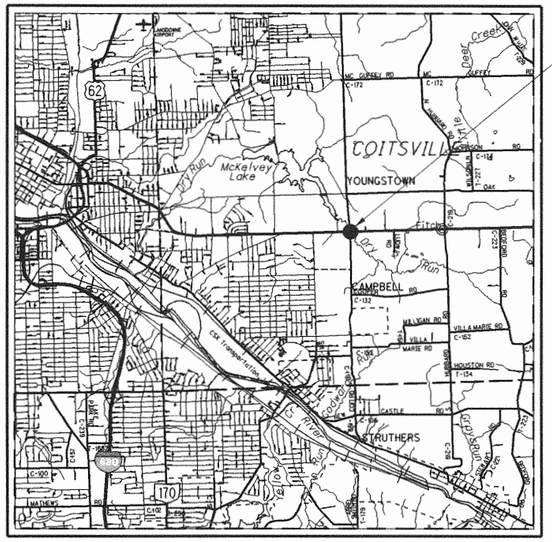

LOCATION MAP

LATITUDE: N41°05'25" LONGITUDE: W80°34'07"

SCALE IN MILES

0 1 2 3 4

N

PORTION TO BE IMPROVED _ _ _ _ _ _ _ _ _ _ _ _

INTERSTATE HIGHWAY _ _ _ _ _ _ _ _ _ _ _ _ _ _

STATE & FEDERAL ROUTES _ _ _ _ _ _ _ _ _ _ _ _

COUNTY & TOWNSHIP ROADS _ _ _ _ _ _ _ _ _ _ _ _

OTHER ROADS _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

MAH-422/616-7.54/5.86

COITSVILLE TOWNSHIP
CITY OF YOUNGSTOWN
MAHONING COUNTY

PROJECT DESCRIPTION

REPLACEMENT OF STRUCTURE MAH-422-0756 AND STRUCTURE MAH-616-0588 WITH INTERSECTION IMPROVEMENTS AND A NEW TRAFFIC SIGNAL.

PROJECT EARTH DISTURBED AREA:	1.43 ACRES
ESTIMATED CONTRACTOR EARTH DISTURBED AREA:	0.25 ACRES
NOTICE OF INTENT EARTH DISTRUBED AREA:	4.90 ACRES

INDEX OF SHEETS:

2010 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.

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY AND THAT DETOURS WILL BE PROVIDED AS INDICATED ON SHEETS 9 & 11.

APPROVED _____
DATE 8-10-12 DISTRICT DEPUTY DIRECTOR

APPROVED _____
DATE _____ DIRECTOR, DEPARTMENT OF TRANSPORTATION

DESIGN DESIGNATION

	US422	SR616
CURRENT ADT (2010)	7800	6100
DESIGN YEAR ADT (2030)	9300	7200
DESIGN HOURLY VOLUME (2030)	930	720
DIRECTIONAL DISTRIBUTION	0.60	0.60
TRUCKS (24 HOUR B&C)	0.06	0.04
DESIGN SPEED	40 MPH	40 MPH
LEGAL SPEED	35 MPH	35 MPH
DESIGN FUNCTIONAL CLASSIFICATION: URBAN PRINCIPAL ARTERIAL		
NHS PROJECT	YES	NO

DESIGN EXCEPTIONS

NONE

UNDERGROUND UTILITIES

CONTACT BOTH SERVICES
CALL TWO WORKING DAYS
BEFORE YOU DIG

CALL
1-800-362-2764
(TOLL FREE)
OHIO UTILITIES PROTECTION SERVICE
NON-MEMBERS
MUST BE CALLED DIRECTLY

OIL & GAS PRODUCERS PROTECTIVE SERVICE CALL: 1-800-925-0988

ROADWAY PLANS PREPARED BY:

ODOT --- DISTRICT 4
PLANNING AND ENGINEERING
2088 SOUTH ARLINGTON ROAD
AKRON, OHIO 44306

MAH-422-0756 STRUCTURE PLANS PREPARED BY:

HNTB OHIO, INC.
1100 SUPERIOR AVENUE
SUITE 1330
CLEVELAND, OHIO 44114

MAH-616-0588 STRUCTURE PLANS PREPARED BY:

BARR & PREVOST
2800 CORPORATE EXCHANGE DRIVE
SUITE 240
COLUMBUS, OHIO 43231

ENGINEERS SEAL:
STRUCTURE SHEETS 49-62
STATE OF OHIO · RICHARD S. BLOCH E-68517 · REGISTERED PROFESSIONAL ENGINEER
SIGNED: Richard S. Bloch
DATE: 07/16/2012

ENGINEERS SEAL:
STRUCTURE SHEETS 63-77
STATE OF OHIO · JAMES E. PREVOST E-64055 · REGISTERED PROFESSIONAL ENGINEER
SIGNED: James E. Prevost
DATE: 07-16-2012

ENGINEERS SEAL:
ROADWAY SHEETS 1-48
STATE OF OHIO · LAUREN M. PHILLIS E-75639 · REGISTERED PROFESSIONAL ENGINEER
SIGNED: Lauren M. Phillis
DATE: 8-9-12

STANDARD CONSTRUCTION DRAWINGS

BP-3.1	4/20/12	DM-4.1	7/20/12			TC-21.20	4/15/11	HL-30.11	10/16/09
BP-4.1	7/16/04	DM-4.3	7/20/12			TC-41.20	1/19/01	HL-30.22	4/17/09
BP-5.1	7/28/00	DM-4.4	7/20/12			TC-42.20	1/21/11		
BP-7.1	10/15/10			MT-101.60	7/20/12	TC-52.10	1/19/07		
		GR-1.1	7/20/12	MT-105.10	7/20/12	TC-52.20	1/19/07		
CB-2.1	7/20/12	GR-2.1	7/20/12	MT-110.10	7/20/12	TC-71.10	1/21/11		
CB-2.2	7/20/12	GR-3.1	7/20/12			TC-73.10	4/20/12		
		GR-5.2	4/16/10	WQ-1.3	7/20/12	TC-81.10	10/21/11		
HW-2.1	7/20/12	GR-5.3	4/16/10			TC-82.10	1/21/11		
HW-2.2	7/20/12					TC-83.10	1/19/07		
		AS-1-81	7/19/02			TC-84.20	1/21/11		
MH-1.2	7/20/12	BR-2-98	7/20/12			TC-85.10	10/16/09		
		CPA-1-08	7/15/08						
DM-1.1	7/20/12	CPP-1-08	7/18/08						
DM-1.4	7/15/11	CS-1-08	7/18/08						
DM-3.1	7/20/12	CB-1-08	7/18/08						

SUPPLEMENTAL SPECIFICATIONS

800-2010	7/20/12
805	7/16/10
832	5/5/09
835	4/18/08

SPECIAL PROVISIONS

WPC	10/26/10

FEDERAL PROJECT NO. E060(983)

PID NO. 77871

CONSTRUCTION PROJECT NO.

RAILROAD INVOLVEMENT NONE

MAH-422/616-7.54/5.86

1/81

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UNDERGROUND UTILITIES

THE FOLLOWING UTILITIES AND OWNERS ARE LOCATED WITHIN THE WORK LIMITS OF THIS PROJECT:

SEE SHEET 5 FOR UTILITY CONTACTS

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 COSTS 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 AND ASSOCIATED EQUIPMENT & DETECTOR UNITS.

CUSTOMARY MANUFACTURER'S GUARANTEES FOR THE FOREGOING ITEMS SHALL BE TURNED OVER TO THE CITY OF YOUNGSTOWN 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.

NOTIFICATION

THE CONTRACTOR SHALL GIVE THE CITY ENGINEER 330-742-8800, 10 WORKING DAYS NOTICE PRIOR TO THE NEW SIGNAL AT SR 422 & SR 616 BEING PLACED IN OPERATION.

THE SIGNAL INSTALLATIONS SHALL BE INSPECTED BY THE CITY OF YOUNGSTOWN ENGINEERING DEPARTMENT. ALL DEFICIENCIES SHALL BE CORRECTED BY THE CONTRACTOR & APPROVED BY THE CITY OF YOUNGSTOWN.

MAINTENANCE OF TRAFFIC SIGNAL/FLASHER INSTALLATION

THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING TRAFFIC SIGNAL INSTALLATIONS ONCE THE SIGNAL HAS BEEN AFFECTED, WITHIN THE PROJECT UNDER THE FOLLOWING CONDITIONS:

A) EXISTING SIGNAL/FLASHER INSTALLATIONS WHICH THE PLANS REQUIRE THE CONTRACTOR TO ADJUST, MODIFY, ADD ONTO OR REMOVE, OR WHICH THE CONTRACTOR ACTUALLY ADJUSTS, MODIFIES OR OTHERWISE DISTURBS INCLUDING DAMAGE DUE TO UTILITY RELOCATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ENTIRE INSTALLATION AT AN INTERSECTION FROM THE TIME THE INSTALLATION IS FIRST DISTURBED, WHETHER FROM UTILITY WORK OR FROM THE CONTRACTOR UNTIL THE INSTALLATION HAS BEEN SUBSEQUENTLY REMOVED OR MODIFIED AND THE WORK IS ACCEPTED.

B) NEW OR REUSED SIGNAL/FLASHER INSTALLATIONS OR DEVICES, INSTALLED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF THESE FROM THE TIME OF INSTALLATION UNTIL THE WORK IS ACCEPTED.

THE CONTRACTOR SHALL CORRECT AS QUICKLY AS POSSIBLE ALL OUTAGES OR MALFUNCTIONS. AT THE PRE-CONSTRUCTION MEETING, THE CONTRACTOR SHALL PROVIDE THE MAINTAINING AGENCY AND THE PROJECT ENGINEER SUCH ADDRESSES AND PHONE NUMBERS WHERE HIS MAINTENANCE FORCES CAN BE CONTACTED. THE CONTRACTOR SHALL PROVIDE ONE OR MORE PERSONS TO RECEIVE ALL CALLS AND DISPATCH THE NECESSARY MAINTENANCE FORCES TO CORRECT OUTAGES. SUCH A PERSON OR PERSONS 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 A DAY, 7 DAYS A WEEK. THE CONTRACTOR SHALL HAVE THE MALFUNCTION CORRECTED AND/OR REPAIRED TO THE SATISFACTION OF THE ENGINEER WITHIN EIGHT HOURS OF THE NOTIFICATION OR LIQUIDATED DAMAGES OF $500 PER HOUR SHALL BE ASSESSED THE CONTRACTOR.

ALL LAMP OUTAGES, CABLE OUTAGES, ELECTRICAL FAILURES, EQUIPMENT MALFUNCTIONS AND MISALIGNED SIGNAL HEADS SHALL BE CORRECTED TO THE SATISFACTION OF THE PROJECT ENGINEER WITH THE SIGNAL BACK IN SERVICE WITHIN FOUR HOURS AFTER THE CONTRACTOR HAS BEEN NOTIFIED OF THE OUTAGES

IN THE EVENT NEW SIGNALS ARE DAMAGED PRIOR TO ACCEPTANCE, ALL DAMAGED EQUIPMENT EXCEPT POLES AND CONTROL EQUIPMENT SHALL BE REPLACED BY THE CONTRACTOR TO THE SATISFACTION OF THE PROJECT ENGINEER WITH THE SIGNAL BACK IN SERVICE WITHIN EIGHT HOURS AFTER THE CONTRACTOR IS NOTIFIED OF THE OUTAGE. THE CONTRACTOR SHALL ARRANGE FOR FULL TRAFFIC CONTROL UNTIL THE SIGNAL IS BACK IN OPERATION.

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

NONE OF THE ABOVE SHALL BE CONSTRUED AS COLLECTIVE OR CONSECUTIVE OUTAGE TIME PERIODS AT ANY ONE LOCATION. THAT IS, WHERE MORE THAN ONE OUTAGE OCCURS AT ANY ONE LOCATION, THEN THE ALLOTTED TIME LIMIT SHALL BE FOR THE WORST SINGLE OUTAGE.

WHERE OUTAGES ARE THE DIRECT RESULT OF A VEHICLE ACCIDENT THE RESPONSE OF THE CONTRACTOR SHALL BE AS OUTLINED ABOVE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COLLECTION OF ANY COMPENSATION FOR THIS WORK FROM THOSE PARTIES RESPONSIBLE FOR THE DAMAGES AS PER 107.15.

WHERE THE CONTRACTOR HAS FAILED TO, OR CANNOT RESPOND TO, AN OUTAGE OR SIGNAL EQUIPMENT MALFUNCTION, AT THESE LOCATIONS WITHIN HIS RESPONSIBILITY, WITHIN PERIODS AS SPECIFIED ABOVE, THE PROJECT ENGINEER MAY INVOKE THE PROVISIONS OF SECTION 105.15 AND ANY SUBSEQUENT BILLINGS TO THE STATE FOR POLICE SERVICES AND MAINTENANCE SERVICES BY STATE OR VILLAGE FORCES SHALL BE DEDUCTED FROM MONEYS DUE OR TO BECOME DUE THE CONTRACTOR IN ACCORDANCE WITH PROVISIONS OF SECTION 105.15. IN ADDITION TO THESE BILLINGS, THE CONTRACTOR SHALL BE ASSESSED LIQUIDATED DAMAGES OF $500/HOUR FOR EACH HOUR BEYOND THE ALLOWED EIGHT HOUR PERIOD THAT THE SIGNAL IS INOPERATIVE.

THE CONTRACTOR SHALL PROVIDE THE MAINTENANCE SERVICES ENTIRELY WITH HIS FORCES OR HE MAY CHOOSE TO ENTER INTO A MUTUALLY ACCEPTABLE AGREEMENT WITH THE LOCAL MAINTAINING AGENCY TO PROVIDE THE MAINTENANCE.

THE CONTRACTOR SHALL INFORM THE PROJECT ENGINEER, IN WRITING, OF THE MAINTENANCE METHOD SELECTED.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO ANY TRAFFIC SIGNAL COMPONENTS REQUIRED TO BE HANDLED DURING THE RELOCATION OF POLES AND REVISIONS TO THE SIGNAL SYSTEM.

WHEN A TRAFFIC SIGNAL MUST BE TAKEN OUT OF SERVICE BY THE CONTRACTOR, DUE TO CONSTRUCTION PROCEDURES, THIS OUTAGE SHALL NOT EXCEED FOUR HOURS AND SHALL NOT INCLUDE THE HOURS OF 6:00AM TO 8:00AM AND 4:00PM TO 6:00PM. ANY SIGNALIZED INTERSECTION, WHERE THE SIGNAL IS OUT OF SERVICE DUE TO CONSTRUCTION PROCEDURES, OR DUE TO AN OUTAGE OR MALFUNCTION OF EQUIPMENT AS DESCRIBED ABOVE, SHALL BE PROTECTED, BY OFF-DUTY POLICE, HIRED BY THE CONTRACTOR.

ANY VEHICULAR TRAFFIC SIGNAL HEAD, EITHER NEW OR EXISTING WHICH WILL BE OUT OF OPERATION SHALL BE COVERED, AS DESCRIBED IN 632.25.

THE CONTRACTOR SHALL 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 REASON FOR THE MALFUNCTION AND PROBABILITY OF REOCCURRENCE; AND 5. TIME OF COMPLETION OF REPAIR AND SYSTEM RESTORED TO FULL SERVICE. A COPY OF THESE RECORDS SHALL BE PROVIDED TO THE ENGINEER WITHIN THREE (3) WORKING DAYS FOLLOWING COMPLETION OF EACH REPAIR.

ALL COSTS RESULTING FROM THE ABOVE REQUIREMENTS SHALL BE CONSIDERED TO BE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 614 - MAINTAINING TRAFFIC.

ITEM 614 - MAINTAINING TRAFFIC

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH 614 AND OTHER APPLICABLE PORTIONS OF THE SPECIFICATIONS, AS WELL AS THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, CURRENT EDITION, LATEST REVISION.

LENGTH AND DURATION OF LANE CLOSURE AND RESTRICTIONS SHALL BE AT THE APPROVAL OF THE ENGINEER. IT IS THE INTENT TO MINIMIZE THE IMPACT TO THE TRAVELING PUBLIC. LANE CLOSURES OR RESTRICTIONS OVER SEGMENTS OF THE PROJECT IN WHICH NO WORK IS ANTICIPATED WITHIN A REASONABLE TIME FRAME, AS DETERMINED BY THE ENGINEER, SHALL NOT BE PERMITTED. THE LEVEL OF UTILIZATION OF MAINTENANCE OF TRAFFIC DEVICES SHALL BE COMMENSURATE WITH THE WORK IN PROGRESS.

IF IT IS NECESSARY TO STOP ALL TRAFFIC FOR THE ERECTION OF SPAN WIRE, THE WORK SHALL BE SO ARRANGED THAT THE STOPPAGE IS LESS THAN TEN (10) MINUTES IN ANY ONE (1) THIRTY (30) MINUTE PERIOD. NO STOPPAGE OF TRAFFIC SHALL OCCUR FOR THE ERECTION OF SIGNAL SUPPORTS, CUTTING AND INSTALLING LOOP DETECTOR WIRE, OR HANGING SPAN WIRE AND SIGNAL HEADS, WITHOUT A LAW ENFORCEMENT OFFICER WITH A PATROL CAR AT THE SITE FOR ASSISTANCE IN CONTROLLING TRAFFIC. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE THE SERVICES AND SCHEDULING OF SAID LAW ENFORCEMENT OFFICER WITH PATROL CAR.

THE CONTRACTOR SHALL FURNISH AND MAINTAIN ALL FLAGS, FLAGGERS, WATCHERS, BARRICADES, SIGNS, SIGN SUPPORTS AND INCIDENTALS RELATED TO TRAFFIC CONTROL.

SIGNS FURNISHED SHALL BE IN NEW OR LIKE NEW CONDITIONS. LIKE NEW SIGNS SHALL BE SUBJECT TO THE APPROVAL OF THE PROJECT ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE AT ALL TIMES FOR PROVIDING AND MAINTAINING LIGHTS, SIGNS, AND BARRICADES FOR THE MAINTENANCE OF TRAFFIC AND SAFETY OF HIS/HER WORK AT THE LOCATIONS SHOWN ON THESE PLANS OR AS DIRECTED BY THE ENGINEER.

TWO-WAY TRAFFIC ON A MINIMUM OF TWO 11-FOOT LANES SHALL BE MAINTAINED BY USE OF THE EXISTING PAVEMENT.

NO LANE CLOSURE SHALL BE IMPLEMENTED DURING THE HOURS OF 6:00am TO 9:00am OR 4:00pm TO 6:00pm WEEKDAYS. ALL ADVANCE WARNING SIGNS FOR ANY CONDITION WHICH RESTRICTS TRAFFIC SHALL BE ERECTED BEFORE ANY SUCH RESTRICTION IS PUT INTO EFFECT. ALL SUCH SIGNS SHALL BE COVERED OR REMOVED FROM THE VIEW OF TRAFFIC WHEN THEY ARE NOT APPLICABLE, AS DETERMINED BY THE ENGINEER. FOR WORK WHICH IS CONFINED TO THE SHOULDER, TRAFFIC CONTROL SHALL CONFORM TO PLATES 6H-1, 6H-3 AND 6H-4 OF THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (OMUTCD).

IF THE CONTRACTOR FAILS TO COMPLY WITH THE PROVISIONS FOR TRAFFIC CONTROL AS SET FORTH IN THESE PLANS AND PROVISIONS OF THE OMUTCD AND THE FAILURE RESULTS IN A CONDITION AT THE WORK SITE WHICH IS UNSAFE FOR TRAFFIC, THE ENGINEER SHALL SUSPEND WORK UNTIL THE CONTRACTOR COMPLIES WITH THE NECESSARY REQUIREMENTS.

CALCULATED RMB CHECKED

SIGNAL NOTES

MAH-422/616-7.54/5.86

ITEM 625 PULL BOX, 725.08, AS PER PLAN

ENSURE THAT THE PORTLAND CONCRETE PULL BOX IS CONSTRUCTED OF REINFORCED PORTLAND CEMENT CONCRETE. WHEN THE BOX IS PRECAST, ONLY PROVIDE PULL BOXES FROM SUPPLIERS CERTIFIED TO SUPPLEMENT 1073. ENSURE THAT THE PULL BOX COVER IS CONSTRUCTED ACCORDING TO 725.08 AND AS SHOWN ON THE PLANS.

FURNISH METAL PULL BOX COVERS THAT CONFORM TO THE FOLLOWING REQUIREMENTS:

1. FURNISH 1/4-INCH (6mm) THICK STEEL PLATE FOR THE STEEL COVER CONFORMING TO 711.01 WITH 1/2-INCH (13mm) MINIMUM FLANGE AROUND THE EDGE AND GALVANIZED TO CONFORM TO 711.02. DISPLAY ON THE STEEL COVER OR ON AN ATTACHED BRASS OR STAINLESS STEEL PLATE (TAG) CLEARLY LEGIBLE BLOCK LETTERS 1 INCH TO 2 INCHES (25mm-50mm) IN HEIGHT WITH THE WORD "TRAFFIC", "LIGHTING", "ELECTRIC" OR "TELEPHONE" TO DESIGNATE THE CIRCUIT(S) CONTAINED. ENSURE THAT THE WORD DESIGNATING THE USE IS IN RAISED LETTERS THAT ARE EITHER INTEGRAL TO THE STEEL COVER OR INTEGRAL TO A BRASS OR STAINLESS STEEL PLATE 1/16-INCH (1.6mm) IN THICKNESS SECURELY MECHANICALLY ATTACHED TO THE STEEL COVER AT THE FOUR CORNERS OF THE TAG AND AT INTERVALS 2 - 3 INCHES (50 - 75mm) ALONG THE PERIMETER BETWEEN CORNERS.

2. FURNISH GRAY IRON OR DUCTILE IRON WITH A MINIMUM THICKNESS OF 3/8-INCH (9mm) CONFORMING TO ASTM A 48 OR ASTM 536. CERTIFICATION IS REQUIRED. ENSURE THAT THE WORD "TRAFFIC", "LIGHTING", "ELECTRIC", OR "TELEPHONE" IS CAST IN THE TOP SURFACE OF THE COVER FORMING LETTERS 1 TO 2 INCHES (25 TO 30mm) IN HEIGHT.

ITEM 632 - MESSENGER WIRE

THE MESSENGER WIRE SHALL BE AS PER SPECIFICATION 632 AND STANDARD CONSTRUCTION DRAWING TC - 84.20 EXCEPT THE "ALTERNATE MESSENGER WIRE ASSEMBLY" SHALL NOT BE USED.

632, POWER SERVICE, AS PER PLAN

POWER SERVICE SHALL BE AS PER CMS ITEM 632 AND SCD TC-83.10 WITH THE FOLLOWING EXCEPTIONS:

1. THE METER BASE MOUNTING HEIGHT SHALL BE NO MORE THAN 5 FEET HIGH TO THE CENTER OF THE METER BASE FROM THE GROUND.

2. THE CONTRACTOR SHALL SUPPLY THE NECESSARY METER BASES.

3. ALL POWER SERVICES SHALL BE METERED. THE METER SHALL HAVE A LEVER OPERATED BYPASS.

DISCONNECT SWITCH ENCLOSURES FURNISHED IN ACCORDANCE WITH CMS ITEM 632, POWER SERVICE, AS PER PLAN, SHALL INCLUDE A PADLOCK EQUAL TO MASTER NO. 4BKA OR WILSON BOHANNON 660, WITH LOCK BODY OF BRONZE OR BRASS AND KEYING SHALL BE TO THE STATE MASTER.

THE CONTRACTOR SHALL CONTACT THE METER SECTION OF THE POWER COMPANY FOR INFORMATION REGARDING THE METER BASE INSTALLATION PRIOR TO ORDERING POLES. THE CONTRACTOR WILL BE RESPONSIBLE FOR REQUESTING AND SCHEDULING ANY INSPECTIONS THE POWER COMPANY MAY REQUIRE FOR THE POWER SERVICE HOOK UP. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTACT THE POWER COMPANY FOR THE ELECTRICAL SERVICE CONNECTION. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR SPLICE POWER CABLE INTO THE POWER COMPANY'S CIRCUITS. THE VOLTAGE SUPPLIED SHALL BE NOMINALLY 120 VOLTS. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY NECESSARY PERMITS AND THE PAYING OF ALL FEES. THE CONTRACTOR SHALL PAY ALL POWER CHARGES UNTIL THE SIGNAL IS ACCEPTED BY THE MAINTAINING AGENCY.

ITEM 632 - VEHICULAR SIGNAL HEAD, (LED), BLACK, BY SECTION, 12" LENS, ONE WAY, WITH BACKPLATE, AS PER PLAN

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

SIGNAL SECTIONS:
1. SIGNAL HEADS AND VISORS SHALL BE CONSTRUCTED OF POLYCARBONATE PLASTIC & MEET ITE SPECIFICATIONS.
2. PIPE, SPACERS AND FITTINGS CONSTRUCTED OF POLYCARBONATE PLASTIC MAY BE USED IN LIEU OF GALVANIZED STEEL OR ALUMINUM.
3. PROPER EXTERIOR COLORS SHALL BE OBTAINED BY USE OF COLORED PLASTIC MATERIAL RATHER THAN PAINTING.

MOUNTING HARDWARE:
1. ALL UPPER SIGNAL SUPPORT HARDWARE AND PIPING UP TO & INCLUDING THE WIRE INLET FITTING SHALL BE FERROUS METAL FOR SIGNAL DISPLAYS OF TWO OR MORE SECTIONS.
2. BALANCE ADJUSTERS SHALL NOT BE USED ON ONE-WAY HEADS

THE DEPARTMENT WILL MEASURE VEHICULAR SIGNAL HEAD, (LED), BLACK, BY SECTION, 12" LENS, ONE WAY, WITH BACKPLATE, AS PER PLAN BY THE NUMBER OF COMPLETE UNITS FURNISHED & INSTALLED, AND WILL INCLUDE ALL SUPPORT AND MOUNTING HARDWARE, DISCONNECT HANGERS, CLOSURE CAPS, DIMMERS, AND LAMPS AS SPECIFIED.

ITEM 632 - STRAIN POLE FOUNDATION, AS PER PLAN

THIS PROJECT REQUIRES CONSTRUCTION OF STRAIN POLE FOUNDATIONS IN LOCATIONS WHICH CONTAIN NUMEROUS EXISTING UNDERGROUND & OVERHEAD UTILITIES. ORDERS FOR SIGNAL POLES SHALL BE PLACED SYSTEMATICALLY AFTER THEIR RESPECTIVE FOUNDATIONS HAVE BEEN CONSTRUCTED. FOUNDATIONS THAT HAVE BEEN CONSTRUCTED SHALL BE PROTECTED AS PER SECTION 107.07 OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS. WITHIN 2 WEEKS OF RECEIVING A SIGNED CONTRACT, THE CONTRACTOR SHALL LAYOUT THE PERIMETER OF EACH FOUNDATION THEN CONTACT OUPS AND ODOT. A MEETING BETWEEN THE CONTRACTOR, THE CONSTRUCTION ENGINEER, AND THE CITY ENGINEER WILL BE HELD ON SITE NO LATER THAN 2 WEEKS AFTER THE OUPS NOTIFICATION. BASED ON THE PRIORITES DETERMINED AT THIS MEETING, THE CONTRACTOR WILL CONSTRUCT FOUNDATIONS BEGINNING WITH THE HIGHEST PRIORITY. IF A UTILITY OR OTHER CONFLICT EXISTS WHICH REQUIRES THAT A STRAIN POLE BE CONSTRUCTED AT A LOCATION OTHER THAN WHAT IS INDICATED ON THE PLAN, THE ENGINEER SHALL DETERMINE WHETHER THE POLE CAN SUPPORT THE SIGNAL HEADS AT THE NEW DESIRED LOCATION OR IF A HIGHER DESIGN NUMBER (STRONGER POLE) IS REQUIRED. THE CONTRACTOR WILL BE PROVIDED WITH THE REVISED POLE DESIGN NUMBER.

632, REMOVAL OF TRAFFIC SIGNAL INSTALLATION

TRAFFIC SIGNAL INSTALLATIONS, INCLUDING SIGNAL HEADS, CABLE, MESSENGER WIRE, STRAIN POLES, CABINET, CONTROLLER, ETC., SHALL BE REMOVED IN ACCORDANCE WITH CMS 632.26 AND AS INDICATED ON THE PLANS. REMOVED ITEMS SHALL BE REUSED AS PART OF A NEW INSTALLATION ON THE PROJECT OR STORED ON THE PROJECT FOR SALVAGE BY THE CITY OF YOUNGSTOWN IN ACCORDANCE WITH THE LISTING GIVEN HEREIN.

SIGNAL HEADS
CONTROLLER

THE CONTRACTOR SHALL CONTACT THE CITY ENGINEER 330-742-8800, WHEN THE SALVAGED ITEMS ARE READY TO BE REMOVED.

IN THE EVENT THE ITEMS STORED ON THE PROJECT FOR SALVAGE BY THE LOCAL AGENCY ARE NOT REMOVED, THE CONTRACTOR SHALL, WHEN DIRECTED BY THE ENGINEER IN WRITING, REMOVE AND DISPOSE OF THE ITEMS AT NO ADDITIONAL COST TO THE PROJECT.

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

THE OVERLAP PROGRAMMING SHALL BE BY USE OF AN INTERCHANGEABLE PLUG IN PRINTED CIRCUIT BOARD ASSEMBLY AS DESCRIBED IN PART 14 OF TS-1-1989.

IN ADDITION TO NEMA REQUIREMENTS, THE CONFLICT MONITOR SHALL ALSO HAVE EXTENDED MONITORING OPERATIONAL FOR EACH LOAD SWITCH IN USE (IN ACCORDANCE WITH 733.03.A2). THE MONITOR SHALL MONITOR EACH LOAD SWITCH SEPARATELY. EACH SIGNALIZED APPROACH TO THE SIGNAL SHALL HAVE A SEPARATE LOAD SWITCH. THE DESIGN OF THE MONITOR SHALL USE MICROPROCESSOR ARCHITECTURE.

THE MINIMUM NUMBER OF LOAD SWITCH SOCKETS IN THE CABINET FOR 2 THROUGH 4 PHASE CONTROLLERS SHALL BE 8. THE MINIMUM NUMBER OF LOAD SWITCH SOCKETS IN THE CABINET FOR 5, 6, 7 AND 8 PHASE CONTROLLERS SHALL BE 16. DUMMY LOAD SWITCHES SHALL BE PROVIDED ON LEFT TURN PHASES REGARDLESS OF CONTROLLER PROGRAMMING CAPABILITIES. LOOP DETECTOR DELAYS SHALL NOT BE PROGRAMMED INTO THE CONTROLLER.

THE CONTROLLER CABINET SHALL NOT BE PAINTED. PRINTED BOARD TYPE BACK PANELS OF THE CONTROLLER CABINET WILL NOT BE ACCEPTABLE. SOLDERED CONNECTIONS WILL BE PERMITTED FOR WIRING ON THE BACK SIDE OF THE BACK PANEL.

ALL SIGNAL CABLE AND LOOP DETECTOR LEADIN CABLE TERMINATIONS IN THE CABINET SHALL HAVE NO MORE THAN FOUR (4) INCHES OF THE OUTER INSULATING JACKET REMOVED.

THE FOUNDATION SHALL BE ORIENTED WITH RESPECT TO THE INTERSECTION IN A MANNER THAT WILL PROVIDE MAINTENANCE PERSONNEL WITH A VIEW OF THE INTERSECTION WHILE WORKING ON THE CONTROLLER.

THE CONTRACTOR SHALL PROVIDE & INSTALL A GENERATOR PANEL IN THE CONTROLLER CABINET. PAYMENT FOR THE PANEL & LABOR SHALL BE INCLUDED IN THE BID ITEM COST OF ITEM 633 CONTROLLER UNIT, TYPE TS2/A2, WITH CABINET, TYPE TS1, AS PER PLAN.

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

LOOP DETECTOR UNITS, BY TYPE

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

THE OUTPUT DEVICE SHALL BE A RELAY, AND ALL CONTACTS SHALL BE IN THE WIRING HARNESS.

THE UNIT SHALL BE SELF TUNING.

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

EACH UNIT SHALL BE LABELED TO CORRESPOND TO ITS PHASE AND DIRECTION.

DELAY INHIBIT SHALL BE CONNECTED ON ALL DETECTOR HARNESSES FOR THEIR RESPECTIVE PHASE GREENS.

ONE UNIT SHALL BE PROVIDED FOR EACH LOOP.

ITEM 614 - LAW ENFORCEMENT OFFICER (WITH PATROL CAR) FOR ASSISTANCE DURING CONSTRUCTION OPERATIONS

USE OF LAW ENFORCEMENT OFFICERS (LEOS) BY CONTRACTORS OTHER THAN THE USES SPECIFIED BELOW WILL NOT BE PERMITTED AT PROJECT COST. LEOS SHOULD NOT BE USED WHERE THE OMUTCD INTENDS THAT FLAGGERS BE USED.

IN ADDITION TO THE REQUIREMENTS OF CMS 614 AND THE OMUTCD, A UNIFORMED LEO WITH AN OFFICIAL PATROL CAR (CAR WITH TOP-MOUNTED EMERGENCY FLASHING LIGHTS AND COMPLETE MARKINGS OF THE APPROPRIATE LAW ENFORCEMENT AGENCY) SHALL BE PROVIDED FOR THE FOLLOWING TRAFFIC CONTROL TASKS:

DURING THE ENTIRE ADVANCE PREPARATION AND CLOSURE SEQUENCE WHERE COMPLETE BLOCKAGE OF TRAFFIC IS REQUIRED.

DURING A TRAFFIC SIGNAL INSTALLATION WHEN IMPACTING THE NORMAL FUNCTION OF THE SIGNAL OR THE FLOW OF TRAFFIC OR WHEN TRAFFIC NEEDS TO BE DIRECTED THROUGH AN ENERGIZED TRAFFIC SIGNAL CONTRARY TO THE SIGNAL DISPLAY (E.G., DIRECTING MOTORISTS THROUGH A RED LIGHT).

LEOS SHOULD NOT FORGO THEIR TRAFFIC CONTROL RESPONSIBILITIES TO APPREHEND MOTORISTS FOR ROUTINE TRAFFIC VIOLATIONS. HOWEVER, IF A MOTORIST'S ACTIONS ARE CONSIDERED TO BE RECKLESS, THEN PURSUIT OF THE MOTORIST IS APPROPRIATE.

THE LEOS WORK AT THE DIRECTION OF THE ENGINEER. THE CONTRACTOR IS RESPONSIBLE FOR SECURING THE SERVICES OF THE LEOS WITH THE APPROPRIATE AGENCIES AND COMMUNICATING THE INTENTIONS OF THE PLANS WITH RESPECT TO DUTIES OF THE LEOS. THE ENGINEER SHALL HAVE FINAL CONTROL OVER THE LEOS' DUTIES AND PLACEMENT, AND WILL RESOLVE ANY ISSUES THAT MAY ARISE BETWEEN THE TWO PARTIES.

THE LEO SHALL REPORT IN TO THE CONTRACTOR PRIOR TO THE START OF THE SHIFT, IN ORDER TO RECEIVE INSTRUCTIONS REGARDING SPECIFIC WORK ASSIGNMENTS DURING HIS/HER SHIFT. THE LEO IS EXPECTED TO STAY AT THE PROJECT SITE FOR THE ENTIRE DURATION OF HIS/HER SHIFT. THE LEO SHALL REPORT TO THE CONTRACTOR AT THE END OF HIS/HER SHIFT. ONCE THE LEO HAS COMPLETED THE DUTIES DESCRIBED ABOVE AND STILL HAS TIME REMAINING ON HIS/HER SHIFT, THE LEO MAY BE ASKED TO PATROL THROUGH THE WORK ZONE (WITH FLASHING LIGHTS OFF) OR BE PLACED AT A LOCATION TO DETER MOTORISTS FROM SPEEDING. SHOULD IT BE NECESSARY TO LEAVE THE PROJECT SITE, THE LEO SHALL NOTIFY THE ENGINEER. THE CONTRACTOR SHALL PROVIDE THE LEO WITH A TWO-WAY COMMUNICATION DEVICE WHICH SHALL BE RETURNED TO THE CONTRACTOR AT THE END OF HIS/HER SHIFT.

LEOS (WITH PATROL CAR) REQUIRED BY THE TRAFFIC MAINTENANCE TASKS ABOVE SHALL BE PAID FOR ON A UNIT PRICE (HOURLY) BASIS UNDER ITEM 614, LAW ENFORCEMENT OFFICER (WITH PATROL CAR) FOR ASSISTANCE. THE FOLLOWING ESTIMATED QUANTITIES HAVE BEEN CARRIED TO THE GENERAL SUMMARY.

ITEM 614, LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE 16 HOURS

THE HOURS PAID SHALL INCLUDE ANY MINIMUM SHOW-UP TIME REQUIRED BY THE LAW ENFORCEMENT AGENCY INVOLVED.

ANY ADDITIONAL COSTS (ADMINISTRATIVE OR OTHERWISE) INCURRED BY THE CONTRACTOR TO OBTAIN THE SERVICES OF AN LEO ARE INCLUDED WITH THE BID UNIT PRICE FOR ITEM 614, LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE.

CALCULATED RMB CHECKED

SIGNAL NOTES

MAH-422/616-
7.54/5.86

GROUNDING AND BONDING

THE REQUIREMENTS OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS (CMS) 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. PROVIDE AN EQUIPMENT GROUNDING CONDUCTOR IN METALLIC CONDUITS (725.04) IN ADDITION TO THE CONDUCTORS SPECIFIED AND BOND THE CONDUIT TO THIS GROUNDING CONDUCTOR.
   B. 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.
   C. 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.
   D. METAL PULL BOX LIDS SHALL BE BONDED BY ATTACHMENT OF THE EQUIPMENT GROUNDING CONDUCTOR TO THE FRAME DIAGONAL AS PROVIDED ON HL-30.11.
   E. IF MULTIPLE CONDUIT RUNS BEGIN AND END AT THE SAME POINTS, ONLY ONE EQUIPMENT GROUNDING CONDUCTOR IS REQUIRED.
   F. 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.
   G. 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.
   A. 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.
   B. THE 725.05 CONDUIT SHALL HAVE THE INSIDE AND OUTSIDE DIAMETERS OF THE CONDUIT DEBURRED AT ALL TERMINATION POINTS.
   C. BOTH ENDS OF METALLIC CONDUIT SHALL BE BONDED TO THE EQUIPMENT GROUNDING CONDUCTOR.
   D. 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.

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 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. 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.
      IV. 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 ¾ 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.

   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	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

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 SPICE.

   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.
      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. 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.

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

   B. WORK ON BRIDGES MAY BE INCLUDED IN THE BID ITEM FOR "ITEM 625, STRUCTURE GROUNDING."

   C. IN A 3-WIRE HIGHWAY LIGHTING SYSTEM, THE THIRD CONDUCTOR OF THE DUCT CABLE OR DISTRIBUTION CABLE WILL BE USED AS THE EQUIPMENT GROUNDING CONDUCTOR AND MAY AS SUCH BE PART OF THE CABLE BID ITEM.

SURVEYING PARAMETERS

USE THE FOLLOWING VERTICAL POSITIONING AND HORIZONTAL POSITIONING PARAMETERS FOR ALL SURVEYING:

VERTICAL POSITIONING

ORTHOMETRIC HEIGHT DATUM: NAVD 88
GEOID: 1999

HORIZONTAL POSITIONING

REFERENCE FRAME: NAD 83 (HARN95)
ELLIPSOID: GRS80
MAP PROJECTION: LAMBERT CONFORMAL CONIC
COORDINATE SYSTEM: OHIO NORTH ZONE (3401)
COMBINED SCALE FACTOR: 0.99989160070
ORIGIN OF SCALE (X,Y) - EASTING (X): 0, NORTHING (Y): 0

UNITS ARE IN U.S. SURVEY FEET. USE THE FOLLOWING CONVERSION FACTOR: 1 METER = 3.280833333 U.S. SURVEY FEET.

CALCULATED RMB CHECKED

SIGNAL NOTES

MAH-422/616-7.54/5.86

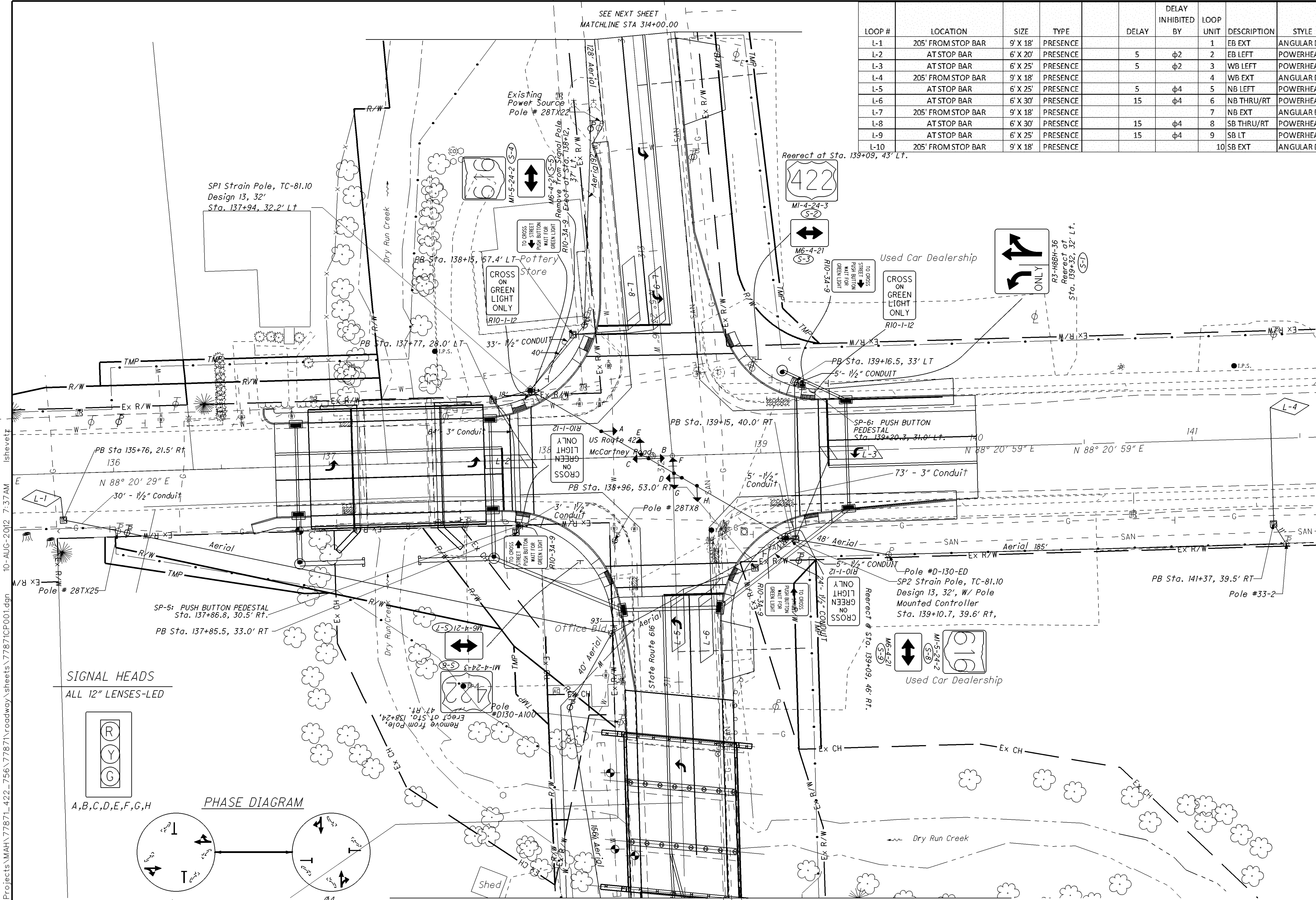
REF NO.	SHEET NO.	STATION TO STATION					625 CONDUIT, 1-1/2", 725.04 FT	625 CONDUIT, JACKED OR DRILLED, 3" FT	625 TRENCH FT	625 TRENCH IN PAVED AREA FT	625 PULL BOX, 725.08, 18", AS PER PLAN EACH	625 PULL BOX, 725.08, 24", AS PER PLAN EACH	625 GROUND ROD EACH	625 PLASTIC CAUTION TAPE FT	632 VEHICULAR SIGNAL HEAD, (LED), BLACK, 3-SECTION, 12" LENS, 1-WAY, POLYCARBONATE, WITH BACKPLATE, AS PER PLAN EACH	632 COVERING OF VEHICULAR SIGNAL HEAD EACH	632 PEDESTRIAN PUSHBUTTON EACH	632 DETECTOR LOOP EACH	632 MESSENGER WIRE, 7 STRAND, 3/8" DIAMETER WITH ACCESSORIES FT	632 TETHER WIRE, WITH ACCESSORIES FT	632 SIGNAL CABLE, 3 CONDUCTOR, NO. 14 AWG FT		632 SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG FT	632 STRAIN POLE FOUNDATION EACH	632 PEDESTAL FOUNDATION EACH	632 LOOP DETECTOR LEAD-IN CABLE FT	632 POWER CABLE, 3 CONDUCTOR, NO. 4 AWG FT	632 POWER SERVICE, AS PER PLAN EACH	632 CONDUIT RISER, 1-1/2" DIAMETER EACH	632 STRAIN POLE, TYPE TC-81.10, DESIGN 13 EACH
			TO																												
L-1		135+76	21.5'Rt		136+06.00	29' Rt	30		30		1			30				1												1	
L-1		136+06.00	29' Rt		138+38.00	82'Rt													230												
L-1		138+38.00	82'Rt		139+10.70	39.6'Rt													93												
L-2		137+77.00	28'Lt		137+94.00	32.2'Lt	18			18	1			18																	
L-2		137+94.00	32.2'Lt		139+10.70	39.6'Rt																									
L-3		139+10.70	39.6'Rt		139+15.00	40'Rt	5			5		1		5				1													
L-4		141+37.00	39.5'Rt		139+10.70	39.6'Rt	11		11		1			11				1	233											1	
L-5/6		138+96.00	53'Rt		139+10.70	39.6'Rt	24			24	1			24				2													
L-7		309+34.00	26'Lt		138+38.00	82'Rt	5		5		1			5				1	196											1	
L-8/9		138+15.00	57.4'Lt		139+10.70	39.6'Rt	33			33	1			33				2													
L-10		314+72.00	21.2'Lt		314+88.00	21'Lt	16		16		1			16				1	260											1	
SP-5		137+86.80	30.5'Rt		137+85.50	33'Rt		67			1		1				1				307				1					
SP-6		139+20.30	31' Lt		139+16.50	33'Lt	5			5	1		1	5			1				112				1					
SP-7		139+16.50	33'Lt		139+15.00	40'Rt		73																							
A/B		137+94.00	32.2'Lt		139+10.70	39.6'Rt							1		2	2	1		137	137			149	1			30	1		1
C/D		137+94.00	32.2'Lt		139+10.70	39.6'Rt							1		2	2	1						124	1						1
E/F		137+94.00	32.2'Lt		139+10.70	39.6'Rt							1		2	2							128							
G/H		137+94.00	32.2'Lt		139+10.70	39.6'Rt							1		2	2							110							
TOTALS CARRIED TO GENERAL SUMMARY							147	140	62	85	9	1	6	147	8	8	4	9	1149	137	419	0	511	2	2	2157	30	1	4	2
							632		633	632	633	633				630			630	630			630					625		

REF NO.	SIZE	STATION TO STATION					PEDESTAL, 5', TRANSFORMER BASE EACH	CONTROLLER UNIT, TYPE TS2/A2, WITH CABINET, TYPE TS1, AS PER PLAN EACH	REMOVAL OF TRAFFIC SIGNAL INSTALLATION EACH	CONTROLLER UNIT, TYPE TS2/A2, WITH CABINET, TYPE TS1, AS PER PLAN EACH	CONTROLLER WORK PAD EACH	GROUND MOUNTED SUPPORT, NO. 3 POST FT	SIGN, FLAT SHEET SQ FT	REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL EACH	REMOVAL OF POLE MOUNTED SIGN AND DISPOSAL EACH	PULL BOX REMOVED EACH
			TO													
SP-5		137+86.80	30.5'Rt				1									
SP-6		139+20.30	31' Lt				1									
Controller		137+94.00	32.2'Lt		139+10.70	39.6'Rt		1	1	1	1					
S-1	30*36	139+32.00	32'Lt									14	7.5	1		
S-2	24*30	139+09.00	43'Lt									15	5	1		
S-3	15*21	139+09.00	43'Lt										2.2	1		
S-4	24*30	138+12.00	37'Lt									15	5		1	
S-5	15*21	138+12.00	37'Lt										2.2		1	
S-6	24*30	138+24.00	47'Rt									15	5		1	
S-7	15*21	138+24.00	47'Rt										2.2		1	
S-8	24*30	139+09.00	46'Rt									15	5	1		
S-9	15*21	139+09.00	46'Rt										2.2	1		
PB Rem		135+95.00	30'Lt													1
PB Rem		137+03.00	30' Lt													1
PB Rem		138+28.00	32'Lt													1
PB Rem		313+74.00	27'Lt													1
PB Rem		141+34.00	30'Rt													1
TOTALS CARRIED TO GENERAL SUMMARY							2	0	1	1	1	1	0	0	0	74	0	0	37	5	0	0	4	0	0	0	0	5	0	0

CALCULATED RMB
CHECKED

SIGNAL SUBSUMMARY

MAH-422/616-7.54/5.86


SEE NEXT SHEET
MATCHLINE STA 314+00.00
Existing Power Source Pole # 28TX22
SP1 Strain Pole, TC-81.10
Design 13, 32'
Sta. 137+94, 32.2' Lt
M1-5-24-2 (S-4)
M6-4-21 (S-5) Remove from Signal Pole, Erect at Sta. 138+12, 37' Lt.
R10-34-9
Dry Run Creek
PB Sta. 138+15, 57.4' LT
Pottery Store
CROSS ON GREEN LIGHT ONLY
R10-1-12
PB Sta. 137+77, 28.0' LT
33' - 1½" CONDUIT
Reerect at Sta. 139+09, 43' Lt.
M1-4-24-3 (S-2)
M6-4-21 (S-3)
Used Car Dealership
R3-H8BH-36 Reerect at Sta. 139+32, 32' Lt. (S-1)
ONLY
PB Sta. 139+16.5, 33' LT
5' - 1½" CONDUIT
SP-6: PUSH BUTTON PEDESTAL Sta. 139+20.3, 31.0' Lt.
PB Sta. 139+15, 40.0' RT
US Route 422
McCartney Road
N 88° 20' 59" E
N 88° 20' 29" E
PB Sta 135+76, 21.5' Rt
30' - 1½" Conduit
64' - 3" Conduit
73' - 3" Conduit
5' - 1½" Conduit
PB Sta. 138+96, 53.0' RT
Pole # 28TX8
3' - 1½" Conduit
48' Aerial
Aerial 185'
5' - 1½" CONDUIT
Pole #D-130-ED
SP2 Strain Pole, TC-81.10
Design 13, 32', W/ Pole Mounted Controller
Sta. 139+10.7, 39.6' Rt,
PB Sta. 141+37, 39.5' RT
Pole #33-2
Pole # 28TX25
SP-5: PUSH BUTTON PEDESTAL Sta. 137+86.8, 30.5' Rt.
PB Sta. 137+85.5, 33.0' RT
TO CROSS STREET PUSH BUTTON WAIT FOR GREEN LIGHT
24' - 1½" CONDUIT
Reerect @ Sta. 139+09, 46' Rt.
M6-4-21 (S-9)
M1-5-24-2 (S-8)
M6-4-21 (S-7)
M1-4-24-3 (S-6)
Office Bld
State Route 616
Pole #D130-A100
Remove from Pole, Erect at Sta. 138+24, 47' Rt.
Used Car Dealership
Dry Run Creek
Shed
MATCHLINE STA 310+00.00 SEE NEXT SHEET
SIGNAL HEADS
ALL 12" LENSES-LED
R
Y
G
A,B,C,D,E,F,G,H
PHASE DIAGRAM
Ø2 RECALL
Ø4
HORIZONTAL SCALE IN FEET
0
20
40

LOOP #	LOCATION	SIZE	TYPE		DELAY	DELAY INHIBITED BY	LOOP UNIT	DESCRIPTION	STYLE
L-1	205' FROM STOP BAR	9' X 18'	PRESENCE				1	EB EXT	ANGULAR DD
L-2	AT STOP BAR	6' X 20'	PRESENCE		5	ϕ2	2	EB LEFT	POWERHEAD
L-3	AT STOP BAR	6' X 25'	PRESENCE		5	ϕ2	3	WB LEFT	POWERHEAD
L-4	205' FROM STOP BAR	9' X 18'	PRESENCE				4	WB EXT	ANGULAR DD
L-5	AT STOP BAR	6' X 25'	PRESENCE		5	ϕ4	5	NB LEFT	POWERHEAD
L-6	AT STOP BAR	6' X 30'	PRESENCE		15	ϕ4	6	NB THRU/RT	POWERHEAD
L-7	205' FROM STOP BAR	9' X 18'	PRESENCE				7	NB EXT	ANGULAR DD
L-8	AT STOP BAR	6' X 30'	PRESENCE		15	ϕ4	8	SB THRU/RT	POWERHEAD
L-9	AT STOP BAR	6' X 25'	PRESENCE		15	ϕ4	9	SB LT	POWERHEAD
L-10	205' FROM STOP BAR	9' X 18'	PRESENCE				10	SB EXT	ANGULAR DD

CALCULATED RMB
CHECKED

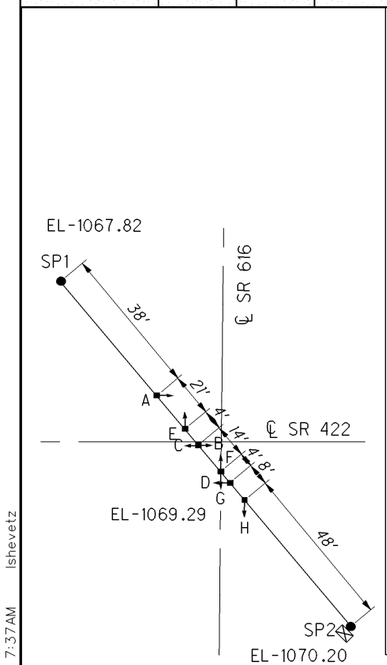
SIGNAL PLAN
SR 422 & SR 616

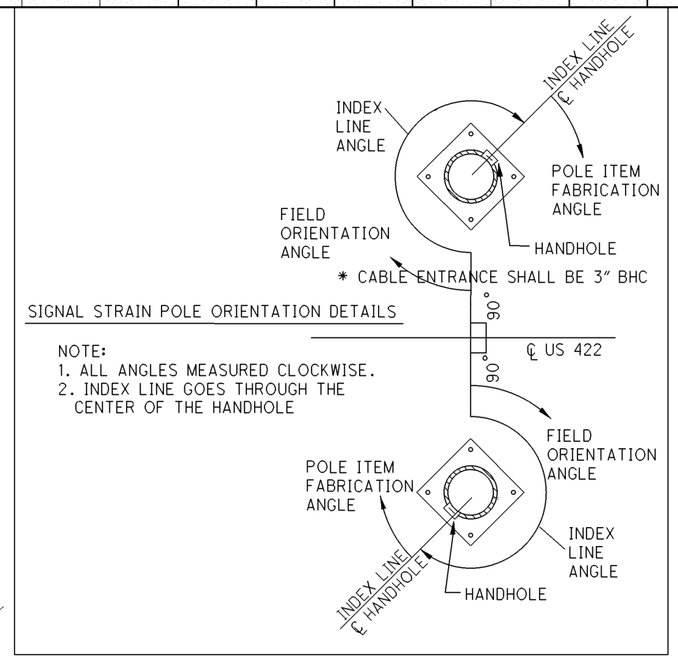
MAH-422/616-7.54/5.86

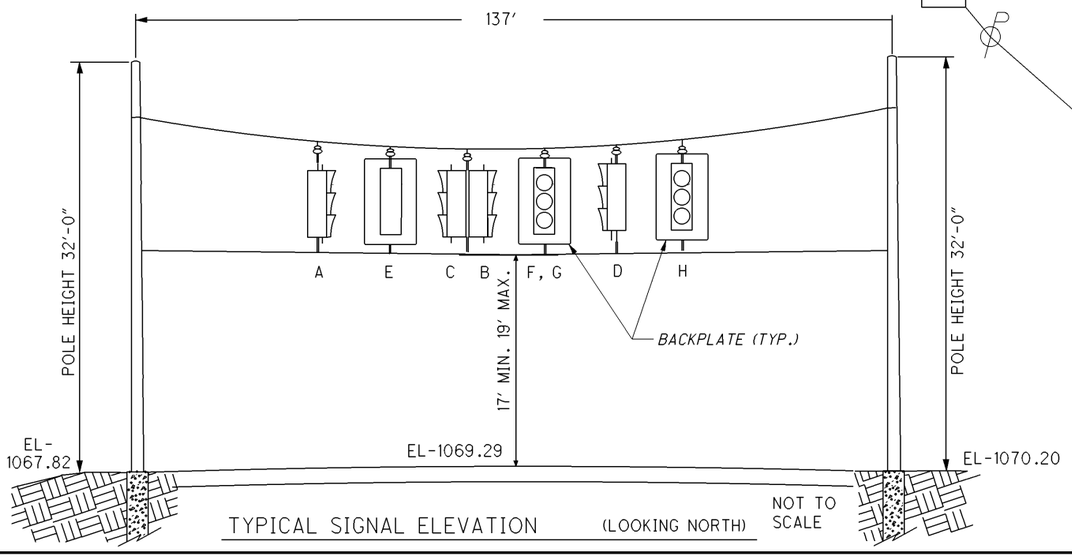
Station & Offset	Pole No.	Design No.	Pole Height (ft)	Span Wire Attach. Ht.	Index Line Angle (Deg.)	Angles (Deg.) from Index Line							
						Anchor Bolt Reference Line		Controller	Power Service	Cable Entrance	Ped Pushbutton		Unused Found Conduit Ell
137+94.0, 32.2' Lt.	SP1	13	32	30.55	135	45				180	135		
139+10.7, 39.6' Rt.	SP2	13	32	28.15	90	45		90	315	225	180		

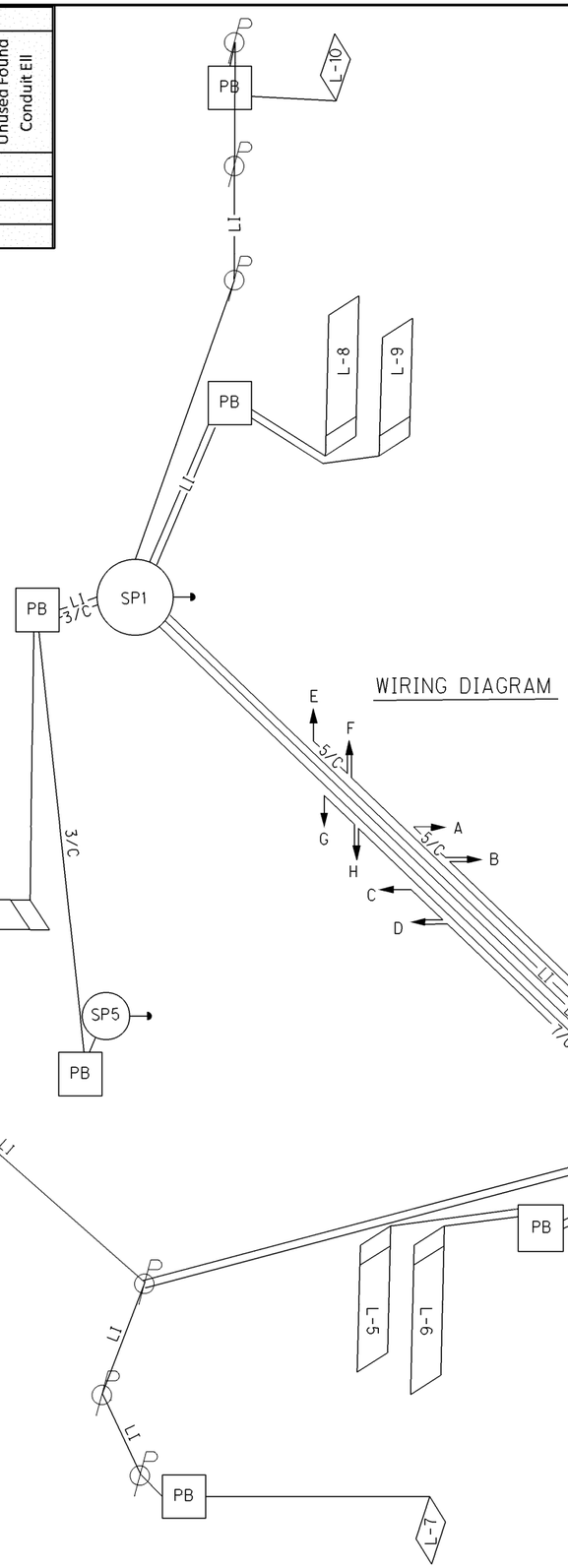
SIGNAL TIMING CHART				
PHASE		2		4
PED. WALK		7		7
PED. CLEAR		9		9
MINIMUM GREEN		20		20
ADDED INITIAL (SEC/ACT)				
PASSAGE		4		4
TBR				
MINIMUM GAP				
TTR				
MAXIMUM GREEN		45		40
MAXIMUM GREEN II				
YELLOW CLEARANCE		4		4
RED CLEARANCE		2		2
RECALL		MIN		

		PHASE						
		ϕ2			ϕ4			FLASH
HEAD	A	G	Y	R	R	R	R	Y
	B	G	Y	R	R	R	R	Y
	C	G	Y	R	R	R	R	Y
	D	G	Y	R	R	R	R	Y
	E	R	R	R	G	Y	R	R
	F	R	R	R	G	Y	R	R
	G	R	R	R	G	Y	R	R
	H	R	R	R	G	Y	R	R









CALCULATED RMB
CHECKED KJG

SIGNAL DETAILS

STA-62-38.38 (SR 62 & PARKWAY BLVD.)

MAH-422/616-7.54/5.86

46
81

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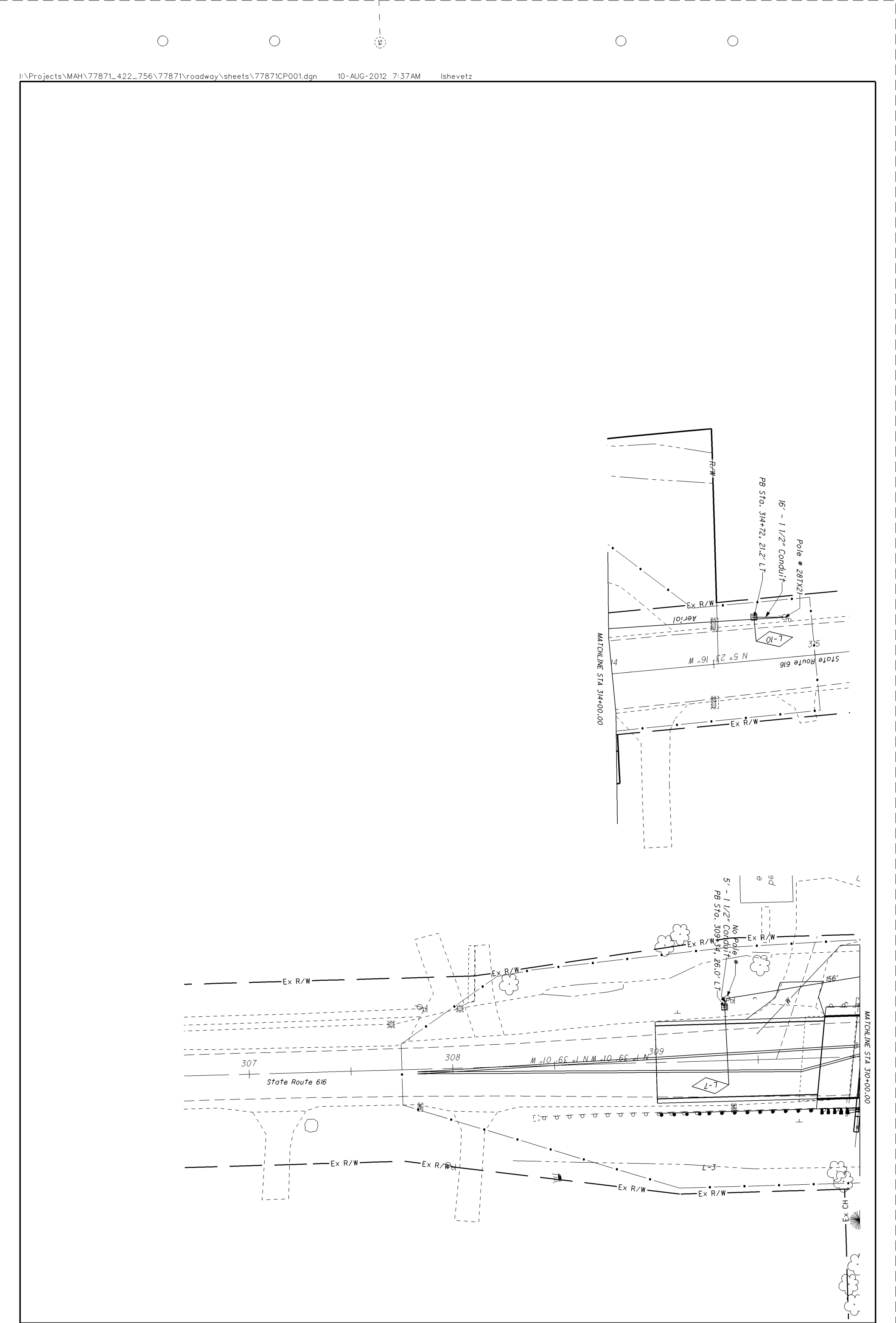
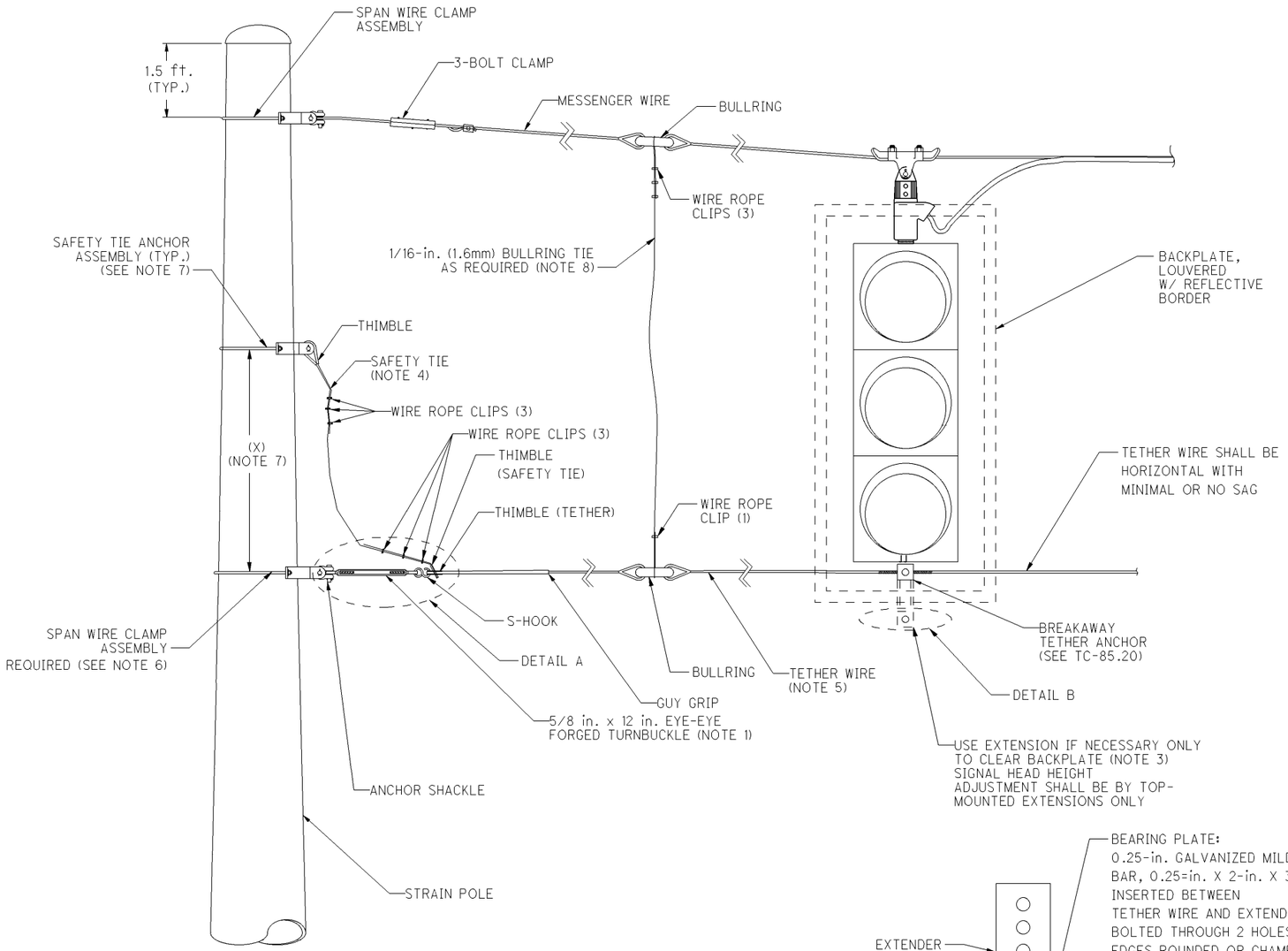
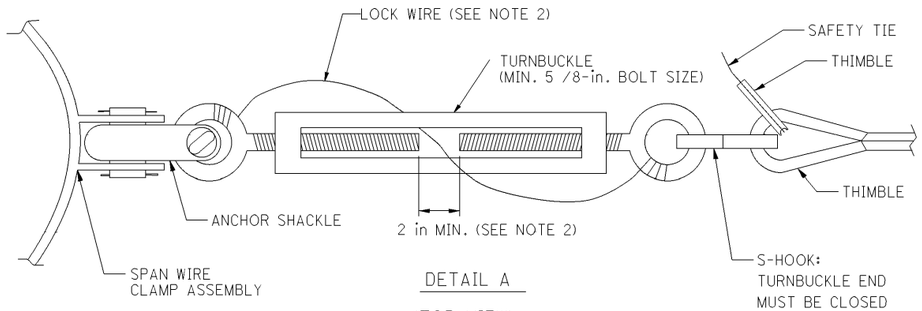


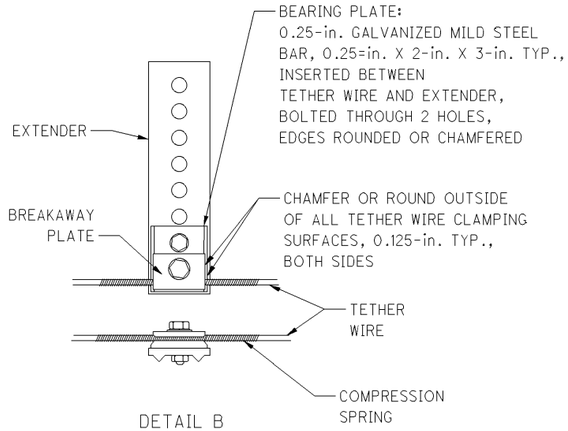
45 / 81	MAH-422/616-7.54/5.86	SIGNAL PLAN SR 422 & SR 616	CALCULATED RMB CHECKED	0 20 10 40 HORIZONTAL SCALE IN FEET





DETAIL A

(TOP VIEW)
(NOT TO SCALE)



DETAIL B

(FRONT VIEW)
(BOTTOM VIEW)

NOTES

1. S-Hook is matched to the strain pole design number (see table). S-Hook and turnbuckle are required only at one end of simple spans, all ends of complex spans. S-hook shall be closed at pole end. If S-hook begins to yield during installation, it shall be removed and replaced.
2. Lock wire shall be stainless steel, 1/8 inch soft temper, wound to prevent turning of the turnbuckle body. Finished span shall have at leasf 2 inches of space for turnbuckle adjustment. Turnbuckle shall not be overtightened. Use 8-inch hand tools, maximum.
3. If signal orientation is not perpendicular to span and tether wire, then use an anchor extension. Clamp assembly must be attached to the flat side of the extender bar.
4. Install safety tie at each turnbuckle. This wire shall be 1x19, 1/8 inch stainless steel. Tie should be slack, but not so slack as to contact pole. Use 3 clips per end at 3-1/4 inch spacing.
5. Tether wire shall be 7-strand ASTM A475 HS or EHS Grade 1/4 inch. On all spans, install tether horizontally. Maintain clearance of 17 feet to 19 feet over roadway.
6. Span wire clamp as per Standard Construction Drawing TC-81.10 required for tether wire attachment. Alternate attachment method shall not be permitted.
7. Safety tie anchor height above tether is adjusted in the field before S-hook is installed. Dimension X (Safety Tie Height) shall be adjusted so that the minimum vertical clearance of the sagging tether wire above the pavement without the S-hook installed is at least 14 feet. Minimum distance between the safety tie clamp and tether clamp shall be 1.5 feet and contain enough slack for head to sway in high winds. Safety tie anchor may be any galvanized or stainless steel pole clamp assembly rated at 3000 pounds. or higher.
8. On spans with bullrings, a tie shall be provided between messenger and tether bullrings if a 14 foot clearance cannot be maintained after S-hook opening. This vertical tie shall be 1x19, 1/16 inch stainless steel. Tie shall be slightly slack, tied back using cast wire rope clips as shown. Wire rope clips shall not be over-tightened.

Strain Pole Design No.	Galvanized Mild Steel S-Hook Wire Diameter (Inches)	S-hook yield point (+10%/-20%) (Pounds)
1	1/4	1000
2	1/4	1000
3	1/4	1000
4	1/4	1000
5	1/4	1000
6	3/8	2000
7	3/8	2000
8	3/8	2000
9	3/8	2000
10	3/8	2000
11	1/2	3300
12	1/2	3300
13	1/2	3300
14	1/2	3300

OFFICE OF TRAFFIC ENGINEERING

DESIGNED | REVIEWED LAM

REVISION DATE 07/15/11 | CHECKED

PIS NUMBER 208521

PLAN INSERT SHEET

SIGNAL TETHER ATTACHMENT

MAH-422/616-
7.54/5.86

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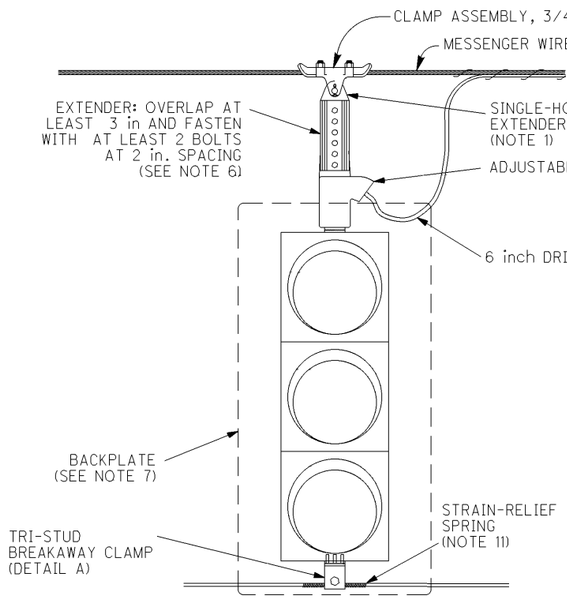
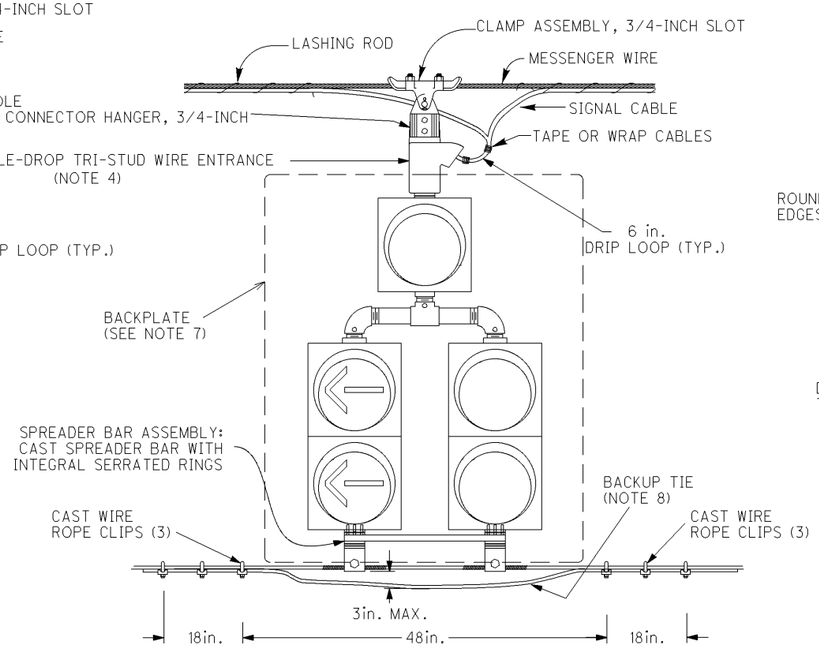


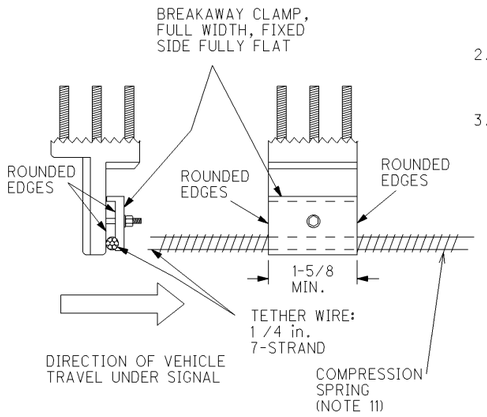
1-4 SECTION SIGNAL HEAD SUSPENSION

(NOTE 10)



5-SECTION SIGNAL HEAD SUSPENSION

(NOTE 10)



DETAIL A: BREAKAWAY TETHER ANCHOR

(TYPICAL, SEE NOTE 6)

NOTES

1. Adjust hanger and span wire clamp to eliminate all play between hanger and clamp by using shim washers as necessary. Cast 3/4-inch aluminum matching clamps and hangers with a tight initial fit shall be used.

2. All signal head assemblies shall be installed in a plumb position and perpendicular to the approach lane.

3. All signal heads shall be installed with their lowest part (including tether attachment hardware and backplates) with a clearance above the roadway pavement at all points of 17 feet to 19 feet It is intended that this clearance be obtained without the use of bottom extenders, but rather by the careful selection of foundation heights, attachment heights, span wire sag, and other factors during the installation. If the installation cannot be adjusted to the proper clearance the contractor shall advise the engineer of all signals which exceed the maximum. The engineer will, in consultation with the maintaining agency, direct the use of extenders or waive the maximum clearance requirement for each head. If extenders are necessary, adjustable signal hangers as detailed may be used. Only top extenders shall be used; see Note 6.

4. Signal head rotation shall be prevented by the use of serrated rings and tri-studs or other positive devices incorporated in the signal housing and at critical locations in the supporting hardware. Only single-piece tri-stud entrance ports shall be used, not inserts.

5. All conductors shall have adequate clearance between hangers, thimbles, bullrings, etc. in order to avoid damage from rubbing.

6. For all tethered installations, breakaway tether anchor(s) shall be installed in bottom bracket. Bottom tether anchor extender shall be used only if there is interference between backplate and tether wire. Signal height adjustment shall be made by top-mounted extenders only. Breakaway clamp shall be full width with rounded edges. Clamp shall compress tether wire only against a flat surface (Detail A).

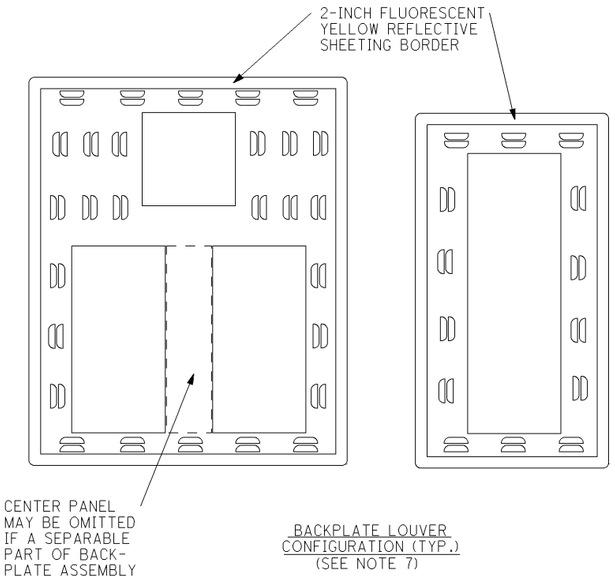
7. All backplates shall have louvers and 2 inch fluorescent yellow reflective border. Border shall not be applied over louvers. Louvers shall be oriented to scoop air from the front side and oriented with the openings facing alternate directions by groups, as shown. Louver open area shall be at least 8 percent of the total backplate area.

8. Backup tie shall be 1/4-inch, 7-strand wire identical to tether wire. Three cast wire rope clips on each side shall be used with 18in. ovelap and spacing as shown. Tie shall hang no lower than 16.5 feet. above pavement, and must not rub against the breakaway clamp. Ties under 3-section heads are recommended in windy areas; shall be installed if specified in plans, or if directed by the Engineer. Spacing of clips may be adjusted to accomodate adjacent heads. Closely spaced adjacent heads may share a single backup tie and wire rope clips; there shall be a minimum of three wire rope clips between heads.

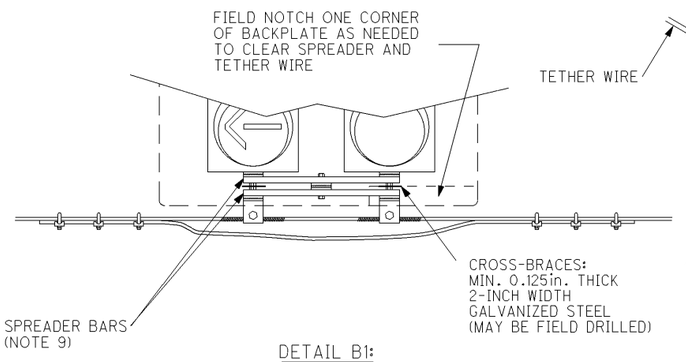
9. On diagonal spans, a double spreader bar assembly shall be used. Each spreader bar shall be cast aluminum or steel with intergral serrations, 2 on the ends, one in the middle on the opposite side. These shall be attached as shown in Details B1 and B2.

10. Multi-way heads with backplates shall not be used on tethered spans. Existing multi-way heads shall be separated as directed by the Engineer. Rewire as necessary to separate the heads per the proper alignment.

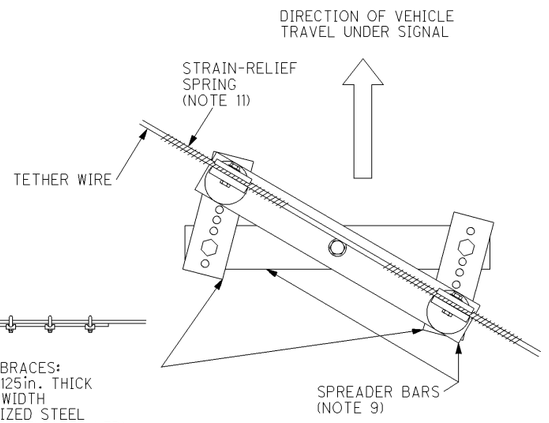
11. Compression spring, 0.375-inch OD, 0.054-inch wire diameter, 10-12 coils per inch, stainless steel 6-inch minimum length.



BACKPLATE LOUVER CONFIGURATION (TYP.)
(SEE NOTE 7)



DETAIL B1:
DOUBLE SPREADER BARS AND CROSS-BRACING ON DIAGONAL SPANS
(FRONT VIEW)



DETAIL B2:
DOUBLE SPREADER BARS AND CROSS-BRACING ON DIAGONAL SPANS
(BOTTOM VIEW)

OFFICE OF TRAFFIC ENGINEERING

DESIGNED | REVIEWED LAM

REVISION DATE 10/21/11 | CHECKED

PIS NUMBER 208522

OVERHEAD SIGNAL ATTACHMENTS, SPAN WIRE

PLAN INSERT SHEET

MAH-422/616-7.54/5.86

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