

GENERAL - SCOPE OF WORK

IT IS THE INTENT OF THESE PLANS AND SPECIFICATIONS THAT THE CONTRACTOR WILL FURNISH AND INSTALL CONDUIT, TRAFFIC SIGNAL POLES AND MAST ARMS, TRAFFIC SIGNAL HEADS, DETECTION SYSTEMS, CABLE AND WIRING, FOUNDATIONS, POWER SOURCES, PULLBOXES, GROUND RODS AND ALL MATERIALS, LABOR, EQUIPMENT, TOOLS AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION IN PLACE, COMPLETE AND ACCEPTED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.

GENERAL - EXISTING TRAFFIC CONTROL SIGNS

EXISTING TRAFFIC CONTROL SIGNS WHICH INTERFERE WITH THE CONTRACTOR'S WORK WILL BE REMOVED AND REPLACED WITH REGULATORY SIGNING BY THE DIVISION OF TRANSPORTATION (419-245-1300). THIS DOES NOT, IN ANY WAY, RELIEVE THE CONTRACTOR'S RESPONSIBILITY UNDER ITEM 614.

GENERAL - OPERATION OF EXISTING TRAFFIC SIGNALS

THE CONTRACTOR SHALL ENSURE CONTINUED OPERATION OF THE EXISTING TRAFFIC SIGNALS AT ALL TIMES. ANY DISRUPTION TO THE OPERATION OF ANY TRAFFIC SIGNAL OR EXISTING TRAFFIC SIGNAL HARDWARE, EXCEPT CONTROLLER AND/OR INTERCONNECT, BY THE CONTRACTOR OR HIS AGENT (SUB-CONTRACTOR) SHALL BE RESTORED BY THE CONTRACTOR OR HIS AGENT (SUB-CONTRACTOR) AT NO COST TO THE STATE OF OHIO OR THE CITY OF TOLEDO.

ANY DISRUPTION OR DAMAGE TO THE TRAFFIC SIGNAL CONTROLLER OR INTERCONNECT CABLE SHALL BE REPAIRED BY CITY FORCES. ALL COSTS ASSOCIATED WITH SERVICES PROVIDED BY CITY FORCES WILL BE DEDUCTED FROM MONIES DUE OR TO BECOME DUE THE CONTRACTOR.

THE CONTRACTOR SHALL NOTIFY THE CITY OF TOLEDO DIVISION OF TRANSPORTATION IMMEDIATELY OF ANY DISRUPTION TO THE OPERATION OF ANY EXISTING TRAFFIC SIGNAL. THE CONTRACTOR SHALL ALSO WORK WITH THE CITY OF TOLEDO TO ADJUST SIGNAL TIMING AND PHASING TO REFLECT CHANGES TO THE TEMPORARY PEDESTRIAN CROSSINGS AND WORK ZONES.

WHERE THE CONTRACTOR HAS FAILED OR CANNOT RESPOND TO DISRUPTION TO AN EXISTING TRAFFIC SIGNAL IMMEDIATELY, THE ENGINEER MAY INVOKE THE PROVISIONS OF SECTION 105.15 AND ANY SUBSEQUENT BILLINGS TO THE STATE OF OHIO OR THE CITY OF TOLEDO FOR POLICE SERVICES AND MAINTENANCE SERVICES BY CITY FORCES SHALL BE DEDUCTED FROM MONIES DUE OR TO BECOME DUE THE CONTRACTOR.

COORDINATION OF ACTIVITIES

ALL WORK SHALL BE COORDINATED WITH THE CITY OF TOLEDO. THE CONTRACTOR SHALL BE REQUIRED TO COORDINATE ACTIVITIES TO ENSURE SMOOTH TRANSITION FROM THE EXISTING TWISTED WIRE PAIR COMMUNICATIONS TO THE FIBER OPTIC COMMUNICATIONS. THE CITY SHALL BE NOTIFIED AT LEAST 24 HOURS PRIOR TO ANY AND ALL SCHEDULED WORK ON THIS PROJECT.

IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE UNDERGROUND CONSTRUCTION ACTIVITIES ON A CONTINUING BASIS WITH EACH OF THE UTILITY AGENCIES THAT HAVE FACILITIES IN THE IMMEDIATE VICINITY OF THE PROJECT AREA.

SCHEDULE OF WORK AND PROGRESS MEETINGS

THE CONTRACTOR SHALL WORK WITH ODOT AND THE CITY TO PREPARE A SCHEDULE OF WORK IN ACCORDANCE WITH THE REQUIREMENTS OF 108.02 THAT SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. THE CONTRACTOR SHALL PROVIDE THE CITY WITH AN ESTIMATED TIME OF DELIVERY FOR THE TRAFFIC CONTROLLER ASSEMBLIES.

THE CONTRACTOR SHALL ATTEND MONTHLY PROGRESS MEETINGS. AT EACH MEETING, THE CONTRACTOR SHALL PRESENT A WRITTEN PROGRESS REPORT AND PROJECT SCHEDULE, GIVING DETAILS OF THE CURRENT STATE OF THE CONTRACT WITH REFERENCE TO CURRENT AND PREVIOUS PROGRESS CHARTS.

WORK ITEMS

THE CONTRACTOR WILL BE REQUIRED TO PERFORM THE FOLLOWING AS PART OF THIS PROJECT:

- FURNISH AND INSTALL CONDUIT, SIGNAL CABLE, VEHICULAR AND PEDESTRIAN SIGNAL HEADS, PEDESTRIAN PUSHBUTTONS, PULLBOXES, POLE FOUNDATIONS, PEDESTAL FOUNDATIONS, VIDEO DETECTION SYSTEMS, AND GROUND RODS AT SPECIFIED LOCATIONS. INSTALL ONLY SIGNAL POLES AND ARMS.
- SPLICE SIGNAL CABLE INTO VEHICULAR AND PEDESTRIAN HEADS.
- REMOVE ITEMS IDENTIFIED IN THE PLANS; SALVAGE AND DELIVER POLES AND ARMS TO THE CITY OF TOLEDO POLE YARD (200 S. ELM DALE, TOLEDO, OHIO) AND ALL OTHER ITEMS TO THE CITY OF TOLEDO, DIVISION OF TRANSPORTATION (110 N. WESTWOOD, TOLEDO, OHIO).
- REMOVE EXISTING SIGNS; SALVAGE AND DELIVER TO THE CITY OF TOLEDO, DIVISION OF TRANSPORTATION (110 N. WESTWOOD, TOLEDO, OHIO).

CITY OF TOLEDO WORK ITEMS

THE CITY OF TOLEDO WILL BE RESPONSIBLE FOR THE FOLLOWING ITEMS OF WORK IN CONJUNCTION WITH THIS PROJECT:

- SPLICE CABLE IN POLE BASES AND CONTROLLERS.
- SPLICE FIBER OPTIC CABLE.
- PULL BACK AND COIL EXISTING FIBER CABLE IN PULLBOXES DURING CONSTRUCTION.
- INSTALL CABINET HARDWARE FOR VIDEO DETECTION SYSTEMS.
- TERMINATE CABLE IN CONTROLLER CABINETS.

STANDARD SPECIFICATIONS

EXCEPT AS OTHERWISE SPECIFICALLY REQUIRED BY THE PLANS AND SPECIAL PROVISIONS, ALL WORK ON THIS PROJECT SHALL FULLY COMPLY WITH THE MOST RECENT VERSION OF THE CITY OF TOLEDO, DIVISION OF TRANSPORTATION, STANDARD DRAWINGS (HEREIN REFERRED TO AS "STANDARD DRAWINGS") AND THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, CONSTRUCTION AND MATERIAL SPECIFICATIONS, 2019 EDITION (HEREIN REFERRED TO AS "SPECIFICATIONS").

THE CONTRACTOR SHALL AT ALL TIMES PERFORM HIS WORK IN A NEAT AND PROPER MANNER, IN ACCORDANCE WITH THE HIGHEST DEGREE OF WORKMANSHIP AS ACCEPTED IN THE INDUSTRY. THE ENGINEER MAY REFUSE WORK, WHICH, IN HIS OPINION, DOES NOT MEET THESE REQUIREMENTS AND IS CONSIDERED OF UNSATISFACTORY QUALITY. IN SUCH CASES, THE CONTRACTOR SHALL THEN REMOVE THE DEFICIENT WORK AND REPLACE IT WITH WORK OF SPECIFIED QUALITY AT NO ADDITIONAL EXPENSE TO THE CITY OR ODOT.

COMPLIANCE WITH OTHER SPECIFICATIONS AND STANDARDS

ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE REQUIREMENTS OF:

- THE ODOTCD
- THE NATIONAL MUTCD
- ASTM STANDARDS
- ANSI STANDARDS
- NATIONAL ELECTRICAL CODE (NEC)
- NATIONAL ELECTRICAL SAFETY CODE (NEC)
- IMSA STANDARDS
- APPLICABLE CITY CODES AND ORDINANCES.

ALL ELECTRICAL EQUIPMENT SHALL CONFORM TO THE FOLLOWING, WHEREVER APPLICABLE:

- NEMA STANDARDS PUBLICATIONS TS 1-1989 (R-1994), TS 2-1992, TS 3.1-1996, TS 3.2-1996, AND TS 3.3-1996
- UL STANDARDS
- ELECTRONIC INDUSTRIES ASSOCIATION (EIA) STANDARDS.

WHEREVER REFERENCE IS MADE TO ANY SUCH SPECIFICATION, MANUAL, CODE, OR STANDARD, THE REFERENCE SHALL BE CONSTRUED TO MEAN THE VERSION, AS REVISED, THAT IS IN EFFECT ON THE DATE OF ISSUANCE OF THIS PROJECT.

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 725.05 CONDUIT SHALL HAVE THE INSIDE AND OUTSIDE DIAMETERS OF THE CONDUIT DEBURRED AT ALL TERMINATION POINTS.
 - B. BOTH ENDS OF METALLIC CONDUIT SHALL BE BONDED TO THE EQUIPMENT GROUNDING CONDUCTOR.
 - C. 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.

GROUNDING AND BONDING (CONT)

- 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 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.
 - B. THE TYPICAL GROUNDING CONDUCTOR (GROUND WIRE) SHALL BE 4 AWG INSULATED, COPPER.
5. POWER SERVICE AND DISCONNECT SWITCH.
 - A. AT THE POWER SERVICE LOCATION, THE GROUNDING CONDUCTOR (GROUND WIRE) FROM THE DISCONNECT SWITCH NEUTRAL (AC-) BAR TO THE GROUND ROD SHALL BE A CONTINUOUS, UNSPLICED CONDUCTOR. IF SPLICED, IT SHALL BE AN EXOTHERMIC WELD BUTT SPLICE.
 - B. THE SERVICE NEUTRAL (AC-) SHALL ONLY BE CONNECTED TO GROUND AT THE PRIMARY POWER SERVICE DISCONNECT SWITCH.
 - I. NEMA CONTROLLER CABINETS: IF A POWER SERVICE DISCONNECT SWITCH IS LOCATED BEFORE THE CONTROLLER CABINET, THE NEUTRAL (AC-) AND THE GROUNDING BARS IN THE CONTROLLER CABINET SHALL NOT BE CONNECTED TOGETHER AS SHOWN IN NEMA TS-2, FIGURE 5-4.
 - 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.
6. PAYMENT - ALL MATERIALS AND WORK REQUIRED TO COMPLETE THE EFFECTIVE GROUND FAULT CURRENT PATH SYSTEM ARE INCIDENTAL TO THE CONDUCTORS INSTALLED BY CONTRACT.

CALC: BRO		DATE: 7/15/2020		TRAFFIC SIGNAL SUBSUMMARY	
CHECKED: DRJ		DATE: 7/15/2020			
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	SEE SHEET
625	00450	4	EACH	CONNECTION, FUSED PULL APART	
625	00460	4	EACH	CONNECTION, UNFUSED PULL APART	
625	00480	8	EACH	CONNECTION, UNFUSED PERMANENT	
625	18510	4	EACH	BRACKET ARM, 30'	
625	23000	545	FT	NO. 4 AWG 600 VOLT DISTRIBUTION CABLE	
625	23400	556	FT	NO. 10 AWG POLE AND BRACKET CABLE	
625	25503	270	FT	CONDUIT, 3", 725.05, AS PER PLAN	45
625	25603	40	FT	CONDUIT, 4", 725.05, AS PER PLAN	45
625	25901	370	FT	CONDUIT, JACKED OR DRILLED, AS PER PLAN, 4"	45
625	26253	4	EACH	LUMINAIRE, CONVENTIONAL, SOLID STATE (LED), AS PER PLAN, IES-II	51
625	29001	310	FT	TRENCH, AS PER PLAN	45
625	31600	5	EACH	PULL BOX, MISC.:PULL BOX, TYPE A	45
625	31600	3	EACH	PULL BOX, MISC.:PULL BOX, TYPE S	45
625	32001	11	EACH	GROUND ROD, AS PER PLAN	45
625	76000	1	EACH	ARC FLASH CALCULATIONS AND LABEL, SIGNAL CABINET	
625	76000	1	EACH	ARC FLASH CALCULATIONS AND LABEL, POWER SERVICE	
630	79500	8	EACH	SIGN SUPPORT ASSEMBLY, POLE MOUNTED	
630	80100	6	SF	SIGN, FLAT SHEET	
632	05007	12	EACH	VEHICULAR SIGNAL HEAD, (LED), 3-SECTION, 12" LENS, 1-WAY, POLYCARBONATE, AS PER PLAN, BLACK	46
632	05087	2	EACH	VEHICULAR SIGNAL HEAD, (LED), 5-SECTION, 12" LENS, 1-WAY, POLYCARBONATE, AS PER PLAN, BLACK	46
632	20731	8	EACH	PEDESTRIAN SIGNAL HEAD (LED), TYPE D2, COUNTDOWN, AS PER PLAN	45
632	26001	8	EACH	PEDESTRIAN PUSHBUTTON, AS PER PLAN	45
632	25000	14	EACH	COVERING OF VEHICULAR SIGNAL HEAD	
632	25010	8	EACH	COVERING OF PEDESTRIAN SIGNAL HEAD	
632	40201	160	FT	SIGNAL CABLE, 2 CONDUCTOR, NO. 14 AWG, AS PER PLAN	46
632	40501	990	FT	SIGNAL CABLE, 5 CONDUCTOR, NO. 14 AWG, AS PER PLAN	46
632	40701	1215	FT	SIGNAL CABLE, 7 CONDUCTOR, NO. 14 AWG, AS PER PLAN	46
632	41200	730	FT	SIGNAL CABLE, 12 CONDUCTOR, NO. 14 AWG, AS PER PLAN	46
632	67200	71	FT	POWER CABLE, 2 CONDUCTOR, NO. 8 AWG	
632	64011	4	EACH	SIGNAL SUPPORT FOUNDATION, AS PER PLAN	46
632	64020	6	EACH	PEDESTAL FOUNDATION	
632	70001	1	EACH	POWER SERVICE, AS PER PLAN	46
632	70400	1	EACH	CONDUIT RISER, 2" DIAMETER	
632	81700	2	EACH	COMBINATION SIGNAL SUPPORT, MISC.: COMBINATION SIGNAL SUPPORT, TYPE TC-81.22, DESIGN 13, INSTALLATION	47
632	81700	2	EACH	COMBINATION SIGNAL SUPPORT, MISC.: COMBINATION SIGNAL SUPPORT, TYPE TC-81.22, DESIGN 14, INSTALLATION	47
632	89900	6	EACH	PEDESTAL, 8', TRANSFORMER BASE	
632	90101	1	EACH	REMOVAL OF TRAFFIC SIGNAL INSTALLATION, AS PER PLAN	47
633	67101	1	EACH	CABINET FOUNDATION, AS PER PLAN	48
633	67200	1	EACH	CONTROLLER WORK PAD	
633	75001	1	EACH	UNINTERRUPTIBLE POWER SUPPLY (UPS), 1000 WATT, AS PER PLAN	50
633	99000	1	EACH	CONTROLLER ITEM, MISC.: ETHERNET SWITCH, CABINET	49
633	99000	1	EACH	CONTROLLER ITEM, MISC.: CONTROLLER UNIT, SIEMENS M60, TYPE TS2/A2 WITH CABINET, SIZE P-UPS, TYPE TS2	48
816	30001	1	EACH	VIDEO DETECTION SYSTEM, AS PER PLAN	51

CALC: BRO		DATE: 7/15/2020		INTERCONNECT SUBSUMMARY	
CHECKED: DRJ		DATE: 7/15/2020			
ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	SEE SHEET
625	25503	155	FT	CONDUIT, 3", 725.05, AS PER PLAN	45
625	29001	155	FT	TRENCH, AS PER PLAN	45
625	31600	2	EACH	PULL BOX, MISC.:PULL BOX, TYPE S	45
625	31600	2	EACH	PULL BOX, MISC.:PULL BOX RECONSTRUCTED TO GRADE	45
625	36000	155	FT	PLASTIC CAUTION TAPE	
804	15031	443	FT	FIBER OPTIC CABLE, 72 FIBER, AS PER PLAN	50
804	30001	1	EACH	FAN-OUT KIT, 6 FIBER, AS PER PLAN	51
804	32001	1	EACH	DROP CABLE, 6 FIBER, AS PER PLAN	50
804	33001	1	EACH	FIBER OPTIC PATCH CORD, 4 FIBER, AS PER PLAN	51
804	34001	1	EACH	FIBER TERMINATION PANEL, 6 FIBER, AS PER PLAN	51
804	37001	2	EACH	SPLICE ENCLOSURE, AS PER PLAN	51
804	98100	1	EACH	FIBER OPTIC CABLE, MISC.: FIBER MODULE	51