1/1	100

NOTES:

- OFFSETS ARE MEASURED FROM REFERENCE PHASE(S)  
END OF GREEN/BEGINNING OF YELLOW.

0	2019-06-04	RFC
NO.	DATE	DESCRIPTION
ISSUE RECORD		



# Submittal: 031

## Revision:

Date Submitted: 8/09/2019

Response Due: 8/23/2019



**Project:** ODOT 3000(17) – Opportunity Corridor 3

**Subject:** Traffic Signal Equipment

**To:** Julie Meyer, P.E.  
Ohio Department of Transportation – District 12

**Email:** Julie.Meyer@dot.ohio.gov

**From:** Marty Fritz  
Kokosing Construction Company, Inc.

**Email:** mwf@kokosing.biz

We Are Sending:	Submitted For:
<input type="checkbox"/> As-Built Construction Drawings	<input checked="" type="checkbox"/> Approval
<input type="checkbox"/> Certifications / Test Results	<input type="checkbox"/> Acceptance
<input type="checkbox"/> Engineered / Working Drawings	<input type="checkbox"/> Record
<input checked="" type="checkbox"/> Product Data / Samples	
<input type="checkbox"/> Quality Control Procedures	<b>Sent Via:</b>
<input type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Attached (Electronic)
<input type="checkbox"/> Other:	<input type="checkbox"/> Attached (Hard Copy)

Submittal #	Spec	Revision	Description	Status
031	632.04		Traffic Signal Equipment	For Approval

### Comments:

Please review/approve the included product data for the proposed traffic signal equipment (BU12). Additionally, please confirm the information below is acceptable:

#### Vehicle Signals

- Astrobac, per included submittals, are proposed for all mast arms and auxiliary/supplemental signal heads.
- Louvered backplates with 2" fluorescent border:
  - Contrary to ODOT TC85.22, Note 7, backplates for the 5 section clusters will be provided without the notched top corners. 5 section cluster backplates are to appear as a full rectangle.

#### Controller Cabinet Assembly

- The MMU2-16LE is submitted. If the MMU2LEip is desired please specify.

Please feel free to contact me for any questions/concerns regarding this submittal.

Signed: 



# SA Polycarbonate ✓ Vehicle Traffic Signal



Vehicular Signal Head, GE (LED), 12" Lens, polycarbonate cutaway visors YELLOW ✓  
with rigid mount Astrobrac unpainted, reflective backplates. ✓

## Description

The standard signal is composed of three polycarbonate LED-ready body sections containing the door and visor. The basic construction design provides minimum weight but maximum rigidity and strength. The housing, door and visor are injection molded of ultraviolet stabilized, pre-colored opaque polycarbonate. It meets or exceeds ITE specifications.

\* Inside of Visors shall be flat black

## Features

**Housing** – One piece unit with serrations in 5° increments at each end. Each housing has provisions for mounting two terminal blocks and attaching backplates. Housings may be fastened together to make multi-section signals. The 8" and 12" housings can be intermixed to form combination signals.

**Door** – One piece polycarbonate unit equipped with stainless steel hinge pins. Stainless steel thumbscrews are used to hold the door against the housing.

**Visor** – The removable twist-on visor is secured to the door with stainless steel hardware. Cap, tunnel, and full circle visors are available.

**Positive Positioning** – Positive positioning and locking is achieved through the use of serrated brackets, mast arm, or span wire fittings.

**Terminal Block** – All terminal blocks are composed of a sturdy polycarbonate weather resistant casing and stainless steel hardware. Terminal block is standardly installed in the yellow section of signal (second from top).

✓ **Hardware** – Stainless steel material inside and outside.



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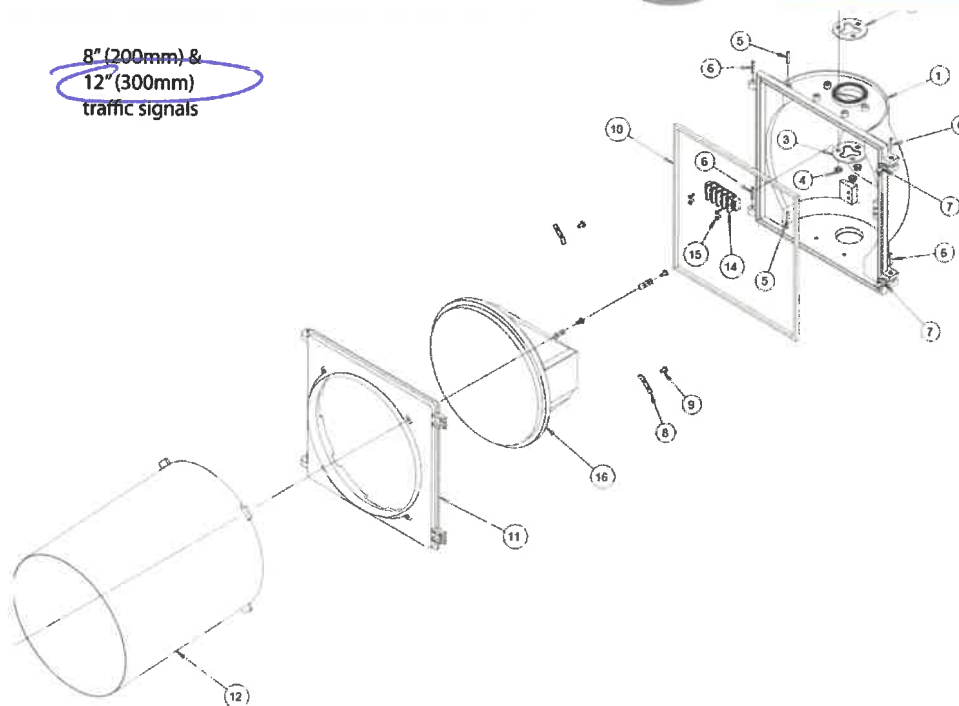


# SA Polycarbonate ✓ Vehicle Traffic Signal



## Diagram

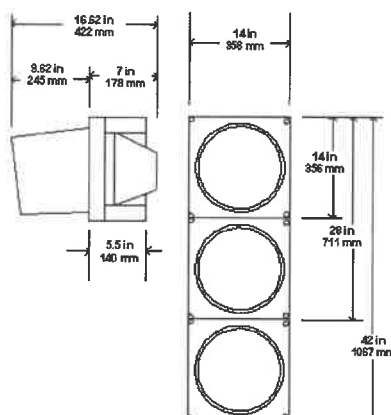
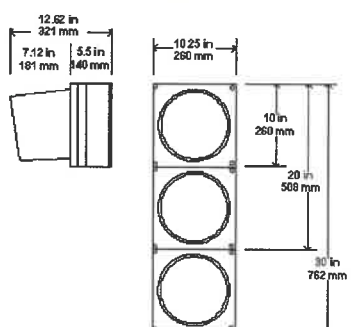
8" (200mm) &  
12" (300mm)  
traffic signals



Weights	8" (200 mm)	12" (300 mm)
Single section with visor (approx.)	4 lbs. (1.81 kg)	7 lbs. (3.18 kg)
Housing Only	1 lbs. 6.4 oz. (.64 kg)	2 lbs. 5.2 oz. (1.05 kg)
Door Only	7.5 oz. (.21 kg)	15.1 oz. (.43 kg)
Ring	3.5 oz. (.10 kg)	6.6 oz. (.19 kg)

## 12" (300 mm) Signal Dimensions

### 8" (200 mm) Signal Dimensions



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# SA Polycarbonate Vehicle Traffic Signal



## Replacement Parts

8" (200mm) &

12" (300mm)

Signals

## Signal Replacement Parts

Ref No.	Description	Part # 8"(200 mm)	Part # 12"(300 mm)
1	Signal Housing Green	KB19113	KB4818
	Signal Housing Yellow	KB19111	KB8416
	Signal Housing Black	KB19112	KB4817
2	Screw (10-24 hex screw)	0141716	0141716
3	Flange nut	0150715	0150715
4	Door hinge pin	K1196	K1196
5	Thumbscrew, SS	0141212	0141212
6	Thumbscrew washer, SS	0155924	0155924
7	Hole plug	PHP16	PHP16
8	Lens clip, generic	A84436155	A84436155
9	Lens clip screw	0133029	0133029
10	Signal door, green	PDM2029	PDM2032
	Signal door, yellow	PDM2028	PDM2031
	Signal door, black	PDM2027	PDM2030
11	Visor - tunnel	A700119 XX	A700120 XX
	Visor - cutaway	A700468 XX	A700469 XX
12	Visor Screw (10-32 x 3/8")	135021	135021
13	Terminal block, 6 pos. spade type	PCT100TX	PCT100TX
14	Terminal block screw, SS	A702121	A702121

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# GTX™ City VLA Model LED Signal Modules

8 and 12 inch  
Incandescent look (120V)

## Robust Features

- Optimal thermal management for longer life.
- Provides performance under extreme field temperature conditions.

## Innovative Design

- Low profile module permits efficient installation into existing traffic housings.
- Power consumption levels allow compatibility with most controllers.
- Mask compatible to fit your unique signaling needs.\*

## Outstanding Performance

- High-brightness central light source and custom optical lensing distribute light uniformly and efficiently.
- Rigorously tested for long life design and low maintenance costs.
- Excellent color uniformity.



## Meets Rigorous Certification & Testing Standards

- Intertek ETL Verified compliant.
- Compliant with ITE VTCSH LED Circular Signal Supplement dated June 27<sup>th</sup> 2005.
- CSA approved version available.

\* Sold separately. Refer to masks datasheet TRAF208.



imagination at work



The Greatest Signals Stand the Test of Time.™

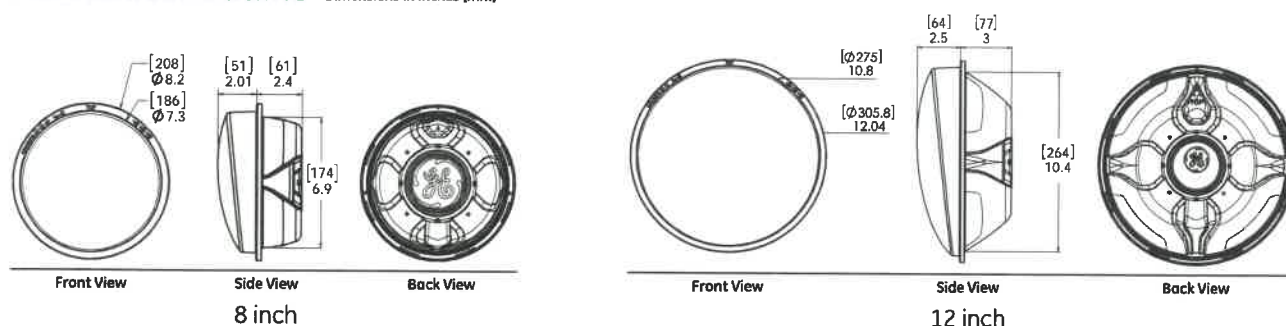


# GTX™ City LED Signal Modules

• 8 and 12 inch

## Mechanical Outline

Dimensions in inches [mm]



## Design Compliance

Test type	Compliance
Luminous Intensity	ITE VTCSH-LED Circular Signal Supplement - June 2005
Chromaticity	ITE VTCSH-LED Circular - June 2005
Moisture Resistance	Blown Wind Rain MIL-STD-810F method 506.4
Mechanical Vibration	MIL-STD-883 Method 2007
Electronic Noise	FCC Title 47 Sub. B Sec 15 <sup>1</sup>
Transient Voltage Protection	Sec. 2.1.6 NEMA TS2-2003, 300V, 2500W Sec. 2.1.6 NEMA TS2-2003, 600V, 10µF Sec. 2.1.8 NEMA TS2-2003, 1kV, 2Ω
Controller Compatibility	ITE VTCSH-LED Circular Signal Supplement - June 2005
Wiring	NFPA 70, National Electric Code
Transient Suppression	Sec. 8.2 IEC 61000-4-5 & Sec. 6.1.2 ANSI/IEEE C62.41.2 - 2002, 3KV, 2 Ω Sec. 8.0 IEC 61000-4-12 & Sec. 6.1.1 ANSI/IEEE C62.41.2 - 2002, 6KV, 30 Ω

## Operating Specifications

Parameter	Rating
Operating Temperature Range*	-40 to +74°C (-40 to +165°F)
Operating Voltage Range	80 to 135 V (60Hz AC)
Power Factor (PF)	> 90%
Total Harmonic Distortion (THD)	< 20%
Minimum Voltage Turn-Off (VTO)	35 V
Turn-On / Turn-Off Time	< 75 ms
Lens & Shell Material	UV Stabilized Polycarbonate
Wiring	8 in lamp: 40 in, 20 AWG, Color Coded with Strain Relief ** 12 in lamp: 40 in, 20 AWG, Color Coded with Strain Relief **

\* Operating Temperature Range per ITE 2005, Section 3.3.2

\*\* For CSA approved version : 40In, 18AWG, Color Coded with Strain Relief

## Product Information

Model Number	Front Shell	Size (in)	AC Voltage Nominal	Power (W) Nominal	Wavelength (nm) nominal	Maintained Intensity (Cd) Minimum <sup>2</sup>
DR4-RTFB-VLA	Tinted	8	120V - 60Hz	6.7	628	165
DR4-RCFB-VLA	Clear	8	120V - 60Hz	6.7	628	165
DR4-YZFB-VLA	Tinted	8	120V - 60Hz	10.9	588	410
DR4-YTFB-VLA	Tinted	8	120V - 60Hz	7.9	589	410
DR4-YCFB-VLA	Clear	8	120V - 60Hz	7.9	589	410
DR4-GTFB-VLA	Tinted	8	120V - 60Hz	7.3	499	215
DR4-GCFB-VLA	Clear	8	120V - 60Hz	7.3	499	215
DR6-RTFB-VLA	Tinted	12	120V - 60Hz	6.7	625	365
DR6-RCFB-VLA	Clear	12	120V - 60Hz	6.7	625	365
DR6-YZFB-VLA	Tinted	12	120V - 60Hz	10.9	588	910
DR6-YTFB-VLA	Tinted	12	120V - 60Hz	9.9	589	910
DR6-YCFB-VLA	Clear	12	120V - 60Hz	9.9	589	910
DR6-GTFB-VLA	Tinted	12	120V - 60Hz	8.4	501	475
DR6-GCFB-VLA	Clear	12	120V - 60Hz	8.4	501	475

Standard product equipped with universal connectors (insulated spade-quick disconnect).

All colors available in tinted or clear lens.

<sup>1</sup> Class A

<sup>2</sup> Measured at vertical angle of -2.5° and at horizontal angle of 0°.

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## GTX™ City VLA Model LED Arrow Signals

✓ 12 inch  
Incandescent look (120V)

### Excellent Appearance & Visibility

- Efficient optical design allows omnidirectional arrow placement with maximum light output
- Excellent color uniformity creates an incandescent look for easy readability
- New or retrofit use

### Outstanding Reliability & Robust Operation

- High efficiency and high-brightness LED light source
- Failed state impedance protection detects the loss of LED load
- Optimized thermal management for longer life
- Provides performance under extreme field temperature conditions

### Meets Rigorous Certification & Testing Standards

- Intertek ETL Verified compliant
- DOE compliant
- CSA approved model available
- Using MIL-STD-810F and MIL-STD-883 for environmental robustness, passed reliability and qualification testing, including high temperature, high humidity cycling
- Compliant with ITE VTCSH LED Vehicle Arrow Traffic Signal Supplement dated July 1, 2007



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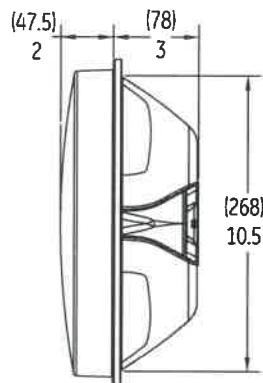
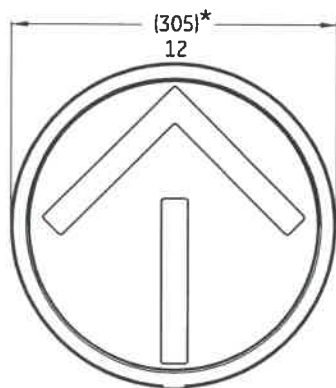


# GTX™ City LED Arrow Signal Modules

- 12 inch module ✓

## Mechanical Outline

Dimensions in inches. (mm) indicates metric equivalent



## Operating Specifications

Parameter	Rating
Operating Temperature Range*	-40 to +74°C (-40 to +165°F)
Operating Voltage Range	80 to 135 V (60Hz AC)
Power Factor (PF)	> 90 %
Total Harmonic Distortion (THD)	< 20 %
Voltage Turn-Off (VTO)	35 V
Turn-On / Turn-Off Time	< 75msec
Lens & Shell Material	UV Stabilized Polycarbonate
Wiring	40in, 20 AWG, Color Coded with Strain Relief

\* Operating Temperature Range per ITE 2005 section 3.3.2

## Design Compliance

Test type	Compliance
Luminous Intensity	ITE VTCSE-LED Vehicle Arrow Traffic Signal Supplement, July 2007
Chromaticity	ITE VTCSE-LED Vehicle Arrow Traffic Signal Supplement, July 2007
Moisture Resistance	NEMA STD 250 Type 4 - 1991 Blown Wind Rain MIL-STD-810F method 506.4
Mechanical Vibration	MIL-STD-883 Method 2007
Electronic Noise	FCC Title 47 Sub. B Sec. 15 <sup>1</sup>
Transient Voltage Protection	Sec. 2.1.6 NEMA TS2-2003, 300V, 2500W Sec. 2.1.6 NEMA TS2-2003, 600V, 10μF Sec. 2.1.8 NEMA TS2-2003
Controller Compatibility	ITE VTCSE-LED Vehicle Arrow Traffic Signal Supplement, July 2007
Wiring	NFPA 70, National Electric Code
Transient Suppression	Sec. 8.2 IEC 1000-4-5 & Sec. 6.1.2 ANSI/IEEE C62.41.2 - 2002, 3KV, 2Ω Sec. 8.0 IEC 1000-4-12 & Sec. 6.1.1 ANSI/IEEE C62.41.2 - 2002, 6KV, 30Ω

## Product Information

Model Number	Size (in)	AC Voltage Nominal	Power* (W) Nominal	Wavelength* (nm) Dominant	Maintained Intensity (Cd) Minimum
DR6-RTAAN-VLA	12	120V - 60Hz	6.5	625	58
DR6-RCAAN-VLA	12	120V - 60Hz	6.5	625	58
DR6-YTAAN-VLA	12	120V - 60Hz	6.5	589	146
DR6-YCAAN-VLA	12	120V - 60Hz	6.5	589	146
DR6-GTAAN-VLA	12	120V - 60Hz	6.5	500	76
DR6-GCAAN-VLA	12	120V - 60Hz	6.5	500	76

All lamps available in tinted or clear lens.

<sup>1</sup> Class A

\* Data shown is target specification undergoing validation testing

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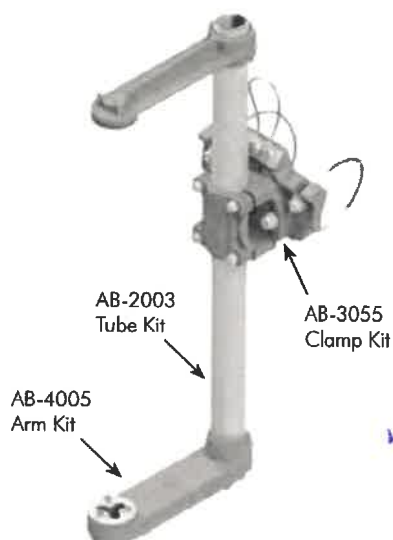


## 1-Way Assemblies

Designed to accommodate all traffic signals, with the exception of optically programmed (see pages T1-18 through T1-21). The Galaxy and Stellar Astro-Brac series feature all-axis adjustability and are designed to facilitate the mounting of any size signal to any shape mast arm or pole.



### Astro-Brac Galaxy Assy, 1-Way Cable Mount



Signal Section	Cable Length	Cable	Coating
AG-0125 - <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1=1 Sec 2=2 Sec 3=3 Sec 4=4 Sec 5=5 Sec	See Note	Blank=Galv SS=Stainless	PNC=Process No Color P__=Paint

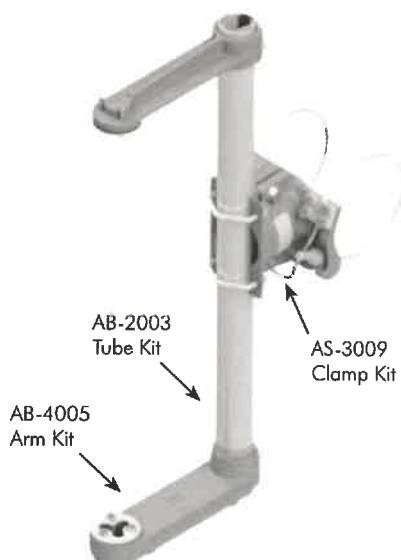
3 section Vehicle Signal mounting hardware. Mast arm and auxiliary signals / supplemental signals



Note:

Cable Length: 62", 84", 96", 110", 120", 132", 144", 220", or 280".

### Astro-Brac Stellar Assy, 1-Way Cable Mount



Signal Section	Cable Length	Cable	Coating
AS-0125 - <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
1=1 Sec 2=2 Sec 3=3 Sec 4=4 Sec 5=5 Sec	See Note	Blank=Galv SS=Stainless	PNC=Process No Color P__=Paint



Note:

Cable Length: 62", 84", 96", 110", 120", 132", 144", 220", or 280".

- Note: 1. All assemblies are supplied standard with stainless steel slotted washers and fasteners.  
2. See Reference Section page iv for cable and band clamp kit pole diameters.  
3. See Reference Section for available paint colors.







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# ASSEMBLY CUT SHEET

REF:

TITLE:

Astro-Brac Assy, 1-Way Galaxy, Cable, Alum

PART NO.:

AG-0125

Example Part No.

AG-0125-3-62-PXX

AG-0125-3-62-SS-PXX

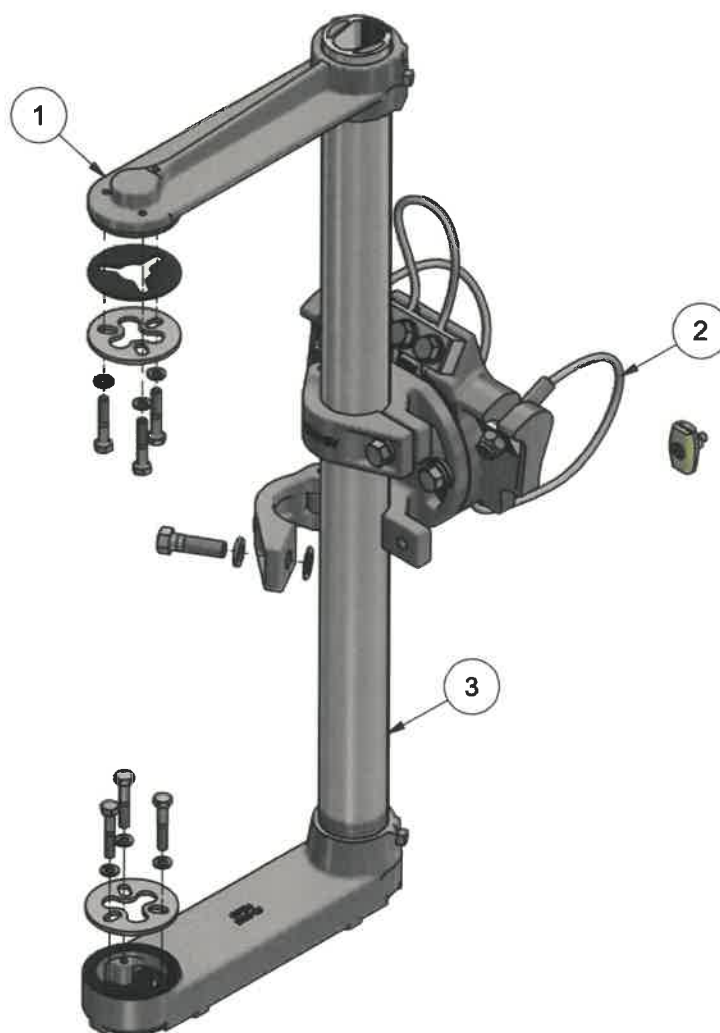
Signal Section

Cable Length

Stainless Upgrade

Process No Color=PNC

Paint=PXX



Cable Length	Max Pole Dia	Max Pole Dia w/ Ty-Back
62"	7.0"	4.5"
84"	10.5"	7.6"
96"	12.4"	9.6"
110"	14.6"	11.8"
120"	16.2"	13.4"
132"	18.2"	15.3"
144"	20.1"	17.2"
220"	32.2"	29.3"
280"	35.0"	35.0"

## Options

Signal Section:

3 =46" Tube

4 =58" Tube

5 =74" Tube

Cable Length:

Min 4.5" Pole Dia, See Chart for Max

SS=Stainless Upgrade

Paint

Note: Stainless Upgrade=Stainless cable on clamp kit.

ITEM	PART NUMBER	DESCRIPTION	QTY
1	AB-4005-PXX	Astro-Brac Arm Kit, 1-Way, 8-1/2" CTC, Stainless Slotted Washer, Alum	1
2	AG-3055-L-GLV-PXX	Astro-Brac Clamp Kit, Galaxy Hinged, Galv Cable, Alum	1
3	AB-2003-L-PXX	Gusseted Tube w/ PVC Insert, 1-1/2" TOE x Length, Alum	1

CBJ DRAWN:	2/19/2015 DATE:	ARS CHECKED:	2/19/2015 DATE:	JLH MFG ENG:	2/19/2015 DATE:	RKV QA:	3/25/2015 DATE:	F REV:	12/14/18 TRL	BPM REV CHK'D:	12/20/2018 DATE:	SHEET 1 OF 1
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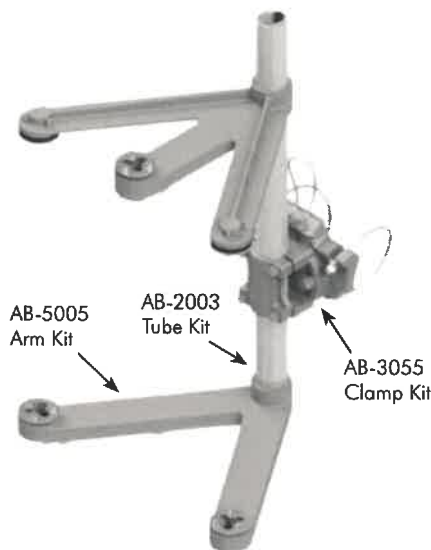


## Cluster Assemblies

Designed to accommodate all traffic signals, with the exception of optically programmed (see pages T1-18 through T1-21). The Cluster Galaxy and Stellar Astro-Brac features all-axis adjustability and is designed to facilitate the mounting of 5-section signal heads to any shape mast arm or pole.



### Astro-Brac Galaxy Assy, 5-Sec Cluster Cable Mount



AG-0138 -  -  -   
 See Note      Blank=Galv      PNC=Process No Color  
                          SS=Stainless      P\_\_=Paint

5 section Vehicle Signal mounting hardware. Mast arm and auxiliary signals *supplemental signals*



Note:

Cable Length: 62", 84", 96", 110", 120", 132", 144", 220", or 280".

### Astro-Brac Stellar Assy, 5-Sec Cluster Cable Mount



AS-0138 -  -  -   
 See Note      Blank=Galv      PNC=Process No Color  
                          SS=Stainless      P\_\_=Paint



Note:

Cable Length: 62", 84", 96", 110", 120", 132", 144", 220", or 280".

- Note: 1. All assemblies are supplied standard with stainless steel slotted washers and fasteners.  
 2. See Reference Section for clamp kit pole diameters.  
 3. See Reference Section for available paint colors.







PH: 405-340-3434  
FAX: 405-340-3435  
Edmond, OK 73013  
www.pelcoinc.com

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# ASSEMBLY CUT SHEET

REF:

TITLE:

**Astro-Brac Assy, 5-Sec Cluster, Galaxy Cable  
Mount, Alum**

PART NO.:

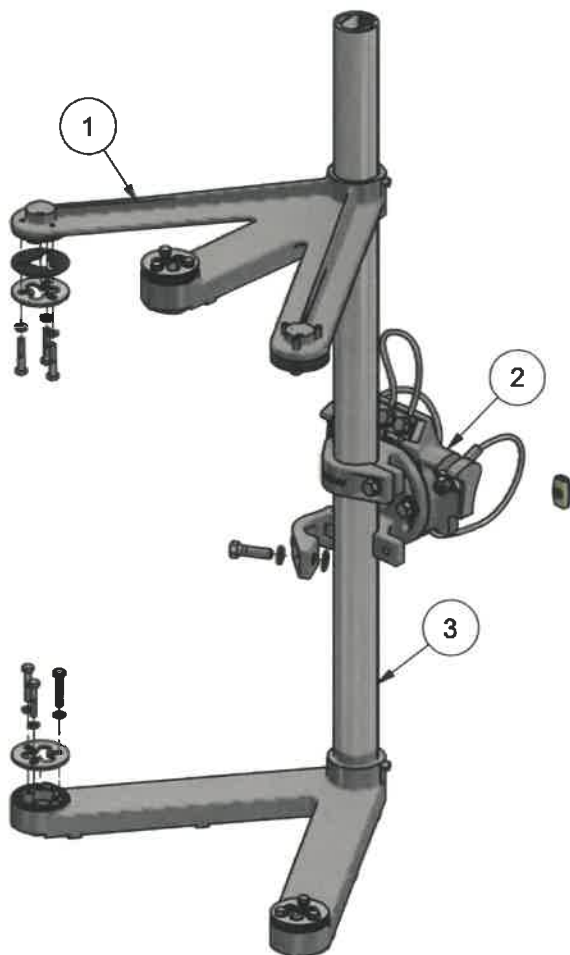
AG-0138

Example Part No.

AG-0138-62-PXX

AG-0138-62-SS-PXX

Cable Length  
Stainless Upgrade  
Process No Color=PNC  
Paint=PXX



Cable Length	Max Pole Dia	Max Pole Dia w/ Ty-Back
62"	7.0"	4.5"
84"	10.5"	7.6"
96"	12.4"	9.6"
110"	14.6"	11.8"
120"	16.2"	13.4"
132"	18.2"	15.3"
144"	20.1"	17.2"
220"	32.2"	29.3"
280"	35.0"	35.0"

## Options

Cable Length:

Min 4.5" Pole Dia, See Chart for Max

SS=Stainless Upgrade

Paint

Note: Stainless Upgrade=Stainless cable on clamp kit.

ITEM	PART NUMBER	DESCRIPTION	QTY
1	AB-5005-PXX	Astro-Brac Arm Kit, 5-Section Cluster w/ Stainless Slotted Washer, Alum	1
2	AG-3055-L-GLV-PXX	Astro-Brac Clamp Kit, Galaxy Hinged, Galv Cable, Alum	1
3	AB-2003-37-PXX	Gusseted Tube w/ PVC Insert, 1-1/2" TOE x 37", Alum	1

Pelco Assy Idw 8/20/18

CBJ	2/19/2015	ARS	2/19/2015	JLH	2/19/2015	RKV	3/25/2015	E	12/14/18	TRL	BPM	12/20/2018	SHEET 1 OF 1
DRAWN:	DATE:	CHECKED:	DATE:	MFG ENG:	DATE:	QA:	DATE:	REV:	DATE:	DATE:	REV CHK'D:	DATE:	



SIGNAL HEAD ASSEMBLY & ORDERING INFORMATION

10 SECTION VERTICAL

103A	103B	103C	103D	103E	103F	103G	103H	103K	103L	103M	103N	103P

103Q	103R	103S	103Y	103AA	103AB	103AC	103AD

3 SECTION CLUSTER 12"

1T3T

Qty 52 Vehicle Signal 3 section 12" configurations:

Qty 49 103A

Qty 2 103B

Qty 1 103D

3 SECTION VERTICAL 8"

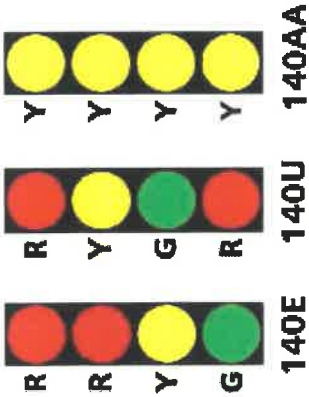
AVAILABLE IN POLYCARBONATE ONLY

130A	130Y	130AA	130AB	130B	130Z



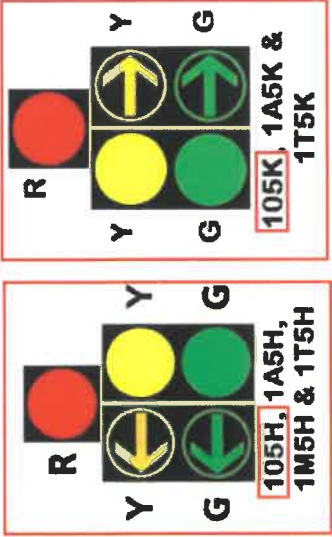
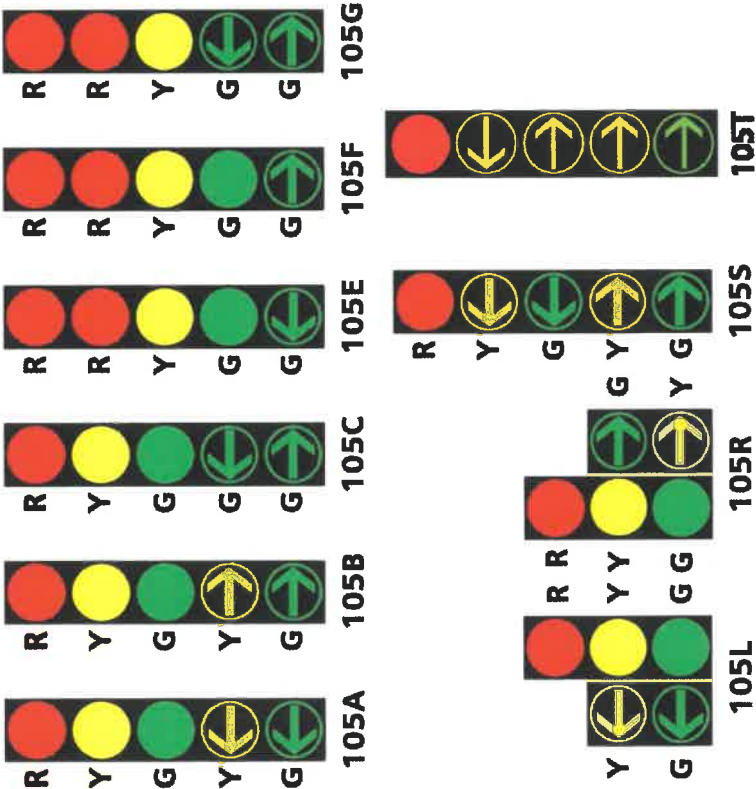
SIGNAL HEAD ASSEMBLY & ORDERING INFORMATION

4 SECTION VERTICAL 8" AVAILABLE IN POLYCARBONATE ONLY



Qty 26 Vehicle Signal 3 section 12" configurations:  
Qty 22 105H  
Qty 4 105K

5 SECTION VERTICAL 12"





# Signal Backplates



## Description

Traffic signal backplates are designed to properly shield a traffic signal from background obstructions. The backplate provides a dark silhouette that isolates the signal face from store lights, signs, sunlight and other environmental conditions that tend to reduce the brilliance of the light indications. A study found that backplating can cut the number of vehicle accident claims at intersections by nearly 15%.



Louvered backplates with 2" Fluorescent Yellow border. ✓  
 Contrary to ODOT TC85.22 Note 7 Backplates for 5 section clusters will be provided without the notched top corners as requested. 5 section cluster backplates to appear as a full rectangle. Please confirm. \*

- Cored holes and stainless steel thread forming screws are provided in the die cast aluminum and polycarbonate traffic signals for quick, easy installation of backplates.
- Aluminum backplates are fabricated from .063" 5052-H32 aluminum and are standardly primed and painted flat black on both sides. Aluminum backplating provides the strongest strength-weight ratio and is very resistant to weather and corrosion in harsh environments.
- Poly backplates are fabricated from .125" high density polyethylene (HDPE) and are standardly dull black on one side and semi-gloss black on the other side. Polyethylene backplating is very resistant to impacts and abrasions. It will also keep its strength and shape in extreme temperatures and severe weather conditions.
- Available with 1", 2" and 3" wide reflective tape installed in center or flush with outside edge. If reflective tape is required, the backplates will be fabricated from ABS material.



*Eagle Traffic Control Systems continues our 80+ year history of providing excellence in the ever evolving traffic industry. All of Eagle's products are developed with the highest standards of engineering and manufacturing. Eagle maintains a superior level of integrity in interactions with all of our business partners and customers. We also take tremendous pride in being model corporate citizens.*

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 301 W. Howard Lane, Suite 200 • Austin, TX • 78753



# Signal Backplates

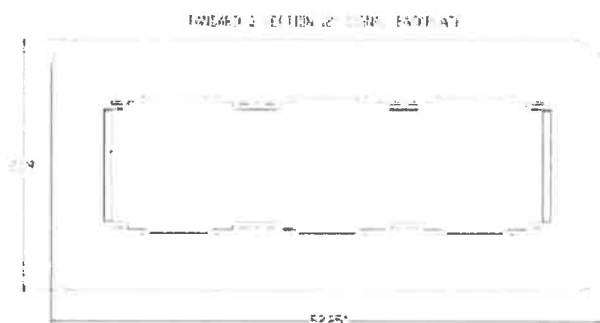
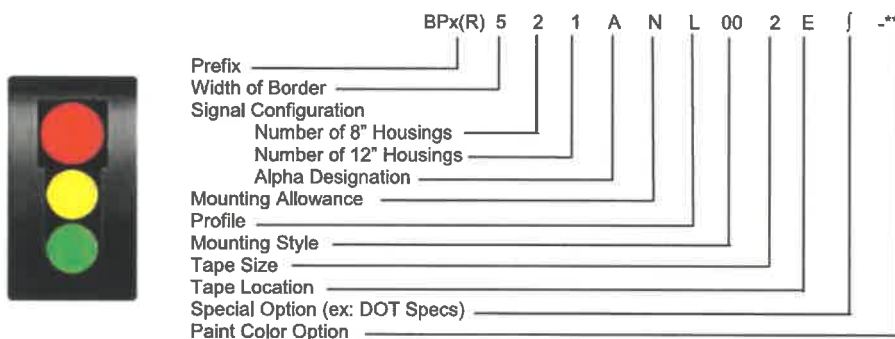


**EAGLE**<sup>®</sup>  
Traffic Control Systems

## Backplate Number Construction Code

Prefix	Width of Border	Signal Configuration			Plumbizer Mounting Allowance	Profile	Hanger Style	Width of Reflective Tape	Tape Location	Special Options j	Paint Option -**
		Number of 8" (203mm) Housings	Number of 12" (300mm) Housings	Face Arrangement*							
BPA = Alum - SG	5 = 5"	0	0	A - Z	N = None E = Eagle R = Ryall (Frey)	F = Flat L = Louver	00 = None 01 = Span Wire 02 = Astro Bracket 03 = Other	0 = None 1 = 1" 2 = 2" 3 = 3"	N = None E = Edge C = Center	0 = None 1 = Multi 2 = Tape 3 = Louver Size or direction 4 = Hardware 5 = Other 6 = Louver centered	-00 = Flat Black -12 = Yellow  (Contact Brown for other paint options)
BPB = Poly - SG		1	1								
BPAP = Alum-SG		2	2								
W/Reflect Tape		3	3								
BPBR = Poly -SG	8 = 8"	4	4								
W/Reflect Tape		5	5								
BPC = Alum - SA		6	6								
BPD = Poly - SA											
BPCR = Alum-SA											
W/Reflect Tape											
BPDR = Poly -SA											
W/Reflect Tape											

\* Use the lowest signal alpha designation for the wanted signal arrangement. Reference VFA (Vehicle Face Arrangement) Chart.



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# 16-inch Pedestrian Signal



## Features

- Meets or exceeds ITE specifications.
- Design provides minimum weight but maximum rigidity and strength.
- The housing is designed to work with a gasket supplied by LED manufacturer.
- Mounting is completely compatible with all standard signal hardware.
- The housing is designed to accommodate 16-inch LEDs.
- Heavy duty .250" thick material.

## Aluminum Signal

The 16 inch Aluminum Pedestrian Signal LED housing is one piece die-cast aluminum alloy, with two integrally-cast hinge lugs, screw slots, and openings at each end. The swing-down door is a single piece die-cast aluminum alloy, with two hinge lugs cast on the top of the door and two latch points on the bottom. The door is attached to the bottom of the housing using two hinge pins. Two eye bolts and wing nuts on the top allow the door to be opened and closed without the need for special tools.

## Polycarbonate Signal

The Polycarbonate 16-Inch Pedestrian Signal is available in three different colors, yellow, black and green. The LED housing is one-piece injection-molded with hinge lugs, screw slots, and openings at each end. The swing-down door is a single piece injection-molded polycarbonate, with two hinge lugs molded on the bottom of the door and two latch points on the bottom. The door is attached to the bottom of the housing using two cotterless locking pins. Two eye bolts and wing nuts on the top allow the door to be opened and closed without special tools.



Qty 48 Polycarbonate Pedestrian signals BLACK with Eggcrate configured as:

Qty ~~34~~<sup>33</sup> - 1 way side of pole.

Qty ~~14~~<sup>15</sup> - 1 way post top

NOTE: side of pole arm kit center to center spacing for BHCs is 20.5". ~~Hubs for banding and or bolt attachment are available if desired. Please specify.~~

*No hub plates, heads to be mounted by BHC's*



# 16-inch Pedestrian Signal



## Signal Housing

The openings will accommodate standard 1.5" pipe brackets. The bottom opening of the housing has an integrally-cast locking boss. The radial angular grooves of the locking boss provide 5 degree incremental positioning of the signal to eliminate rotation or misalignment of the signal. The housing is available with a knock-out plug at the top and bottom. This plug eliminates the need for additional hardware to close these openings when using a clamshell or post-top mounting bracket.

## Visor Options

The egg crate visor option is designed to eliminate sun phantom and minimize damage to the LED. The egg crate visor is inserted through the back side of the door and it overlaps by 1/2 inch. It is sealed when the door is closed, which prevents light from escaping between the visor and the door. The egg crate visor is available only in black. A tunnel visor is also available to be included either with or without the egg crate visor.

## Aluminum Signals Only

- Clamshell installation reference is facing the front of the signal. Clamshell holes drilled on one side only, if requested on S housing.
- M housing has the top and bottom holes plugged and holes drilled on both sides for clamshell mounting.
- M housing has 5 holes on right and left with knock-outs in place.
- Peds are shipped without a door gasket or LED locking device.
- Serration located on bottom. Adapter ring M20466 required for serrations on top.



## Polycarbonate Signals Only

- M housing has the top and bottom holes plugged and 5 knockouts on left and right side to accommodate clamshell mounting (L or R designations are not needed).
- Serrations located on top and bottom.
- Peds are shipped without a door gasket or LED locking device.
- When ordering black housings or doors, use color designator B.

## Visor Notes:

- When ordering egg crate visor, use Visor color designator F.
- When ordering assembly without Visor, use Visor type 0 and visor color designator F.



# 16-inch Pedestrian Signal



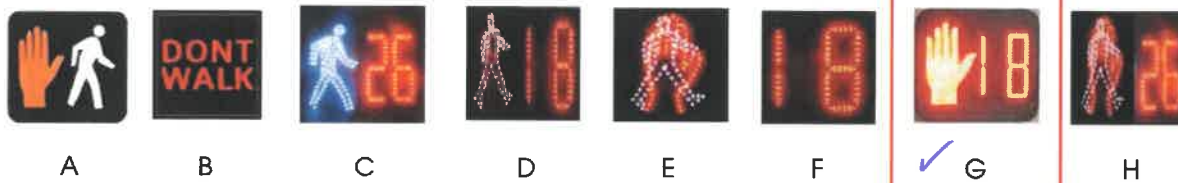
## Signal Head Ordering - 16" Pedestrian

Aluminum and Polycarbonate											
Signal Shape 16" PED	Housing Type <sup>1</sup>	Lens Config <sup>2</sup>	Housing Material	Clamshell Install	LED Supplied By	Visor Type <sup>3</sup>	Housing Color	Door Color	Visor Color	LED CT	Options
SG7	S = STD M=MAINT B = Both	A = H/M B = W/DW C = SM/MM/CD D = Canada E = Canada F = Canada G = Hand/CD H = H/M+CD Z = Customer Supplied 0 = None	1 = Poly 2 = Alum	0 = None 1 = Right 2 = Left	1 = Siemens C = Customer A = Dialight F = Dialight USA 0 = None	0 = None 1 = Egg 3 = Tunnel	0 = No Case/Housing A = Aluminum Gray B = Gloss Black C = Berkeley Brown D = MDC Gray E = Battleship Gray F = Flat Black G = West Coast Green H = Minneapolis Yellow J = Texas Brown L = Ocean State Green M = East Coast Green N = Bare P = Quebec Brown Q = Bronze (Retardo) R = Wine Red S = Star Dust Silver T = Toronto Gray V = VStanley- NY Gm W = White (Navajo) Y = Yellow Z* = Special X# = NonStd for Poly-minimums apply	0 = No Door/Housing A = Aluminum Gray B = Gloss Black C = Berkeley Brown D = MDC Gray E = Battleship Gray F = Flat Black G = West Coast Green H = Minneapolis Yellow J = Texas Brown L = Ocean State Green M = East Coast Green N = Bare P = Quebec Brown Q = Bronze (Retardo) R = Wine Red S = Star Dust Silver T = Toronto Gray V = VStanley- NY Gm W = White (Navajo) Y = Yellow Z* = Special X# = NonStd for Poly-minimums apply	0 = No Visor A = Aluminum Gray B = Gloss Black C = Berkeley Brown D = MDC Gray E = Battleship Gray F = Flat Black G = West Coast Green H = Minneapolis Yellow J = Texas Brown L = Ocean State Green M = East Coast Green N = Bare P = Quebec Brown Q = Bronze (Retardo) R = Wine Red S = Star Dust Silver T = Toronto Gray V = VStanley- NY Gm W = White (Navajo) Y = Yellow Z* = Special X# = NonStd for Poly-minimums apply	10	Contact Your Sales Rep for Optional Configurations

STD - Standard      MAINT - Maintenance      LED CT - LED count  
\*CS - Customer Supplied

A - Hand / Man  
B - Walk / Don't Walk  
C - Standing Man / Walking Man / Count Down  
D - Canadian Standing Man / Walking Man / Count Down  
E - Canadian Walking Man / Hand  
F - Count Down  
G - Hand / Count Down  
H - Hand / Man + Count Down  
Z - Customer Supplied ^ - Can use F or 0 to reflect no visor and always use for Egg Crate

All renderings are for reference only.



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GE  
Lighting

## GTX™ City LED Countdown Pedestrian Signals 16 x 18 inch

### Excellent Appearance & Visibility

- Robust LED system design enables high luminous intensity over product life cycle
- Efficient optical system minimizes power consumption while providing excellent uniformity and viewing angles
- Single piece transparent front window with internal masking to prevent:
  - countdown and icons display from being readily visible when not in operation
  - scratches and abrasions compared with external silk screen technology
- Bright and clear icons
- Fully uniform look
- Lower profile\*
- Improved luminous intensity uniformity

### Outstanding Reliability & Robust Operation

- Internal conflict monitor preventing walk and don't walk indications to light up at the same time
- Individual power supply drives each display to ensure proper indication
- Reduced overall power consumption\*

\* Compared to PS7-CFF1-27A



### Meets Rigorous Certification & Testing Standards

- Intertek ETL Verified compliant
- DOE compliant
- Using MIL-STD-810F and NEMA 250-1991 Type 4 for environmental robustness, passed reliability and qualification testing including high temperature, high humidity cycling (HTHH for 1,000 hours)
- Compliant (for Full Hand/Full Person) with the ITE PTCSI LED Signal Modules
  - version dated August 2010



imagination at work



The Greatest Signals Stand the Test of Time.™

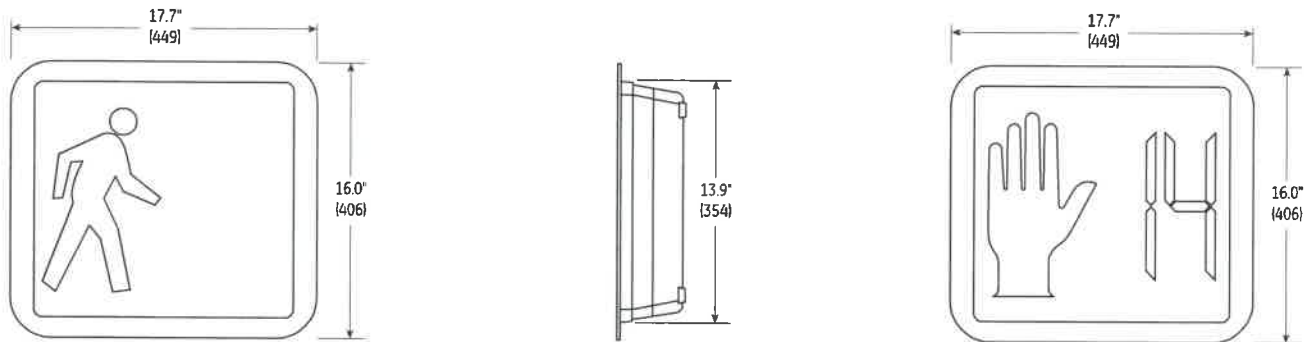


# GTX™ City LED Countdown Pedestrian Signals

- 16 x 18 inch module

## Mechanical Outline

Dimensions in inches. (mm) indicates metric equivalent



## Design Compliance

Test type	Compliance
Luminous intensity, Uniformity & Viewing Angles	ITE PTCSD LED Signal Modules version of August 2010
Chromaticity	ITE PTCSD LED Signal Modules version of August 2010
Moisture Resistance	MIL-STD-810F Procedure 1, Rain & Blowing Rain
Mechanical Vibration	MIL-STD-883 Test Method 2007
Electronic Noise	FCC Title 47 Sec 15 Sub. B <sup>1</sup>
Transient Voltage Protection	Sec. 2.1.6 NEMA TS 2-2003 Sec. 2.1.8 NEMA TS 2-2003
Controller Compatibility	NEMA TS-2-2003
Transient Suppression	Sec. 8.2 IEC 1000-4-5 & Sec. 6.1.2 ANSI/IEEE C62.41.2 - 2002, 3KV, 2 Ω Sec. 8.0 IEC 1000-4-12 & Sec. 6.1.1 ANSI/IEEE C62.41.2 - 2002, 6KV, 30 Ω
Wiring	NFPA 70, National Electric Code
Digits	MUTCD 2003, Section 4E.07, Countdown Numbers Minimum 9" Height & 7" Width

<sup>1</sup> Class A

## Operating Specifications

Parameter	Rating
Operating Temperature Range*	-40 to +74°C (-40 to +165°F)
Operating Voltage Range	80 to 135 V (60Hz AC)
Power Factor (PF)	> 90 %
Total Harmonic Distortion (THD)	< 20 %
Voltage Turn-Off (VTO)	35 V
Start-up Time	< 75msec
Lens & Shell Material	UV Stabilized Polycarbonate
Wiring	16 AWG, Color Coded with Strain Relief
LED Color	Hand: Portland Orange Person: Lunar White Countdown: Portland Orange
Default Mode	Hand only

\* Performed in compliance with ITE test method described in the technical notes

## Product Information

Model Number	Dimensions		Symbol		AC Voltage	Power (W)			Minimum Luminous Intensity Cd/m²	
	Dimensions	Layout	Hand	Person	Nominal	Hand	Person	Countdown	Hand/Digit	Person
PS7-CFF1-VLA	16 x 18 in	Overlay Countdown	Full	Full	120V - 60Hz	6	6	8	1400	2200

<sup>1</sup> Class A.

<sup>2</sup> Full MUTCD Compliance

Test Condition : T<sub>a</sub> = 25°C. All values are design or typical values when measured under laboratory conditions.



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TRAF289-R012615



## Aluminum Slip Fitter Assemblies, Cast Nipple

Pelco's Post Top Slip Fitters are available in aluminum and iron, 1-1/2" NPS, Tri-Bolt or Tri-Stud. Post Top Terminal Compartments are supplied with a 12-Circuit Terminal Strip, unless indicated otherwise.



SE-3054  
Signal Closure Kit



### Slip Fitter Assy, 1-Way for 2-7/8" OD Pole Cast Nipple

SE-3279 -

Coating

PNC=Process No Color  
P\_\_=Paint



SE-3003  
Signal Mounting Kit



### Slip Fitter Assy, 1-Way Offset for 4-1/2" OD Pole Cast Nipple

SE-3310 -

Coating

PNC=Process No Color  
P\_\_=Paint



SE-3003  
Signal Mounting Kit



P33 BLACK Qty ~~14~~ 15

### Slip Fitter Assy, 1-Way for 4-1/2" OD Pole Cast Nipple

SE-3311 -

Coating

PNC=Process No Color  
P\_\_=Paint



SE-3003  
Signal Mounting Kit



### Slip Fitter Assy, 1-Way w/ 2-Way Side Ports for 4-1/2" OD Pole Cast Nipple

SE-3037 -

Coating

PNC=Process No Color  
P\_\_=Paint



- Note: 1. All assemblies supplied standard with stainless steel fasteners.  
2. See Components Section for Slip Fitters without hardware.  
3. See Reference Section for available paint colors.



## Aluminum 1-Way Side-of-Pole ICC Ped Head with Cast Nipples

Pelco's Side-of-Pole assemblies are designed to mount traffic and pedestrian signals on the side of traffic signal poles with an upper and lower arm. Available in aluminum or iron, and 1-1/2" NPS, tri-bolt, or tri-stud, and a vast array of hubs to accommodate both 1-way or 2-way signal configurations.



SE-3144  
Upper Arm Assy



SE-3145  
Lower Arm Assy



### 1-Way Upper & Lower ICC Ped Arm Assy, 12" Nipples

SE-3146 -

Coating



PNC=Process No Color

P\_\_=Paint

Note:

See Components Section for choice of hub plates.

SE-3146  
Upper & Lower  
Arm Assy



### 1-Way Upper & Lower ICC Ped Arm Assy, 12" Nipples, Universal Hub Plates

SE-3214 -

Coating



PNC=Process No Color

P\_\_=Paint

SE-3146  
Upper & Lower  
Arm Assy



### 1-Way Upper & Lower ICC Ped Arm Assy, 12" Nipples, Large Pole Hub Plates

SE-3308 -

Coating



PNC=Process No Color

P\_\_=Paint

Qty <sup>33</sup> ~~34~~ P33 BLACK NOTE: side of pole arm kit center to center spacing pole BHCs is 20.5". Hubs for banding and or bolt attachment are available if desired. Please specify.

Note: 1. All assemblies are supplied standard with stainless steel fasteners.  
2. See Reference Section for available paint colors.

No hub plates

side-of-pole

pelco



Qty 48 Polara Bulldog Yellow with signs per enclosure



9153 STELLAR CT., CORONA, CA 92883 (888) 340-4872

## BDL3 - Bulldog III Series Vandal Resistant ADA Push Button

This button is a highly vandal resistant button with essentially no moving parts. It is pressure activated, but can withstand an impact from a baseball bat or hammer. When the switch activates, you hear a beep and the LED either flashes (Momentary mode) or lights and stays on until the walk cycle (Latching Mode).

**Body Material:** Aluminum, Powder Coated

**Button Material:**

**Standard:** 316 Stainless Steel

**Arrow Button:** Anodized 6061 Aluminum, Nickel Plated

**Black Powder Coat** on area surrounding arrow

**Piezo Driven Solid State Switch:**

**Operating Force:** 2.0 lbs. Maximum

**Operating Temperature:** -30°F to 165°F (-34°C to 74°C)

**Operating Voltage:** 12-36 VDC, 9-25 VAC RMA (18 VDC Typ.)

**MTBF:** 8,800,000 hours Typ.

**Switch Operating Life:** Greater than 300 million operations.

**"Off" Current:** 15µA Typ.

**"On" Resistance:** 85Ω Typ. (Momentary)

**Maximum "On" Current:** 250 mA (over-current protection) Typ.

**Maximum "On" Time:** 11 sec. Typ.

**Debounce Time:** 85 ms. Typ.

**LED Operating Modes:**

**Momentary:** Approx 0.025 sec. LED flash each time button is pressed.

**Latching:** LED activates only during non-walk phases and stays on until the beginning of the walk phase.

**LED Specifications:**

**Luminous Intensity:** 0.3 Lux @ 1 meter Minimum (Red)

**Viewing Angle:** 155° Typical

**Beeper:**

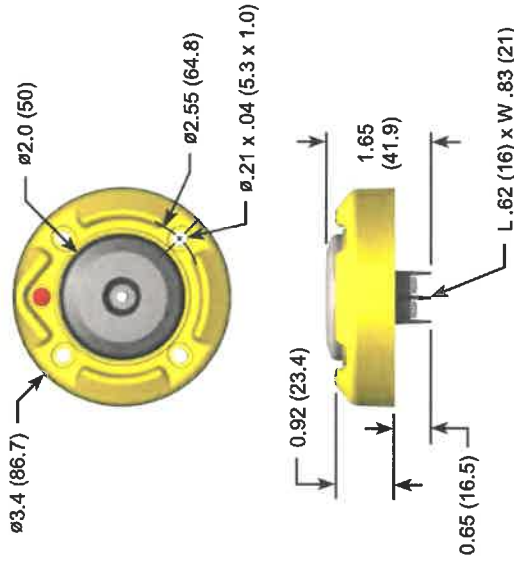
**Volume:** 68dB @ 1 meter Typ.

**Beep on Press:** 2.6kHz

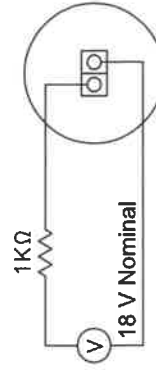
**Beep on Release:** 2.3kHz

**Beep Length:** 50ms Typ.

See page 2 for additional design compliance and accessory information.



**Suggested Test Circuit  
(Momentary Mode Only)**



BDL3-Y model shown.  
Dimensions are in inches (millimeters).



Qty 48 Polara Bulldog Yellow with signs per enclosure



ENGINEERING INC.

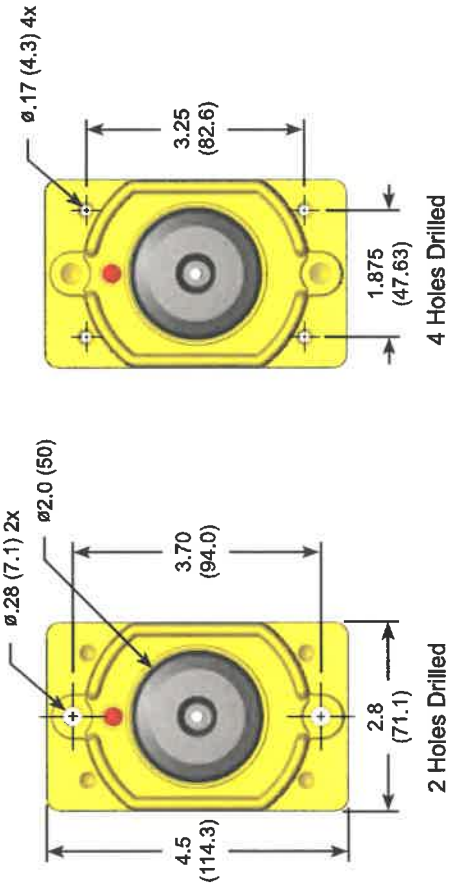
9153 STELLAR CT., CORONA, CA 92883 (888) 340-4872

Design Compliance

Test Type	Compliance
Activation Force	MUTCD 2009 - 4E
Temperature and Humidity	NEMA TS 2
Transient Voltage Protection	NEMA TS 2
Transient Suppression	IEC 61000-4-4, IEC 61000-4-5
Lightning and Power Protection	GR-1089-CORE, Extended to 6000V-400A, 25 reps, 120VAC-15 mins.
Electronic Noise	FCC Title 47, Part 15, Class A
Mechanical Shock and Vibration	NEMA TS 2
Ingress of Water	NEMA 250 - 6P, Rain, Snow, etc...
Ingress of Water	NEMA 250 - 6P, Submersion
Salt Spray and Corrosion	NEMA 250 - 6P
Ingress of Foreign Objects	NEMA 250 - 6P
Electrical Reliability	NEMA TS 4

Note: Applicable sections only of reference standards. All specifications are subject to change without notice.

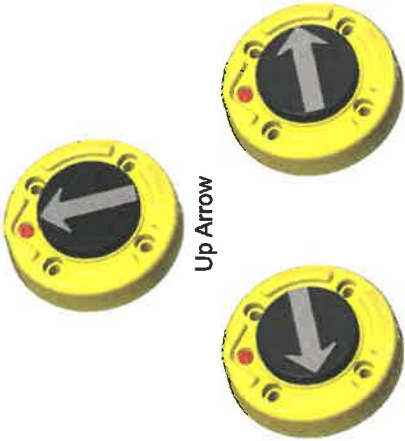
Mounting Hole Options  
(Rectangular Body Only)



Button Style

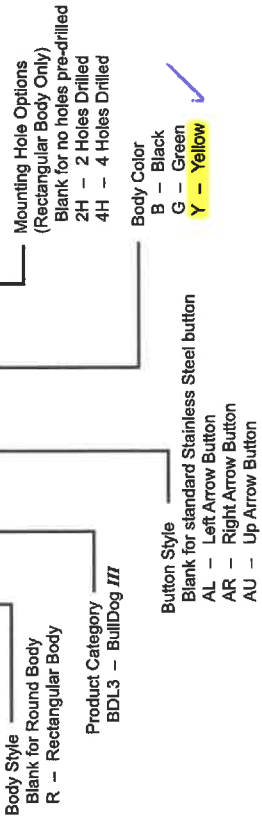


Standard  
(Stainless Steel)



Left Arrow  
Right Arrow  
Up Arrow  
(Aluminum - Black Powder Coat)

R BDL3 AL - B - 2H

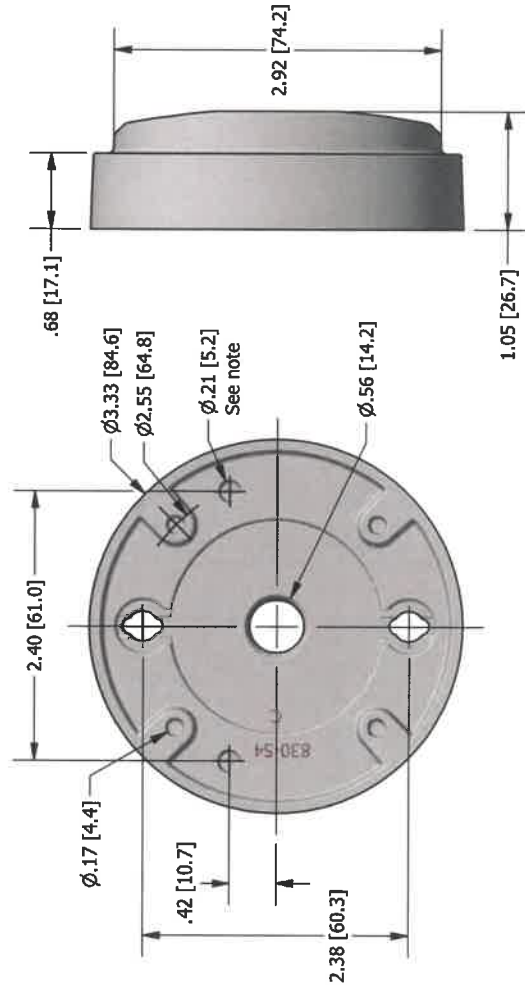




Qty 48 Polara Bulldog Yellow with signs per enclosure



9153 STELLAR CT., CORONA, CA 92883 (888) 340-4872

**BDPM3-X: UNIVERSAL BULLDOG POLE MOUNT**

This cast aluminum Universal Bulldog Pole Mount is uniquely designed to provide either: a very strong and low profile mounting option for Polara's Bulldog Push Button, or as an adapter to a variety of existing mountings. With Polara's Bulldog Button attached to this mount (and directly to the pole), the main body of the button extends only 1.5" from the pole.

The low profile design restricts anyone who attempts to use the button as a foothold to climb the pole. It is also a very rugged solution to vandals who try to damage the buttons. This mount, along with the Bulldog Push Button, is the most vandal resistant button available on the market.

Polara Engineering's Universal Adapter can be used to mount a Bulldog Push Button directly to an existing Pelco or Teeco mounting cup. This mounting is designed to provide a strong mount for Polara's Bulldog Push Button. The low profile Bulldog adapter mounting system adds less than  $\frac{3}{8}$ " of extension from the existing button cup or frame.

Polara installs high quality stainless steel helicoils to use with stainless steel button screws. Should the agency ever have to replace a pushbutton, the screws can be removed easily versus dealing with bi-metal corrosion issues that occur with other aluminum mounts.

The advantage of this new design over Polara older design is that the wire hole is smaller allowing for standard size holes and drilling.

To designate color replace "X" in part number with:

"B" for Black

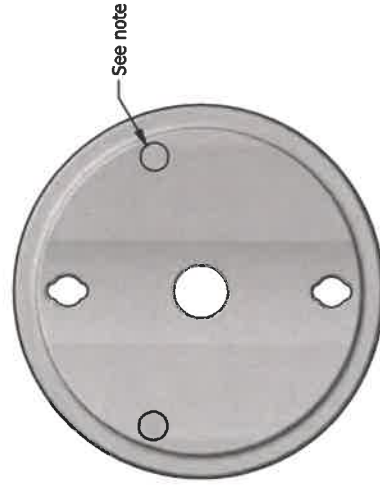
"G" for Green

"Y" for Yellow ✓

Material: Powder Coated Cast Aluminum, Stainless Steel Hardware

Note: These holes are not drilled out. They are provided as a simple drill template for the installer to use should they require them.

Saddle shap on back for pole monting





**Figure 2B-26. Pedestrian Signs and Plaques (Sheet 1 of 2)**

R9-1



R9-2



R9-3



R9-3a



R9-3bP



R9-4



R9-4a



R10-1



R10-2



R10-3



R10-3a



R10-3b



R10-3c



R10-3d



R10-3e ✓



R10-3f



R10-3g



R10-3h



R10-3i

Qty 22 Left; 26 Right





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## m60 Series

The Advanced Traffic Controller for NEMA-style cabinets

Qty. 7



### Description

The Siemens m60 series complies with the industry's latest Advanced Traffic Controller (ATC) standard 5.2b. Built on the proven m50 hardware architecture, combined with powerful industry-leading SEPAC software, the Linux-based m60 series provides a host of functions to meet the needs of traffic

agencies of all sizes. The m60 series provides multiple Ethernet, USB and other industry-specific interfaces, facilitating both backwards and forwards compatibility. The m60 series also enables easy hosting of third-party applications. In addition, the m60 series exceeds industry standards by providing usability features that include the new Siemens Multiview Display concept (SMD) with real-time active status, context-sensitive HELP screens and user-programmable favorite buttons. The m60 series is truly a nerve center for the connected intersection of the future.

### Features

- Exceeds ATC standard 5.2b compliance
- Active TFT backlit LCD display with Siemens Multiview Display Technology
- Modular ATC Communications hub
- Convenient field upgrade packages
  - Linux upgrade package
  - m50 USB upgrade package
  - m60 ATC upgrade package
  - m60 NEMA upgrade package

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### Benefits

The Siemens m60 series provides a vast array of benefits compared to other similar products in the industry.

At the heart of the m60 series is the Siemens Multiview Display (SMD) concept. The SMD provides the user with multiple time-saving mechanisms to operate and program traffic controllers. For ease of operation, the 16 line display is split into an active programming view at the top and a dynamically updated active status view – or the context-sensitive HELP – at the bottom. This dual view enables users to dynamically visualize the impact of their programming changes on the overall efficiency of the intersection.

In addition, the ability to program customized function buttons to a specific menu item ensures quick navigation, making the operation of an m60 series fast and efficient.

Having built upon the proven Siemens m50 hardware platform, the m60 series offers a range of possibilities to address financial and technological constraints faced by traffic agencies.

### Controllers by Siemens

#### Central Processor Unit (CPU)

- Open architecture platform with standard Linux operating system
- MPC 8270 266MHz processor
- 512MB FLASH, 64MB DRAM and 2MB SRAM
- TOD Clock with automatic daylight savings time adjustment
- Power supply will power the SRAM during power failures
  - Supports SEPAC controller software
  - SD memory card
  - Operating System: Linux 2.6.39

#### Keyboard and Display

- Siemens Multiview Display with dual view screens
  - 5 1/8 inch active TFT display
  - Easily removable display and keypad
  - Easily identifiable, discrete HELP button
  - Real-time context sensitive HELP screens
  - User programmable function buttons F1 to F5
- Removable LED backlit LCD with 16 lines of 40 characters with adjustable contrast
- Emulation of terminal per Joint NEMA/AASHTO/ITE Standard
- Key quantity and function per Joint NEMA/AASHTO/ITE Standard

#### m60 Communications Module

- 10 Base-T Ethernet with built-in switch and 4 front panel RJ-45 connectors
  - ENET1 and ENET2 network switches
  - 5 10/100 TCP/IP ports
- 4 USB 2.0 Ports and a Datakey Port
- Dedicated GPS - SP8 Port (9pin EIA-574)
- Unique MAC address assigned by the Institute of Electrical and Electronic Engineers (IEEE)

- EIA-232 port for uploading/downloading applications software and OS updating
- Single and multi-mode fiber optic options
- 1200 bps Frequency Shift Keying (FSK) modem (optional)
  - Datakey



### Communication

- SDLC
- Serial Port
- FSK Modem

### Hardware Specifications

- Dimensions
- Power Supply
- Temperature

### Controller Housing

- 7 slots with card guides for standard size Versa Modules
- 2 slots with card guides for standard Joint NEMA/AASHTO/ITE ATC modems (optional) or ATC Communication Module or USB Plate
- Polycarbonate construction (excluding back panel), rear mounting tabs and aluminum power supply mounting plate for electrical grounding
- Carrying handle

All Siemens controllers and accessories are built with the highest standards in quality and manufacturing. With a long standing history of technological innovations, well renowned customer service, and high quality products and services, Siemens is the leader in traffic technology products and solutions. For more information on our product line see our website at [www.usa.siemens.com/mobility](http://www.usa.siemens.com/mobility).



Material	Description
<b>m60 Series Controllers</b>	
8133-0004-sss <sup>3</sup>	m62 ATC - Siemens Multiview Display (16x40) - ATC Communications Module - ATC Backplane - m60 Linux Engine Board - m60 Power Supply - m62 Field I/O Board
8133-0000-sss <sup>3</sup>	m62 ATC Lite - Siemens Multiview Display (16x40) - ATC Backplane - m60 Linux Engine Board - m60 Power Supply - m62 Field I/O Board - USB Plate
8132-xx'yy <sup>2</sup> -sss <sup>3</sup>	m62 NEMA - Siemens Multiview Display (16x40) - m60 Linux Engine Board - m60 Power Supply - m62 Field I/O Board - USB Plate
1 - Communication Options 2 - Options 3 - Software version code number	
<b>m60 Series Optional Modules</b>	
AAD17048-001	ATC Communications Module
FFS15127-002	Single USB Plate for m60 ATC Lite and m60 NEMA
<b>Software Options</b>	
MBU15805-456	SEPAC NTCIP Linux version 4.56
MBU16037-356	SEPAC ECOM Linux version 3.56
<b>m60 Series Upgrade Kits</b>	
MBV17084-001	m50 OS-9 to m50 Linux Upgrade Kit - m60 Linux Engine Board - m62 Field I/O Board - USB Plate
MBV17085-001	m50 OS-9 to m62 NEMA Upgrade Kit - Siemens Multiview Display (16x40) - m60 Linux Engine Board - m62 Field I/O Board - USB Plate
MBV17086-001	m62 NEMA to m62 ATC Upgrade Kit - ATC Communications Module - ATC Backplane - m60 Power Supply
<b>m60 Series Modules and Spare Parts</b>	
AAD17047-001	Siemens Multiview Display (16x40)
AAD14877-006	m60 Power Supply
AAD17048-001	ATC Communications Module
PXX07659-001	m60 Linux Engine Board
ACP17049-001	ATC Backplane



Siemens Industry, Inc.  
9225 Bee Cave Road  
Building B, Suite 101  
Austin, TX 78733

1.512.837.8300

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Siemens M60 controller with Advanced SEPAC ✓

# SEPAC Local Controller Software

Effective traffic control software

Giving high priority to public transportation without interrupting the general traffic flow has been a major challenge for conventional traffic control software in the past. Siemens' SEPAC® local controller software is focused on enhancing performance of traffic signal control for customers who use Light Rail Transit, Bus Rapid Transit and regular Traffic Signal Priority functionality. Its features improve the use of low and full priority, with minimal impact on pedestrian and vehicle traffic.

SEPAC is unparalleled traffic signal priority software that enables mobility, safety and a better environment in order to improve the quality of life in cities. The software is designed for Siemens "M" series and CalTrans 2070 style controllers.

Incorporating more than 25 years of actual "on-street" traffic control experience, SEPAC is user-friendly and accommodates a large variety of traffic control requirements through its diverse configuration capabilities.

## Programming advantages

- User-friendly, 16 line menu driven software
- Each parameter viewable with a menu and the cursor movable to that parameter for changes
- Easy verification with related parameters visible simultaneously
- On-screen programming area identification and editing prompts
- Standard traffic nomenclature used throughout the programming
- Keystrokes identical on any hardware platform
- Logically laid out programming for easy setup and startup

## Modes of operation

SEPAC's traffic capabilities include five modes of operation that allow for Time of Day (TOD) operations, week plans, time of year or holiday plans, which include: coordination, free and flash functions. Modes include:

- **Standalone** – All functionality is operational as a standalone unit. Time updates available through GPS syncs. Controller can be programmed to use the GPS output for keeping its internal TOD clock accurate.



Siemens M60 ATC controller running SEPAC® local controller software

- **Master Control** – In conjunction with a Marc Master Controller, SEPAC will work within a closed loop system.\*\*
- **System Control** – SEPAC has the ability to communicate to TACTICS® and operate under system control.
- **Manual** – SEPAC can be controlled manually to run specific coordination routines when set to manual, including free operation.
- **Adaptive Control** – SEPAC can accept commands from SCOOT® and ACS Lite for adaptive control, if available.



# Siemens SEPAC® Local Controller Software Features

## Phases

- 16 vehicle phases
- 8 pedestrian phases
- 4 phase banks
- 4 timing rings
- 15 alternate sequences
- 16 overlaps

## Coordination

- 6 modes of coordination
- Locally based traffic responsive routines
- 250 events
- 5 modes for transition
- 3 auxiliary and 8 special functions
- 99 day and 10 week programs
- Free / flash / dimming
- 16 phase function maps

## Detection/Inputs

- 64 vehicle detectors\*
- 8 pedestrian detectors\*
- 8 system detectors\*
- Ethernet detection interface for Sensys Ethernet Access Points (optional)

## Communications

- Supports Siemens SCOOT® communication via Ethernet
- IP / Serial / FSK communications to TACTICS®
- IP standard on "M" series and 2070 1-B, 1-C and 1-E cards (2009 TEES)

## Priority and Pre-emption

- 12 pre-empts
- 6 LRT / TSP (high / low) priority routines
- 4 priority banks with unique timing
- Allows for 24 specific actions
  - 6 detectors per approach
  - 19 vehicles tracked simultaneously
  - Up to six directions at one time
  - Tracks vehicles at any distance from intersection using up to 6 inbound detectors and one exit detector
  - Tested and verified with: Opticom® by GTT, EMTRAC®, E-Views® and Wayside Detection
  - Allows for seamless operation between transit and vehicle traffic
  - Adjusts splits, skips phases when necessary, and adjusts lead/lag in order to make the transitions between normal operation and priority service more fluid
- Low and high priority can be used for both bus and light rail vehicles

## Miscellaneous

- Peer-to-Peer Communication between Controllers
- Bike timing with specific times for large bike traffic areas
- Any detector can be used for bike detection
- Advanced and delayed WALK operation
- Advance Warning Flasher functions
- 16 SPaT IP addresses for Connected Vehicle® operations
- Logging and diagnostics, including: cycling, coordination, pre-emption, detection, outputs, alarms and communications

- Anti-Backup (yellow trap avoidance)
- Password protection
- Collision avoidance routines (Red Protect)
- Available when used with a speed detector such as Iteris' new Vantage Vector™ video and radar camera
- External back-up - USB or DataKey®
- Help screen
- Illinois Rail Road security available
- International timing
- Extensive reporting capabilities

## Hardware Platforms

- Linux Operating System
- NEMA or CalTrans specifications
- Meets all current NTCIP requirements for traffic signal control
- Cabinet types include: ATC, TS-1, TS-2, TS-2 Type 2, CalTrans 332 style, ITS and CBD
- External Memory Storage
- OS-9 uses DataKey®
- Linux uses USB memory sticks or DataKey®

\* 80 total detectors defaulted to listed configuration but can be programmed as different types, if necessary.

\*\* SEPAC has been developed to be used in combination with SEMARC (Master Controller Software) in the same controller, eliminating the need for two controllers in one cabinet.

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9225 Bee Cave Road  
Building B, Suite 101  
Austin, TX 78733

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# SeMARC™ Intersection Software Solution

Qty. 1

Master Software Installed on M60 Master Controller for OC & Kinsman. Latest Version SEMAC 4.0 supports hardware twisted pair and Ethernet / IP communications.

## Description

Siemens SeMARC™ Closed-Loop Master Software drives the coordinating master in a closed-loop traffic control system. SeMARC™ software combines system management control, monitoring, and data collection capabilities for up to thirty-two (32) intersections. One master controller with SeMARC™ software can control and supervise the Traffic Program Selection for two (2) independent groups. Siemens now offers its versatile SeMARC™ Closed-Loop Master Software on the Siemens MARC, 2070 ATC, m50 Series NEMA controller, and Siemens m51 and m52 (with fiber modem) controllers. The ATC<sup>NXTM</sup> controller. The SeMARC™ Closed-Loop Master Software is fully compatible with Siemens local controllers, and provides continuous real-time monitoring and reporting of conditions for each interconnected ATC<sup>NXTM</sup> or 2070 ATC (with SEPAC™ software), EPAC™ m40/ m50 (actuated), or EPIC (interval) controller.

The friendly, English language-based user interface allows full system access from the on-street master or from an optional central office site via Siemens MARC NX or ACTRA™ Windows-based central system software packages. The remote access allows master and local intersection programming and monitoring, providing improved programming efficiency while reducing errors.

## Features

- The system features a SSM (Signal System Master) with the ability to select system timing plans responsively based on surveillance of actual traffic conditions, Time Base events, manual, and/or remote commands.
- Primary system objectives are:
- Flexibility of traffic responsive and / or time base (time-of-day/day-of-week/month day-of-year) system control.
- System diagnosis from a single site.
- System monitoring and reporting at a single site.
- System timing modification from a single site.
- Multi-level back-up operation.
- Minimize reliance on and cost of communications.
- Staged implementation capability.
- Future potential for multi-level central operation.

**SeMARC™ Controller Software by Siemens**

[www.itssiemens.com](http://www.itssiemens.com)

**SIEMENS**



## Controller Software by Siemens

### System Functions

The principal function of a computerized traffic control system is to provide optimum area-wide, traffic responsive signal timing. Secondary functions provided by a computerized traffic control system include:

- **Traffic Responsive:** The SSM computes smoothed values of current traffic volume + occupancy at various locations throughout the system, and matches (compares) them with values of various traffic pattern thresholds stored in the SSM memory.
- **Malfunction Detection:** Once malfunctions have been detected, the SSM logs the event and reports selected malfunctions to the Central, where used.
- **Time Base:** The time base events are scheduled on a time-of-day/day-of-week/month/day-of-year basis and are initiated from SSM memory as a result of time. A time base event shall select the traffic pattern (Dial, Split, Offset, Free, and Flash) and special functions.
- **Back-up Modes:** In the event of a system failure, such as a SSM malfunction or a communications failure, the SSL will continue to operate in accordance with the last system timing information for a specific interval of time.

### System Controls

- MARC/2070ATC/m50 Series based
- Thirty-two (32) Local Intersections
- Two (2) Independent Traffic Control Groups
- Sixty-four (64) System Detectors
- Forty-Eight (48) Traffic Coordination Patterns
- Sixteen (16) Timing Plans with Cycle Length, Splits, & Offsets
- Priority Based Program Selection (Manual, Remote, Time Based, Traffic Responsive)
- Common Group Sync Reference (Crossing Arterials)
- Group Traffic Responsive Operation
- Matching Program Technique (based on V+O)
- Group Time Based Traffic Operation
- One hundred eighty (180) Event Capacity
- Ten (10) Week & Ninety-nine (99) Day Programs
- Group Time Based, Manual and Remote Traffic Plans



m50 Controller

ATC Controller

All of Siemens controllers and accessories are built with the highest standards in quality and manufacturing. With a long standing history of technological innovations, well renowned customer service, and high quality products and services, Siemens is the leader in traffic technology products and solutions. For more information on our product line see our website at [www.itssiemens.com](http://www.itssiemens.com).

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Traffic Solutions  
8004 Cameron Road, Austin, TX 78754  
Tel. +1.512.837.8310 • Fax +1.512.837.0196

[www.itssiemens.com](http://www.itssiemens.com)



# EL704, Size M36 NEMA Cabinet



## Description

The Eagle Size M36 Cabinet protects electronic components including controllers and other equipment. It features an aluminum enclosure for protection from all forms of outdoor natural elements including rain, sleet, and snow, as well as seepage and splash.

## Optional Configurations

- Outward-rotating door handle.
- Double-flanged door frame to provide a better splash shield.
- Continuously welded enclosure for maximum protection from contaminants.
- Unique lock/keying combinations.
- Custom finish per customer requirements.
- Lifting ears.

Qty 6 (of 7) Controller Cabinet Assembly  
NEMA Size 5 + M36 (EL704) with TF5016  
TS2 terminal facility with 16 channel  
detector rack .....

**P44** Option  
alternated proposed for the OC Blvd &  
Kinsman Master location cabinet

\*\* We are proposing to furnish the same  
Dark Bronze powder coat finish that has  
been supplied with all previous Eagle cabinet  
assemblies for the City of Cleveland. The  
Cabinet exterior paint proposed is a Dark  
Bronze Powder Coat Equivalent to Dark  
Valley Bronze by Sherwin Williams #  
PDS4-70030-C50. ✓

\* Approved by project



Eagle EL704 Cabinet

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MANUFACTURING



# EL704, Size M36 NEMA Cabinet

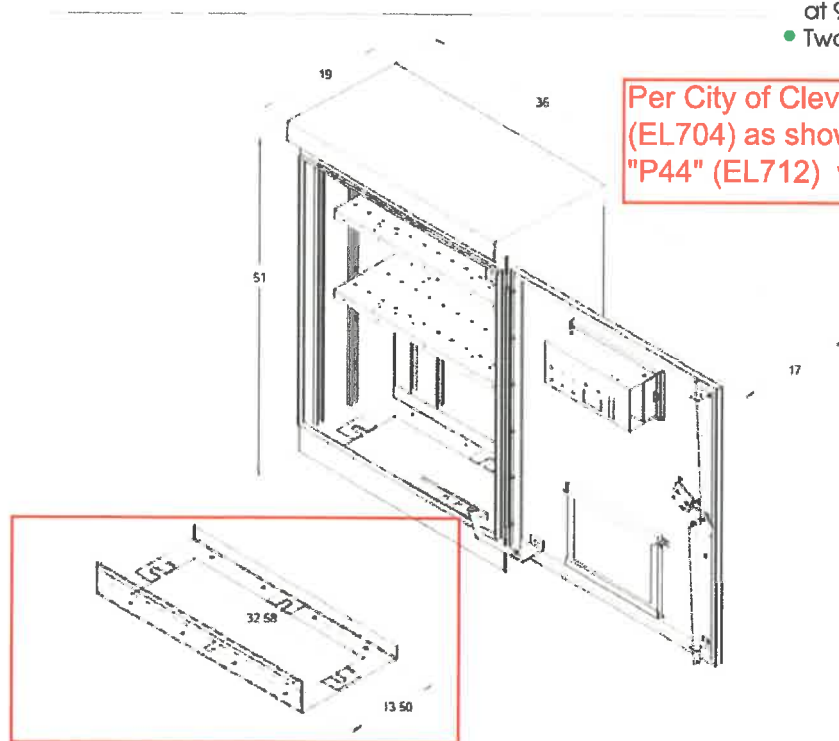


## Standard Door Specifications

- Provided with three-point locking mechanism with nylon rollers at the top and bottom.
- 3/4" diameter stainless steel outward turning handle with provisions for padlocking.
- Main door lock - industrial standard pin tumbler lock with #2 key.
- Louvered inlet with filter to prevent dirt from entering with air flow.
- Closed cell PVC door gasket with polyester film to prevent sticking.
- Heavy gauge stainless steel continuous hinge utilizing a 1/4" diameter stainless steel hinge pin for door support, carriage bolted in place for ease of door removal.
- A 2" deep fabricated switch compartment is included with a standard police lock and a stainless steel continuous hinge with a 1/8" diameter hinge pin riveted in place. Compartment is mounted flush to the door.

## Standard Enclosure Specifications

- Completely fabricated from .125"-thick type 5052-H32 mill-finished aluminum, utilizing intermittently welded construction, subsequently weather proofed with silicone sealant.
- Internal attaching components include four (4) "C" mounting channels (2 per side) and four (4) slotted rails on rear wall for attaching equipment panels.
- The door opening is double-flanged on top to prevent water drops when the door is open. The opening also includes a mount for two door-operated switches.
- Thermoconvection air ventilation system utilized with provisions for mounting fan for forced-air cooling.
- Exhaust outlet openings are provided under the roof over-hang.
- All internal and external hardware is fabricated from non-corrosive material.
- Automatic door stop to hold main door open at 90 , 120 , and 135
- Two (2) shelves included.



Per City of Cleveland request please use size M36 (EL704) as shown here. \*Use larger "P44" (EL712) where necessary @ Kinsman/OC

## Ordering Information

EL704 Base Mount  
EL704 2-Pole Mount

Order 1 (set of 2) anchor bolts, UA242, if required

Order 2 pole mount brackets, UL26, if required

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# EL712, Size P Cabinet NEMA Size 6



## Description

The Eagle Size P Cabinet protects electronic components including controllers and other equipment. It features an aluminum enclosure for protection from all forms of outdoor natural elements including rain, sleet, and snow, as well as seepage and splash.

## Optional Configurations

- Outward-rotating door handle.
- Double-flanged door frame to provide a better splash shield.
- Continuously welded enclosure for maximum protection from contaminants.
- Unique lock/keying combinations.
- Custom finish per customer requirements.
- Lifting ears.

**OPTION P44 alternate cabinet size** ✓  
proposed for the OC Blvd & Kinsman Master  
location cabinet with same TF5016 TS2  
terminal facility with 16 channel detector  
rack.

**\*\* We are proposing to furnish the same** ✓  
**Dark Bronze powder coat finish that has**  
been supplied with all previous Eagle cabinet  
assemblies for the City of Cleveland. The  
Cabinet exterior paint proposed is a Dark  
Bronze Powder Coat Equivalent to Dark  
Valley Bronze by Sherwin Williams #  
PDS4-70030-C50.

*\*Approved by project*



*Eagle EL712 Cabinet*

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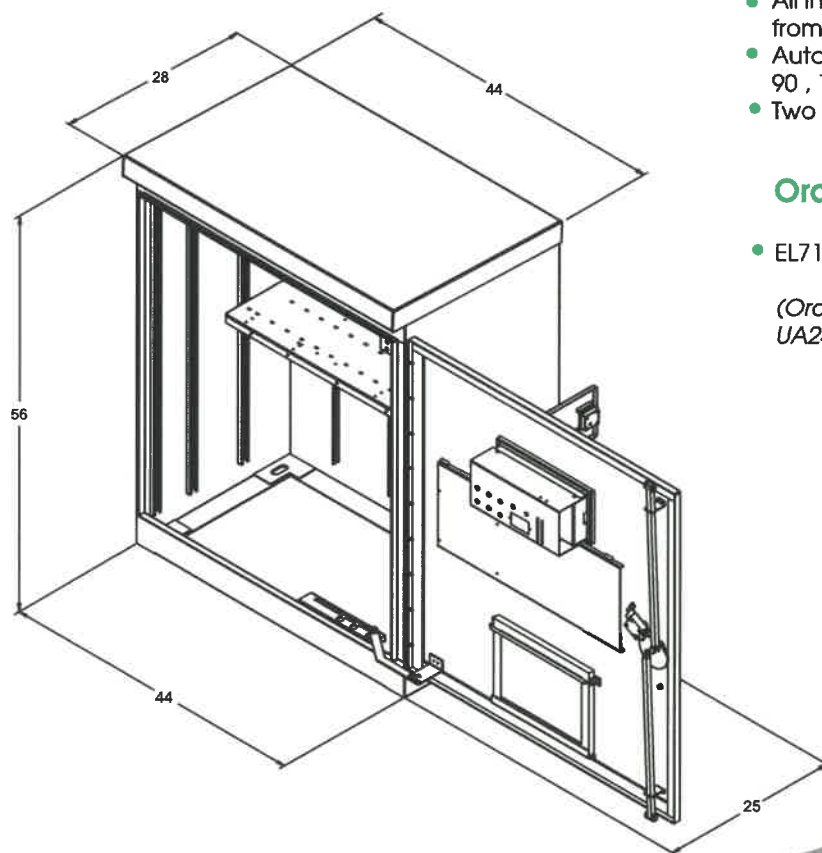


# EL712, Size P Cabinet NEMA Size 6



## Standard Door Specifications

- Provided with three-point locking mechanism with nylon rollers at the top and bottom.
- 3/4"-diameter stainless steel inward turning handle with provisions for padlocking.
- Main door lock - industrial standard pin tumbler lock with #2 key.
- Louvered inlet with filter to prevent dirt from entering with air flow.
- Closed cell PVC door gasket with polyester film to prevent sticking.
- Heavy gauge stainless steel continuous hinge utilizing a 1/4"-diameter stainless steel hinge pin for door support, carriage bolted in place for ease of door removal.
- A 2"-deep fabricated switch compartment is included with a standard police lock and a stainless steel continuous hinge with a 1/8"-diameter hinge pin riveted in place. Compartment is mounted flush to the door.



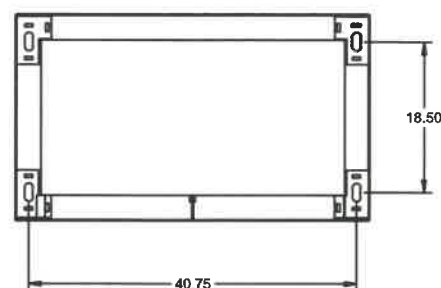
## Standard Enclosure Specifications

- Completely fabricated from .125"-thick type 5052-H32 mill-finished aluminum utilizing intermittently welded construction, subsequently weatherproofed with silicone sealant.
- Internal attaching components include six (6) adjustable "C" mounting channels (3 per side), and three (3) slotted rails on rear wall for attaching equipment panels.
- The door opening is double-flanged on top to prevent water drops when the door is open. The opening also includes a mount for two door-operated switches.
- Thermoconvection air ventilation system utilized with provisions for mounting fan for forced-air cooling.
- Exhaust outlet openings are provided under the roof over-hang.
- All internal and external hardware is fabricated from non-corrosive material.
- Automatic door stop to hold main door open at 90, 120 and 135.
- Two (2) shelves included.

## Ordering Information

- EL712- Base Mount

(Order 1 (set of 4) anchor bolts, UA242, if required)



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## TF5000 Series Load Bay NEMA TS-2, Type 1



### Description

#### NEMA TS2 Cabinet Terminal Facility

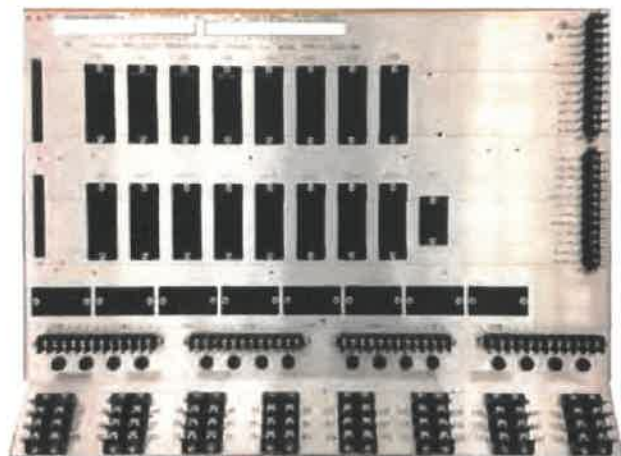
Eagle load bays are available in dedicated four, eight, twelve, and sixteen load switch configurations.

The TF5000 series load bays are hardwired for ease of maintenance and economical modification.

The flash indication colors can be programmed from the front panel, using only a screwdriver.

The load bays will fit into most existing Eagle cabinets and can be installed in less than four (4) hours.

Note: The TF5016 and TF5116 loadbays will only fit in size 6 or larger cabinets.



Eagle TF5115 Load bay

PartNumber	TF5004	TF5008	TF5012/TF5112**	TF5016/TF5116**
Controller	NEMA TS2, Type1	NEMA TS2, Type1	NEMA TS2, Type1	NEMA TS2, Type1
Monitor	MMU	MMU	MMU	MMU
Load Switch Positions	4	8	12	16
Flash Realy Positions	2	4	6	8
NEMA-2 Circuit Flasher	1	1	1	1
Dimensions	18.5"H x 19.25"W	18.5"H x 19.25"W	18.5"H x 19.25"W	18.5"H x 28.25"W

\* The TF5112 and TF5116 use 10-32 screw connector field terminal connections.

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# Cabinet Detector Racks



## NEMA TS2 Cabinet Terminal Facility Detector rack 16 channels

### Description

The Cabinet Detector Rack (CDR) provides housing and circuitry for one (1) BIU and up to 16 channels of detection (eight (8) two-channel or four (4) four-channel detector cards).

The CDR is programmable for any of the four (4) TS2 defined detector rack addresses. A 37-pin connector is attached to the printed circuit board for designated inputs/outputs.

Other models are available with 4 channels of optical detection and external vehicle detector inputs.



CDR100

2nd rack where required

**CDR100** - 16 channel, 8 position rack.  
Requires ABW12062P008 (8ft) or ABW12062P010 (10ft) cable.  
**Dimensions:** 14.6"W x 5.4"H x 7.5"D

**CDR101** - 8 channel, 4 position rack.  
Requires ABW12303P006 (6ft) or ABW12303P001 (7.5ft).  
**Dimensions:** 9.8"W x 5.9"H x 7.1"D

**AAD12047P001** - 16 channel, 10 position rack.  
Requires ABW12062P008 (8ft) or ABW12062P010 (10ft) cable.

Optional ABW12047P002 allows for 4 additional channels of preempt detection (and Opticom compatibility). Optional **ABW12047P001** allows for momentary push button detector call capability (Opticom, Tomar, or standard preempt compatible).  
**Dimensions:** 17"W x 7.1"D x 5.9"H



AAD12047P001

Primary Rack

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# Cabinet Detector Racks



## CDR Connector Pin Assignment

### CDR100

Pin	Function
1	Detector 1/2, Loop 1 - A
2	Detector 1/2, Loop 1 - B
3	Detector 1/2, Loop 2 - A
4	Detector 1/2, Loop 2 - B
5	Detector 1/2, Loop 3 - A
6	Detector 1/2, Loop 3 - B
7	Detector 1/2, Loop 4 - A
8	Detector 1/2, Loop 4 - B
9	Detector 3/4, Loop 1 - A
10	Detector 3/4, Loop 1 - B
11	Detector 3/4, Loop 2 - A
12	Detector 3/4, Loop 2 - B
13	Detector 3/4, Loop 3 - A
14	Detector 3/4, Loop 3 - B
15	Detector 3/4, Loop 4 - A
16	Detector 3/4, Loop 4 - B
17	Detector 5/6, Loop 1 - A
18	Detector 5/6, Loop 1 - B
19	Detector 5/6, Loop 2 - A
20	Detector 5/6, Loop 2 - B
21	Detector 5/6, Loop 3 - A
22	Detector 5/6, Loop 3 - B
23	Detector 5/6, Loop 4 - A
24	Detector 5/6, Loop 4 - B
25	Detector 7/8, Loop 1 - A
26	Detector 7/8, Loop 1 - B
27	Detector 7/8, Loop 2 - A
28	Detector 7/8, Loop 2 - B
29	Detector 7/8, Loop 3 - A
30	Detector 7/8, Loop 3 - B
31	Detector 7/8, Loop 4 - A
32	Detector 7/8, Loop 4 - B
33	+ 12 volts D.C.
34	Logic Common
35	+ 24 volts D.C.
36	Line Frequency Reference
37	Equipment Ground

\* Only channels 1-16 and 33-34 are available for use with the CDR101 rack.

### ABW12047P001

Pin	Function
1	Channel 1 Call
2	Channel 2 Call
3	Channel 3 Call
4	Channel 4 Call
5	Channel 5 Call
6	Channel 6 Call
7	Channel 7 Call
8	Channel 8 Call
9	Channel 9 Call
10	Channel 10 Call
11	Channel 11 Call
12	Channel 12 Call
13	Channel 13 Call
14	Channel 14 Call
15	Channel 15 Call
16	Channel 16 Call

### ABW12047P002

Pin	Function
1	**
2	**
3	**
4	1A Detector
5	+24 #1
6	1A Out (C)
7	1B Detector
8	DC- #1
9	**
10	2A Detector
11	+24 #2
12	2A Out (C)
13	2B Detector
14	DC- #2
15	1B Out (C)
16	2B Out (C)
17	1A Out (E)
18	1B Out (E)
19	2A Out (E)
20	2B Out €

\*\* Not Used

### Detector Loop Hook-Up Panel (PC Board)

AAD14972P001	16 Channel Hook-Up Panel
ABW14503P0XX*	16 Channel Loop Harness
ABW14665P0XX*	Opticom Harness

Note: Other special Loop Hook-Up Panels are available. Please contact your representative.

\*XX = Length in feet of cable

### SDLC Cable/Hook-Up Panel (PC. Board)

ABW14652P0XX*	SDLC Harness
AAD14753P003	6 Position
AAD14753P001	8 Position

\*XX = Length in feet of cable

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MOBILITY & TRAFFIC EXPERTS  
MANUFACTURING



# Cabinet Power Supply (P/N) CPS105



## Description

The Cabinet Power Supply (CPS) provides regulated DC power, unregulated AC power and a line frequency reference for the BIUs, load switches, detector racks and other auxiliary equipment within the cabinet. The Cabinet Power Supply is shelf mounted. The CPS meets the specifications of NEMA TS2-1998, Section 5, and exceeds the TXDOT TS-2 2003 addendum.

## NEMA TS2 Cabinet Terminal Facility

## Specifications

### Dimensions:

9"W x 4.0"H x 6.75"L  
(229 mm W x 102 mm H x 171 mm L)

### Power Requirements:

89 VAC to 135 VAC  
Interface: MS3106-18-IPW

### Outputs:

+12 VDC @ 5.0 Amps  
+24 VDC @ 3.0 Amps  
12 VAC @ 0.25 Amps  
Line Frequency Reference  
Test Jacks for 24 VDC

### Indicators:

24 VDC  
12 VDC  
12 VAC  
Line Frequency



Cabinet Power Supply Unit

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## Cabinet Riser Bases



**EAGLE**<sup>®</sup>  
Traffic Control Systems

NEMA TS2 Cabinet Terminal Facility. ✓

Base Riser for Cleveland Dark Bronze to match M36 signal cabinet assembly.

\* 6 each M36 Cabinet Riser

\* 1 each P44 Cabinet Riser

Eagle Part No.	Description	Construction	Height	Length	Width	Typical Cabinet	Pad Mounting Center to Center
* AQC11186P001	P-Riser Base	two-pieces, bolted	12"	44"	25.5"	P-cab, EL712	L=40.75" W=18.5"
AQC11186P002	P-Riser Base	two-pieces, bolted	15"	44"	25.5"	P-cab, EL712	L=40.75" W=18.5"
AQC11186P003	P-Riser Base	two-pieces, bolted	18"	44"	25.5"	P-cab, EL712	L=40.75" W=18.5"
AQC11186P005	P-Riser Base	two-pieces, bolted	8"	44"	25.5"	P-cab, EL712	L=40.75" W=18.5"
AQC12242P001	P-Riser Base	one-piece, cont. weld	12"	44.25"	26"	P-cab, EL712	L=40.75" W=18.5"
AQC14943P001	M-Riser Base	two-pieces, bolted	6"	30"	17"	M-cab, EL702	L=15.0" W=12.75"
AQC17090-001	M-Riser Base	one-piece, cont. weld	12"	30"	17"	M-cab, EL702	L=15.0" W=12.75"
AQC11498P001	M-Riser Base	two-pieces, bolted	15"	30"	17"	M-cab, EL702	L=15.0" W=12.75"
							(only 2 anchor bolts)
AQC11268P002	M-36 Riser Base	two-pieces, bolted	15"	36"	17"	M36-cab, EL704	L=26.0" W=12.75"
✓ AQC11268P003	M-36 Riser Base	two-pieces, bolted	12"	36"	17"	M36-cab, EL704	L=26.0" W=12.75"
AQC14281P001	#4 Riser Base	two-pieces, bolted	24"	24"	16"	#4-Cab, EL760	L=16.0" W=13.0"
AQC11186P004	Base Adapter	one-piece, cont. weld	8"	47"	26.5"	332 Cab, P Foundation	L=40.75" W=18.50"
AQC16324-001	332/336 Base Adapter	one-piece, cont. weld	8"	44"	25.5"	332/336 Cab, P Foundation	L=40.75" W=18.50"
AQC14844P001	332-Riser Base	two-pieces, bolted	8"	30"	24"	332 cab	L=25" W=15"
AQC14844P002	332-Riser Base	two-pieces, bolted	12"	30"	24"	332 cab	L=25" W=15"
AQC14844P003	332-Riser Base	two-pieces, bolted	18"	30"	24"	332 cab	L=25" W=15"
AQC16459-002	332-Riser Base	one-piece, cont. weld	8"	30"	24"	332 cab	L=25" W=15"
AQC16459-001	332-Riser Base	one-piece, cont. weld	12"	30"	24"	332 cab	L=25" W=15"
AQC17105-001	336-Riser Base	two-pieces, bolted	8"	24"	20"	336 cab	L=15" W=6"
AQC16195P001	336-Riser Base	two-pieces, bolted	12"	24"	20"	336 cab	L=15" W=6"
AQC17102-001	336-Riser Base	two-pieces, bolted	18"	24"	20"	336 cab	L=15" W=6"
AQC16505-001	332D-Riser Base	one-piece, cont. weld	12"	48"	30"	332D cab	L=39" W=25"
AQC16505-002	332D-Riser Base	one-piece, cont. weld	8"	48"	30"	332D cab	L=39" W=25"
AQC16287P001	Super P Riser Base	one-piece, cont. weld	8"	56.63"	26.5"	Super P cab, ELS1014	L=40.75" W=18.50"
AQC16470-001	Super P Riser Base	two-pieces, bolted	12"	56.63"	26.5"	Super P cab, ELS1014	L=40.75" W=18.50"



Not Pictured

Not Pictured



Not Pictured

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**Complies With The New  
NEMA MMU2 Standard and  
MUTCD Requirements**



# SmartMonitor

## MMU2-16LE SERIES

### NEMA LCD MALFUNCTION MANAGEMENT UNIT

- MMU2-16LEip with Ethernet Port
- ★ ▪ **MMU2-16LE** with EIA-232 Port

Whether you're a **NOVICE** or **EXPERT** Signal Technician, wouldn't it be great if you could:

- ☐ Use a built-in SETUP WIZARD to **quickly and accurately configure** the Signal Monitor to the exact requirements of the cabinet and intersection?
- ☐ Use a MENU DRIVEN LCD interface to **view** vital cabinet operational details such as field signal voltages, historical event logs, and monitor configuration data?
- ☐ Use a built-in DIAGNOSTIC WIZARD to **automatically diagnose** cabinet malfunctions and **pinpoint** faulty signals?

If your answer is Yes, the **MMU2-16LE SmartMonitor®** is for YOU!

### NEW MMU2-16LE SmartMonitor® ENHANCED FEATURES

<b>NEMA TS2-2003 (R2008) Standard Including Amendment #4:</b>	The MMU2-16LE SmartMonitor® meets all specifications of the NEMA Standard TS2-2003 (R2008) for the MMU2 configuration while maintaining compatibility with NEMA TS1-1989 Assemblies.
<b>NEMA Standard Flashing Yellow Arrow PPLT:</b>	The MMU2-16LE SmartMonitor® supports MUTCD Flashing Yellow Arrow PPLT operation and meets / exceeds the NEMA Standard MMU2 requirements of TS-2 Amendment #4-2012, providing modes for both TS-2 or TS-1 cabinet configurations.
<b>Standardized Communications:</b>	Real-time SDLC communications with the Controller Unit exchanges field input status, Controller Unit output status, fault status, MMU programming, and time and date.
<b>Full Intersection &amp; Status Display:</b>	Two high contrast, large area Liquid Crystal Displays (LCD) continuously show full RYG(W) intersection status. A separate graphic LCD provides a menu driven user interface to status, signal voltages, configuration, event logs, and the Help system.
<b>Event Logging:</b>	A time-stamped nonvolatile event log records the complete intersection status as well as AC Line events, configuration changes, monitor resets, temperature and true RMS voltages.
<b>Setup Wizard:</b>	Use the built-in Setup Wizard to configure the Nema Enhanced settings of the SmartMonitor® by answering a short series of questions regarding intersection design and operation.
<b>Diagnostic Wizard and Help System</b>	The Diagnostic Wizard <i>automatically pinpoints</i> faulty signals and offers trouble-shooting guidance. The integrated Help System provides context sensitive operational assistance.
<b>TS-1 Type 12 with SDLC Mode:</b>	The MMU2-16LE SmartMonitor® can be configured to operate with the Port 1 SDLC function and Diagnostic Wizard enabled in a TS-1 twelve channel cabinet with no cabinet wiring changes.
<b>Program Card Memory:</b>	Enhanced settings of the MMU2-16LE SmartMonitor® are stored in nonvolatile memory on the EDI Program Card. Moving the Program Card to another MMU2-16LE automatically transfers all settings.
<b>Signal Sequence History Log:</b>	The five Signal Sequence History logs stored in nonvolatile memory graphically display up to 30 seconds of signal status prior to each fault event.
<b>LEDguard®:</b>	This EDI innovative signal threshold technique can be used to increase the level of monitoring protection when using LED based signal heads.
<b>EDI RMS-Engine:</b>	A DSP coprocessor converts AC input measurements to True RMS voltages, virtually eliminating false sensing due to changes in frequency, phase, or sine wave distortion.
<b>ECcom PC Software:</b>	Access to the MMU2-16LE data is provided by the industry standard EDI ECcom Windows based software for status, event log retrieval, configuration, and data archival.



\* The MMU2-16LE is submitted. If MMU2LEip is desired please specify.



TS2 Loop amplifiers are 2 channel



# LM622

## INDUCTIVE LOOP MONITOR™

- DUAL CHANNEL – RACK MOUNT
- NEMA TS-2 Type A

For over 25 years Eberle Design, Inc. (EDI), has provided technicians and engineers with reliable, high quality mission critical component products that improve the performance and lifecycle of traffic control systems.

EDI's wide range of traffic control vehicle detection products help technicians save valuable time and bank budgeted dollars by quickly installing, accurately troubleshooting, and reliably maintaining traffic control systems with easy to use hi-tech vehicle detectors.

The LM622 has been specifically designed to deal with all traffic and highway applications and meets or exceeds all requirements of NEMA Standard TS2-2003, Section 6.5 (Inductive Loop Detectors).

### ENHANCED FEATURES

#### Rugged Handle Assembly:



The rugged integrated handle assembly is made of GE Lexan™, which is a super durable polycarbonate resin. The design of this assembly strengthens and protects the whole PCB assembly much better than conventional metal face plates. The temperature stability of critical components is improved with the larger more encompassing enclosure. Detailed operating instructions are conveniently attached directly on the side of the unit, eliminating the need for instruction cards.

#### Separate Detect / Fault LEDs:

The Fault (FLT) indicator displays the type of fault: Short, Open or 25% change of inductance. Each type of fault is indicated by a unique sequence of flashes allowing the user to diagnose loop failures at a glance. Individual indicators eliminate the confusion encountered with other detectors that use only one LED to display both faults and detection.

#### Loop Fault Memory:

Loop Fault Memory reports previous loop fault information. If a loop problem self-heals, the detector channel will resume normal operation. The contents of the memory will be displayed on the Fault (FLT) indicator. This feature can be used to isolate the source of intermittent loop failures.

### STANDARD FEATURES

#### Automatic Tuning / Loop Configuration:

No manual tuning is required and works effectively on all inductive loops from 20 to 2500 uH.

#### Fifteen (15) Levels of Sensitivity:

Allows users to fine tune to their application.

#### Four Loop Frequencies and Sequential Scanning:

Together these features greatly reduce the incidence of crosstalk.

#### Three Selectable Modes:

**Short Presence:** For normal detection.

**Long Presence:** For sites where loops may be occupied for extended periods of time.

**Pulse:** For counting and volume.

#### Environmental Tracking:

Ensures reliable operation by continuously adjusting for changes in ambient conditions.

#### Options:

Relay Outputs, Model LM622R

Loop Monitor is a trademark of Eberle Design Inc.  
Patent Pending  
LEXAN Resin is a trademark of General Electric

### EBERLE DESIGN INC.

3819 East La Salle Street  
Phoenix, AZ 85040 USA  
www.EDIttraffic.com

Tel: + 1 (480) 968-6407  
Fax: + 1 (602) 437-1996





## MODEL LM622 DUAL CHANNEL INDUCTIVE LOOP VEHICLE DETECTOR

### SPECIFICATION

#### GENERAL CHARACTERISTICS

**Controls:** Front panel switches allow the user to set up sensitivity, operational mode, and frequency independently on each channel.

**Loop Frequency:** One of four settings may be selected to alleviate interference which may occur when loops connected to different detectors are located adjacent to one another.

**Sensitivity:** One of fifteen settings may be selected to optimize detection on varying loop and lead-in configurations. Sensitivity is stated in terms of  $\Delta L/L$ , which is the minimum percentage change in the total inductance (loop plus lead-in) to which the unit will respond at the given level setting. Selecting level 0 will switch the Channel OFF. In this condition, the loop oscillator is de-energized, and the output will remain in the no-call state.

Sensitivity	$\Delta L/L$	Sensitivity	$\Delta L/L$	Sensitivity	$\Delta L/L$
15	0.010%	10	0.057%	5	0.320%
14	0.014%	9	0.080%	4	0.453%
13	0.020%	8	0.113%	3	0.640%
12	0.028%	7	0.160%	2	0.905%
11	0.040%	6	0.226%	1	1.280%

#### SPECIFICATION

**Construction:** Printed circuit boards are double sided 2 oz. (56.70 gm.) copper with plated through holes. Circuit boards are coated for environmental protection.

#### Environmental:

**Operating Temperature Range:** -30°F to 165°F (-34°C to 74°C)

**Storing Temperature Range:** -50°F to 185°F (-45°C to +85°C)

**Humidity Range:** 0 to 95% relative.

#### Mechanical:

**Dimensions/Connector:** International Card 4.500"H (114.30mm) x 6.875"D (174.63mm) x 1.200"W (30.48mm), excluding handle, with 44 pin double sided edge connector.

**Weight:** 7 oz. (199 gm.)

**Lead-in Length:** The unit will operate with lead-in (feeder) lengths up to 5,000 feet (1,524 m.) with appropriate loops and proper lead-in cable.

#### ELECTRICAL

##### Pin Assignment:

Pin	Function	Pin	Function
A	Logic Ground	1	Reserved
B	Detector Unit DC Supply	2	Reserved
C	External Reset	3	Reserved
D	Channel 1 Loop Input	4	Channel 1 Redundant Loop Input
E	Channel 1 Loop Input	5	Channel 1 Redundant Loop Input
F	Channel 1 Output (+)	6	Reserved
H	Channel 1 Output (-)	7	Channel 1 Status Output
J	Channel 2 Loop Input	8	Channel 2 Redundant Loop Input
K	Channel 2 Loop Input	9	Channel 2 Redundant Loop Input
L	Chassis Ground	10	Reserved
M	Reserved	11	Reserved
N	Reserved	12	Reserved
P	Reserved	13	Reserved
R	Reserved	14	Reserved
S	Reserved	15	Reserved
T	Reserved	16	Reserved
U	Reserved	17	Reserved
V	Reserved	18	Reserved
W	Channel 2 Output (+)	19	Reserved
X	Channel 2 Output (-)	20	Channel 2 Status Output
Y	Reserved	21	Reserved
Z	Reserved	22	Reserved

**Power Supply:** 10.8 to 28.8 VDC, 60mA nominal both channels operating.

**Loop Inductance (Tuning) Range:** 20 to 2500 micro Henry with a Q factor greater than 5.

**Loop Input (Lightning Protection):** The loop input incorporates lightning and transient protection devices and the loop oscillator circuitry is transformer-isolated. The lightning protection will withstand the discharge of a 10 uF capacitor charged to 2,000V across the loop inputs or between either loop input and earth ground. The transformer isolation allows operation with a loop which is grounded at a single point.

**Reset:** The detector may be reset by applying a ground true logic level to the reset input Pin C. Changing any DIP switch selection will also reset the detector.

#### Output Ratings:

**Optically Isolated Output (LM622):** Maximum collector current is 100mA. In the saturated condition the collector voltage will be less than 1.5Volts with a collector current of 50mA. Maximum off state leakage current is 1 microampere. Isolation exceeds 2,500 Vrms. Solid state outputs are failsafe; should the detector lose power, the output will give a constant CALL output.

**Relay Output Option (LM622R):** Contacts are rated 5A@120 VAC, 5A@30 VDC. Relay outputs are failsafe; should the detector lose power, the output will give a constant CALL output.

**Status Output:** Each channel includes a separate output which is used to transmit operational status information to a bus interface unit (BIU). Fault information is transmitted by means of pulse-width modulation. Pulse widths shown are +10ms.

Status .....	Status Output condition
Normal operation/ No fault .....	Continuous ON (low)
Watchdog fail/ Power Supply fail .....	Continuous OFF (high)
Open circuit loop .....	50ms OFF, 50ms ON
Short circuit loop .....	100ms OFF, 50ms ON
25% change in inductance .....	150ms OFF, 50ms ON

#### OPERATIONAL

**High Intensity Color-Coded LED Indicators:** Two indicators are used per channel. The DET indicator is red and the FLT indicator is yellow. During normal operation the DET indicator will be On solid to indicate a Call state.

**Loop Fault Monitoring:** Each detector channel continuously checks the integrity of the loop. The system is able to detect open or shorted circuit loops, or sudden changes in inductance exceeding 25% of the nominal inductance. If a fault is detected on a channel, both the DET (Red) and FLT (Yellow) LEDs continuously emit a sequence of flashes followed by a pause. The sequence is repeated until the fault is removed. Each type of fault is identified by a different flash sequence. While the unit is in the fault condition, the channel output will remain in the detect (CALL) state.

Flash Sequence	Fault
1 flash (per second) .....	Open Circuit Loop.
2 flashes (per second) .....	Shorted Circuit Loop.
3 flashes (per second) .....	25% change in inductance.

If the fault is removed, both the DET LED and the output will return to normal operation. The FLT LED will continue to emit the sequence signifying the type of fault that was last detected. In the case of the excessive inductance change fault, the unit will retune to the new inductance after a period of two seconds and continue operation.

#### Operational Modes:

**Pulse Mode:** ..... 125ms +/-25ms momentary output.

**Short Presence:** ..... 15 minutes.

**Long Presence:** ..... 2 hours.

**Note:** When operating in pulse mode, a vehicle remaining over a loop will inhibit further pulse outputs from being issued for a period of 2 seconds after which time vehicles passing over the uncovered portion of the loop will be detected.

**Response Times:** The following are typical response times at different sensitivity levels for units with optically isolated outputs. Response times on units with relay output will reflect the effects of contact bounce. This table assumes that both channels are set to the same Sensitivity.

Sensitivity	Response	Sensitivity	Response	Sensitivity	Response
15	76-96 ms	10	13-17 ms	5	4-6 ms
14	57-75 ms	9	9-12 ms	4	4-6 ms
13	38-50 ms	8	7-9 ms	3	4-6 ms
12	26-35 ms	7	5-7 ms	2	4-6 ms
11	18-24 ms	6	5-6 ms	1	4-6 ms

**Self Tuning:** Each detector channel will automatically tune to any loop and lead-in combination within the tuning range upon application of power. See also "Reset".

**Environmental Tracking:** The detector automatically and continuously compensates for component drift and environmental effects throughout the tuning range and across the entire temperature range.

**Grounded Loop Operation:** The detector will operate when connected to poor quality loops including those that have a short to ground at a single point.

**Sequential Scanning:** Only one channel is energized at any given time, thus reducing the possibility of crosstalk between adjacent loops connected to the same unit.



# Submittal: 038

## Revision:

Date Submitted: 8/29/2019

Response Due: 9/12/2019



**Project:** ODOT 3000(17) – Opportunity Corridor 3

**Subject:** Signal Support & Pedestals

**To:** Julie Meyer, P.E.  
Ohio Department of Transportation – District 12

**Email:** Julie.Meyer@dot.ohio.gov

**From:** Marty Fritz  
Kokosing Construction Company, Inc.

**Email:** mwf@kokosing.biz

We Are Sending:	Submitted For:
<input type="checkbox"/> As-Built Construction Drawings	<input checked="" type="checkbox"/> Approval
<input type="checkbox"/> Certifications / Test Results	<input type="checkbox"/> Acceptance
<input type="checkbox"/> Engineered / Working Drawings	<input type="checkbox"/> Record
<input type="checkbox"/> Product Data / Samples	
<input type="checkbox"/> Quality Control Procedures	
<input checked="" type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Attached (Electronic)
<input type="checkbox"/> Other:	<input type="checkbox"/> Attached (Hard Copy)

Submittal #	Spec	Revision	Description	Status
038			Signal Support & Pedestals	For Approval

### Comments:

Please review/approve the included signal support and pedestal drawings (BU12). Additionally, please note the clarifications requested below:

- Page 2/3- Please verify the signal support mast arm heights are acceptable with submittal approval.
- All pedestrian signal coupling orientations from T-Base door on 16' pedestals, as determined by Miller Cable Company.

Please feel free to contact me for any questions/concerns regarding this submittal.

Signed: \_\_\_\_\_

A handwritten signature in blue ink, appearing to read "Marty Fritz", is written over the signature line.



REMOVABLE END CAP

DETAIL 1

DETAIL 2

DETAIL 3

DETAIL 11

SEE POLE AND SIGNAL ARM DATA

DETAIL 4

NOTE 2

DETAIL 5

NOTE 1

8'-0"

DETAIL 6

1'-6"

DETAIL 7

DETAIL 8, 9, 10

SUPPLIED BY OTHERS

Upper H.H. behind Mast Arm Attachment

SEE POLE DATA

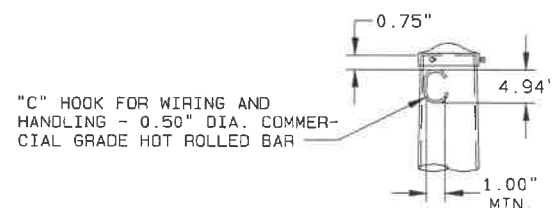
SEE POLE DATA

MATERIAL DATA			FINISH DATA	
COMPONENT	ASTM DESIGNATION	MIN. YIELD (KSI)	SYSTEM:	FINISH PAINT/GALVANIZED (FPGV)
TAPERED TUBES	A595 GR.A OR A572	55	BASE COAT:	HOT-DIP GALVANIZED ✓ TO ASTM A123
POLE BASE	A36	36	PRIME COAT:	NONE
SIGNAL ARM CONNECTION	A36	36	FINISH COAT:	TGIC OR URETHANE POLYESTER POWDER
SIGNAL ARM CONN BOLTS	A325/A449		COLOR:	ORION BRONZE ✓
GALVANIZING-HARDWARE	HOT DIP GALV		VALMONT SPEC:	F-283MT

- 

SEE POLE AND SIGNAL  
ARM DATA FOR POLE  
COUPLING ORIENTATIONS

## RADIAL INDEX

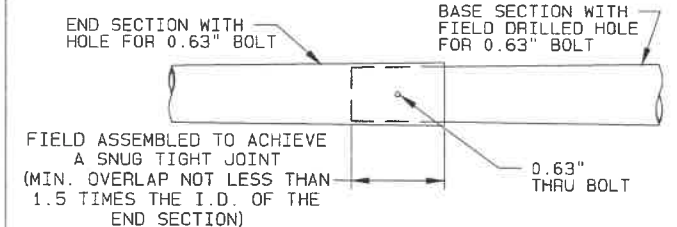


DETAIL 1	POLE TOP
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TC-81.21 POLE DES. NO.	"G" (IN)
1 THRU 4	0.25
11 THRU 13	0.31
14	0.38

DETAIL 2	ARM ATTACHMENT - TAPPED
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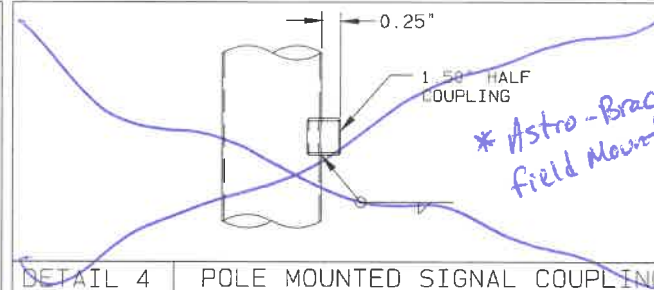
OHIO SIGNAL ARM ATTACHMENT DATA							
POLE DES. NO.	"A" (IN)	"B" (IN)	"C" (IN)	"D" (IN)	"E" (IN)	"X" (IN)	"F"
2 ✓	14.50 ✓	12.00 ✓	8.00 ✓	10.50 ✓	1.25 ✓	1.50 ✓	1.25" X 3.50"
3 ✓	14.50 ✓	12.00 ✓	8.00 ✓	10.50 ✓	1.25 ✓	1.50 ✓	1.25" X 3.50"
4 ✓	16.50 ✓	14.50 ✓	9.50 ✓	12.50 ✓	1.50 ✓	2.00 ✓	1.25" X 4.00"
11 ✓	16.50 ✓	14.50 ✓	9.50 ✓	12.50 ✓	1.50 ✓	2.00 ✓	1.25" X 4.00"
12 ✓	16.50 ✓	14.50 ✓	9.50 ✓	12.50 ✓	1.75 ✓	2.00 ✓	1.50" X 4.25"
13 ✓	19.50 ✓	16.50 ✓	12.00 ✓	15.00 ✓	1.50 ✓	2.00 ✓	1.50" X 4.25"
14 ✓	19.50 ✓	16.50 ✓	12.00 ✓	15.00 ✓	2.00 ✓	2.00 ✓	2.00" X 5.00"



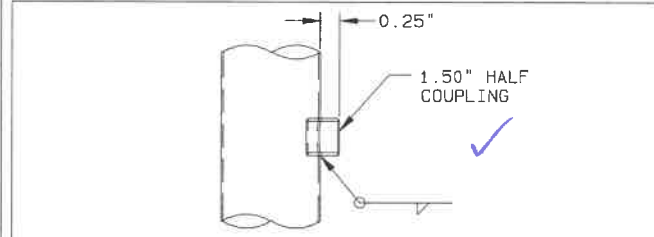
## ARM SECTION DATA

ARM DES. NO.	SPAN (FT)	BASE SECTION		END SECTION		
		LENGTH (FT)	GAUGE/THK	DIA. (IN)	LENGTH (FT)	GAUGE/THK
11 ✓	40 ✓	17.00 ✓	0.239	9.19	24.25 ✓	0.179
11 ✓	41 ✓	17.00 ✓	0.239	9.19	25.25 ✓	0.179
11 ✓	42 ✓	17.00 ✓	0.239	9.19	26.25 ✓	0.179
11 ✓	45 ✓	17.00 ✓	0.239	9.19	29.25 ✓	0.179
12 ✓	46 ✓	17.00 ✓	0.313	9.19	30.25 ✓	0.179
12 ✓	47 ✓	17.00 ✓	0.313	9.19	31.25 ✓	0.179
12 ✓	48 ✓	17.00 ✓	0.313	9.19	32.25 ✓	0.179
13 ✓	50 ✓	30.00 ✓	0.313	9.62	22.00 ✓	0.239
13 ✓	52 ✓	30.00 ✓	0.313	9.62	24.00 ✓	0.239
13 ✓	58 ✓	30.00 ✓	0.313	9.62	30.00 ✓	0.239
14 ✓	61 ✓	35.00 ✓	0.313	9.90	28.00 ✓	0.239
14 ✓	67 ✓	35.00 ✓	0.313	9.90	34.00 ✓	0.239
14 ✓	68 ✓	35.00 ✓	0.313	9.90	35.00 ✓	0.239

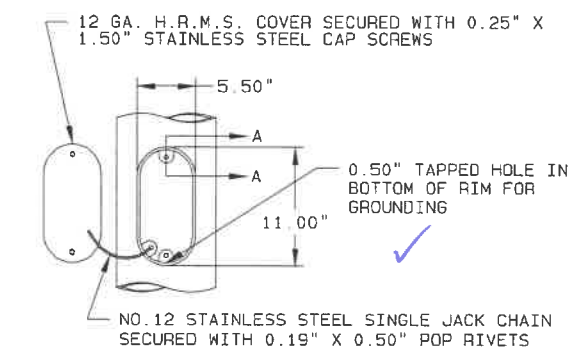
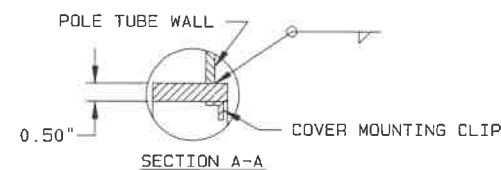
DETAIL 3	TC-81.21 TWO PIECE ARM DETAIL
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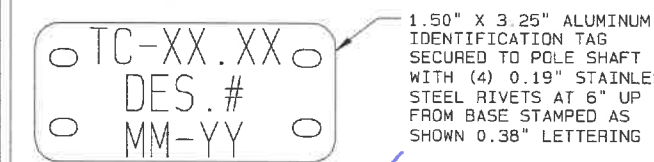
DETAIL 4	POLE MOUNTED SIGNAL COUPLIN
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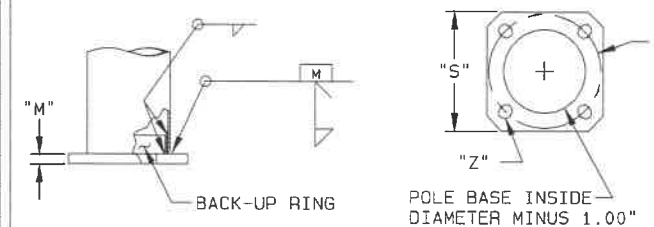
DETAIL 5	PEDESTRIAN SIGNAL COUPLING
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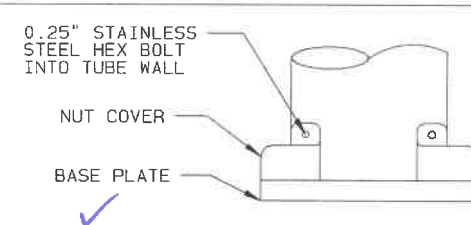
DETAIL 6	HANDHOLE
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DETAIL 7	I.D. TAG
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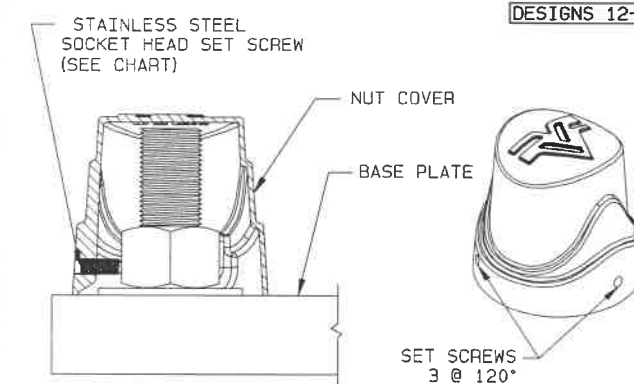


DETAIL 8	POLE BASE
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DESIGNS 1-11, 14

DETAIL 9	NUT COVER
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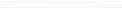
DESIGNS 12-13

## HARDWARE

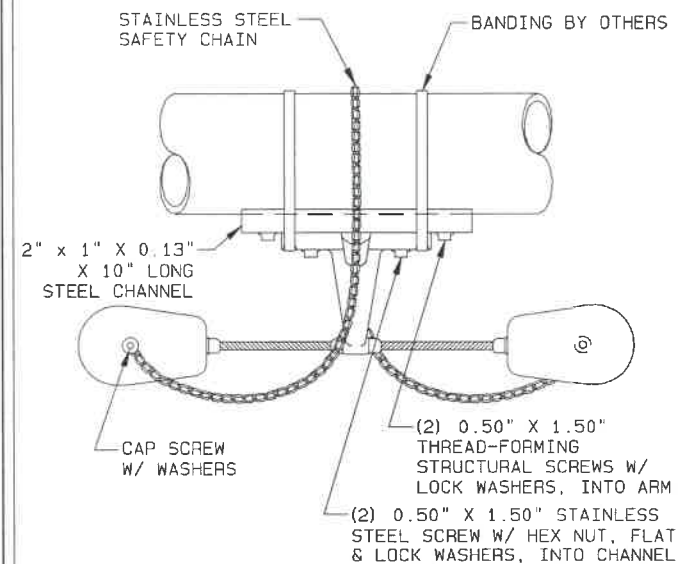
ANCHOR BOLT SIZE	SET SCREW SIZE
1.25", 2.00" - 2.25"	0.38"-16UNC X 1.25"
1.50" - 1.75", 2.50"	0.38"-16UNC X 1.00"

DETAIL 10	WAVE NUT COVER
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SEE PAGE 2 OF 2 FOR POLE &  
ARM DATA, ADDITIONAL DETAILS  
AND IMPORTANT NOTES

				SOLD TO: BAYSIDE SUPPLY		JOB ✓ ODOT 173000/OC3 IMPROVEMENT		VALMONT INDUSTRIES, INC. RESERVES		✓ <b>valmont</b> 		ORDER NUMBER: 453545-P1		
				SHIP TO: MILLER CABLE COMPANY		CUYAHOGA COUNTY - MCC# 19221		THE RIGHT TO INSTALL VARIOUS,				PAGE NUMBER: 1 OF 3		
A		JDF1 08/19/19	JDF1 08/19/19	ADDED PAGE 3, PEDESTAL POLES		P.O. #: 1499		ENGINEER APPROVED, MATERIAL HANGING				DRAWING NUMBER		
—		JDF1 07/31/19	JDF1 07/31/19	-----		AGENT: R.C. CHILDS		ACCOMMODATIONS TO FACILITATE THE		Valley, NE 68064		REV		
REV	DRAWN BY-DATE		CHECK BY-DATE		DESCRIPTION		TITLE ✓ TRAFFIC SIGNAL STRUCTURES		MANUFACTURING PROCESS		(402) 359-2201		0453545P1 A	





ALCOA NO: B5431-X  
VIBRATION DAMPER DEVICE  
MODIFIED TO INCLUDE  
SAFETY CHAIN  
VALMONT #J261688

QUANTITY OF (3) DAMPER DEVICES  
COMPONENTS FINISHED TO MATCH STRUCTURE

PLEASE SELECT ONE:

- ☒ SUPPLIED BY VALMONT  
ARMS OVER 59' LONG
- ☐ NOT SUPPLIED BY VALMONT  
ARMS OVER 59' LONG

\*PLEASE REFER TO QUOTE FOR ADDITIONAL COST

DETAIL 11 VIBRATION DAMPER - SIGNAL ARM

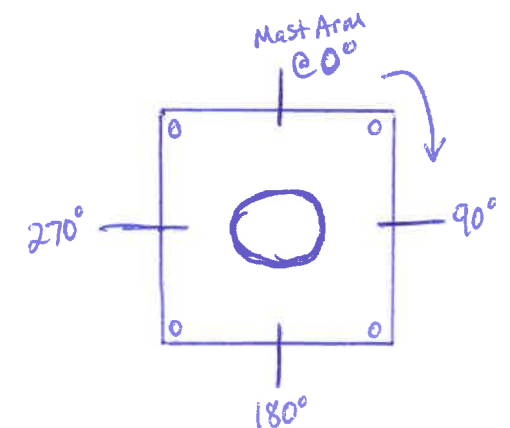
NOTES:

- PEDESTRIAN SIGNAL COUPLING VERTICAL SPACING MUST BE PROVIDED WITH RELEASE FOR MANUFACTURING, IF REQUIRED FOR SIGNAL MOUNTING. *20.5" Center to Center*
- POLE MOUNTED SIGNAL COUPLING VERTICAL SPACING MUST BE PROVIDED WITH RELEASE FOR MANUFACTURING, IF REQUIRED FOR SIGNAL MOUNTING. *N/A, field mount Astro-Brac*
- IF ANY ADDITIONAL COUPLINGS ARE REQUIRED AND NOT SHOWN HERE, PLEASE SPECIFY SIZE, LOCATION AND ORIENTATION OF EACH WITH RELEASE FOR MANUFACTURING. *N/A*

POLE AND SIGNAL ARM DATA

POLE NO.	REF NO.	TC 81.21 DES. NO.	QTY.	POLE TUBE			POLE BASE				ANCHOR BOLT				SIGNAL ARM TUBE					ORIENTATIONS		
				BASE DIA. (IN)	TOP DIA. (IN)	LENGTH (FT)	GAUGE OR THK. (IN)	SQUARE "S" (IN)	BOLT CIRCLE "Y" (IN)	THK. "M" (IN)	HOLE / SLOT "Z" (IN)	DIA. "K" (IN)	LENGTH "J" (IN)	HOOK "H" (IN)	THREAD LENGTH "U" (IN)	ARM ATTACH HEIGHT (FT)	TC 81.21 DES. NO.	FIXED END DIA. (IN)	GAUGE OR THICK (IN)	SPAN (FT)	HAND HOLE	PEDESTRIAN SIGNAL COUPLINGS
E. 55TH ST. & QUADRANT ROAD																						
SP-1	3	4	1	13.00	9.85	22.50	0.239	18.50	18.00	2.00	2.13	1.75	SUPPLIED BY OTHERS	21.00	4	10.32	0.239	38.00	180°	180°	N/A	
SP-2	1	2	1	11.00	7.85	22.50	0.179	15.63	15.00	1.50	1.75	1.50	SUPPLIED BY OTHERS	21.00	2	8.00	0.179	31.00	180°	90°	N/A	
SP-3	6	12	1	14.00	10.85	22.50	0.313	20.50	20.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.00	12	11.00	DET.3	48.00	180°	0°	N/A	
O.C. BLVD. & QUADRANT ROAD																						
SP-1	1	2	1	11.00	7.85	22.50	0.179	15.63	15.00	1.50	1.75	1.50	SUPPLIED BY OTHERS	21.00	2	8.00	0.179	31.00	180°	N/A	N/A	
SP-2	5	11	1	14.00	10.85	22.50	0.250	20.50	20.00	2.00	2.13	1.75	SUPPLIED BY OTHERS	21.00	11	11.00	DET.3	41.00	180°	N/A	57° N/A	
SP-3	5	11	1	14.00	10.85	22.50	0.250	20.50	20.00	2.00	2.13	1.75	SUPPLIED BY OTHERS	21.00	11	11.00	DET.3	45.00	180°	N/A	N/A	
O.C. BLVD. & KINSMAN ROAD																						
SP-1	7	13	1	16.00	12.85	22.50	0.313	23.00	22.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.00	13	13.00	DET.3	58.00	180°	90°	N/A	
SP-2	2	3	1	12.00	8.85	22.50	0.179	17.00	16.00	1.50	1.75	1.50	SUPPLIED BY OTHERS	21.00	3	9.00	0.179	37.00	180°	295°	N/A	
SP-3	2	3	1	12.00	8.85	22.50	0.179	17.00	16.00	1.50	1.75	1.50	SUPPLIED BY OTHERS	21.00	3	9.00	0.179	37.00	180°	112°	N/A	
SP-4	7	14	1	17.00	13.85	22.50	0.313	23.00	22.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.00	14	14.00	DET.3	68.00	180°	90°	N/A	
O.C. BLVD. & E. 75TH ST.																						
SP-1	8	14	1	17.00	13.85	22.50	0.313	23.00	22.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.00	14	14.00	DET.3	61.00	180°	180°	N/A	
SP-2	5	11	1	14.00	10.85	22.50	0.250	20.50	20.00	2.00	2.13	1.75	SUPPLIED BY OTHERS	21.00	11	11.00	DET.3	40.00	180°	270°	N/A	
SP-3	6	12	1	14.00	10.85	22.50	0.313	20.50	20.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.00	12	11.00	DET.3	47.00	180°	90°	N/A	
SP-4	7	13	1	16.00	12.85	22.50	0.313	23.00	22.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.00	13	13.00	DET.3	58.00	180°	180°	N/A	
O.C. BLVD. & E. 79TH ST.																						
SP-1	6	12	1	14.00	10.78	23.00	0.313	20.50	20.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.50	12	11.00	DET.3	46.00	180°	102°	N/A	
SP-2	6	12	1	14.00	10.78	23.00	0.313	20.50	20.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.50	12	11.00	DET.3	46.00	180°	80°	N/A	
SP-3	6	12	1	14.00	10.78	23.00	0.313	20.50	20.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.50	12	11.00	DET.3	47.00	180°	257°	N/A	
SP-4	6	12	1	14.00	10.78	23.00	0.313	20.50	20.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	21.50	12	11.00	DET.3	47.00	180°	93°	N/A	
O.C. BLVD. & BUCKEYE ROAD																						
SP-1	5	11	1	14.00	10.92	22.00	0.250	20.50	20.00	2.00	2.13	1.75	SUPPLIED BY OTHERS	20.50	11	11.00	DET.3	42.00	180°	93°	N/A	
SP-2	7	13	1	16.00	12.92	22.00	0.313	23.00	22.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	20.50	13	13.00	DET.3	50.00	180°	264°	N/A	
SP-3	7	13	1	16.00	12.92	22.00	0.313	23.00	22.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	20.50	13	13.00	DET.3	52.00	180°	268°	N/A	
SP-4	2	3	1	12.00	8.92	22.00	0.179	17.00	16.00	1.50	1.75	1.50	SUPPLIED BY OTHERS	20.50	3	9.00	0.179	37.00	180°	278°	N/A	
O.C. BLVD. & WOODLAND AVE.																						
SP-1	2	3	1	12.00	8.92	22.00	0.179	17.00	16.00	1.50	1.75	1.50	SUPPLIED BY OTHERS	20.50	3	9.00	0.179	35.00	180°	116°	N/A	
SP-2	8	14	1	17.00	14.06	21.00	0.313	23.00	22.00	2.00	2.38	2.00	SUPPLIED BY OTHERS	19.50	14	14.00	DET.3	67.00	180°	89°	N/A	
SP-3	5	11	1	14.00	10.78	23.00	0.250	20.50	20.00	2.00	2.13	1.75	SUPPLIED BY OTHERS	21.50	11	11.00	DET.3	41.00	180°	270°	N/A	
SP-4	3	4	1	13.00	9.92	22.00	0.239	18.50	18.00	2.00	2.13	1.75	SUPPLIED BY OTHERS	20.50	4	10.32	0.239	38.00	180°	92°	272° N/A	

\*Please verify the mast arm attachment height with release for manufacturing.



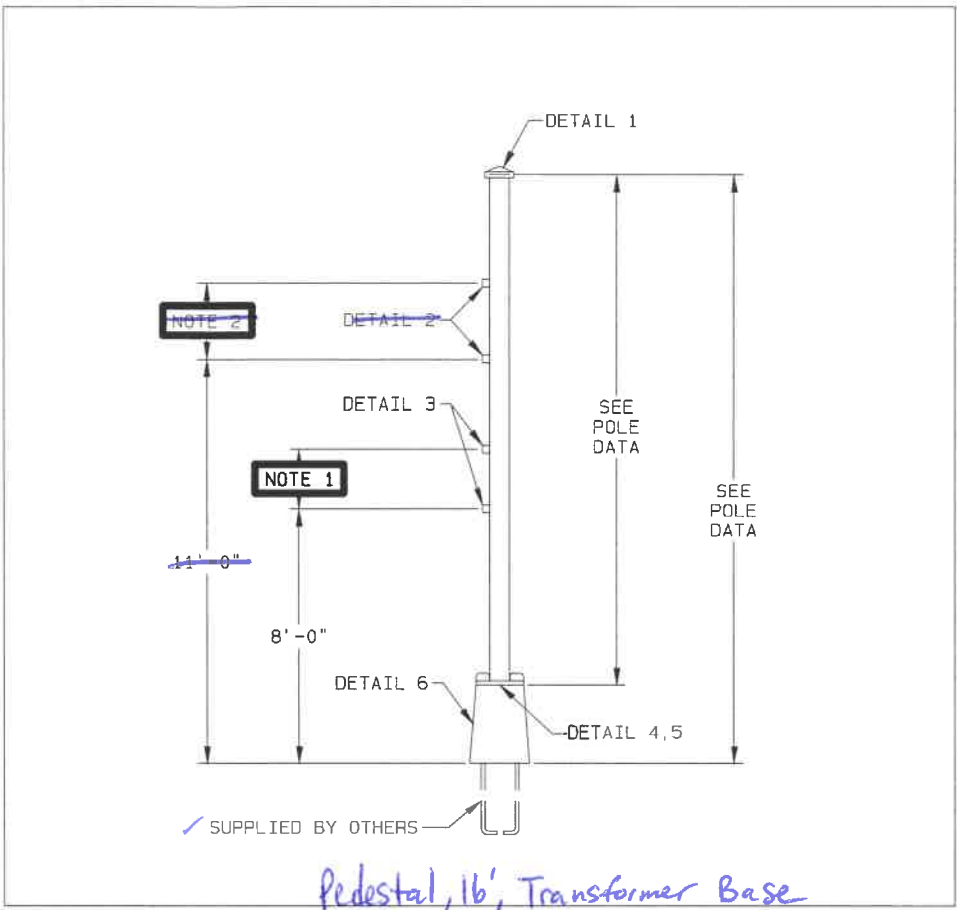
JOB  
ODOT 173000/OCS IMPROVEMENTS  
CUYAHOGA COUNTY - MCC# 19221  
TITLE  
TRAFFIC SIGNAL STRUCTURES

VALMONT INDUSTRIES, INC. RESERVES  
THE RIGHT TO INSTALL VARIOUS,  
ENGINEER APPROVED, MATERIAL HANGING  
ACCOMMODATIONS TO FACILITATE THE  
MANUFACTURING PROCESS.

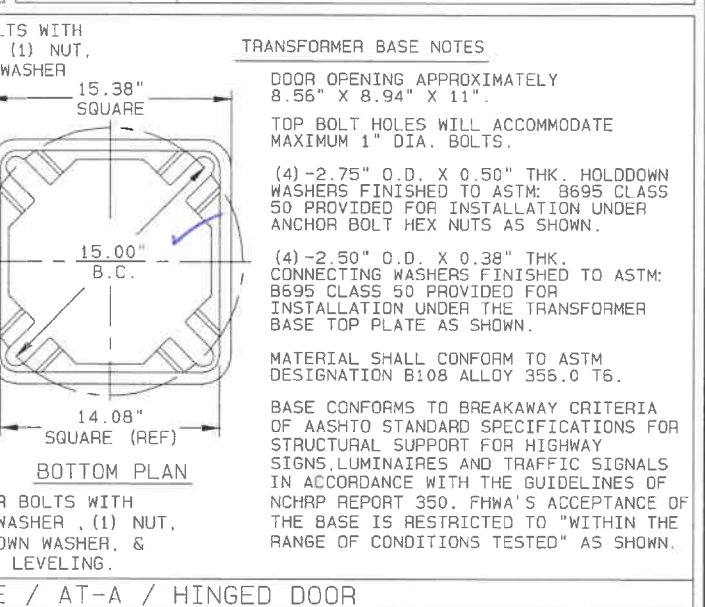
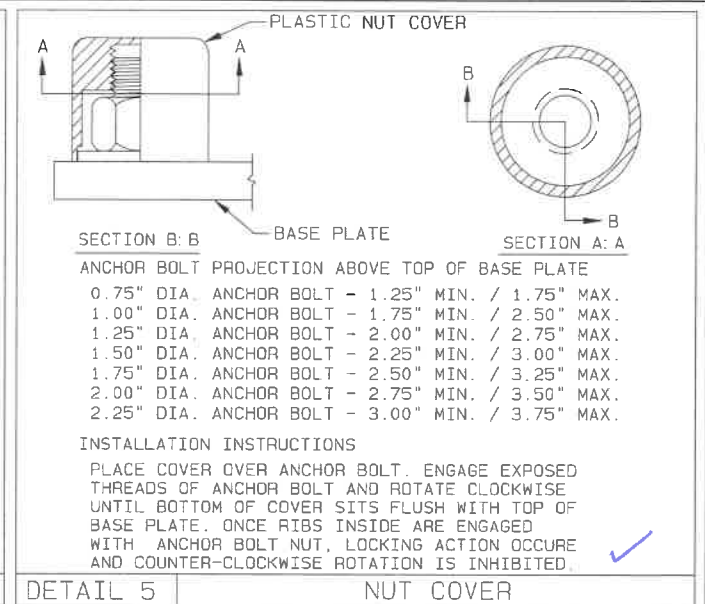
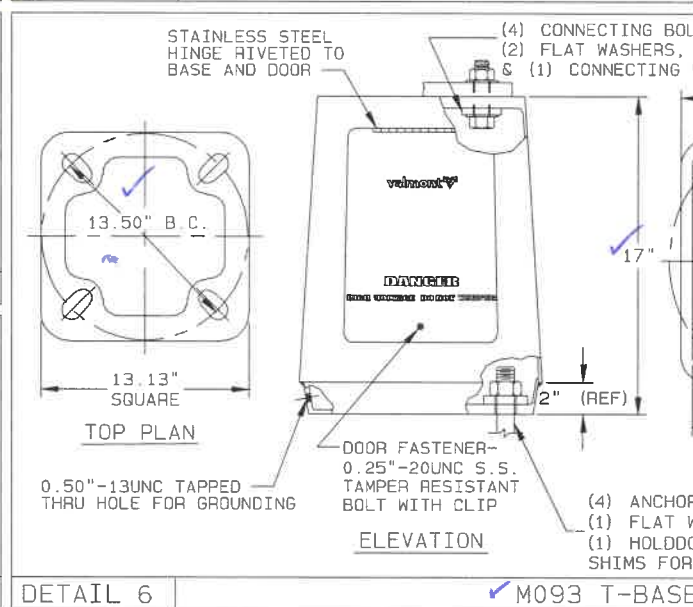
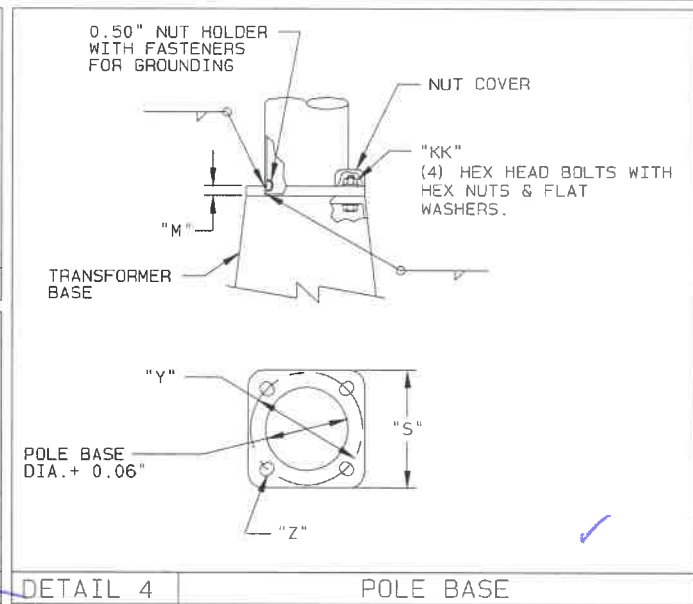
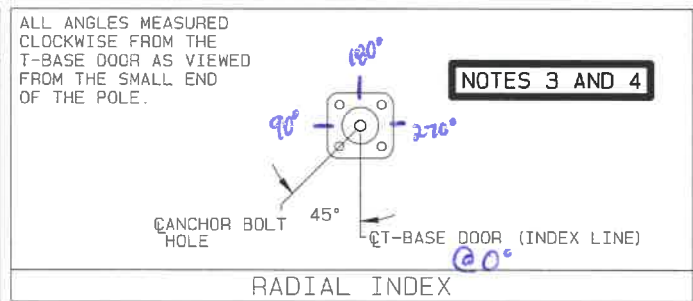
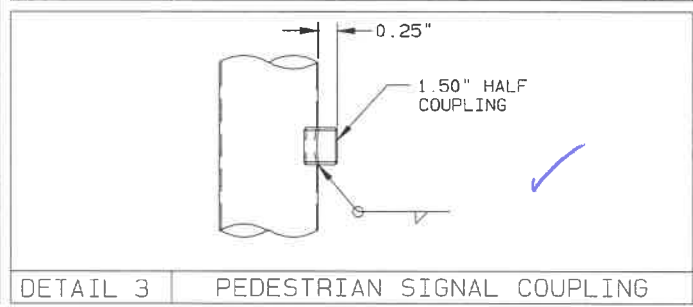
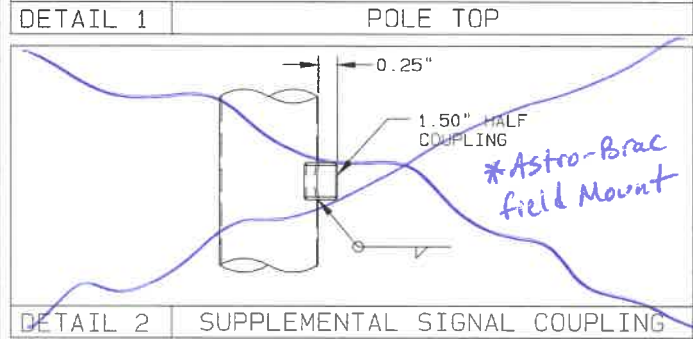
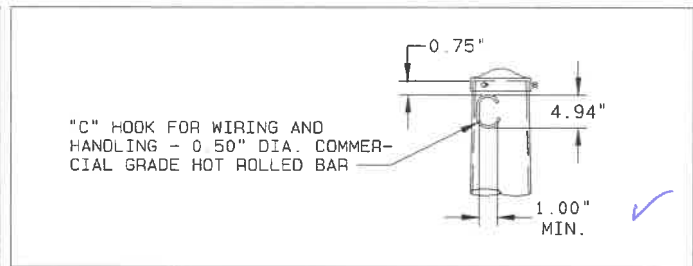
**valmont**  
Valley, NE 68064  
(402) 359-2201

ORDER NUMBER: 453545-P1  
PAGE NUMBER: 2 OF 3  
DRAWING NUMBER  
OH453545P1  
REV  
A





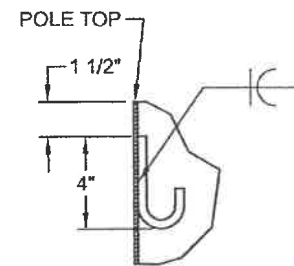
MATERIAL DATA			FINISH DATA	
COMPONENT	ASTM DESIGNATION	MIN. YIELD (KSI)	SYSTEM:	FINISH PAINT/GALVANIZED (FPGV)
POLE SHAFT	A500 GR. B	42	BASE COAT:	HOT-DIP GALVANIZED TO ASTM A123
POLE BASE	A36	36	PRIME COAT:	NONE
GALVANIZING-HARDWARE	HOT DIP ZINC		FINISH COAT:	TGIC OR URETHANE POLYESTER POWDER
ANCHOR BOLTS	BY OTHERS		COLOR:	ORION BRONZE
			VALMONT SPEC:	F-283MT



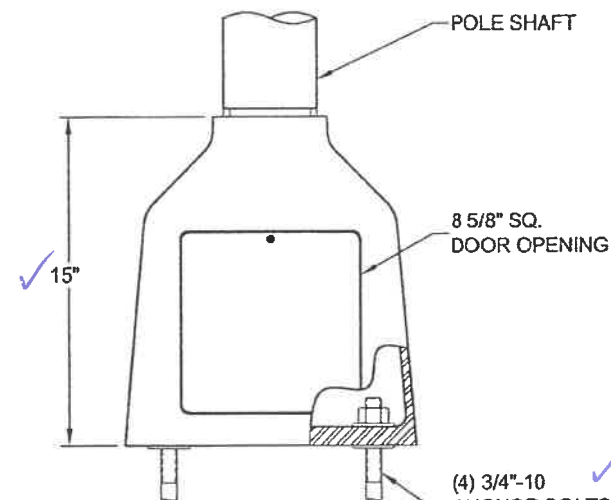
POLE DATA																					
INTERSECTION	SUPT. NO.	REF. NO.	QTY.	TOTAL HEIGHT (FT)	POLE TUBE				POLE BASE				CONNECTING BOLT DIA. "KK" (IN)	ANCHOR BOLT					T-BASE	ORIENTATIONS FROM TBASE DOOR	
					BASE DIA. (IN)	TOP DIA. (IN)	LENGTH (FT)	GAUGE OR THK. (IN)	SQUARE "S" (IN)	BOLT CIRCLE "Y" (IN)	THK. "M" (IN)	HOLE "Z" (IN)		DIA. "K" (IN)	FOUNDATION BOLT CIRCLE (IN)	LENGTH "J" (IN)	HOOK "H" (IN)	THREAD LENGTH "U" (IN)		PEDESTRIAN SIGNAL COUPLINGS	SUPPLEMENTAL SIGNAL COUPLINGS
QUADRANT RD	PS-1	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	N/A	0° N/A		
KINSMAN	PS-1	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	180° 90°	243° N/A		
KINSMAN	PS-13	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	180° 225°	0° N/A		
KINSMAN	PS-14	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	180° 310°	243° N/A		
E. 79TH ST.	PS-1	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	180° 225°	195° N/A		
E. 79TH ST.	PS-14	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	180° 90°	185° N/A		
BUCKEYE RD	PS-12	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	180° 225°	175° N/A		
BUCKEYE RD	PS-13	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	180° 230°	175° N/A		
WOODLAND AVE	PS-1	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	180° 225°	288° N/A		
WOODLAND AVE	PS-2	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	180° 260°	154° N/A		
WOODLAND AVE	PS-3	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	N/A	175° N/A		
WOODLAND AVE	PS-5	9	1	16.00	4.50	4.50	14.58	0.237	13.13	13.50	1.25	1.25	1.00	1.00	15.00	SUPPLIED BY OTHERS	M093	325° 127°	150° N/A		

- NOTES:
- PEDESTRIAN SIGNAL COUPLING SPACING MUST BE PROVIDED WITH RELEASE FOR MANUFACTURING. IF REQUIRED FOR SIGNAL MOUNTING. *20.5" center to center*
  - SUPPLEMENTAL SIGNAL COUPLING SPACING MUST BE PROVIDED WITH RELEASE FOR MANUFACTURING. IF REQUIRED FOR SIGNAL MOUNTING. *N/A, field mount Astro-Brac*
  - PLEASE CONFIRM INDEX LINE FOR PEDESTAL POLES IS THE HANDHOLE ORIENTATION SHOWN IN THE PLANS. THE PLANS DO NOT HAVE AN ORIENTATION DIAGRAM FOR PEDESTAL POLES.
  - PLEASE VERIFY ALL ORIENTATIONS FROM T-BASE DOOR WITH RELEASE FOR MANUFACTURING.

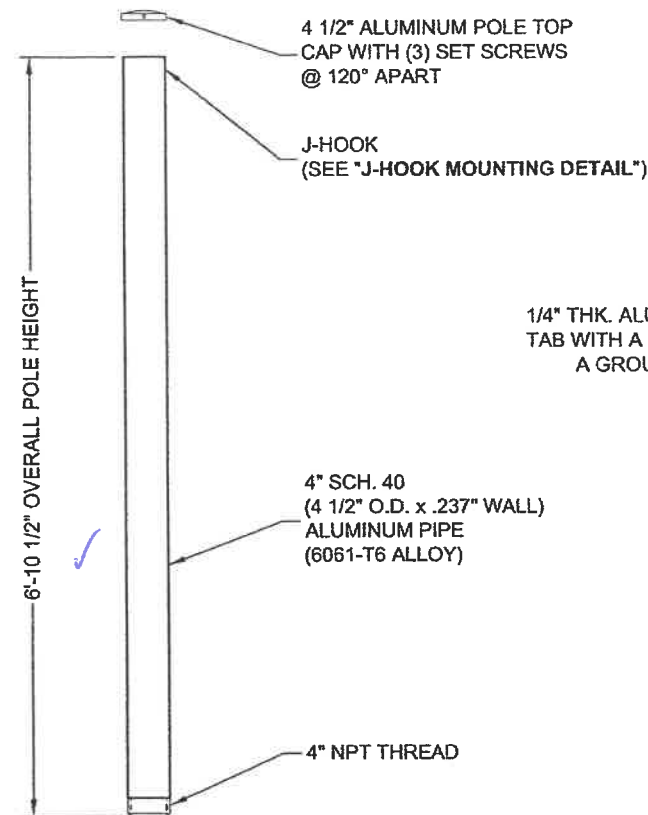




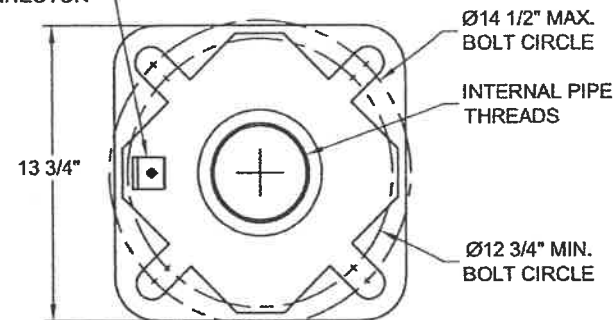
**J-HOOK MOUNTING  
DETAIL**



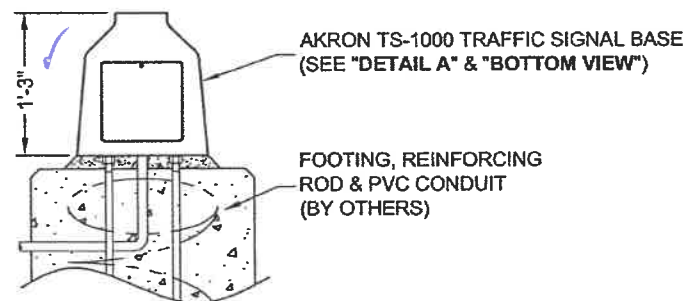
**DETAIL A**



1/4" THK. ALUMINUM GROUND  
TAB WITH A 3/8"-16 HOLE FOR  
A GROUND CONNECTOR



**BOTTOM VIEW**



**NOTE:**  
NOMINAL MOUNTING HEIGHT 8'-0"

DO NOT SCALE

ITEM#1

**valmont**

Valmont Industries, Inc. Structures Division  
20805 Eaton Ave Farmington, Minnesota 55024-7932  
Phone: (651) 463-8990 (800) 899-7577  
Fax: (651) 463-3349

**\*\*CONFIDENTIAL\*\***

The information contained in this drawing is privileged and confidential,  
and may be protected from disclosure. Please be aware that any use or  
dissemination of this drawing may be subject to legal restriction or sanction.

TITLE: S AKRON TS-1000 TRAFFIC SIGNAL BASE POLE  
MODEL NO.: 080045458SPB  
MATERIAL: ALUMINUM ALLOY  
FINISH: POWDER PAINT- COOPER BRONZE  
PROJECT: ODOT173000 ID#19221  
SOLD TO: BAYSIDE SUPPLY  
SHIP TO:  
P.O. NO: 1499  
REP: RC CHILDS CO

QTY: 14  
OWN BY: KPS  
CHK'D BY:  
APPR BY: JPS  
DATE: 07-19-19  
DWG NO: A435755  
PAGE:

*Pedestal, 8',  
Transformer Base*

REV	DATE	REVISION DESCRIPTION	BY
△			
△			
△			

1/3



**Submittal: 111**

**Revision: 0**

**Date Submitted: 11/11/2020**

**Response Due By: 11/26/2020**



**Project:** 16051 - ODOT 173000 CUY IR 490/SR010 (OC3)

**Description:** BU12 - Surveillance Camera

**To:** Andrew Cross, PE  
Traffic Engineer – City of Cleveland

**Email:** across@city.cleveland.oh.us

**From:** Oliver Bluestone  
Kokosing Construction Company, Inc.

**Email:** obluestone@kokosing.biz

Submittal Type:	Submitted For:
<input type="checkbox"/> Engineered Drawings	<input checked="" type="checkbox"/> Approval
<input type="checkbox"/> Shop Drawings	<input type="checkbox"/> Record
<input type="checkbox"/> Working Drawings	<input type="checkbox"/> Other
<input type="checkbox"/> CPM Schedule	
<input type="checkbox"/> Material Certifications / Test Results	<b>Sent Via:</b>
<input type="checkbox"/> Reports	<input checked="" type="checkbox"/> Attached (Electronic)
<input checked="" type="checkbox"/> Product Data/Samples	<input type="checkbox"/> Attached (Hard Copy)
<input type="checkbox"/> Other:	

Submittal #	Copies	Spec #	Rev. #	Description	Status
111	1		0	111 – BU12 - Surveillance Camera	For Approval

**Comments:**

Please see the attached submittal from Miller Cable for the surveillance camera system called for in the BU12 plans. Included in this submittal is product data for:

- Surveillance Cameras
- Camera Mounts
- Warning Lights
- Smart Node

Let me know if you have any questions or concerns.

Signed: 



# AXIS Q6075-E PTZ Network Camera

Outdoor-ready PTZ with HDTV 1080p and 40x optical zoom

AXIS Q6075-E PTZ Network Camera offers HDTV 1080p and 40x optical zoom for great overviews and excellent details. This high-performance outdoor PTZ camera comes with autotracking 2 with click and track functionality, as well as an orientation aid for active object tracking and quick orientation. With Axis Lightfinder 2.0 the camera delivers low-light images with more saturated colors and sharper images of moving objects. Plus, enhanced security features such as signed firmware and secure boot ensures the integrity and authenticity of the firmware. Furthermore, Axis Zipstream with H.264/ H.265 significantly lowers bandwidth and storage requirements.

- > [HDTV 1080p with 40x optical zoom](#)
- > [Axis Lightfinder 2.0](#)
- > [Autotracking 2 and orientation aid](#)
- > [Built-in analytics](#)
- > [TPM, FIPS 140-2 level 2 certified](#)





# AXIS Q6075-E PTZ Network Camera

<b>Models</b>	AXIS Q6075-E 60 Hz AXIS Q6075-E 50 Hz	Edge storage: recording ongoing, storage disruption I/O: digital input, manual trigger, virtual input PTZ: PTZ malfunctioning, PTZ movement, PTZ preset position reached, PTZ ready Scheduled and recurring: scheduled event Video: live stream open
<b>Camera</b>		
<b>Image sensor</b>	1/2.8" progressive scan CMOS	
<b>Lens</b>	4.25-170 mm, F1.6-4.95 Horizontal field of view: 65.1°-2.00° (1080p) Vertical field of view: 39.1°-1.18° (1080p) Autofocus, auto-iris	
<b>Day and night</b>	Automatically removable infrared-cut filter	
<b>Minimum illumination</b>	Color: 0.1 lux at 30 IRE, F1.6 B/W: 0.002 lux at 30 IRE, F1.6 Color: 0.15 lux at 50 IRE, F1.6 B/W: 0.003 lux at 50 IRE, F1.6	
<b>Shutter time</b>	1/11000 s to 1/3 s with 50 Hz 1/11000 s to 1/3 s with 60 Hz	
<b>Pan/Tilt/Zoom</b>	Pan: 360° endless, 0.05°-450°/s Tilt: 220°, 0.05°-450°/s Zoom: 40x optical, 12x digital, total 480x zoom E-flip, 256 preset positions, tour recording (max 10, max duration 16 minutes each), guard tour (max 100), control queue, on-screen directional indicator, orientation aid PTZ, set new pan 0°, adjustable zoom speed, focus recall	
<b>Video</b>		
<b>Video compression</b>	H.264 (MPEG-4 Part 10/AVC) Baseline, Main and High Profiles H.265 (MPEG-H Part 2/HEVC) Main Profile Motion JPEG	
<b>Resolution</b>	HDTV 1080p 1920x1080 to 320x180	
<b>Frame rate</b>	Up to 50/60 fps (50/60 Hz) in HDTV 1080p	
<b>Video streaming</b>	Multiple, individually configurable streams in H.264, H.265 and Motion JPEG Axis Zipstream technology in H.264 and H.265 Controllable frame rate and bandwidth VBR/ABR/MBR H.264/H.265	
<b>Image settings</b>	Manual shutter time, compression, color, brightness, sharpness, white balance, exposure control, exposure zones, fine tuning of behavior at low light, rotation: 0°, 180°, text and image overlay, polygon privacy masks, electronic image stabilization (EIS), freeze on PTZ, automatic defog, backlight compensation, scene profiles Wide Dynamic Range (WDR): Up to 120 dB depending on scene, highlight compensation	
<b>Network</b>		
<b>Security</b>	Password protection, IP address filtering, HTTPS <sup>a</sup> encryption, IEEE 802.1x (EAP-TLS) <sup>a</sup> network access control, digest authentication, user access log, centralized certificate management, brute force delay protection, signed firmware, secure boot, protection of cryptographic keys with FIPS 140-2 certified TPM 2.0 module	
<b>Supported protocols</b>	IPv4, IPv6 USGv6, HTTP, HTTP/2, HTTPS <sup>a</sup> , SSL/TLS <sup>a</sup> , QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, Bonjour, UPnP <sup>®</sup> , SNMP v1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, SRTP, TCP, UDP, IGMP, RTPC, ICMP, DHCPv4/v6, ARP, SOCKS, SSH, NTCIP, LLDP, MQTT, Syslog	
<b>System integration</b>		
<b>Application Programming Interface</b>	Open API for software integration, including VAPIX <sup>®</sup> and AXIS Camera Application Platform; specifications at <a href="https://axis.com">axis.com</a> AXIS Video Hosting System (AVHS) with One-Click Connection ONVIF <sup>®</sup> Profile G, ONVIF <sup>®</sup> Profile S and ONVIF <sup>®</sup> Profile T, specification at <a href="https://onvif.org">onvif.org</a>	
<b>Analytics</b>	<b>Included</b> AXIS Video Motion Detection, AXIS Motion Guard, AXIS Fence Guard, AXIS Loitering Guard, autotracking 2, active gatekeeper Basic analytics (not to be compared with third-party analytics): object removed, enter/exit detector, object counter <b>Supported</b> Support for AXIS Camera Application Platform enabling installation of third-party applications, see <a href="https://axis.com/acap">axis.com/acap</a>	
<b>Event conditions</b>	Device status: above operating temperature, above or below operating temperature, below operating temperature, fan failure, IP address removed, network lost, new IP address, shock detected, storage failure, system ready, within operating temperature	
<b>Event actions</b>	Day/night mode, overlay text, video recording to edge storage, pre- and post-alarm video buffering, send SNMP trap PTZ: PTZ preset, start/stop guard tour File upload via FTP, SFTP, HTTP, HTTPS network share and email Notification via email, HTTP, HTTPS and TCP	
<b>Data streaming</b>	Event data	
<b>Built-in installation aids</b>	Pixel counter, leveling guide	
<b>General</b>		
<b>Casing</b>	IP66-, IP67-, NEMA 4X- and IK10-rated Metal casing (aluminum), polycarbonate (PC) clear dome, sunshield (PC/ASA)	
<b>Sustainability</b>	PVC free	
<b>Memory</b>	1024 MB RAM, 512 MB Flash	
<b>Power</b>	Axis High PoE 60 W SFP midspan: 100-240 V AC, max 66.1 W Camera consumption: typical 14 W, max 51 W	
<b>Connectors</b>	RJ45 10BASE-T/100BASE-TX PoE, RJ45 Push-pull Connector (IP66/IP67) included	
<b>Storage</b>	Support for SD/SDHC/SDXC card Support for SD card encryption Support for recording to network-attached storage (NAS) For SD card and NAS recommendations see <a href="https://axis.com">axis.com</a>	
<b>Operating conditions</b>	With 30 W: -20 °C to 50 °C (-4 °F to 122 °F) With 60 W: -50 °C to 50 °C (-58 °F to 122 °F) Maximum temperature according to NEMA TS 2 (2.2.7): 74 °C (165 °F) Arctic Temperature Control: Start-up as low as -40 °C (-40 °F) Humidity 10-100% RH (condensing)	
<b>Storage conditions</b>	-40 °C to 65 °C (-40 °F to 149 °F)	
<b>Approvals</b>	<b>EMC</b> EN 55032 Class A, EN 55035, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 55024, FCC Part 15 Subpart B Class A, ICES-003 Class A, VCCI Class A, RCM AS/NZS CISPR 32 Class A, KCC KN32 Class A, KN35 EN 50121-4, IEC 62236-4 <b>Safety</b> IEC/EN/UL 60950-1, IS 13252 IEC/EN/UL 60950-22, IEC/EN/UL 62368-1 <b>Environment</b> IEC/EN 60529 IP66/IP67, NEMA TS 2 (2.2.7-2.2.9), IEC 62262 IK10, ISO 4892-2, EN 50121-4, IEC 62236-4, IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-6, IEC 60068-2-14, IEC 60068-2-27, IEC 60068-2-60, IEC 60068-2-78, NEMA 250 Type 4X <b>Network</b> NIST SP500-267 <b>Midspan:</b> EN 60950-1, GS, UL, cUL, CE, FCC, VCCI, CB, KCC, UL-AR	
<b>Weight</b>	3.75 kg (8.3 lb)	
<b>Dimensions</b>	Ø232 x 269 mm (Ø9 1/8 x 10.6 in)	
<b>Included accessories</b>	Axis High PoE 60 W SFP midspan 1-port, RJ45 Push-pull Connector (IP66), Sunshield Installation Guide, Windows decoder 1-user license	
<b>Optional accessories</b>	Smoked dome cover AXIS T91 Mounting Accessories, AXIS T8415 Wireless Installation Tool, AXIS T90 Illuminators, AXIS T8310 Video Surveillance Control Board, multi-user decoder license pack	
<b>Video management software</b>	AXIS Companion, AXIS Camera Station, Video management software from Axis' Application Development Partners available on <a href="https://www.axis.com/vms">www.axis.com/vms</a>	
<b>Languages</b>	English, German, French, Spanish, Italian, Russian, Simplified Chinese, Japanese, Korean, Portuguese, Traditional Chinese	
<b>Warranty</b>	5-year warranty, see <a href="https://axis.com/warranty">axis.com/warranty</a>	



- a. *This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (openssl.org), and cryptographic software written by Eric Young (eay@cryptsoft.com).*

Environmental responsibility:

[axis.com/environmental-responsibility](http://axis.com/environmental-responsibility)



# AXIS T91L61 Wall-and-Pole Mount

For quick wall and pole installations

Designed for Axis PTZ and multisensor cameras, AXIS T91L61 Wall-and-Pole Mount can quickly connect power and data to the camera through a built-in Ethernet cable with an IP66 RJ45 connector. The ability to choose between an RJ45 or IDC (insulation-displacement contact) connector makes installation flexible. The included mounting bracket can be simply flipped over for flexible mounting on either walls or poles (separate stainless steel straps required for pole installation). AXIS T91L61 is also suitable for corner mounting with an optional accessory. Thanks to its impact-resistant and outdoor-proven material, it can be used in both indoor and outdoor environments.

- > Flexible installation using the IDC connector
- > Built-in IP66 RJ45 connector
- > Suitable for wall and pole mounting
- > Protection against impact, water, dust and corrosion





## AXIS T91L61 Wall-and-Pole Mount

General		Impact
<b>Supported products</b>	AXIS Q60 Series AXIS Q61 Series AXIS P55 Series AXIS P56 Series AXIS Q37 Series	IEC 62262 IK10
<b>Casing</b>	Material: Powder-coated aluminum casing Color: White NCS S 1002-B	<b>Dimensions</b> 280 x 174 x 152 mm (11 x 7 x 6 in)
<b>Sustainability</b>	PVC free	<b>Weight</b> 1.85 kg (4 lb)
<b>Connectors</b>	Out: IP66 RJ45 Ethernet (male) In: RJ45 Ethernet (female), IDC	<b>Maximum load</b> 30 kg (66 lb)
<b>Environment</b>	Indoor Outdoor	<b>Cable routing</b> Back: Cable hole Bottom: 3/4" Conduit entrance
<b>Operating conditions</b>	-50 °C to 65 °C (-58 °F to 149 °F) Humidity 10–100% RH (condensing)	<b>Included accessories</b> Installation Guide
<b>Storage conditions</b>	-40 °C to 65 °C (-40 °F to 149 °F)	<b>Optional accessories</b> AXIS ACI Conduit Adapters AXIS T91A64 Corner Bracket Stainless steel straps 700 mm (28 in), 1 pair Stainless steel straps 1450 mm (57 in), 1 pair For more accessories, see <a href="http://www.axis.com">www.axis.com</a>
<b>Approvals</b>	<b>Safety</b> IEC/EN/UL 60950-1, IEC/EN/UL 60950-22 <b>Environment</b> IEC 60721, IEC 60721-4 Class 4M3, MIL-STD 810G 509.5, IP66, NEMA 250 Type 4X, RoHS, WEEE	<b>Warranty</b> 3-year warranty, see <a href="http://axis.com/warranty">axis.com/warranty</a>

Environmental responsibility:

[axis.com/environmental-responsibility](http://axis.com/environmental-responsibility)




**North American Signal Company**

605 South Wheeling Road

Wheeling, Illinois 60090 USA

**Phone:** 1-877-246-6274 • **Fax:** 1-847-537-8895

**Email:** [sales@nasig.com](mailto:sales@nasig.com)

## Item # LED625F-X, LED 625 Series High Power Warning Lights - Amber

LED625F-A is a high impact LED Warning light with a complete 360° Display. It includes a yellow wire for the user to select patterns. There are five (5) user-selectable patterns. Flange Base.

- Available in Amber, Red, Green, Blue, White

Class 2 Light Output



### Specifications

Operating Voltage	12/24 V
Rated Current	1.2 Amperes
Lens Color	Amber Blue Green Red White
Flash Pattern	5 User-Selectable
Height	4.5 inches
Diameter	5.5 inches
Warranty- US Sales Only	5 years





# Smart-Node

Power and communication solution for video surveillance

**Simplifying CCTV deployments while reducing total costs**

RADWIN Smart-Node is an all-in-one, multi-power and communication managed solution for video surveillance deployments. Eliminating the need to build costly communication cabinets from scratch, Smart-Node comes ready-to-install and supports a variety of power and networking interfaces for CCTV cameras, speakers, radios, infra-red projectors and other third-party devices.

RADWIN Smart-Node is a remarkably compact, IP-67 grade solution that guarantees low visual impact for street-level deployments and ensures high reliability in extreme environments.

Typical cabinet



Smart-Node



Smaller, lighter and smarter

- » 1/3 the size
- » 1/3 the weight
- » Lower cost
- » Feature rich



# All-in-One Power and Communication



## Smart-Node main benefits:

- » **Reduced site costs**
- » **No labor costs** for design and assembly
- » **Greater flexibility** due to a wide array of power and communication options for various devices
- » **Rapid and simple installations**
- » **Unified management system** for remote monitoring & control
- » **Low maintenance** due to robustness and high reliability

## Highlights

### Versatile power options

#### Input power options

- AC: 100-240 VAC
- DC: 40-57 VDC

#### Output power options

- PoE, PoE+ (15W/30W/60W)
- Passive PoE (24V/56V)
- DC-OUT (12V/24V)

### Versatile communication options

#### GbE switch

- 5-Port Gigabit PoE switch
- SFP Gigabit port

#### Wired and wireless

- Fiber - SFP
- Copper - LAN
- Wireless broadband (external)

### Unified power & networking management

- Remote power and networking management
- Switch PoE assignment per port (802.3 af, at, at+[60W], 24V/56V)
- Lithium-ion battery backup (UPS) monitoring
- Graceful power degradation by priority