

TMS ENGINEERS, INC. GENERATOR PANEL DETAIL SHEET 6.DWG 04/16/09

MATERIAL SPECIFICATIONS FOR GENERATOR POWER PANEL EQUIPMENT

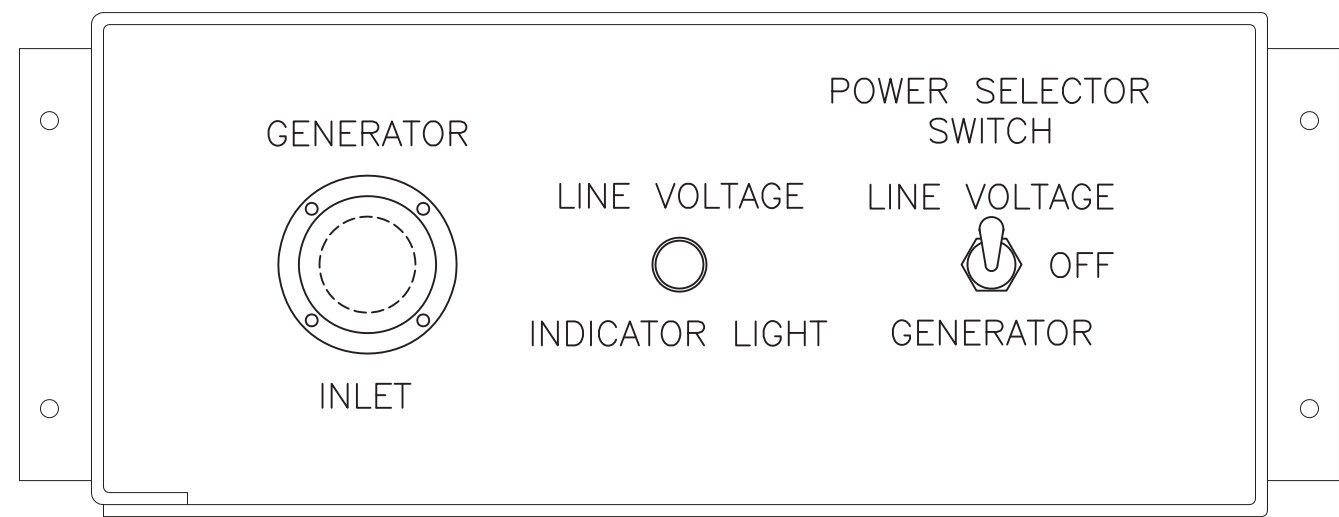
GENERATOR INLET ---- The inlet shall be 30 amp, 125/250VAC, locking, four (4) wire grounding and meet the NEMA configuration number L14-30-P 30A 125/250VAC specification. The inlet shall be Hubbell catalog #2715

LINE VOLTAGE GENERATOR SWITCH ---- The switch shall be 30 amp, 125/250VAC, two (2) pole, three (3) position (On, Off, On). The switch shall be Hubbell catalog #1388.

LINE VOLTAGE INDICATOR LIGHT ---- The indicator light shall be a 125VAC light emitting diode with red lens.

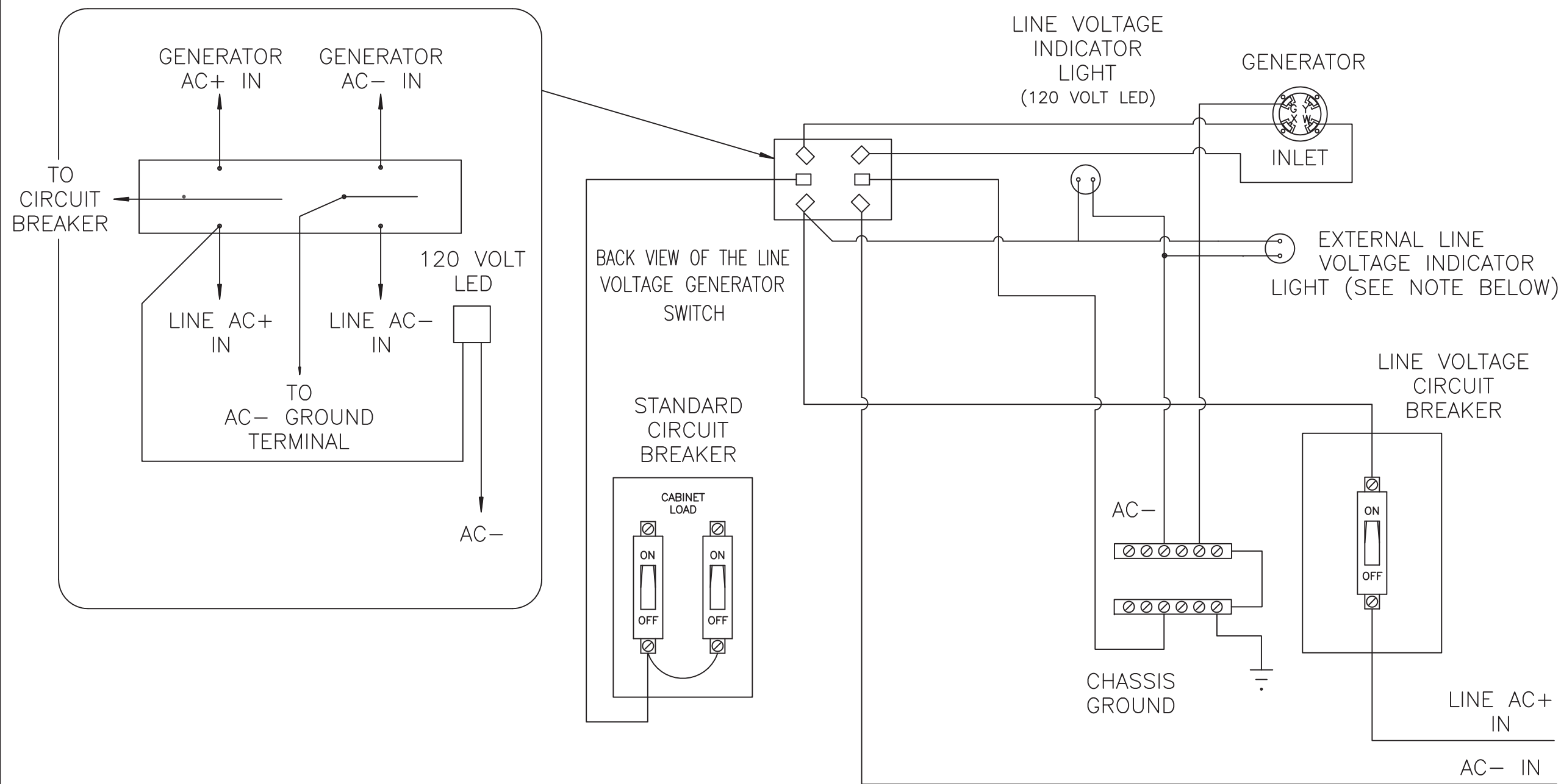
LINE VOLTAGE CIRCUIT BREAKER ---- The circuit breaker shall be single pole single throw and a minimum of 30 amps. The amperage shall be increased to accomodate greater loads, if necessary. The gauge of the power cable shall be of proper size per the N.E.C.

EXTERNAL LINE VOLTAGE INDICATOR LIGHT ---- The indicator light shall be a 1 inch (25mm) waterproof NEMA 4X or IP66 LED lamp with GREEN lens.



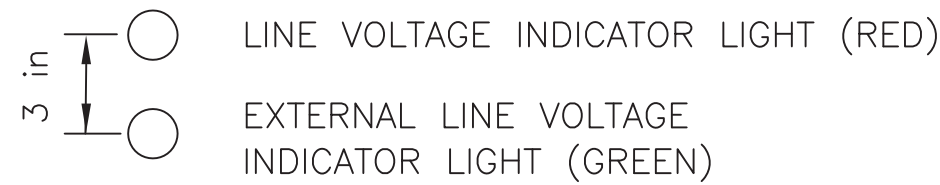
FRONT VIEW OF GENERATOR POWER PANEL

SCHEMATIC OF THE LINE VOLTAGE GENERATOR SWITCH

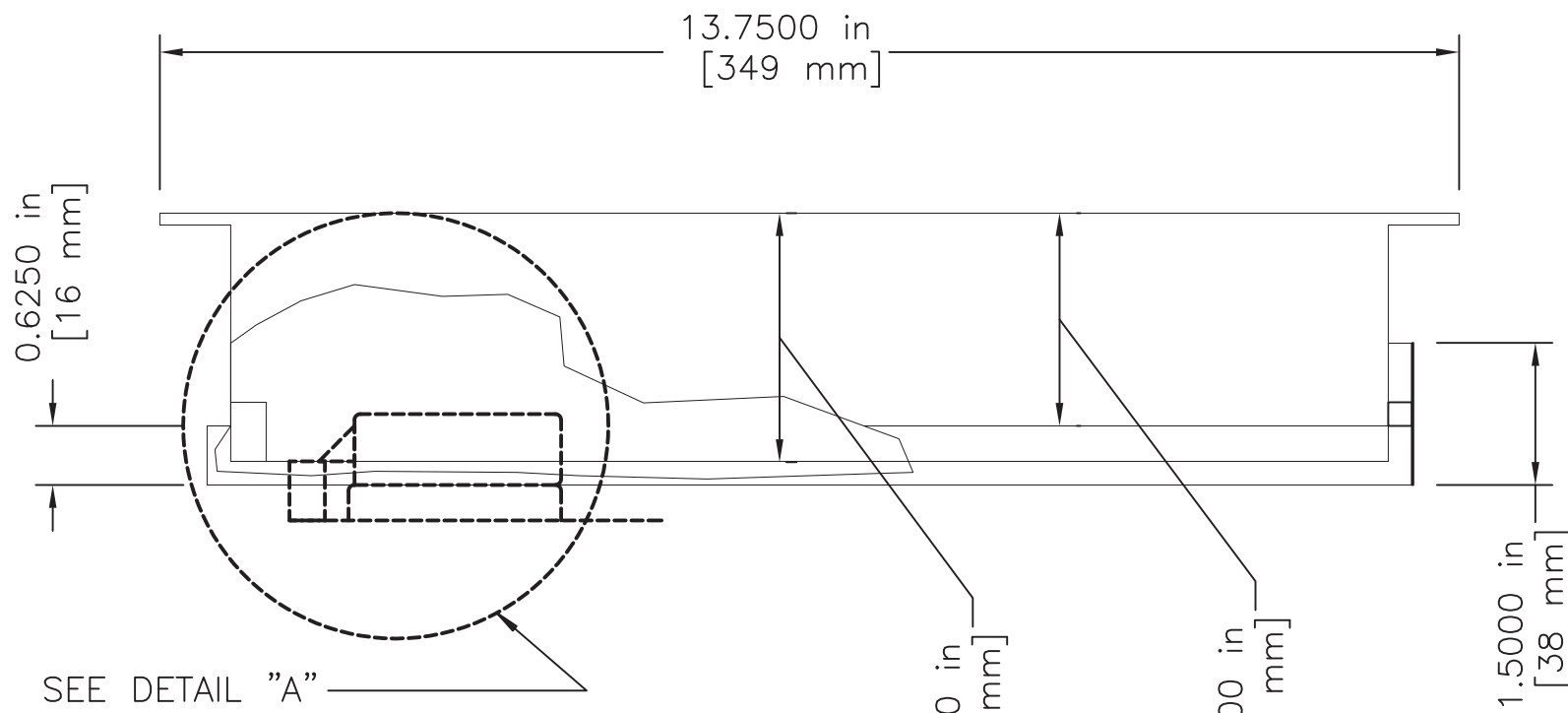


ELECTRICAL HOOKUP DETAIL FOR THE GENERATOR POWER PANEL

NOTE: EXTERNAL LINE VOLTAGE INDICATOR LIGHT shall be located on the enclosure exterior for visibility from adjacent roadway when all cabinet, and generator panel doors are closed.



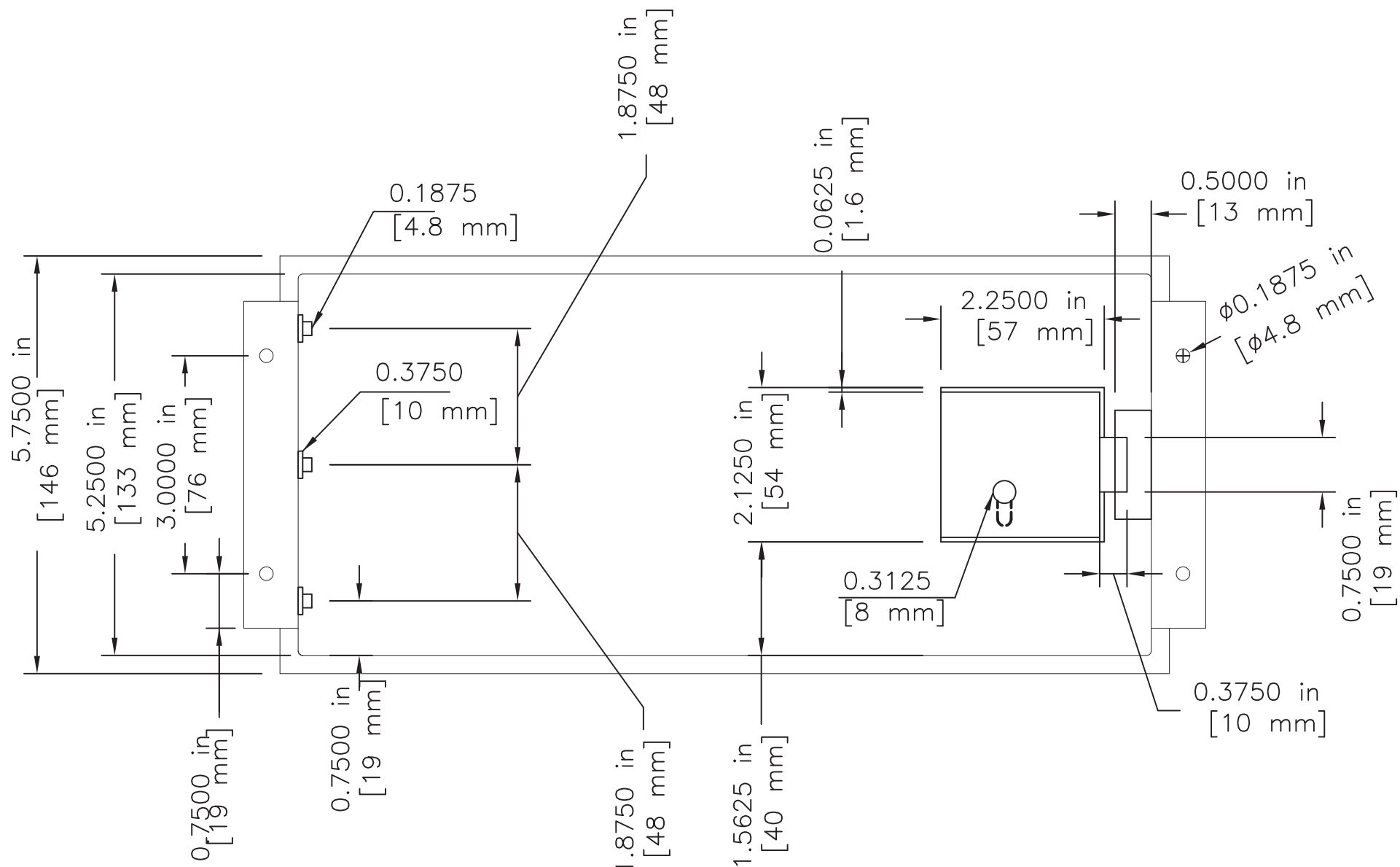
POSITION OF INDICATOR LIGHTS



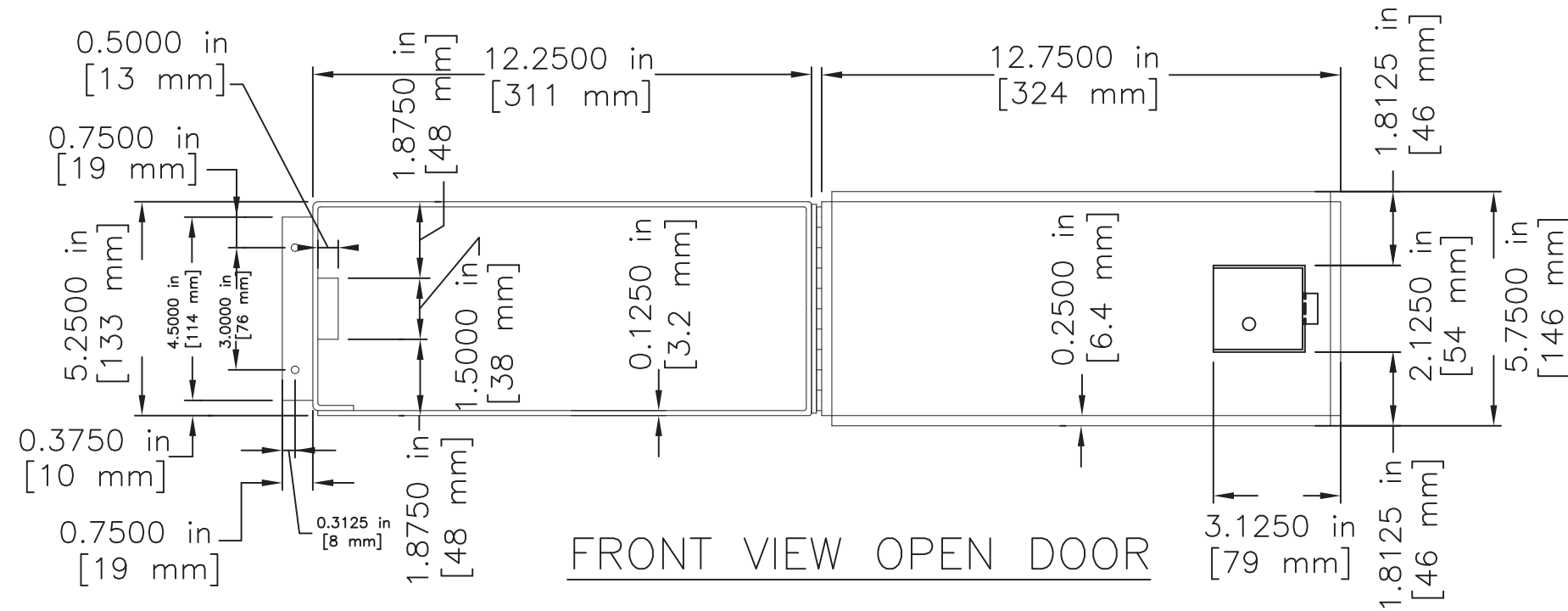
TOP VIEW



FRONT VIEW CLOSED DOOR



BACK VIEW CLOSED DOOR

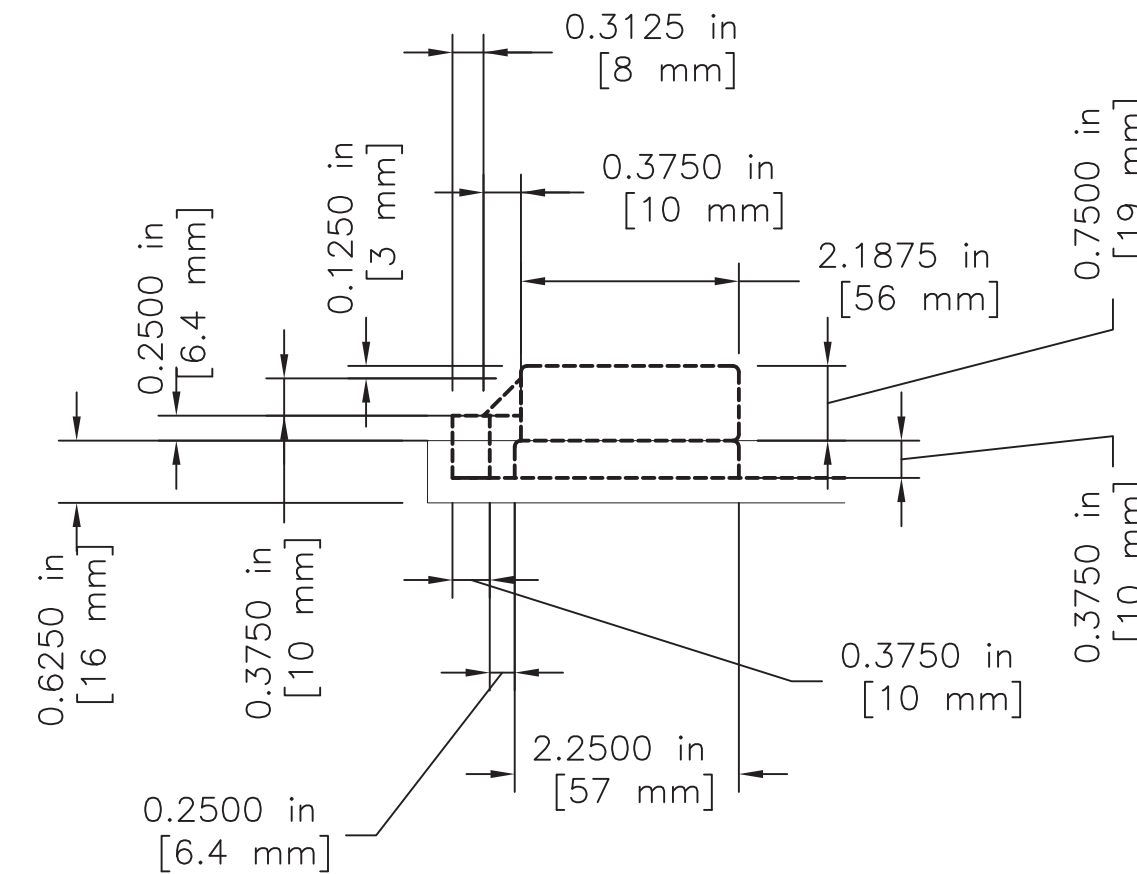


FRONT VIEW OPEN DOOR

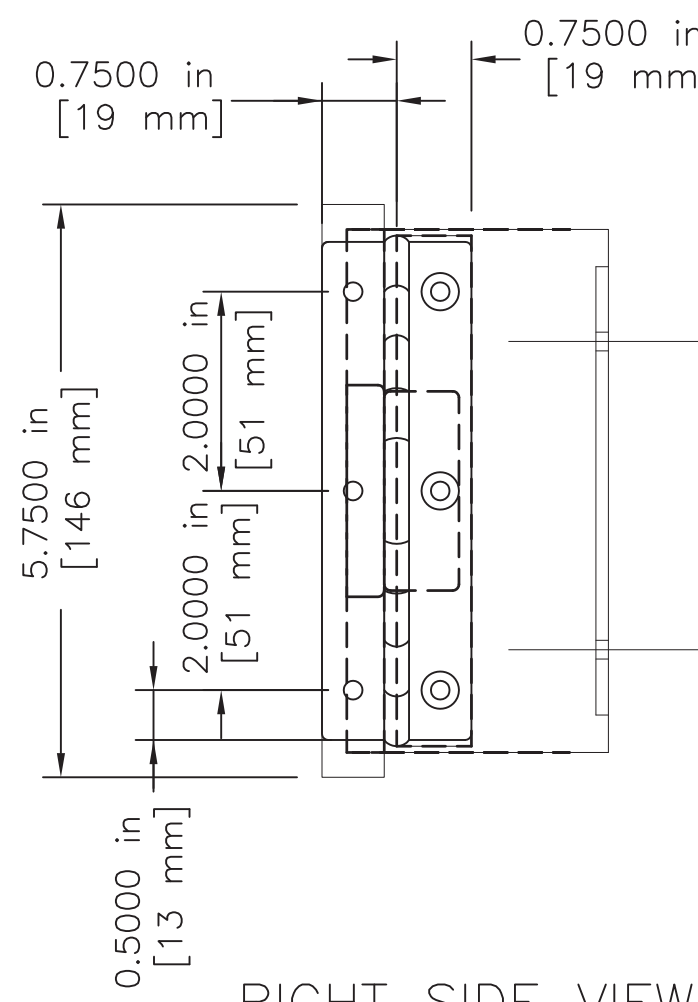
GENERATOR POWER PANEL ENCLOSURE

NOTES:

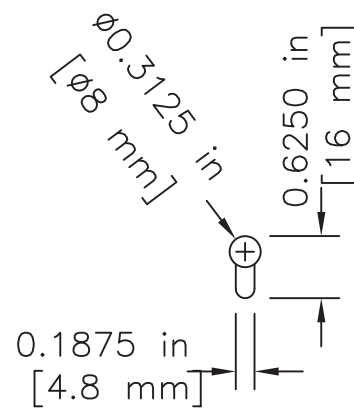
1. The enclosure shall be constructed of 0.1250 [3.2] thick aluminum.
2. The lock shall be the standard police door type, keyed with the standard flasher door skeleton key.
3. The door shall be sealed with a foam rubber gasket to prevent moisture from entering the enclosure.
4. The enclosure shall be mounted onto the outside of the controller cabinet with non-accessible bolts and sealed with high quality silicon caulk at all surfaces touching the cabinet.
5. The hinge shall be of stainless steel or equivalent corrosive-resistant material.
6. All metric dimensions in parentheses are in millimeters unless otherwise noted.



DETAIL "A"



RIGHT SIDE VIEW
CLOSED DOOR



DETAIL "B"

SCOPE

FURNISH LABOR, SUPPLIES, EQUIPMENT, AND MATERIALS AND PERFORM ALL OPERATIONS NECESSARY FOR THE ACCEPTABLE INSTALLATION OF THE TRAFFIC CONTROL DEVICES, IN STRICT ACCORDANCE WITH THESE PLANS, NOTES AND SPECIFICATIONS. THESE NOTES, SCHEDULES AND DRAWINGS ARE INTENDED TO PROVIDE FOR ALL MATERIAL AND LABOR REQUIRED TO FURNISH AND INSTALL A COMPLETE TRAFFIC CONTROL SYSTEM. ACQUIRE AND SUBMIT ANY PERTINENT ODOT SIGNAL AND CONSTRUCTION PERMITS. COST INCURRED WITH THE PERMIT APPLICATIONS SHALL BE BORNE BY THE CONTRACTOR. ACQUIRE AND OBSERVE ALL REQUIREMENTS FROM ODOT STANDARDS FOR ENGINEERING CONSTRUCTION.

ITEM 614 – MAINTAINING TRAFFIC

MAINTAIN A MINIMUM OF ONE LANE OF TRAFFIC IN EACH DIRECTION AT ALL TIMES.

MAINTAIN SAFE AND SATISFACTORY ACCESS TO ABUTTING PROPERTY. THE CONTRACTOR SHALL MAINTAIN ADEQUATE PEDESTRIAN WALKS AT ALL INTERSECTIONS.

DIVERT TRAFFIC FROM NORMAL CHANNELS WITH PLASTIC DRUMS, FLASHING ARROW PANELS COMPLYING WITH MT-35.10, AND TRAFFIC SIGNS AND PAVEMENT MARKINGS.

FURNISH, ERECT, MAINTAIN, AND REMOVE CONSTRUCTION TRAFFIC CONTROL DEVICES USED FOR THIS PROJECT CONFORMING TO THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS.

FURNISH AND MAINTAIN ALL NECESSARY SAFEGUARDS, SUCH AS BARRICADES, LIGHTING, FLAGGERS, AND SUCH OTHER TRAFFIC CONTROL DEVICES AS PROVIDED IN ITEM 614, MAINTAINING TRAFFIC, SO AS TO AVOID DAMAGE AND/OR INJURY TO VEHICLES AND PERSONS USING THE ROADWAY DURING CONSTRUCTION.

RELOCATE ANY EXISTING TRAFFIC CONTROL DEVICES (SIGNS AND/OR TRAFFIC SIGNALS), LOCATED WITHIN THE WORK AREA, WHICH ARE REQUIRED FOR INTERIM OR PERMANENT TRAFFIC CONTROL, TO POINTS APPROVED BY THE ENGINEER. MAINTAIN APPROPRIATE TRAFFIC CONTROL DEVICES IN COMPLIANCE WITH THE MANUAL, AT ALL TIMES.

THE ENGINEER WILL APPROVE THE LENGTH AND DURATION OF LANE CLOSURES AND OR TRAFFIC RESTRICTIONS, WITH THE INTENT TO MINIMIZE THE IMPACT TO THE TRAVELING PUBLIC. THE ENGINEER WILL NOT PERMIT LANE CLOSURES OR RESTRICTIONS OVER SEGMENTS OF THE PROJECT IN WHICH NO WORK IS ANTICIPATED WITHIN A REASONABLE TIME FRAME.

PERFORM ALL WORK AND USE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE SPECIFICATIONS, AND THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

RESTORATION OF DISTURBED AREAS

RESTORE ALL DISTURBED LANDSCAPED AREAS, PAVEMENT SURFACES, SIDEWALKS, AND DRIVEWAYS TO A CONDITION EQUAL TO OR BETTER THAN THAT WHICH EXISTED PRIOR TO THE START OF WORK. PERFORM ALL RESTORATION WITH MATERIALS IDENTICAL TO THE EXISTING SURFACE, INCLUDING, BUT NOT LIMITED TO ASPHALT AND CONCRETE PAVEMENT, ASPHALT, CONCRETE AND BRICK SIDEWALK, INTEGRAL CURB, AND SPECIAL SURFACES (SUCH AS COLORED OR TEXTURED) AS ENCOUNTERED. DO NOT PATCH CONCRETE SIDEWALKS OR DRIVEWAYS. REPLACE SIDEWALKS AND DRIVEWAYS IN ENTIRE ORIGINAL SLAB SECTIONS.

DO ALL RESTORATION WORK IN ACCORDANCE WITH THE PERTINENT SPECIFICATION ITEMS AS DIRECTED BY THE ENGINEER. THE DEVELOPER WILL CONSIDER ALL RESTORATION WORK, INCLUDING MATERIALS, EQUIPMENT, LABOR, INCIDENTALS, AND DISPOSAL OF ALL SURPLUS MATERIALS AS INCIDENTAL TO THE VARIOUS ITEMS OF WORK. NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK.

MAINTENANCE OF TRAFFIC SIGNAL INSTALLATIONS

MAINTAIN TRAFFIC SIGNAL INSTALLATIONS WITHIN THE PROJECT UNDER THE FOLLOWING CONDITIONS:

- A

EXISTING SIGNAL INSTALLATIONS WHICH THE PLANS REQUIRE THE CONTRACTOR TO ADJUST, MODIFY, ADD ONTO, OR REMOVE, OR WHICH THE CONTRACTOR ACTUALLY ADJUSTS, MODIFIES OR OTHERWISE DISTURBS. MAINTAIN THE ENTIRE INSTALLATION (AT AN INTERSECTION) FROM THE TIME OPERATIONS FIRST DISTURB THE INSTALLATION UNTIL THE INSTALLATION HAS BEEN SUBSEQUENTLY REMOVED, MODIFIED, OR RESTORED TO ITS ORIGINAL CONDITION, AND THE WORK HAS BEEN ACCEPTED.
- B

NEW OR REUSED SIGNAL INSTALLATIONS OR DEVICES, INSTALLED BY THE CONTRACTOR. MAINTAIN THESE INSTALLATIONS FROM THE TIME OF INSTALLATION UNTIL THE WORK IS ACCEPTED.

CORRECT ALL OUTAGES OR MALFUNCTIONS AS QUICKLY AS POSSIBLE. PROVIDE THE MAINTAINING AGENCY AND THE ENGINEER ADDRESSES AND PHONE NUMBERS WHERE THE CONTRACTOR'S MAINTENANCE FORCES CAN BE CONTACTED. PROVIDE ONE OR MORE PERSONS TO RECEIVE ALL CALLS AND DISPATCH THE NECESSARY MAINTENANCE FORCES TO CORRECT OUTAGES OR MALFUNCTIONS. THE PERSON OR PERSONS SO DESIGNATED MAY BE USED TO PERFORM OTHER DUTIES AS LONG AS PROMPT ATTENTION IS GIVEN TO THESE CALLS, AND A PERSON IS READILY AVAILABLE CONTINUOUSLY 24 HOURS PER DAY, 7 DAYS PER WEEK. CORRECT ALL LAMP OUTAGES, CABLE OUTAGES, ELECTRICAL FAILURES, EQUIPMENT MALFUNCTIONS AND MISALIGNED SIGNAL HEADS TO THE SATISFACTION OF THE ENGINEER, WITH THE SIGNAL BACK IN SERVICE, WITHIN FOUR (4) HOURS OF NOTIFICATION OF THE OUTAGE OR MALFUNCTION.

IN THE EVENT NEW SIGNALS ARE DAMAGED PRIOR TO ACCEPTANCE, REPLACE ALL DAMAGED EQUIPMENT, EXCEPT POLES AND CONTROL EQUIPMENT, TO THE SATISFACTION OF THE ENGINEER AND HAVE THE SIGNAL BACK IN SERVICE, WITHIN EIGHT (8) HOURS OF NOTIFICATION OF THE DAMAGE. ARRANGE FOR FULL TRAFFIC CONTROL UNTIL THE SIGNAL IS BACK IN OPERATION.

IF POLES AND/OR CONTROL EQUIPMENT ARE DAMAGED AND MUST BE REPLACED, MAKE TEMPORARY REPAIRS AS NECESSARY TO BRING THE SIGNAL BACK INTO FULL OPERATION WITHIN THE ALLOWED EIGHT (8) HOUR PERIOD, AND MAKE PERMANENT REPAIRS OR REPLACEMENTS AS SOON THEREAFTER AS POSSIBLE.

DO NOT CONSTRUE THE ABOVE AS COLLECTIVE OR CONSECUTIVE OUTAGE TIME PERIODS AT ANY ONE LOCATION. THAT IS, WHERE MORE THAN ONE OUTAGE OR MALFUNCTION OCCURS CONCURRENTLY AT ANY ONE LOCATION, THEN THE ALLOTTED TIME LIMIT SHALL BE FOR THE WORST SINGLE OUTAGE OR MALFUNCTION.

WHERE OUTAGES OR MALFUNCTIONS ARE THE DIRECT RESULT OF A VEHICLE ACCIDENT, RESPOND AS OUTLINED ABOVE. COLLECT ANY COMPENSATION FOR THIS WORK FROM THOSE PARTIES RESPONSIBLE FOR THE DAMAGE.

WHERE THE CONTRACTOR HAS FAILED TO OR CANNOT RESPOND TO AN OUTAGE OR SIGNAL EQUIPMENT MALFUNCTION AT THOSE LOCATIONS WITHIN HIS RESPONSIBILITY, WITHIN THE PERIODS SPECIFIED ABOVE, THE ENGINEER MAY INVOKE THE PROVISIONS OF SECTION 105.15, AND ANY SUBSEQUENT BILLINGS TO THE TOWNSHIP FOR POLICE SERVICES AND/OR MAINTENANCE SERVICES BY TOWNSHIP FORCES OR OUTSIDE CONTRACTORS HIRED BY THE TOWNSHIP, WILL BE DEDUCTED FROM MONIES DUE OR TO BECOME DUE TO THE CONTRACTOR IN ACCORDANCE WITH THE PROVISIONS OF SECTION 105.15.

PROVIDE THE MAINTENANCE SERVICE ENTIRELY OR ENTER INTO A COOPERATIVE UNDERSTANDING WITH THE LOCAL MAINTAINING AGENCY TO PROVIDE THE MAINTENANCE. INFORM THE ENGINEER IN WRITING OF THE MAINTENANCE METHOD SELECTED, AND SHALL PROVIDE A COPY OF THE AGREEMENT WITH THE TOWNSHIP IN THIS REGARD.

REPAIR ANY DAMAGE TO ANY TRAFFIC SIGNAL COMPONENTS REQUIRED TO BE HANDLED DURING THE RELOCATION OF POLES AND REVISIONS TO THE SIGNAL SYSTEM AT NO COST TO THE PROJECT.

WHEN A TRAFFIC SIGNAL MUST BE TAKEN OUT OF SERVICE BY THE CONTRACTOR, DUE TO CONSTRUCTION PROCEDURES, DO NOT PERMIT THE OUTAGE TO EXCEED 3 HOURS AND SCHEDULE THE OUTAGE TO AVOID THE HOURS OF 6:00 TO 9:00 AM, 12:00 TO 1:00 PM, AND/OR 4:00 TO 7:00 PM.

PROTECT EACH INTERSECTION, WHEN THE SIGNAL IS OUT OF SERVICE DUE TO CONSTRUCTION PROCEDURES, OR DUE TO AN OUTAGE OR EQUIPMENT MALFUNCTION AS DESCRIBED ABOVE, BY LAW ENFORCEMENT OFFICERS WITH PATROL CAR HIRED BY THE CONTRACTOR.

COVER ANY VEHICULAR TRAFFIC SIGNAL HEAD, EITHER NEW OR EXISTING, WHICH WILL BE OUT OF OPERATION, IN THE MANNER DESCRIBED IN 632.24.

MAINTAIN COMPLETE RECORDS OF MALFUNCTIONS, INCLUDING:

1.

TIME OF NOTIFICATION OF MALFUNCTION;
2.

TIME OF WORK CREWS' ARRIVAL TO CORRECT THE MALFUNCTION;
3.

ACTIONS TAKEN TO CORRECT THE MALFUNCTION, INCLUDING A LIST OF PARTS REPAIRED OR REPLACED;
4.

A DIAGNOSIS OF THE REASON FOR THE MALFUNCTION AND PROBABILITY OF RECCURRANCE; AND
5.

TIME OF COMPLETION OF THE REPAIR AND SYSTEM RESTORED TO FULL SERVICE.

PROVIDE A COPY OF THESE RECORDS TO THE ENGINEER WITHIN THREE (3) WORKING DAYS FOLLOWING COMPLETION OF EACH REPAIR.

ALL COSTS RESULTING FROM THE ABOVE REQUIREMENTS WILL BE CONSIDERED AS INCIDENTAL TO, AND INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 614 – MAINTAINING TRAFFIC.

UNDERDRAINS FOR PULL BOXES

REFERENCE IS MADE TO STANDARD DRAWING HL-30.11 FOR DETAILS OF DRAINING PULL BOXES. UNDERDRAINS FOR PULL BOXES SHALL BE USED AS DIRECTED BY THE ENGINEER AND SHALL BE PROVIDED WHERE THE LENGTH REQUIRED FOR A SATISFACTORY OUTLET DOES NOT EXCEED APPROXIMATELY 20 FEET. THE FOLLOWING ESTIMATED QUANTITY IS INCLUDED IN THE TRAFFIC SIGNAL GENERAL SUMMARY FOR THIS PURPOSE.

ITEM 603, 4" CONDUIT, TYPE E 100 LINEAR FEET

ITEM 632 – REMOVAL OF TRAFFIC SIGNAL INSTALLATION. AS PER PLAN

REMOVE TRAFFIC SIGNAL INSTALLATIONS, INCLUDING SIGNAL HEADS, CABLE, MESSENGER WIRE, POLES, CONDUIT RISERS, CABINET, CONTROLLER, DOWN GUYS, PULL BOXES, AND OTHER INCIDENTAL ITEMS REQUIRED BY THE ENGINEER, IN ACCORDANCE WITH 632.26 AND AS INDICATED ON THE PLANS. ABANDON IN PLACE ANY UNUSED CONDUITS NOT SPECIFICALLY MARKED FOR REMOVAL, WHICH DO NOT INTERFERE WITH CONSTRUCTION.

STORE ALL REMOVED ITEMS ON THE PROJECT FOR SALVAGE BY ODOT, IN ACCORDANCE WITH THE LISTING GIVEN HEREIN. REMOVE AND DISPOSE OF ANY ITEMS NOT DESIGNATED FOR SALVAGE, AND/OR ANY ITEMS NOT SALVAGED BY ODOT BY THE COMPLETION DATE, WHEN DIRECTED BY THE ENGINEER IN WRITING, AT NO ADDITIONAL COST TO THE PROJECT.

STORE THE FOLLOWING ITEMS FOR SALVAGE:

CONTROLLER CABINET AND ALL INTERNAL COMPONETS.

ITEMS REMOVED FOR SALVAGE SHALL BE DELIVERED TO: ODOT DISTRICT 3 TRAFFIC DEPARTMENT, ASHLAND OHIO, CONTACT KEVIN CAPIZZI, AT 419-207-7189.

DISPOSE OF THE FOLLOWING ITEMS:

SIGNAL CABLE, POWER CABLE, MESSENGER WIRE, CONDUIT RISERS, PULLBOX'S, SIGNAL HEADS AND STRAIN POLES.

ITEM 632 – POWER SERVICE, AS PER PLAN

POWER SERVICE SHALL BE AS PER CMS 632.24 AND STANDARD CONSTRUCTION DRAWING TC--83.10. POWER SERVICE SHALL ALSO INCLUDE THE FOLLOWING:

- 1) DISCONNECT SWITCH ENCLOSURES FURNISHED IN ACCORDANCE WITH ITEM 632, POWER SERVICE, AS PER PLAN, SHALL INCLUDE A PADLOCK EQUAL TO WILSON BOHANNON 660, WITH LOCK BODY AND SHACKLE OF BRONZE OR BRASS AND KEYING SHALL BE TO THE STATE MASTER. ALL CONDUIT AND FITTINGS SHALL BE GALVANIZED STEEL AS PER CMS 725.04. CONDUIT RISERS SHALL BE 1-1/2" MINIMUM DIAMETER.
- 2) THE CONTRACTOR SHALL BE RESPONSIBLE FOR REQUESTING AND SCHEDULING ANY INSPECTIONS THE POWER COMPANY MAY REQUIRE FOR THE POWER SERVICE HOOKUP. THE CONTRACTOR SHALL BE REPOSNSIBLE FOR CONTACTING THE POWER COMPANY FOR ELECTRICAL SERVICE CONNECTION. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR SPlice POWER CABLES INTO THE POWER COMPANY'S CIRCUITS. THE VOLTAGE SUPPLIED SHALL BE NOMINALLY 120 VOLTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY NECESSARY PERMITS AND PAYING OF ALL FEES RELATING TO THE POWER SERVICE CONNECTION. THE CONTRACTOR SHALL PAY ALL POWER CHARGES UNTIL THE SIGNAL IS ACCEPTED BY THE MAINTAING AGENCY.
- 3) THE POWER SERVICE SHALL INCLUDE A BYPASS STYLE METER BASE SOCKET. THE METER BASE SHALL BE 100 AMP MINIMUM AND INCLUDE A BYPASS SWITCH AND 1-1/2" HUB AT THE TOP OF THE METER BASE. THE METER BASE SOCKET SHALL BE AS MANUFACTURED BY LANDIS & GYR. MODEL # 40204--01, MILBANK U7487--RL--TG--KK, SQUARE D MODEL UHTRS101B, OR APPROVED EQUAL BY THE ENGINEER.

IN ADDITION TO THE REQUIREMENTS OF THIS NOTE, PAYMENT WILL INCLUDE ALL NECESSARY LABOR, MICELLANEOUS HARDWARE AND EQUIPMENT REQUIRED TO PROVIDE FOR THIS ITEM OF WORK IN ACCORDANCE WITH SPECIFICATION 632. PAYMENT WILL BE AT THE CONTRACT UNIT PRICE PER EACH. SEE SHEET NO. 5 FOR ADDITIONAL NOTES AND DETAILS.

TRAFFIC CONTROL SYSTEM GUARANTEE

FURNISH A GUARANTEE TO ODOT THAT THE TRAFFIC CONTROL SYSTEM INSTALLED AS A PART OF THIS CONTRACT WILL OPERATE SATISFACTORILY FOR A PERIOD OF 180 DAYS FOLLOWING COMPLETION OF THE TEN (10) DAY PERFORMANCE TEST SPECIFIED IN 632.27 AND 633.05. IN THE EVENT OF UNSATISFACTORY OPERATION, CORRECT FAULTY INSTALLATIONS, MAKE REPAIRS, AND REPLACE DEFECTIVE PARTS WITH NEW PARTS OF EQUAL OR BETTER QUALITY. BEAR THE COST OF ALL EQUIPMENT, MATERIAL, AND LABOR COSTS INCURRED IN CORRECTING UNSATISFACTORY OPERATIONS.

FURNISH A GUARANTEE TO ODOT COVERING THE FOLLOWING ITEMS:

CONTROLLERS, CABINETS AND ASSOCIATED EQUIPMENT, LED SIGNAL HEADS AND DETECTOR UNITS.

TURN OVER ALL CUSTOMARY MANUFACTURER'S GUARANTEES FOR THE FOREGOING ITEMS AND ALL OTHER TRAFFIC CONTROL EQUIPMENT TO THE MAINTAINING AGENCY FOLLOWING ACCEPTANCE OF THE EQUIPMENT.

THE DEVELOPER WILL CONSIDER THE COST OF GUARANTEEING THE TRAFFIC CONTROL SYSTEM AS INCIDENTAL TO AND INCLUDED IN THE CONTRACT UNIT PRICES BID FOR THE VARIOUS ITEMS INCLUDED IN THE SYSTEM.

ITEM 625 -- PLASTIC CAUTION TAPE

MARK THE LOCATION OF CONDUIT IN TRENCH BY THE USE OF A CONTINUOUS IDENTIFYING TAPE BURIED IN THAT TRENCH ABOVE THE CONDUIT LINE. FOR THE IDENTIFYING TAPE, USE AN RED INERT MATERIAL APPROXIMATELY 6" WIDE COMPOSED OF POLYETHYLENE PLASTIC AND HIGHLY RESISTANT TO ALKALIS, ACIDS OR OTHER CHEMICAL COMPONENTS LIKELY TO BE ENCOUNTERED IN SOILS. MARK THE TAPE WITH THE WORDS "ELECTRIC LINE BURIED BELOW" PRINTED IN BLACK LETTERS ON ONE SIDE ONLY. SUPPLY THE TAPE IN CONTINUOUS ROLLS WITH THE IDENTIFYING LETTERING REPEATED FOR THE FULL LENGTH OF THE TAPE.

BURY THE TAPE IN THE TRENCH WITH ONE STRIP PLACED APPROXIMATELY ALONG THE CENTER LINE AND 8" TO 12" BELOW THE FINAL GRADE. PLACE THE TAPE IN THE TRENCH WITH THE PRINTED SIDE UP AND ESSENTIALLY PARALLEL TO THE FINISHED SURFACE. TAKE ALL NECESSARY PRECAUTIONS TO INSURE THAT THE TAPE IS NOT PULLED, DISTORTED OR OTHERWISE MISPLACED IN COMPLETING THE TRENCH BACKFILLING. FURNISH "TERRA TAPE", "ALLEN SYSTEMS", OR AN EQUAL AS APPROVED BY THE ENGINEER.

THE DEVELOPER WILL PAY FOR ACCEPTED QUANTITIES OF "ITEM SPECIAL -- PLASTIC CAUTION TAPE", AT THE CONTRACT UNIT PRICE BID PER FOOT, COMPLETE AND IN PLACE.

ITEM 632 – SIGNAL SUPPORT, BY TYPE, AS PER PLAN

FURNISH SIGNAL POLES WHICH COMPLY WITH 732.11, BUT DO NOT FURNISH POLES 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, AS SHOWN ON STANDARD CONSTRUCTION DRAWING TC--12.30.

ATTACH PEDESTRIAN SIGNAL HEADS TO THE POLES BY UTILIZING "CLAM SHELL" BRACKETS BOLTED TO THE POLE. DO NOT USE STAINLESS STEEL BANDING.

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 AND WRITTEN NOTICE TO PROCEED WITH THE ORDERS FOR THESE ITEMS HAS BEEN RECEIVED FROM THE ENGINEER,

IF ANY FOUNDATION LOCATIONS MUST BE ADJUSTED, NOTIFY THE ENGINEER, WHO WILL DETERMINE THE REVISED LOCATIONS AND IF ANY SUPPORT DESIGN CHANGES ARE NECESSARY, IN CONSULTATION WITH THE MAINTAINING AGENCY. YOU WILL NOT BE RESPONSIBLE FOR DETERMINING THE REVISED DESIGN. THE ENGINEER WILL SUBSEQUENTLY INFORM THE CONTRACTOR OF ANY CHANGES NECESSARY, AND AUTHORIZE HIM TO ORDER THE SUPPORTS.

WHEN DEVELOPING THE PROGRESS SCHEDULE, AND THOSE OF THE SUBCONTRACTORS, ENSURE THAT THE FOUNDATIONS ARE INSTALLED AT THE EARLIEST TIME AS IS FEASIBLE AND PRACTICAL, AND INCLUDE SUFFICIENT TIME IN THE PROGRESS SCHEDULE FOR THE ORDERING, MANUFACTURE, DELIVERY, AND INSTALLATION OF THESE ITEMS AFTER THE FOUNDATIONS ARE IN PLACE.

THE DEVELOPER WILL NOT MAKE PAYMENTS FOR DELIVERED MATERIALS FOR THESE ITEMS UNTIL THE FOUNDATIONS ARE IN PLACE, AND, IF CHANGES IN THE DESIGN OF THESE ITEMS ARE REQUIRED, NO PAYMENTS WILL BE MADE FOR ITEMS MANUFACTURED TO THE ORIGINAL DESIGNS.

THE DEVELOPER WILL PAY FOR ACCEPTED QUANTITIES AT THE CONTRACT UNIT PRICE BID FOR EACH SIGNAL SUPPORT.

ITEM 632 – VEHICULAR SIGNAL HEAD, (LED), (BY TYPE), POLYCARBONATE, AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF CMS 632 AND 732, THE FOLLOWING SHALL APPLY:

- 1) SIGNAL HEADS AND VISORS SHALL BE CONSTRUCTED OF BLACK POLYCARBONATE PLASTIC AND MEET ITE SPECIFICATIONS. VISORS SHALL BE CUTAWAY DESIGN. PROPER EXTERIOR COLORS SHALL BE OBTAINED BY USE OF COLORED PLASTIC MATERIAL RATHER THAN PAINTING. SIGNAL HEAD HOUSINGS SHALL BE THE HEAVY DUTY DESIGN WITH A MINIMUM WALL THICKNESS OF 0.117".
- 2) THE ENTRANCE FITTING SHALL BE OF THE TRI--STUD DESIGN, WITH STAINLESS STEEL HARDWARE AND SERRATED RINGS IN ORDER TO ACHIEVE POSITIVE LOCKING.
- 3) THE LIGHT EMITTING DIODE (LED) SIGNAL LAMP UNITS SHALL MEET THE REQUIRMENTS OF C&MS 732.04--C AND BE LISTED ON ODOT'S QPL (QUALIFIED PRODUCTS LIST). ALL LED LAMPS SHALL BE THE LATEST MODEL CURRENTLY IN PRODUCTION AND NEW. LAMPS NO LONGER BEING MANUFACTURED SHALL NOT BE ACCEPTED. THE CONTRACTOR SHALL PROVIDE ODOT, IN WRITTING, WITH THE LED MANUFACTURER NAME, SERIAL NUMBER, DESCRIPTION OF LAMP, AND DATE OF MANUFACTURE FOR ALL LED UNITS THAT ARE TO BE USED IN THE SIGNAL HEAD PRIOR TO INSTALLATION, Foe ACCEPTANCE AND WARRANTY PURPOSES.
- 4) THE VISOR AND EACH LENS CLIP THAT HOLDS THE LED SIGNAL LAMP IN PLACE SHALL BE FASTENED TO THE SIGNAL HEAD HOUSING DOOR BY USE OF STAINLESS STEEL SOCKET SET SCREW AND STAINLESS STEEL NUTS. EACH CONNECTION SHALL INCLUDE A SINGLE 1.50" LONG STAINLESS STEEL SOCKET SET SCREW WITH THE SOCKET END ON THE INSIDE OF THE DOOR PLUS TWO STAINLESS STEEL NUTS, ONE FOR THE VISOR AND ONE FOR THE LENS CLIP.
- 5) ALL SIGNAL HEADS SHALL HAVE A BLACK 5" ALUMINUM BACK PLATE WITH A YELLOW REFLECTIVE TAPE BORDER PER CMS 732.22.
- 6) WHEN MOUNTING ON MAST ARMS THE FOLLOWING SHALL APPLY:
 - a) SIGNAL HEADS SHALL BE RIGIDLY ATTACHED TO THE MAST ARM BY THE USE OF AN "ASTRO--BRAC" TYPE ASSEMBLY. STAINLESS STEEL HARDWARE SHALL BE USED. THREADED PIPE STYLE HANGERS SHALL NOT BE PERMITTED.
 - b) SIGNAL HEADS SHALL BE INSTALLED WITH THE RED LENS CENTERED OVER THE MAST ARM WHENEVER POSSIBLE UNLESS NOTED OTHERWISE IN THE PLAN.

PAYMENT FOR "ITEM 632--VEHICULAR SIGNAL HEAD (LED), (BY TYPE), POLYCARBONATE, AS PER PLAN", SHALL BE MADE FOR COMPLETE SIGNAL HEAD FURNISHED AND INSTALLED, INCLUDING ALL LABOR, EQUIPMENT, AND MATERIALS AS DESCRIBED ABOVE.

ITEM 633 – CONTROLLER UNIT, TYPE TS2/A2, WITH CABINET, TYPE TS1, AS PER PLAN

THE CONTROLLER SHALL BE ECONOLITE, LATEST MODEL, NEMA TS--2 TYPE 2 WITH DOWNWARD COMPATABILITY WITH NEMA TS--1. THE CONTROLLER AND CABINET SHALL HAVE THE CAPABILITY OF OPERATING WITH A MINIMUM OF 8 ACTUATED PHASES. THE OVERLAP PROGRAMMING SHALL BE BY USE OF AN INTERCHANGEABLE PLUG--IN PRINTED CIRCUIT BOARD ASSEMBLY AS DIRECTED IN TS--1-1989. IF THE CONTROLLER DOES NOT HAVE A SOCKET FOR THE INTERCHANGEABLE PLUG--IN PRINTED CIRCUIT BOARD ASSEMBLY, THE BOARD SHALL STILL BE PROVIDED SEPARATELY. THE CABINET SHALL BE WIRED SO THAT CONTROLLER PIN CONNECTIONS ASSOCIATED WITH A GIVEN PHASE NUMBER SHALL MATCH THE PHASE NUMBER ASSIGNED TO THE SPECIFIED TRAFFIC MOVEMENT AS SHOWN ON THE PLANS. THE CONTROLLER CABINET SHALL BE KEYED TO THE STATE MASTER.

CONTROLLER CABINET SIZE SHALL COMPLY TO THE REQUIREMENTS OF NEMA TS--1 SECTION 14 BUT SHALL BE A MINIMUM SIZE OF 57" HIGH X 30" WIDE X 17" DEEP, SM DESIGNATION. THE CONTROLLER CABINET DOOR HANDLE, DOOR HINGE AND HINGE BOLTS SHALL BE STAINLESS STEEL. GROUND MOUNTED CONTROLLER CABINETS SHALL INCLUDE A MINIMUM 18" HIGH CABINET EXTENSION.

THE CABINET SHALL INCLUDE A GENERATOR POWER PANEL AS SHOWN IN THE PLAN INSERT SHEET XX. THE GENERATOR PANEL SHALL BE RECESSED INSIDE THE CABINET WITH AN ACCESS DOOR AND STANDARD POLICE LOCK. THE PANEL SHALL BE SEALED AND WEATHERTIGHT TO PREVENT MOISTURE FROM ENTERING THROUGH THE CLOSED DOOR.

THE CONTROLLER SHALL HAVE INTERNAL TIME BASE COORDINATION AND PROVIDE DATA UPLOAD AND DOWNLOAD CAPABILITY. ALL CONTROLLER MEMORIES SHALL BE INVOLITILE AND SHALL NOT REQUIRE BATTERIES OR OTHER SOURCES OF ENERGY TO RETAIN DATA WHILE POWER IS REMOVED FROM THE CONTROLLER.

PRINTED BOARD BACK PANELS OF THE CONTROLLER CABINET SHALL NOT BE ACCEPTABLE. SOLDERED CONNECTIONS WILL BE PERMITTED FOR WIRING ON THE BACKSIDE OF THE BACK PANEL. THE CONTROLLER CABINET SHALL HAVE DETECTOR CALL BUTTONS FOR ALL PHASES INCLUDING PED MOVEMENTS, CABINET LIGHT WITH SWITCH AND AUTO FLASH SWITCH ON THE INSIDE CABINET DOOR.

THE CONFLICT MONITOR SHALL BE CAPABLE OF 12--CHANNEL OPERATION AND EXTENDED MONITORING (IN ACCORDANCE WITH CMS 733.03 SECTION A "TYPE TS--1" PART 2C) IN ADDITION TO NEMA REQUIREMENTS. THE MONITOR SHALL HAVE THE CAPABILITY OF MONITORING EACH LOAD SWITCH SEPARATELY, AS SHOWN IN THE LOAD SWITCH HOOKUP DIAGRAM IN THE PLANS. THE DESIGN OF THE MONITOR SHALL USE MICROPROCESSOR ARCHITECTURE AND LIQUID CRYSTAL DISPLAYS. THE MONITOR SHALL INDICATE THE EXACT LOAD SWITCH CHANNEL IN WHICH THE FAILURE OCCURRED. THE CONFLICT MONITOR SHALL HAVE AN EVENT LOGGING MEMORY AND SHALL BE CAPABLE OF UPLOADING REPORTS OF EVENTS OR USER SETTINGS VIA CLOSED LOOP HOST CONTROLLER. A MINIMUM OF 9 EVENTS SHALL BE LOGGED. EXAMPLE OF EVENTS INCLUDE: POWER OUTAGES, CONFLICTS, CONTROLLER VOLTAGE MONITOR, ETC. EVENTS SHALL BE DISPLAYED ON THE CONFLICT MONITOR'S LIQUID CRYTAL DISPLAY WHEN INTERROGATED.

THE LOAD SWITCHES SHALL PROVIDE INPUT AND OUTPUT INDICATIONS.

PAYMENT FOR THIS ITEM 633, CONTROLLER UNIT, TYPE TS2/A2, WITH CABINET, TYPE TS1, AS PER PLAN, WILL BE AT THE CONTRACT PRICE BID PER EACH COMPLETE AND IN PLACE INCLUDING ALL CONNECTIONS TESTED AND ACCEPTED.

ITEM 632-- LOOP DETECTOR UNIT, DELAY AND EXTENSION TYPE, AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF 632, 732.07 AND 732.08, LOOP DETECTOR UNITS SHALL HAVE THE FOLLOWING FEATURES:

THE OUTPUT DEVICE SHALL BE AN ELECTROMECHANICAL RELAY AND ALL CONTACTS SHALL BE INCLUDED IN THE WIRING HARNESS.

THE UNIT SHALL BE SINGLE CHANNEL AND SELF--TUNING.

THE UNIT'S ELECTRICAL CONNECTION PLUGS OR WIRING HARNESS SHALL ALLOW READY REPLACEMENT WITH SINGLE CHANNEL AMPLIFIERS AS DESCRIBED IN 732.07.

IN ADDITION TO THE REQUIREMENTS LISTED ABOVE, THE DETECTOR UNIT SHALL HAVE EASILY ADJUSTABLE TIMERS INCORPORATED IN THE UNIT THAT ARE CAPABLE OF BOTH EXTEND CALL AND DELAY CALL OUTPUTS. THESE ADJUSTMENTS SHALL BE SEPARATE AND CONTROLLABLE BY CALIBRATED SWITCHES OR KNOBS ON THE OUSIDE OF THE DETECTOR UNIT. THE EXTEND CALL TIMER SHALL BE CAPABLE OF HOLDING THE CALL OF A VEHICLE FOR A PERIOD OF TIME BEGINNING AT THE INSTANT THE VEHICLE LEAVES THE DETECTION AREA. THE DELAY CALL TIMER SHALL BE SUCH THAT IT DOES NOT ISSUE AN OUTPUT UNTIL THE DETECTION ZONE HAS BEEN OCCUPIED FOR A PERIOD OF TIME THAT HAS BEEN SET ON THE ADJUSTABLE TIMER. WHEN TIMES ARE SET ON BOTH EXTEND AND DELAY TIMERS, THE UNIT SHALL BE DESIGNED TO INHIBIT THE EXTEND FUNCTION UNTIL THE DELAY TIME HAS BEEN MET. WHEN THE LOOP BECOMES UNOCCUPIED, THE DELAY OUTPUT IS REMOVED. WHEN THE VEHICLE CAP EXCEEDS THE EXTEND TIME, THE ENTIRE DELAY--EXTEND OPERATION BECOMES EFFECTIVELY RESET FOR THE NEXT CYCLE -- DELAY TO TIME OUT, ETC.

PAYMENT FOR ITEM 632, LOOP DETECTOR UNIT, DELAY AND EXTENSION TYPE, AS PER PLAN SHALL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH AND SHALL INCLUDE ALL LABOR, EQUIPMENT, AND MATERIALS.

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:
- 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.
 - PROVIDE AN EQUIPMENT GROUNDING CONDUCTOR IN METALLIC CONDUITS (725.04) IN ADDITION TO THE CONDUCTORS SPECIFIED AND BOND THE CONDUIT TO THIS GROUNDING CONDUCTOR.
 - 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.
 - METALLIC CONDUIT CARRYING THE LOOP WIRES FROM IN THE PAVEMENT TO THE PULL BOX SPLICE LOCATION WILL ONLY BE BONDED AT THE PULL BOX END, AND WILL NOT CONTAIN AN EQUIPMENT GROUNDING CONDUCTOR.
 - METAL PULL BOX LIDS SHALL BE BONDED BY ATTACHMENT OF THE EQUIPMENT GROUNDING CONDUCTOR TO THE FRAME DIAGONAL AS PROVIDED ON HL-30.11.
 - IF MULTIPLE CONDUIT RUNS BEGIN AND END AT THE SAME POINTS, ONLY ONE EQUIPMENT GROUNDING CONDUCTOR IS REQUIRED.
 - 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.
 - 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.
 - CONDUITS.
 - THE 725.04 CONDUIT SHALL HAVE GROUNDING BUSHINGS INSTALLED AT ALL TERMINATION POINTS. THE BUSHING MATERIAL SHALL BE COMPATIBLE WITH GALVANIZED STEEL CONDUIT AND THE GROUNDING LUG MATERIAL SHALL BE COMPATIBLE FOR USE WITH COPPER WIRE. THREADED OR COMPRESSION TYPE BUSHINGS MAY BE USED.
 - THE 725.05 CONDUIT SHALL HAVE THE INSIDE AND OUTSIDE DIAMETERS OF THE CONDUIT DEBURRED AT ALL TERMINATION POINTS.
 - BOTH ENDS OF METALLIC CONDUIT SHALL BE BONDED TO THE EQUIPMENT GROUNDING CONDUCTOR.
 - METALLIC CONDUIT MAY BE BONDED TO METALLIC BOXES THROUGH THE USE OF CONDUIT FITTINGS UL APPROVED FOR THIS TYPE OF CONNECTION, WITH THE BOX BONDED TO THE EQUIPMENT GROUNDING CONDUCTOR.
 - WIRE FOR GROUNDING AND BONDING.
 - 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:
 - USE 4 AWG BETWEEN THE POWER SERVICE AND SUPPORTS, POLES, PEDESTALS, CONTROLLER OR FLASHER CABINETS.
 - 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.
 - USE A MINIMUM 8 AWG BETWEEN THE "PREPARE TO STOP WHEN FLASHING" INSTALLATION (INCLUDING SUPPORT) AND THE FIRST CONDUIT THAT REQUIRES A LARGER SIZE AS SPECIFIED IN 3.A.I ABOVE.
 - 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.
 - 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.
 - GROUND ROD.
 - A 3/4 INCH SCHEDULE 40 PVC CONDUIT WILL BE USED IN FOUNDATIONS AND CONCRETE WALLS FOR THE GROUNDING CONDUCTOR (GROUND WIRE) RACEWAY TO THE GROUND ROD. SHOULD METALLIC CONDUIT BE USED, BOTH ENDS OF THE CONDUIT SHALL BE BONDED TO THE GROUNDING CONDUCTOR.
 - THE TYPICAL GROUNDING CONDUCTOR (GROUND WIRE) SHALL BE 4 AWG INSULATED, COPPER.
 - 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	EQUIPMENT GROUND	EQUIPMENT GROUND
5	ORANGE	YELLOW BALL	#2 DW/FDW
6	BLUE	GREEN ARROW	#2 WALK
7	WHITE/BLACK STRIPE	YELLOW ARROW	NOT USED

- POWER SERVICE AND DISCONNECT SWITCH.
 - 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 SPICE.
 - THE SERVICE NEUTRAL (AC-) SHALL ONLY BE CONNECTED TO GROUND AT THE PRIMARY POWER SERVICE DISCONNECT SWITCH.
 - 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.
 - 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.
- STRUCTURE GROUNDING: HL-50.21 SHOWS A 1/0 AWG STRANDED COPPER CABLE USED FOR STRUCTURE GROUNDING. ADDITIONALLY, THIS SAME CABLE SHALL BE INSULATED AND ANY CONNECTIONS AND BARE COPPER STRANDS EXPOSED TO CONCRETE SHALL BE COVERED WITH MASTIC TO PREVENT CONTACT WITH THE CONCRETE.
- PAYMENT.
 - ALL MATERIALS AND WORK REQUIRED TO COMPLETE THE EFFECTIVE GROUND FAULT CURRENT PATH SYSTEM ARE INCIDENTAL TO THE CONDUCTORS INSTALLED BY CONTRACT.

START OF WORK NOTIFICATION AND INSPECTION

THE CONTRACTOR SHALL NOTIFY ODOT DISTRICT 3 CONSTRUCTION ENGINEER, PERRY RICCIARDI (419-207-7022) AND ERIE COUNTY MANAGER, KAREN CAPIZZI (419-499-2351) A MINIMUM OF 14 DAYS PRIOR TO START OF CONSTRUCTION. THE DISTRICT CONSTRUCTION ENGINEER OR COUNTY MANAGER WILL ASSIGN AN INSPECTOR TO THE PROJECT. NO WORK SHALL BE PERFORMED WITHOUT AN ODOT INSPECTOR PRESENT. THIS REQUIREMENT CAN BE WAIVED BY THE DISTRICT CONSTRUCTION ENGINEER IF PERSONNEL ARE NOT AVAILABLE TO PERFORM THE FULL TIME INSPECTION WORK.

THE CONTRACTOR SHALL CONTACT RICHARD RONEY IN THE DISTRICT 3 PRODUCTION DEPT. (419-207-7064) TO SCHEDULE WHEN THE SIGNAL CAN BE PLACED IN STOP-AND-GO OPERATION. THIS NOTIFICATION MUST BE MADE A MINIMUM OF 7 DAYS IN ADVANCE. A FINAL SIGNAL INSPECTION WILL BE DONE BY DISTRICT 3 JUST PRIOR TO THE TEN-DAY BURN TEST. ALL MAJOR DEFICIENCIES FOUND DURING THE FINAL INSPECTION MUST BE CORRECTED PRIOR TO THE BEGINNING OF THE 10-DAY BURN TEST. DISTRICT 3 WILL NOT PROVIDE FINAL ACCEPTANCE UNTIL SUCCESSFUL COMPLETION OF THE 10-DAY BURN TEST AND ALL CORRECTIVE WORK IS COMPLETED BY THE CONTRACTOR.

ITEM 625 – GROUND ROD, AS PER PLAN

THIS ITEM SHALL CONSIST OF FURNISHING AND DRIVING A ONE (1) INCH BY TEN (10) FOOT GROUND ROD BELOW GRADE ADJACENT TO THE CONTROLLER HOUSING. ALSO INCLUDED IS THE FURNISHING AND RUNNING OF A CONTINUOUS (UNBROKEN) SEVEN (7) STRAND # 4 COPPER WIRE FROM THE TOP OF THE GROUND ROD AND ATTACHING IT TO THE NEUTRAL BAR IN THE CONTROLLER CABINET. GROUND ROD RESISTANCE SHALL BE TEN (10) ohms MAXIMUM.

PAYMENT WILL BE MADE AT THE CONTRACT UNIT PRICE PER EACH.

ITEM 632 – COVERING OF VEHICULAR SIGNAL HEAD, AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF CMS 632.25, VEHICULAR SIGNAL HEADS SHALL BE COVERED IMMEDIATELY FOLLOWING INSTALLATION AND REMAIN COVERED UNTIL ENERGIZED. THE COVERING MATERIAL SHALL BE LARGE ENOUGH TO COVER THE FRONT AND BOTH SIDES OF THE VEHICULAR SIGNAL HEAD. THE COVERING MATERIAL SHALL BE A CANVAS OR SIMILAR DURABLE MATERIAL. USE OF POLYETHELENE TRASH BAGS AS A COVERING MATERIAL SHALL NOT BE PERMITTED.

PAYMENT FOR ITEM 632 – COVERING OF VEHICULAR SIGNAL HEAD, AS PER PLAN, WILL BE MADE AT THE CONTRACT UNIT PRICE PER EACH.

SCHEDULING OF DETECTOR LOOP INSTALLATION AND INSTALLATION OF PAVEMENT MARKINGS

PRIOR TO APPLYING THE SURFACE COURSE ON STRUB ROAD SCHEDULE THE WORK, TO ENSURE THAT DETECTOR LOOP INSTALLATION, (INCLUDING PAVEMENT CUTTING, THE INSTALLATION OF LOOP DETECTOR WIRES, AND SEALING OF THE LOOP DETECTOR SLOTS) IS COMPLETED PRIOR TO THE INSTALLATION OF THE VARIOUS PAVEMENT MARKINGS TO BE INSTALLED IN THE SAME LOCATIONS (SUCH AS. STOP LINES, CROSSWALK LINES, WORDS ON PAVEMENT, AND LANE ARROWS) INSURE THAT THE PAVEMENT MARKINGS ARE INSTALLED AS SOON AS PRACTICABLE AFTER THE DETECTOR LOOP IS INSTALLED AND THE ROAD IS READY TO OPEN TO TRAFFIC.

ALTERNATE BID ITEM

ITEM 633 – CONTROLLER, MISC.: ADVANCE /DILEMMA ZONE DETECTION SYSTEM

THIS ITEM OF WORK SHALL CONSIST OF FURNISHING AND INSTALLING AN ADVANCE/DILEMMA ZONE DETECTION SYSTEM CAPABLE OF INTERSECTION ADVANCE DETECTION CONTROL UTILIZING ABOVE GROUND DIGITAL WAVE RADAR DETECTION TECHNIQUES. THE SYSTEM SHALL BE NON-INTRUSIVE AND SHALL DETECT VEHICLES FROM 100 FEET UP TO 500 FEET FROM THE SENSOR. THE SYSTEM SHALL DETECT VEHICLE PRESENCE, SPEED AND SHALL IDENTIFY VEHICLES WITHIN THE DILEMMA ZONE AND SHALL PROVIDE UP TO 8 DETECTION ZONES SIMULTANEOUSLY FOR INTERSECTION CONTROL. ONE SENSOR SHALL BE PROVIDED PER APPROACH, COVERING MULTIPLE LANES WHERE ADVANCE DETECTION IS REQUIRED. THE DETECTION SYSTEM SHALL INCLUDE THE FOLLOWING LIST OF FEATURES AND CAPABILITIES:

THE SYSTEM SHALL PROVIDE ACCURATE PRESENCE-DETECTION OF MOVING VEHICLES OR CLUSTER OF VEHICLES. THE SENSOR SHALL BE MOUNTED IN A FORWARD-FIRE POSITION, LOOKING AT EITHER APPROACHING OR DEPARTING TRAFFIC AND SHALL ONLY DETECT VEHICLES IN ONE DIRECTION OF TRAVEL. IT SHALL MAINTAIN ACCURATE PERFORMANCE IN ALL WEATHER CONDITIONS AND SHALL BE TESTED TO MEET NEMA TS2 ENVIRONMENTAL STANDARDS.

THE SYSTEM SHALL DYNAMICALLY TRACK THE SPEED, ARRIVAL TIME AND RANGE OF ALL VEHICLES AS THEY APPROACH THE STOP BAR. THE SYSTEM SHALL CALCULATE ON A CONTINUOUS BASIS WHICH VEHICLES ARE WITHIN THE PREDETERMINED DILEMMA ZONE AND PLACE A CALL TO THE CONTROLLER. GAPS WITHIN THE DILEMMA ZONE SHALL THEN BE IDENTIFIED SUCH THAT THE CORRESPONDING PHASE CALL WILL BE DROPPED AND THE PHASE SAFELY TERMINATED.

THE SYSTEM SHALL INCLUDE A SIMPLE SETUP ROUTINE THAT WILL AUTOMATICALLY CONFIGURE AND CALIBRATE THE SENSOR FOR PROPER OPERATION DURING INSTALLATION. THE SENSOR SHALL ALSO BE CAPABLE OF BEING PROGRAMMED AND UPDATED FROM A LAPTOP COMPUTER OR OTHER PORTABLE PROGRAMMING DEVICE SUCH AS A POCKET PC. SOFTWARE SHALL BE PROVIDED. THE GRAPHICAL USER INTERFACE SHALL OPERATE ON A WINDOWS PLATFORM.

THE SENSOR SHALL BE MOUNTED DIRECTLY TO A POLE OR MAST ARM AS RECOMMENDED BY THE MANUFACTURER. CABLE SHALL BE PROVIDED AS REQUIRED AND RECOMMENDED BY THE MANUFACTURER.

SURGE PROTECTION DEVICES AS RECOMMENDED BY THE MANUFACTURER SHALL BE INCLUDED BOTH AT THE POLE WHERE THE SENSOR IS LOCATED TO PROTECT THE SENSOR AND IN THE TRAFFIC CABINET TO PROTECT THE CABINET ELECTRONICS.

POWER SHALL BE PROVIDED FROM THE TRAFFIC CABINET. THE SENSOR SHALL CONSUME LESS THAN 10 WATTS AND OPERATE FROM A DC INPUT BETWEEN 12VDC AND 28VDC. COMPLETE AND AUTOMATIC RECOVERY FROM A POWER FAILURE SHALL BE WITHIN 15 SECONDS AFTER RESUMPTION OF NORMAL POWER.

ALL REQUIRED INPUTS CARDS SHALL BE INCLUDED IN THE TRAFFIC CABINET THAT ARE COMPATIBLE WITH 170, 2070, NEMA TS1 AND NEMA TS2 DETECTOR RACKS. THE CARDS SHALL PROVIDE TRUE PRESENCE DETECTOR CALLS OR CONTACT CLOSURE TO THE TRAFFIC CONTROLLER.

CONSTRUCTION – LOCATE AND MOUNT DETECTOR IN ACCORDANCE WITH MANUFACTURER SPECIFICATIONS.

PAYMENT FOR ITEM 633 CONTROLLER, MISC.: ADVANCE DILEMMA ZONE DETECTION SYSTEM, AS PER PLAN SHALL BE MADE AT THE CONTRACT UNIT PRICE FOR EACH, COMPLETE AND IN PLACE INCLUDING ALL REQUIRED CABINET HARDWARE, MOUNTING BRACKETS, CABLES, CONNECTIONS TESTED AND ACCEPTED.

REVISED ESTIMATED QUANTITIES PER ALTERNATE BID ITEM

	QTY	UNIT	DESCRIPTION
625	314	FOOT	CONDUIT, 2", 725.04
625	0	FOOT	CONDUIT, JACKED OR DRILLED UNDER PAVEMENT, SIZE: 2"
625	334	FOOT	TRENCH
625	334	FOOT	PLASTIC CAUTION TAPE, AS PER PLAN
625	13	EACH	PULLBOX, REMOVED
632	9	EACH	DETECTOR LOOP
632	9	EACH	LOOP DETECTOR UNIT, DELAY & EXTENSION TYPE, AS PER PLAN
632	0	FOOT	MESSENGER WIRE, 7 STRAND, 3/8" DIAMETER WITH ACCESSORIES
632	1134	FOOT	LOOP DETECTOR LEAD-IN CABLE
632	1	EACH	CONDUIT RISER, 2" DIAMETER

ITEM 630 – SIGN HANGER ASSEMBLY, MAST ARM, AS PER PLAN

RIGIDLY ATTACH STREET NAME SIGNS TO TRAFFIC SIGNAL MAST ARMS WITH THE SIGN CENTERED VERTICALLY WITH THE ARM, USING CONTINUOUS SLOTTED SIGN SUPPORT SECTIONS, UNIVERSAL CHANNEL CLAMPS, AND BANDING, AS SPECIFIED BELOW.

MOUNT SIGNS WHERE SHOWN ON THE PLANS, OR AS DIRECTED BY THE ENGINEER. MOUNT SIGNS LEVEL AND NOT SLOPED ALONG THE MAST ARM. INSURE THAT THE SIGN FACE IS MOUNTED PERPENDICULAR (90 DEGREES) TO THE DIRECTION OF TRAFFIC. DO NOT REMOVE EXISTING STREET NAME SIGNS UNTIL THE NEW SIGNS ARE ERECTED. TEMPORARILY RELOCATE ANY STREET NAME SIGNS MOUNTED ON POLES TO BE REMOVED UNTIL THE NEW SIGNS ARE INSTALLED.

CONTINUOUS SLOTTED SIGN SUPPORT SECTIONS

PROVIDE FOUR (4) SLOTTED SIGN SUPPORT SECTIONS, MOUNTED VERTICALLY, FOR EACH STREET NAME SIGN. FABRICATE SECTIONS FROM ALLOY 6061-T6 ALUMINUM, IN STANDARD 16 FOOT LENGTHS. THE CONFIGURATION OF THE SECTIONS SHALL BE:

THE WIDTH OF THE BASE SHALL BE 1.41" OVERALL. THE WALL THICKNESS OF THE BASE SHALL BE 0.098". THE VERTICAL WALLS SHALL EXTEND UPWARDS 0.689', AT WHICH POINT THEY SHALL EXTEND INWARD AT A 45° ANGLE. THE WALL THICKNESS FOR THE VERTICAL WALLS SHALL BE 0.083". A "U" SHAPED CHANNEL, 0.771" IN WIDTH OVERALL, SHALL EXTEND VERTICALLY 0.470" FROM THE BOTTOM OF THE "U" TO FORM A CONTINUOUS INVERTED "T" SLOT. THE BOTTOM OF THE "T" SHALL HAVE A WALL THICKNESS OF 0.079". VERTICAL WALL THICKNESS SHALL BE 0.110". THE OPENING IN THE INVERTED "T" SHALL BE 0.335" WIDE. THE INVERTED "T" SHALL HAVE AN ANGLE OF 45° TO CREATE A TRACK IN WHICH THE BOLTS WILL NOT ROTATE.

THERE SHALL BE ONE GROOVE, 0.015" DEEP BY 90° IN THE CENTER OF THE BASE.

THIS SECTION SHALL BE FABRICATED SO AS TO ACCOMMODATE POSITIONABLE STAINLESS STEEL FITTINGS AND CLAMPS, PROVIDING COMPLETE FREEDOM OF ALIGNMENT WITHIN THE 0.335" SLOT TO CREATE AN INTEGRATED SUPPORT SYSTEM.

UNIVERSAL CHANNEL CLAMPS

PROVIDE AND USE ONE (1) CLAMP FOR EACH CHANNEL SECTION. THIS DEVICE SHALL BE FABRICATED FROM STAINLESS STEEL TYPE 304. EACH UNIVERSAL CHANNEL CLAMP SHALL BE 2.75" LONG, 1.1875" HIGH, 1.125" DEEP AT EITHER END. THE "SADDLE" SHALL BE FORMED FROM 16 GAUGE STAINLESS STEEL TYPE 304 FORMED BY TAPERING UNIFORMLY TOWARD THE CENTER OF THE LARGER SIDE TO A DEPTH OF 0.50", FORMING A MODIFIED "V".

LOCKED WITHIN THE "SADDLE" SHALL BE A PORTION OF THE UNIT REFERRED TO AS THE "INSERT PLATE", WHICH SHALL BE FABRICATED FROM 14 GAUGE STAINLESS STEEL TYPE 304, AND SHALL FORM A SHALLOW "U". THE LEGS OF THE "U" SHALL BE 1.0" HIGH AND 1.0625" WIDE WITH AN APERTURE DESIGNED TO PERMIT PASSAGE OF 0.1875" VERTICALLY ON THE 1.0" SADDLE DIMENSION AND SHALL BE IN FROM THE EDGE CLOSEST TO THE "V" OF THE SADDLE. THE BASE OF THE "U" SHALL BE 0.5" WIDE AND 2.50" LONG WHERE IT IS PREDESIGNED TO SLIDE IN A POSITIONABLE MANNER INTO THE 0.335" CONTINUOUS SLOTTED SIGN SUPPORT SECTION.

BANDING:

PROVIDE TYPE AISI 1201 STAINLESS STEEL BANDING, 0.030" THICK AND 0.750" WIDE.

ATTACHMENT OF STREET NAME SIGNS

ATTACH THE STREET NAME SIGNS TO THE CHANNEL SECTIONS USING ALUMINUM POP RIVETS. OR STAINLESS STEEL SELF TAPPING SCREWS.

PAYMENT:

THE DEVELOPER WILL PAY FOR ACCEPTED QUANTITIES OF "ITEM 630 – SIGN HANGER ASSEMBLY, MAST ARM, AS PER PLAN" AT THE CONTRACT UNIT PRICE BID PER EACH. PAYMENT INCLUDES THE COST OF ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, AND ALL PARTS NECESSARY TO ATTACH ONE

ITEM 630 – SIGN FLAT SHEET, AS PER PLAN

SUPPLY OVERHEAD MOUNTED STREET NAME SIGNS UNDER THIS ITEM THAT MEET THE REQUIREMENTS OF 630, WITH THE FOLLOWING EXCEPTIONS:

USE GREEN SHEETING FOR THE BACKGROUND.

USE WHITE SHEETING FOR THE BORDER, AND LEGEND.

FORM THE LEGEND FROM UPPER CASE SERIES C-2000 LETTERS, 12" HIGH FOR ONE LINE MESSAGES, AND 8" HIGH FOR TWO LINE MESSAGES.

USE A FLAT SHEET ALUMINUM PLATE FOR THE BACKING MATERIAL, 18" HIGH FOR ONE LINE MESSAGES AND 24" HIGH FOR TWO LINE MESSAGES.

THE DEVELOPER WILL PAY FOR ITEM 630 – SIGN, FLAT SHEET, AS PER PLAN, AT THE CONTRACT UNIT PRICE BID PER SQUARE FOOT, COMPLETE AND IN PLACE.

ITEM 633 – UNINTERRUPTIBLE POWER SUPPLY (UPS), 1000 WATT, AS PER PLAN, WITHOUT ENCLOSURE

THIS ITEM OF WORK SHALL CONSIST OF FURNISHING AND INSTALLING A BATTERY BACKUP UPS SYSTEM PER CMS 633.18 AND 733.09 WITH THE FOLLOWING EXCEPTIONS:

THE SYSTEM, INCLUDING ALL UPS HARDWARE AND REQUIRED NUMBER OF BATTERIES, SHALL FIT INSIDE THE PROPOSED TRAFFIC SIGNAL CONTROLLER CABINET AND CABINET EXTENSION.

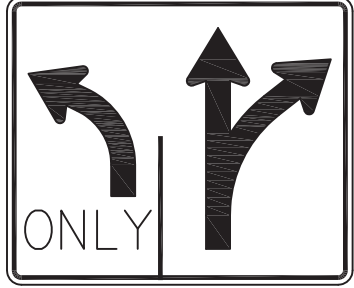
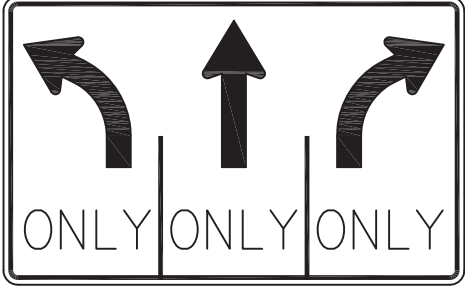
THE SYSTEM SHALL BE PROGRAMMED TO SWITCH THE INTERSECTION FROM FULL-OPERATION TO FLASHING OPERATION AFTER TWO (2) HOURS OF RUNTIME ON BATTERY POWER, THIS IS TO CONSERVE BATTERY OPERATION DURING AN EXTENDED UTILITY POWER OUTAGE.

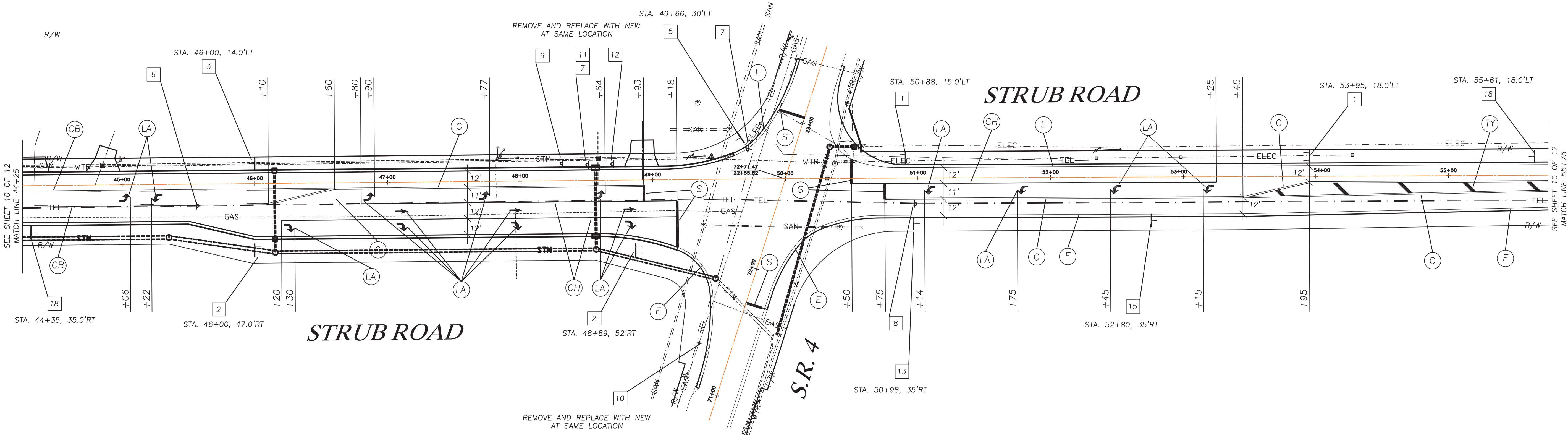
ALSO INCLUDED IN THIS ITEM SHALL BE THE INSTALLATION OF A UPS STATUS INDICATOR LAMP WITH RED LENS. THE CONTRACTOR SHALL FURNISH, INSTALL AND TEST THE UPS STATUS INDICATOR LAMP THAT ALLOWS MAINTENANCE PERSONNEL AND LAW ENFORCEMENT TO QUICKLY ASSESS WHETHER A TRAFFIC SIGNAL CABINET IS BEING POWERED BY THE UPS. A 1-INCH (25 MM) WATERPROOF NEMA 4X OR IP66 LAMP WITH A DOMED RED LENS SHALL BE USED TO INDICATE THAT THE CABINET IS OPERATING UNDER UPS BACKUP POWER (THE "BACKUP" OPERATING CONDITION). THIS LAMP SHALL BE WIRED USING MINIMUM 20GA STRANDED, INSULATED WIRE TO THE STATUS RELAY OUTPUTS OF THE UPS. THE WIRES SHALL BE TERMINATED BY LUGS AT THE DISPLAY END AND PERMANENTLY LABELED "BACKUP POWER STATUS DISPLAY", WITH WIRE POLARITY INDICATED. THIS ITEM INCLUDES PROGRAMMING THE UPS STATUS RELAY OUTPUTS TO PRODUCE THE LAMP STATUS DISPLAYS. THE STATUS DISPLAY SHALL BE SOLID 100% DUTY CYCLE (NOT FLASHING). THE LAMP SHALL BE PLACED IN THE CONTROLLER CABINET WALL (NOT THE ROOF) IN SUCH A MANNER AS TO BE 1) SEALED FROM WATER INTRUSION AND 2) VISIBLE FROM A VEHICLE AT THE STOP BAR IN THE CLOSEST LANE OF AT LEAST ONE APPROACH TO THE SIGNALIZED INTERSECTION. THE OPERATING VOLTAGE OF THE LED LAMP SHALL BE 120V AC.

PAYMENT FOR "ITEM 633-UNINTERRUPTABLE POWER SUPPLY (UPS), 1000 WATT, AS PER PLAN, WITHOUT ENCLOSURE" SHALL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH. PAYMENT SHALL BE FULL COMPENSATION FOR ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, TESTING, CERTIFICATIONS AND OTHER INCIDENTALS NECESSARY TO FURNISH THE UPS COMPLETE IN PLACE, INCLUDING ALL CONNECTIONS MADE, WIRING COMPLETE, TESTED AND ACCEPTED.

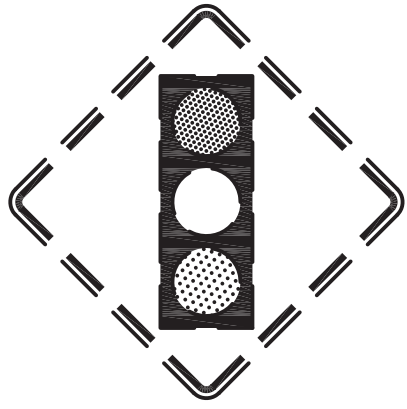
PAVEMENT MARKING LEGEND	
PROPOSED:	
(E)	EDGE LINE
(C)	CENTER LINE, DOUBLE, SOLID
(CB)	CENTER LINE, DOUBLE, SOLID & BROKEN
(CH)	CHANNELIZING LINE
(S)	STOP LINE
(TY)	TRANSVERSE LINE YELLOW
(IS)	ISLAND MARKING, YELLOW
(LA)	LANE ARROW

PROPOSED SIGNS

									
1	2	3	5	13	14	15	16	17	18
R3-H8bh 36" X 30" 7.5 sq ft QTY = 2	R3-8b 48" x 30" 10 sq ft QTY = 2	R3-9b 24x36 6 sq ft QTY = 1	R7-1LR 12x18 1.5 sq ft QTY = 2	R12-1 24x30 5 sq ft QTY = 1	R2-1 24x30 5 sq ft QTY = 1	R2-1 24x30 5 sq ft QTY = 2	R12-1 24x30 5 sq ft QTY = 1	OM2-2V 6x12 0.5 sq ft QTY = 1	M2-1 21x15 2.19 sq ft QTY = 2 M1-5 24x24 4 sq ft QTY = 2



EXST. SIGNS TO BE REMOVED

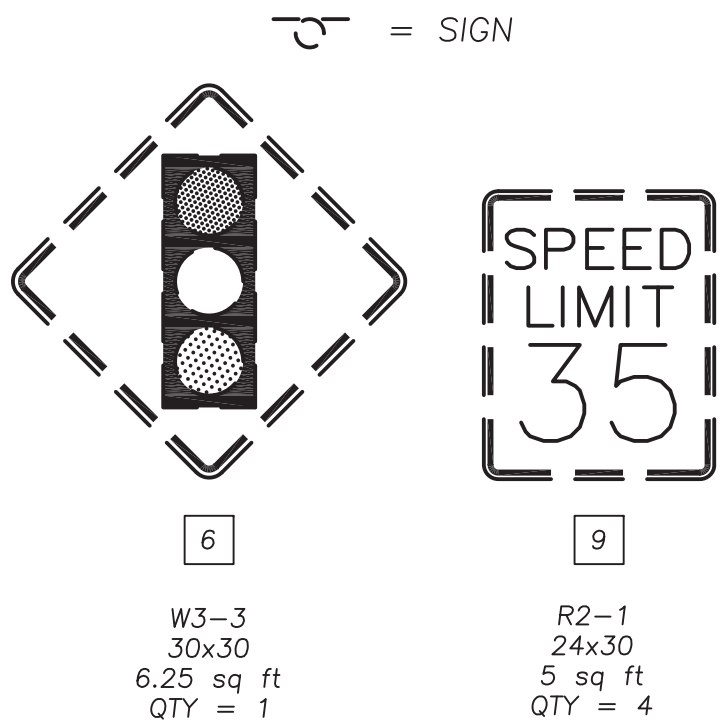
						
6	7	8	9	10	11	12
W3-3 30x30 6.25 sq ft QTY = 1	R7-1LR 12x18 1.5 sq ft QTY = 2	R12-1 24x30 5 sq ft QTY = 1	R2-1 24x30 5 sq ft QTY = 1	R2-1 24x30 5 sq ft QTY = 1	R12-1 24x30 5 sq ft QTY = 1	OM2-2V 6x12 0.5 sq ft QTY = 1

ESTIMATED QUANTITIES

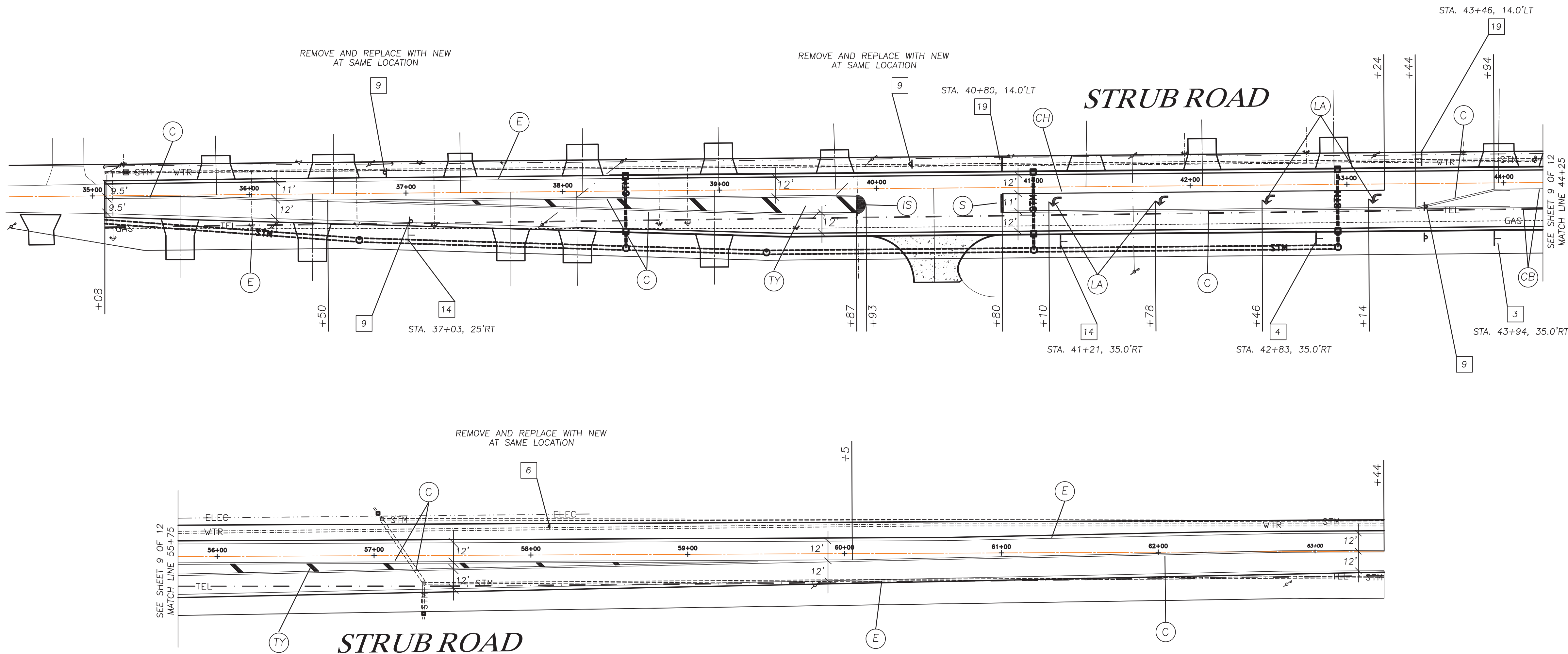
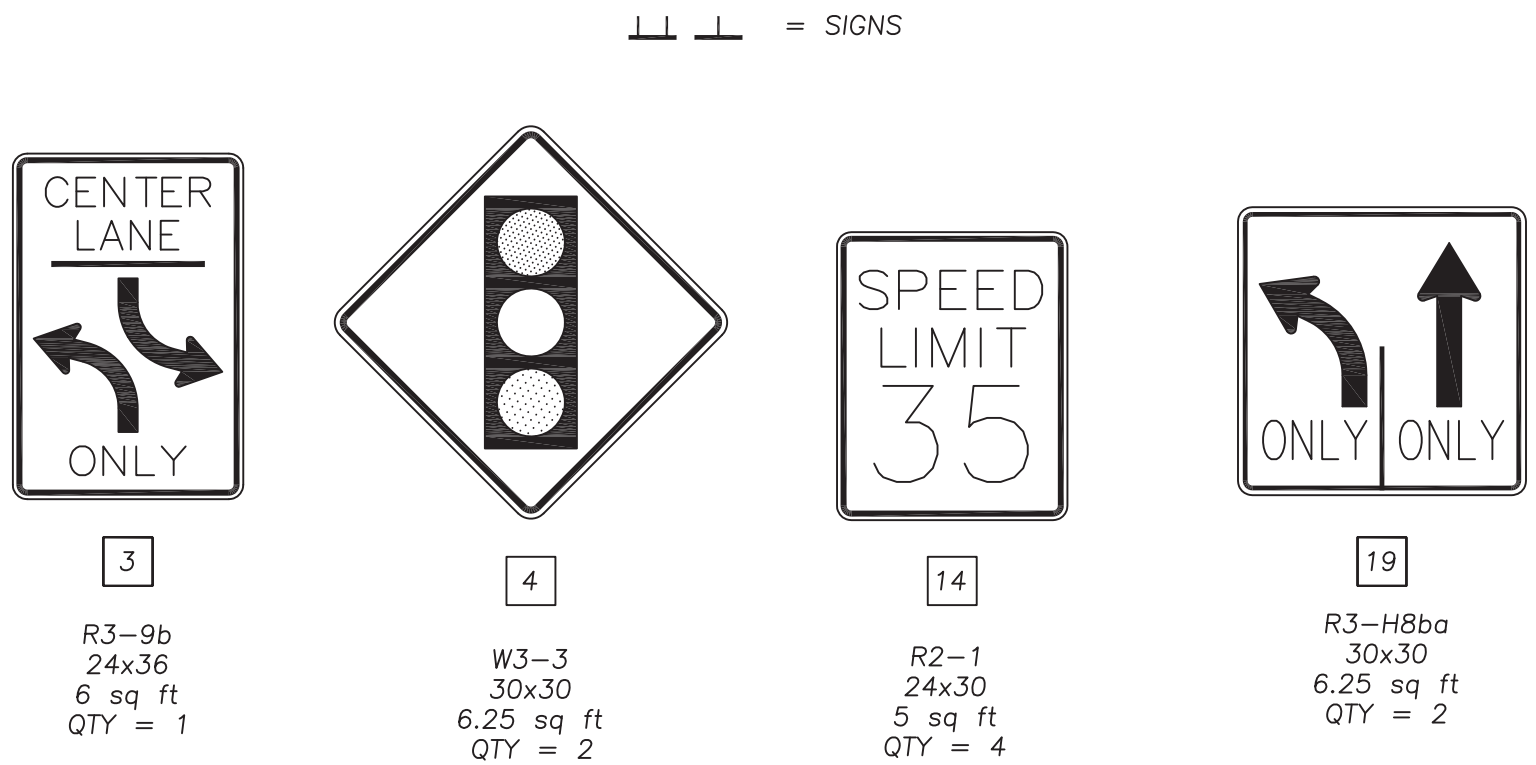
ITEM	QTY	UNIT	DESCRIPTION
630	247	FOOT	GROUND MOUNTED SUPPORT, NO. 3 POST
630	81.90	SQ FT	SIGN, FLAT SHEET
630	8	EACH	REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL
630	8	EACH	REMOVAL OF GROUND MOUNTED SIGN AND STORAGE
642	.27	MILE	EDGE LINE, TYPE 1
642	.29	MILE	CENTER LINE, TYPE 1
644	812	FOOT	CHANNELIZING LINE
644	97	FOOT	STOP LINE
644	49	FOOT	TRANSVERSE LINE YELLOW
644	16	EACH	LANE ARROW

PAVEMENT MARKING LEGEND	
PROPOSED:	
(E)	EDGE LINE
(C)	CENTER LINE, DOUBLE, SOLID
(CB)	CENTER LINE, DOUBLE, SOLID & BROKEN
(CH)	CHANNELIZING LINE
(S)	STOP LINE
(TY)	TRANSVERSE LINE YELLOW
(IS)	ISLAND MARKING, YELLOW
(LA)	LANE ARROW

EXST. SIGNS TO BE REMOVED



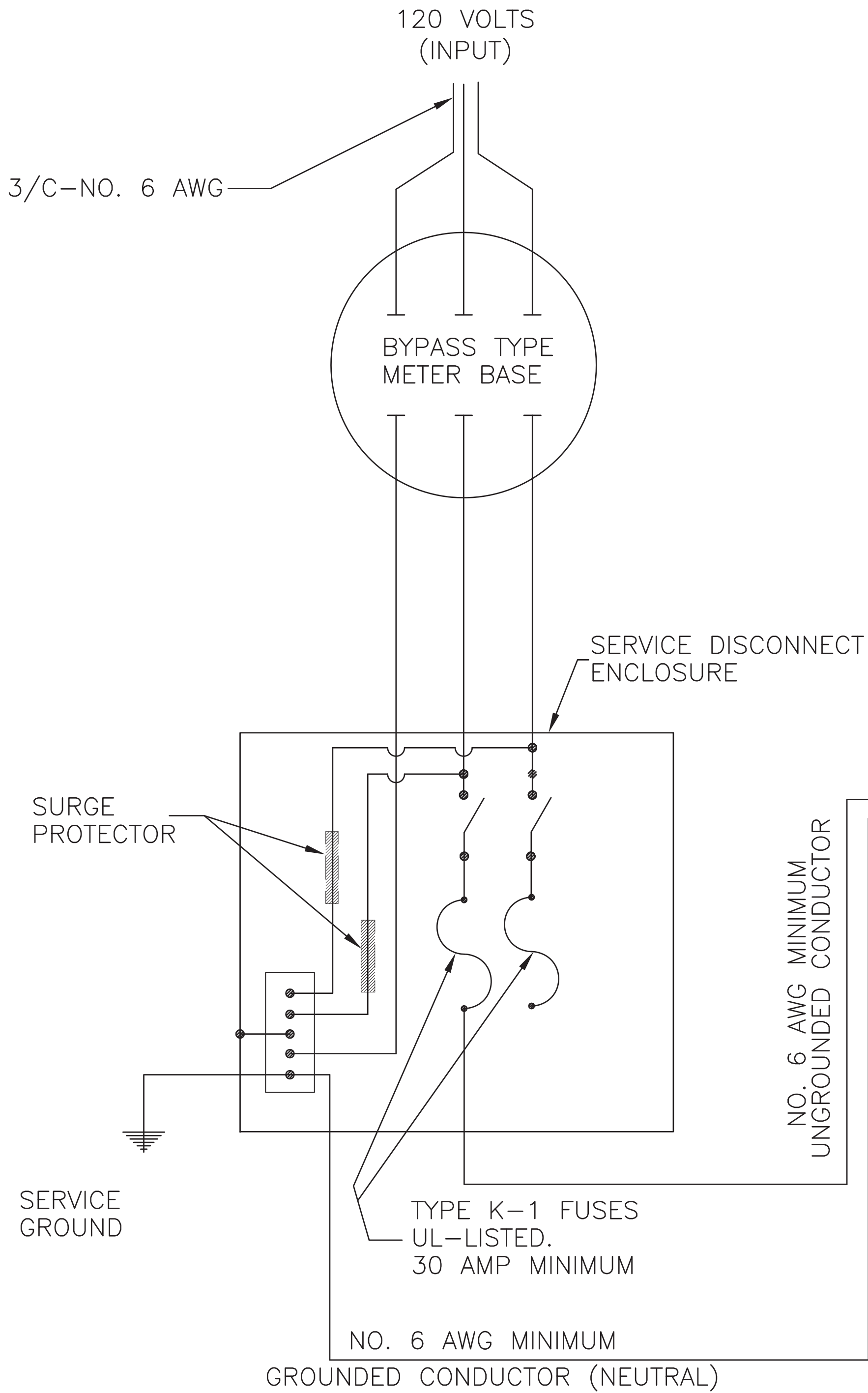
PROPOSED SIGNS



ESTIMATED QUANTITIES

ITEM	QTY	UNIT	DESCRIPTION
630	117	FOOT	GROUND MOUNTED SUPPORT, NO. 3 POST
630	51.0	SQ FT	SIGN, FLAT SHEET
630	5	EACH	REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL
630	5	EACH	REMOVAL OF GROUND MOUNTED SIGN AND STORAGE
642	.39	MILE	EDGE LINE, TYPE 1
642	.45	MILE	CENTER LINE, TYPE 1
644	244	FOOT	CHANNELIZING LINE
644	12	FOOT	STOP LINE
644	58	FOOT	TRANSVERSE LINE YELLOW
644	113	SQ FT	ISLAND MARKING
644	4	EACH	LANE ARROW

TYPICAL POWER SERVICE
WIRING DIAGRAM



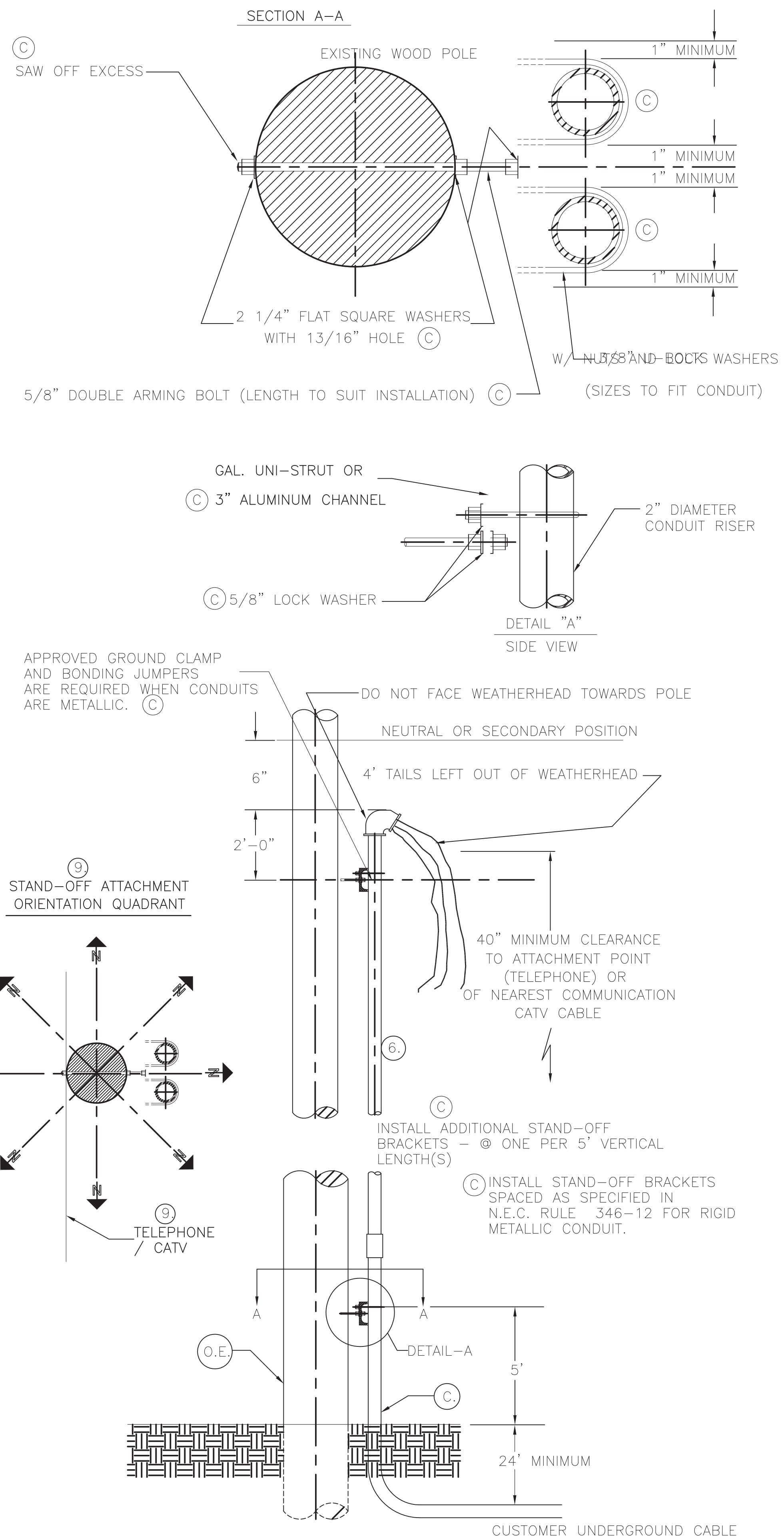
NOTE:
BYPASS METER BASE AND SERVICE DISCONNECT TO BE MOUNTED ON THE SIDE OF SIGNAL SUPPORT.

SERVICE SWITCH UL-LISTED. DPST. 30 AMP MINIMUM. IF PERMITTED BY THE UTILITY, A FUSED PULLOUT OR CIRCUIT BREAKER MAY BE USED AS THE SERVICE SWITCH.

1. THIS DRAWING IS TO BE USED AT ALL LOCATIONS SPECIFIED IN THE PLANS, WHERE "POWER SERVICE, AS PER PLAN," IS INDICATED.
2. CONTRACTOR TO NOTIFY OHIO EDISON COMPANY ENGINEERING SECTION UPON COMPLETION OF INSTALLATION AT POLE LOCATION. (419-627-6889)
3. OHIO EDISON COMPANY SHALL MAKE ALL FINAL ELECTRICAL CONNECTIONS.
4. (C) - DENOTES CUSTOMER OWNERSHIP AND INSTALLATION RESPONSIBILITIES.
5. (OE) - DENOTES OHIO EDISON OWNERSHIP AND INSTALLATION RESPONSIBILITIES.
6. OHIO EDISON TO SPECIFY DIMENSION WHEN NEUTRAL OR SECONDARY POSITION IS NOT EVIDENT (HEIGHT OF VERTICAL CONDUIT RISER).
7. SIZE AND NUMBER OF CONDUITS MAY VARY TO SUIT REQUIREMENTS, HOWEVER CHANNEL MUST NOT EXCEED 18" IN OVERALL LENGTH, AS INSTALLED ON POLE.
8. ALL CUSTOMER ATTACHMENTS (SERVICES) ON OHIO EDISON POLES ARE SUBJECTED TO OHIO EDISON COMPANY APPROVAL.
9. STAND - OFF ATTACHMENT TO BE LOCATED DIRECTLY OPPOSITE TELEPHONE AND CATV ATTACHMENT ON POLE.
10. BASED UPON THE REQUIREMENTS OF OHIO EDISON COMPANY FORM NS-204 (REV. 9/92), FABRICATED ASSEMBLY METHOD.
11. NOTICE TO CONTRACTOR, DO NOT EXTEND CONDUIT RISER AND WEATHERHEAD ABOVE THE SECONDARY OR NEUTRAL POSITION AT ANY TIME. DOING SO MAY RESULT IN SEVERE ELECTRICAL SHOCK OR EVEN DEATH.

* NOTE = USE BONDING CLAMP AT WEATHERHEAD

STANDOFF ATTACHMENT OF CUSTOMER SECONDARY SERVICE(S) IN CONDUIT ON OHIO EDISON POLES, IF REQUIRED.



SIGNAL TIMING

START-UP		DUAL ENTRY ●							
START IN: Y/R FLASH ●; ALL RED ○		REST IN RED: RING 1 ○ : RING 2 ○							
TIME FOR FLASH OR ALL RED 10		OVERLAP				A	B	C	D
FIRST PHASE (S) 2 & 6		PHASES							
COLOR DISPLAYED: GREEN●; YELLOW○									
INTERVAL OR FEATURE		PHASE NO.							
		1	2	3	4	5	6	7	8
INTERSECTION MOVEMENT (SEC.)		–	NB	–	EB	–	SB	–	WB
MINIMUM GREEN (INITIAL) (SEC.)		–	24	–	10	–	24	–	10
PASSAGE TIME (SEC.)		–	3.0	–	3.5	–	3.0	–	3.5
MAXIMUM GREEN I (SEC.)		–	43	–	27	–	43	–	27
MAXIMUM GREEN II (SEC.)		–	43	–	27	–	43	–	27
YELLOW CHANGE (SEC.)		–	5.1	–	3.1	–	5.1	–	5.1
ALL RED CLEARANCE (SEC.)		–	1.3	–	1.9	–	1.3	–	1.9
WALK (SEC.)		–	–	–	–	–	–	–	–
PEDESTRIAN CLEARANCE (SEC.)		–	–	–	–	–	–	–	–
RECALL	MAXIMUM (ON/OFF)	–	OFF	–	OFF	–	OFF	–	OFF
	MINIMUM (ON/OFF)	–	OFF	–	OFF	–	OFF	–	OFF
	PEDESTRIAN (ON/OFF)	–	OFF	–	OFF	–	OFF	–	OFF
MEMORY (ON/OFF)		–	ON	–	OFF	–	ON	–	ON
CALL TO NON-ACTUATED	NO.1		ON				ON		
	NO.2								

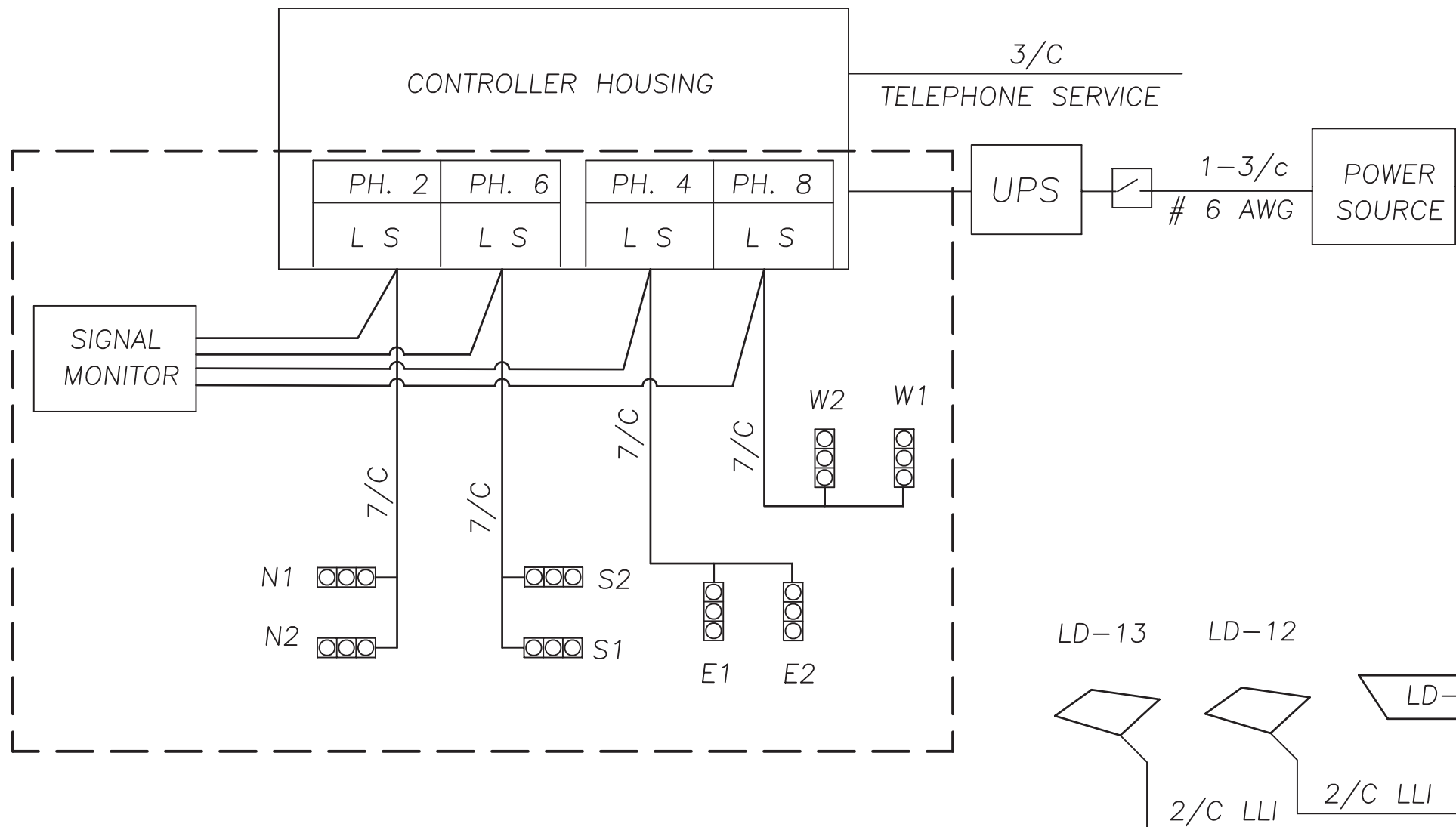
ESTIMATED QUANTITIES

ITEM	QTY	UNIT	DESCRIPTION
603	100	FOOT	4" CONDUIT, TYPE E, 707.3
625	531	FOOT	CONDUIT, 2", 725.04
625	20	FOOT	CONDUIT, 4", 725.04
625	17	FOOT	CONDUIT, JACKED OR DRILLED UNDER PAVEMENT, SIZE: 2"
625	179	FOOT	CONDUIT, JACKED OR DRILLED UNDER PAVEMENT, SIZE: 3"
625	61	FOOT	CONDUIT, JACKED OR DRILLED UNDER PAVEMENT, SIZE: 4"
625	551	FOOT	TRENCH
625	551	FOOT	PLASTIC CAUTION TAPE, AS PER PLAN
625	7	EACH	PULLBOX, 725.08, 18"
625	1	EACH	PULLBOX, 725.08, 24"
625	4	EACH	PULLBOX, REMOVED
625	4	EACH	GROUND ROD
625	1	EACH	GROUND ROD, AS PER PLAN
630	22.0	SQ FT	SIGN, FLAT SHEET
630	15.0	SQ FT	SIGN, FLAT SHEET, AS PER PLAN
630	2	EACH	SIGN HANGER ASSEMBLY, MAST ARM
630	2	EACH	SIGN HANGER ASSEMBLY, MAST ARM, AS PER PLAN
630	2	EACH	SIGN SUPPORT ASSEMBLY, POLE MOUNTED
632	8	EACH	VEHICULAR SIGNAL HEAD, WITH LED LAMP UNITS, 3 SECT., 12" LENS, 1-WAY, W/ BACKPLATE, AS AS PER PLAN
632	8	EACH	COVERING OF VEHICULAR SIGNAL HEAD, AS PER PLAN
632	15	EACH	DETECTOR LOOP
632	15	EACH	LOOP DETECTOR UNIT, DELAY & EXTENSION TYPE, AS PER PLAN
632	923	FOOT	SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG
632	190	FOOT	MESSENGER WIRE, 7 STRAND, 3/8" DIAMETER WITH ACCESSORIES
632	4191	FOOT	LOOP DETECTOR LEAD-IN CABLE
632	95	FOOT	POWER CABLE, 3 CONDUCTOR, NO. 6 AWG
632	2	EACH	CONDUIT RISER, 2" DIAMETER
632	1	EACH	POWER SERVICE, AS PER PLAN
632	1	EACH	REMOVAL OF TRAFFIC SIGNAL INSTALLATION, AS PER PLAN
632	1	EACH	SIGNAL SUPPORT, TYPE TC-81.21 DES. 3, AS PER PLAN
632	1	EACH	SIGNAL SUPPORT, TYPE TC-81.21 DES. 4, AS PER PLAN
632	1	EACH	SIGNAL SUPPORT, TYPE TC-81.21 DES. 11, AS PER PLAN
632	1	EACH	SIGNAL SUPPORT, TYPE TC-81.21 DES. 13, AS PER PLAN
632	1	EACH	SIGNAL SUPPORT FOUNDATION
633	1	EACH	CONTROLLER UNIT, TYPE TS2/A2, WITH CABINET TYPE TS1, AS PER PLAN
633	1	EACH	TELEPHONE SERVICE
633	1	EACH	UNINTERRUPTABLE POWER SUPPLY (UPS), AS PER PLAN
633	1	EACH	CABINET RISER
633	1	EACH	CABINET FOUNDATION
633	1	EACH	CONTROLLER WORK PAD
614	-	LUMP	MAINTAINING TRAFFIC
623	-	LUMP	CONSTRUCTION LAYOUT STAKES

ALTERNATE BID ITEM

633	3	EACH	CONTROLLER, MISC.: ADVANCE/DILEMMA ZONE DETECTION SYSTEM
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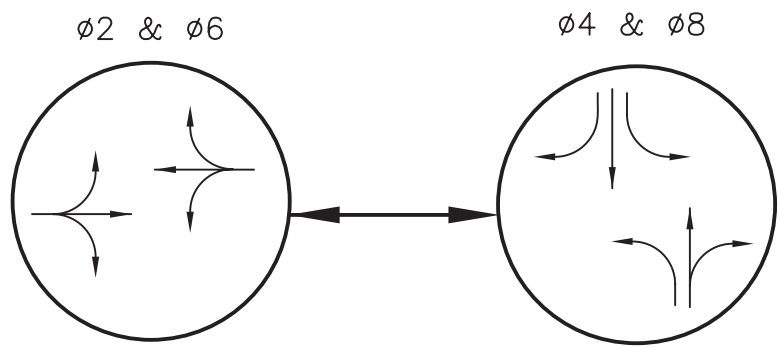
SIGNAL APPROACH MONITORING DIAGRAM



FIELD WIRING HOOK-UP CHART

SIGNAL HEAD	INDICATION	TERMINAL	FLASH	SIGNAL HEAD	INDICATION	TERMINAL	FLASH
N1 (NB)	R	ø2 R	Y	W1 (WB)	R	ø8 R	R
	Y	ø2 Y			Y	ø8 Y	
	G	ø2 G			G	ø8 G	
N2 (NB)	R	ø2 R	Y	W2 (WB)	R	ø8 R	R
	Y	ø2 Y			Y	ø8 Y	
	G	ø2 G			G	ø8 G	
S1 (SB)	R	ø6 R	Y	E1 (EB)	R	ø4 R	R
	Y	ø6 Y			Y	ø4 Y	
	G	ø6 G			G	ø4 G	
S2 (SB)	R	ø6 R	Y	E2 (EB)	R	ø4 R	R
	Y	ø6 Y			Y	ø4 Y	
	G	ø6 G			G	ø4 G	

PHASING DIAGRAM

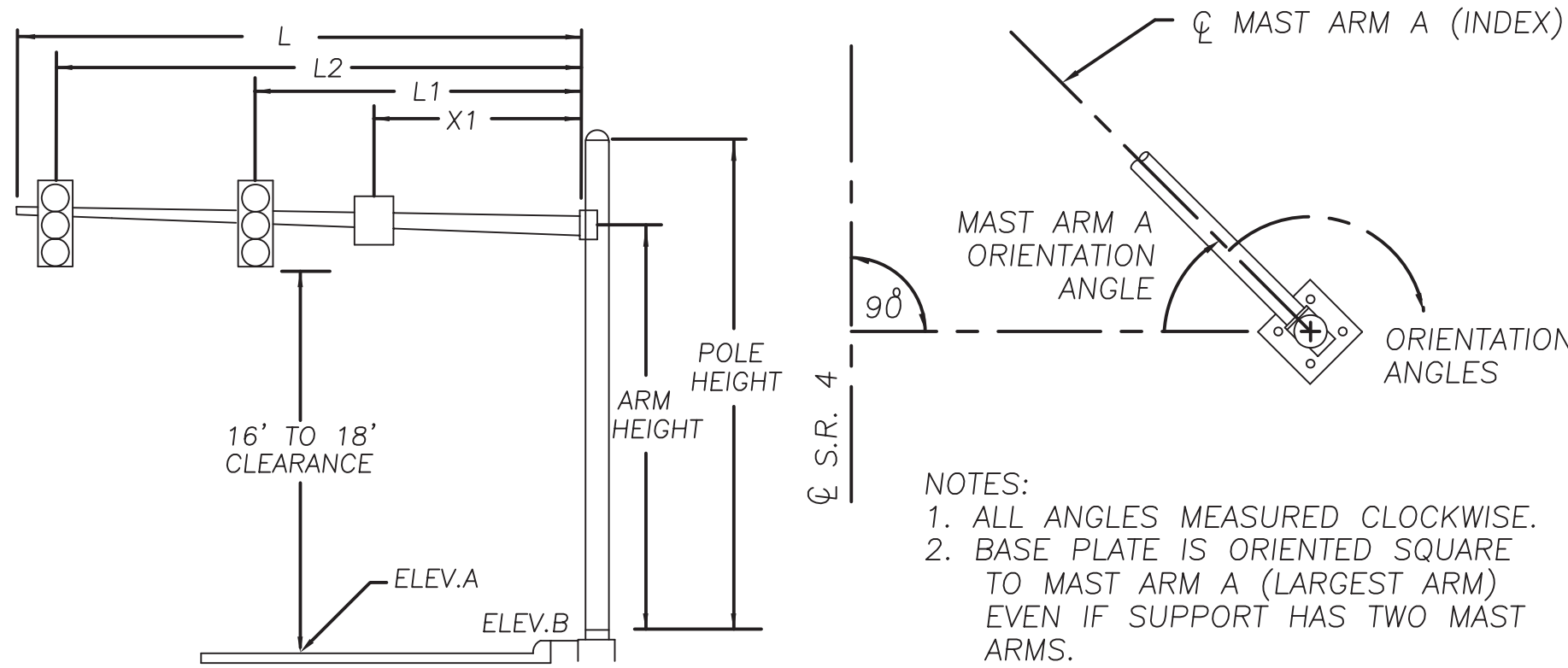


LOOP DETECTOR CHART

LOOP #	SIZE	TYPE	MODE	DELAY	AMP #	PHASE
LD-1	6' x 30'	POWERHEAD	PRESENCE	8*	1	4
LD-2	6' x 30'	POWERHEAD	PRESENCE		2	4
LD-3	6' x 30'	POWERHEAD	PRESENCE	8*	3	4
LD-4	6' x 30'	POWERHEAD	PRESENCE		4	CALL 6
LD-5	4.5'	ADD	PULSE		5	EXTEND 6
LD-6	4.5'	ADD	PULSE		6	EXTEND 6
LD-7	6' x 30'	POWERHEAD	PRESENCE	8*	7	CALL 8
LD-8	6' x 30'	POWERHEAD	PRESENCE	3*	8	8
LD-9	4.5'	ADD	PULSE		9	EXTEND 8
LD-10	4.5'	ADD	PULSE		10	EXTEND 8
LD-11	6' x 30'	POWERHEAD	PRESENCE		11	CALL 2
LD-12	4.5'	ADD	PULSE		12	EXTEND 2
LD-13	4.5'	ADD	PULSE		13	EXTEND 2
LD-14	6' x 22'	RECTANGLE	PULSE	8*	14	CALL 8
LD-15	6' x 22'	RECTANGLE	PULSE	8*	15	CALL 4

* INHIBIT DELAY DURING ASSOCIATED PHASE GREEN INTERVAL

ORIENTATION ANGLES



- NOTES:
1. ALL ANGLES MEASURED CLOCKWISE.
 2. BASE PLATE IS ORIENTED SQUARE TO MAST ARM A (LARGEST ARM) EVEN IF SUPPORT HAS TWO MAST ARMS.

SUPPORT NO.	SIGNAL SUPPORT											ELEVATION		ORIENTATION ANGLES (DEG.) FROM MAST ARM "A"					
	POLE DESIGN NO.		ARM DESIGN NO.	POLE HEIGHT (FT)	ARM HEIGHT (FT)	FOUNDATION		L (FT.)	L 1 (FT.)	L 2 (FT.)	X 1 (FT.)	X 2 (FT.)	MAST ARM A ANGLE (DEG.)	A	B	MAST ARM B	PEDESTRIAN SIGNALS	PEDESTRIAN PUSHBUTTONS	HANDHOLE
	TC-81.21	TC-12.30				STATION	OFFSET												
SS-1	13		13	25	21.5	71+86.7	50.8'L	50	38	49	19		345	617.33	615.78	--	--	--	180
SS-2	3		3	23	19.5	22+62.7	54.8'L	28	15	25	0	22	75	616.05	616.71	--	--	--	180
SS-3	11		11	23	19.5	23+00.8	41.6'R	41	30	40	15		345	617.98	617.00	--	--	--	180
SS-4	4		4	25	21.5	72+31.7	42.0'R	34	23	31	0	28	75	617.50	615.00	--	--	--	180



CALCULATED
CHECKED

TMS ENGINEERS INC.
4547 HUDSON DRIVE
STOW, OHIO 44224
(330) 666-6402 (330) 666-6417 FAX

TRAFFIC DETAIL PLAN - STRUB ROAD

STRUB ROAD / S.R. 4
INTERSECTION IMPROVEMENTS

LEGEND	
EXISTING	PROPOSED
	CURB & GUTTER
	EDGE OF PAVEMENT
	FUTURE ROADWAY
	PEDESTRIAN PUSHBUTTON
	PEDESTRIAN SIGNAL
	SIGNAL HEAD (PLAN)
	LOOP DETECTOR
	CONTROL CABINET
	PULL BOX (CONCRETE)
	OVERHEAD SIGN
	GROUND SIGN
	SIGNAL POLE

STA. 71+04.0, 18.5' RT.
PB-12
EXST. PULLBOX

STA. 71+04.0, 29.2' RT.
REMOVE EXIST. WOOD POLE

STA. 71+74.4, 21.8' RT.
PB-11
PROP. 18" PULL BOX

STA. 72+31.7, 42.0' RT.
SS-4
PROP. SIGNAL SUPPORT, TYPE
TC-81.21 DES. 4, 34' ARM W/
PEDESTRIAN SIGNAL AND
PUSHBUTTON

STA. 72+41.8, 43.6' RT.
PB-10
PROP. 18" PULL BOX

STA. 50+81.2, 32.7' RT.
PB-16
PROP. 18" PULL BOX

NOTE:
ALL EXISTING OVERHEAD LLI CABLE TO BE
REMOVED BY CONTRACTOR. THIS ITEM OF WORK SHALL
BE INCLUDED IN ITEM 632 REMOVAL OF TRAFFIC SIGNAL
INSTALLATION.

NOTE:
ALL UNDERGROUND UTILITIES SHOWN ON THIS PLAN
HAVE BEEN DRAWN FROM RECORD INFORMATION AND
OR FROM UTILITY COMPANY LOCATIONS, AND SHOULD
BE CONSIDERED APPROXIMATE.

PROP. STREET NAME SIGNS

②

Strub Rd.

60" x 18"
QTY = 2

(WHITE TEXT / GREEN BACKGROUND)

PROPOSED SIGNS

R10-12
24" X 30"
QTY = 2

③

LEFT TURN
YIELD
ON GREEN

M1-5-1
24" X 24"
QTY = 2

M6-4
24" X 12"
QTY = 2

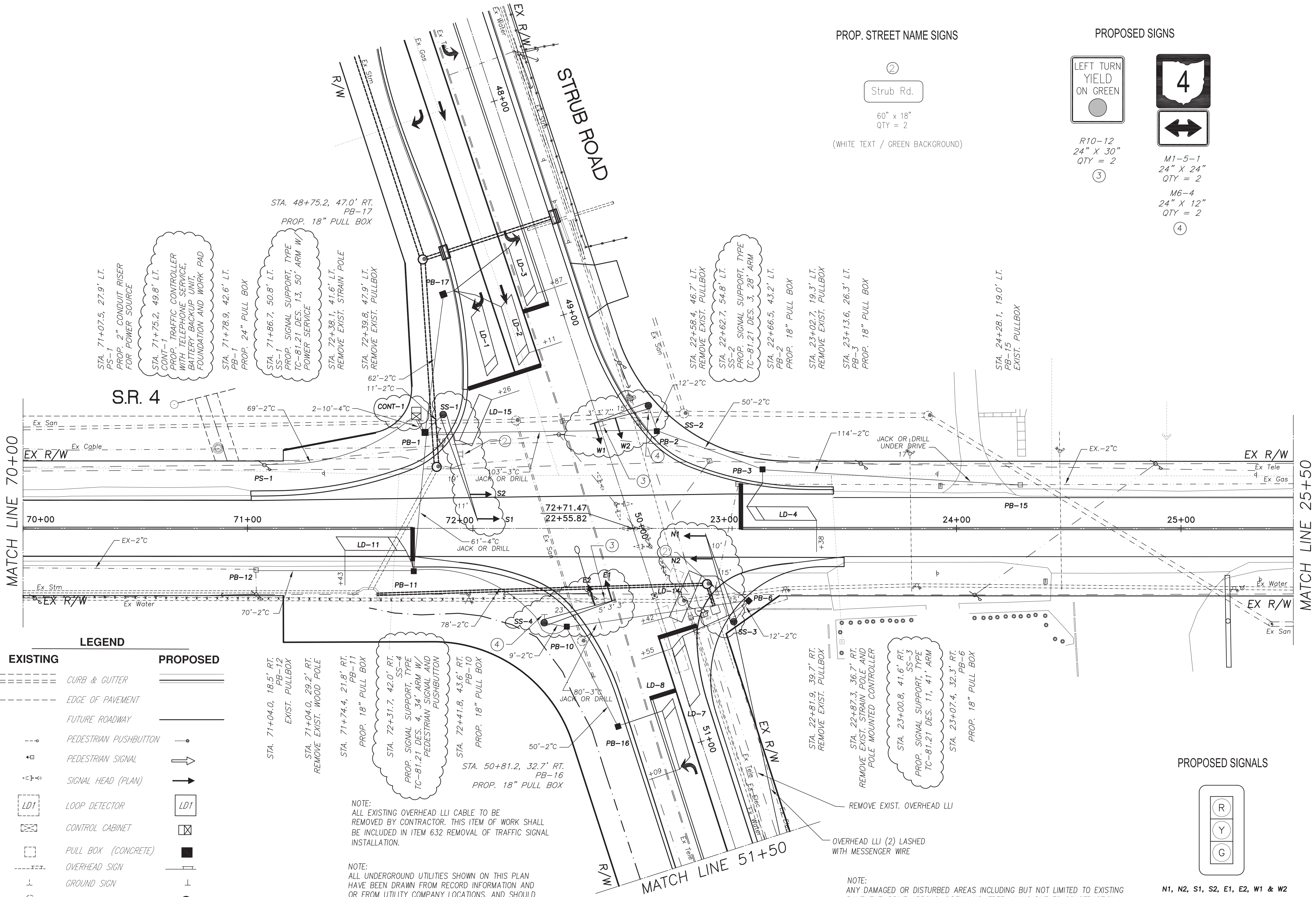
④

PROPOSED SIGNALS

N1, N2, S1, S2, E1, E2, W1 & W2

ALL HEADS ARE 12" WITH LED LAMP UNITS
WITH BACKPLATES.

NOTE:
ANY DAMAGED OR DISTURBED AREAS INCLUDING BUT NOT LIMITED TO EXISTING
PAVEMENT, DRIVE APRONS, SIDEWALKS, TREE LAWNS DUE TO CONSTRUCTION
SHALL BE REPLACED IN KIND AS DIRECTED BY THE ENGINEER. COST WILL BE
INCLUDED IN THE PRICES BID FOR OTHER ITEMS OF WORK.



80
93

STRUB ROAD / S.R. 4
INTERSECTION IMPROVEMENTS

TRAFFIC CONTROL PLAN - STRUB ROAD

TMS ENGINEERS INC.
4547 HUDSON DRIVE
STOW, OHIO 44224
(330) 686-6402 (330) 686-6417 FAX

CALCULATED
CHECKED

0 20 40
HORIZONTAL
SCALE IN FEET

LEGEND	
EXISTING	PROPOSED

