STATE OF OKLAHOMA
DEPARTMENT OF TRANSPORTATION

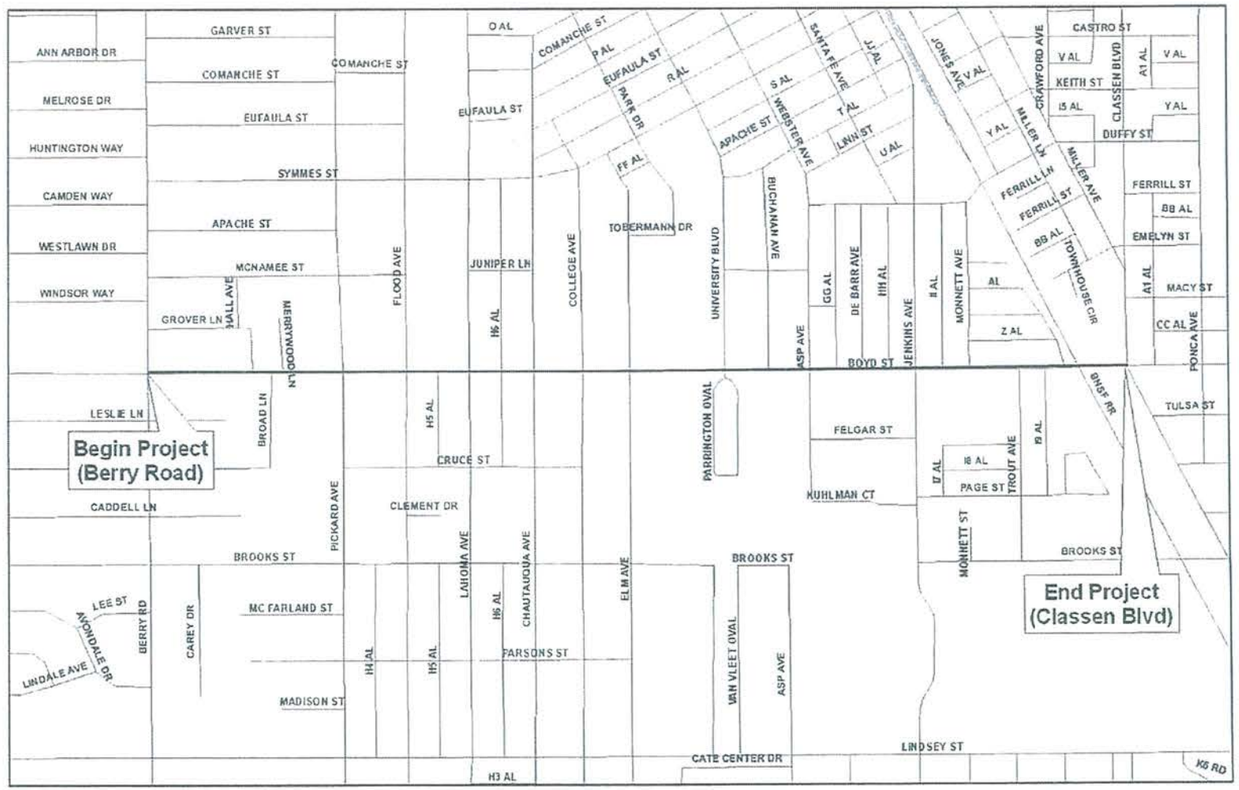
PLAN OF PROPOSED
BOYD STREET (BERRY ROAD TO CLASSEN BOULEVARD)
FIBER OPTIC INTERCONNECT UPGRADES
STATE JOB NO. 24285(04)

CLEVELAND COUNTY

FEDERAL AID PROJECT NO. STPG-114C(200)AG

R 2 W

T 9 N



BOYD STREET INTERCONNECT
UPGRADE SITE LOCATION MAP

THIS PROJECT IS LOCATED WITHIN THE URBAN LIMITS OF THE CITY OF NORMAN.

BEGINNING OF PROJECT	END OF PROJECT
LAT. 35°12' N	LAT. 35°12' N
LONG. 97°27' W	LONG. 97°26' W

2009 OKLAHOMA STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION GOVERN, APPROVED BY THE U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, JANUARY 14, 2009.

INDEX OF SHEETS

THE FOLLOWING STANDARDS WILL BE REQUIRED:

ROADWAY	TRAFFIC	
TWD-1-0	CCD1-1-00	TCS1-1-01
SSS-1-1	PBD1-1-00	TCS2-1-00
	PMAP1-2-00	TCS3-1-01
	SA1-1-02	TCS5-1-00
	ID1-1-00	TCS6-1-02
	SNS1-1-02	TCS7-1-02
	TSSS1-1-00	TCS11-1-01
	PWD1-2-00	TCS14-1-00
	CFD1-2-01	
	CC1-1-00	
	PM1-1-02	

LICENSED PROFESSIONAL ENGINEER
David R. Riesland
24187
OKLAHOMA
6/20/16
DATE
DAVID R. RIESLAND, P.E.
OKLA. REG. NO. 24187

REGISTERED PROFESSIONAL ENGINEER
NICCI D. TINER
20572
OKLAHOMA
6-20-16
DATE
NICCI D. TINER, P.E.
OKLA. REG. NO. 20572

CITY OF NORMAN OKLAHOMA	CITY OF NORMAN OKLAHOMA
DATE APPROVED 6/20/16	DATE APPROVED 6/20/16
BY CITY TRANSPORTATION ENGINEER	BY DIRECTOR OF PUBLIC WORKS
PROJECT NO. 24285(04)	SHEET NO.

OKLAHOMA DEPARTMENT OF TRANSPORTATION	DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION
DATE APPROVED	DATE APPROVED
BY CHIEF ENGINEER	BY DIVISION ADMINISTRATOR
PROJECT NO. 24285(04)	SHEET NO. 1

P.E. No. XXXX(XX)

PAY QUANTITIES

TRAFFIC SECT. 0300

ITEM NO.	CODE NO.	DESCRIPTION		UNIT	QUANTITY
201(B)	0181	SELECTIVE CLEARING	(SP-10)	LSUM	1
230(A)	2806	SOLID SLAB SODDING		S.Y.	53
610(I)	4615	TACTILE WARNING DEVICE-RETROFIT		S.F.	96
619(B)	4792	REMOVAL OF SIDEWALK	(R-49, 50)	S.Y.	18
802(B)	8344	3" PVC SCH.40 PLASTIC CONDUIT BORED	(TP-1)	L.F.	660
802(B)	8346	3" PVC SCH.40 PLASTIC CONDUIT TRENCHED	(TP-1)	L.F.	120
802(B)	8348	4" PVC SCH.40 PLASTIC CONDUIT BORED	(TP-1)	L.F.	233
802(B)	8350	4" PVC SCH.40 PLASTIC CONDUIT TRENCHED	(TP-1)	L.F.	24
802(C)	8552	2" HIGH DENSITY PE PIPE-BORED	(TP-1) (SP-13)	L.F.	7070
802(C)	8557	2" HIGH DENSITY PE PIPE-TRENCHED	(TP-1) (SP-13)	L.F.	12
803(A)	8066	PULL BOX (SIZE II)	(SP-9)	EA.	14
803(B)	8085	GROUND BOX (GB36)	(SP-9)	EA.	18
803(B)	8105	GROUND BOX (R48)	(SP-9)	EA.	9
804(A)	2915	STRUCTURAL CONCRETE		C.Y.	12
804(B)	2916	REINFORCING STEEL		LB.	1733.7
805(A)	8704	REMOVAL OF PULL BOX		EA	5
805(A)	8712	(PL) REMOVAL OF LIGHT POLE	(TL-44)	EA	1
805(A)	8726	(PL) REMOVAL OF EXISTING TRAFFIC SIGNAL EQUIPMENT		LSUM	1
806(B)	8894	10' MTG. HT. TS PED POLE (G. STL.)	(SP-1,20 & 21) (C-6)	EA	4
806(E)	200	DECORATIVE POLE AND MAST ARM	(SP-1, 2, 3 & 20) (C-6)	EA	4
809(A)	8090	ROADWAY LUMINAIRE	(SP-3)	EA	4
810(A)	3118	SERVICE POLE	(SP-18)	EA	1
811	8040	1/C NO.6 ELECT.COND.	(TP-1)	L.F.	150
811	8042	1/C NO.8 ELECT.COND.	(TP-1)	L.F.	375
811	8044	1/C NO.10 ELECT.COND.	(TP-1)	L.F.	762
818(A)	8710	(SP) FIBER OPTIC CABLE, 12, SMF	(TP-1) (ITS-2, 6, 7 & 12) (SP-12 & 14)	L.F.	380
818(A)	8733	(SP) FIBER OPTIC CABLE, 144 SMF	(TP-1) (ITS-2, 7 & 12) (SP-12 & 14)	L.F.	8150
818(B)	8743	(SP) FIBER OPTIC PATCH PANEL, 12 PORT	(SP-12)	EA.	7
818(C)	8735	(SP) FIBER OPTIC CABLE SPLICE	(ITS-12) (SP-12)	EA.	292
818(D)	8740	SP) FIBER OPTIC CABLE TERMINATION	(ITS-15) (SP-12)	EA.	108
818(F)	8370	(SP) SHIELD ISOLATION PEDESTAL	(ITS-22) (SP-12)	EA.	9
818(G)	5570	(SP) FIBER OPTIC ROUTE SIGN AND INSTALLATION	(ITS-22) (SP-12)	EA.	22
825	8550	TRAFFIC SIGNAL CONTROLLER ASSEMBLY	(SP-5, 11, 15, 16 & 17)	EA.	3
828	8132	(PL)DETECTION SYSTEM (VIDEO)	(SP-8)	LSUM	1
830	8000	PEDESTRIAN PUSH BUTTON	(SP-4, 5 & 19)	EA.	8
831	8231	1WAY 3 SEC. ADJ. SIG. HD. S-6	(SP-7 & 19)	EA.	7
831	8286	1WAY 5 SEC. ADJ. SIGN. HD. S-19	(SP-7 & 19)	EA.	1
831	8295	1WAY 2 SEC. ADJ. PED. SIG. HD. S-20	(SP-5 & 19)	EA.	8
833	3030	BACKPLATE		EA.	8
834(A)	8207	5/C TRAFFIC SIGNAL ELECTRICAL CABLE	(TP-1)	L.F.	983
834(A)	8208	7/C TRAFFIC SIGNAL ELECTRICAL CABLE	(TP-1)	L.F.	528
834(A)	8213	21/C TRAFFIC SIGNAL ELECTRICAL CABLE	(TP-1)	L.F.	1235
834(B)	8220	2/C SHIELDED LOOP DETECTOR LEAD-IN CABLE	(TP-1)	L.F.	32
840(A)	8592	E.P.S. OPTICAL EMITTER	(SP-15)	EA.	1
840(B)	8593	E.P.S. OPTICAL DETECTOR	(SP-15)	EA.	1
840(C)	8594	E.P.S. OPTICAL DETECTOR CABLE	(SP-15)	L.F.	63
840(D)	8595	(PL)E.P.S. 2 CHANNEL PHASE SELECTOR	(SP-15)	EA.	2
850(A)	8110	SHEET ALUMINUM SIGNS	(TS-6)	S.F.	42
850(C)	8118	MAST ARM MOUNTED SIGNS (ALUM.)	(TS-6)(C-6)	S.F.	79
855(A)	8812	TRAFFIC STRIPE(PLASTIC) (4" WIDE)	(TS-19)	L.F.	70
855(A)	8814	TRAFFIC STRIPE(PLASTIC) (8" WIDE)	(TS-21)	L.F.	50
855(A)	8825	TRAFFIC STRIPE(PLASTIC) (24" WIDE)	(TS-23)	L.F.	179
880(J)	8905	CONSTRUCTION TRAFFIC CONTROL	(TC-25) (SP-22)	LSUM	1

PAY QUANTITIES

STAKING SECT. 0600

ITEM NO.	CODE NO.	DESCRIPTION	UNIT	QUANTITY
642(B)	0096	CONSTRUCTION STAKING LEVEL II	LSUM	1

PAY QUANTITIES

MOBILIZATION SECT. 0640

ITEM NO.	CODE NO.	DESCRIPTION	UNIT	QUANTITY
641	1552	MOBILIZATION	LSUM	1

DESIGN	CEM	02/16
DRAWN	CEM	02/16
CHECKED	NDT	02/16
APPROVED		
SQUAD	GARVER	

BOYD ST. AND UNIVERSITY BLVD.

SUMMARY OF PAY QUANTITIES

STATE JOB NO. 24285(04) SHEET NO. 2

GENERAL CONSTRUCTION NOTES

ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE OKLAHOMA DEPARTMENT OF TRANSPORTATION 2009 ENGLISH STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS INCLUDED HEREIN.

THE CONTRACTOR SHALL WORK IN COOPERATION WITH THE CITY OF NORMAN TO ESTABLISH, INSTALL, MAINTAIN AND OPERATE COMPLETE, ADEQUATE AND SAFE TRAFFIC CONTROLS DURING THE ENTIRE CONSTRUCTION PERIOD. ALL TRAFFIC CONTROL DEVICES SHALL BE APPROVED BY THE CITY OF NORMAN. CONTRACTOR SHALL PROVIDE AND MAINTAIN A TRAFFIC CONTROL PLAN TO BE APPROVED BY THE ENGINEER PRIOR TO ANY CONSTRUCTION. AN ORANGE CONSTRUCTION FENCE WITH TOP WIRE SHALL BE INSTALLED AND MAINTAINED AROUND THE LIMITS OF CONSTRUCTION FOR THE DURATION OF THE PROJECT.

THIS PROJECT SHALL BE CONSTRUCTED WITHOUT CLOSING THE EXISTING ROAD TO LOCAL AND THROUGH TRAFFIC. SEE O.D.O.T. STANDARDS AND DETAIL DRAWINGS FOR MAINTENANCE OF LOCAL AND THROUGH TRAFFIC.

ANY DAMAGE CAUSED BY THE CONTRACTOR TO ANY STRUCTURES, ROADWAY SURFACES, STRIPING, RAISED PAVEMENT MARKERS, GUARDRAIL, SLOPES, AND SIGNS SHALL BE REPLACED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE ENGINEER.

THIS PROJECT SHALL BE CONSTRUCTED WITHOUT CLOSING TRAFFIC ON CROSS STREETS. A MINIMUM OF ONE LANE IN EACH DIRECTION SHALL BE MAINTAINED AT ALL TIMES. SEE O.D.O.T. STANDARDS AND DETAIL DRAWINGS FOR MAINTENANCE OF LOCAL AND THROUGH TRAFFIC.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE HE MAY INFLICT TO THE EXISTING UNDERGROUND UTILITIES WITHIN THE PROJECT AREA AS A RESULT OF HIS DIGGING, TRENCHING, BORING, ETC. PRIOR TO DIGGING NEAR THE UTILITIES, THE CONTRACTOR SHALL CALL FOR A LIST OF ALL UNDERGROUND FACILITIES REGISTERED IN THE AREA OF CONSTRUCTION LISTED WITH THE FOLLOWING AGENCIES: THE "OKIE" NOTIFICATION CENTER (405) 840-5032 OR 1-800-522-6543, THE LOCAL COUNTY CLERK'S OFFICE. DEPTH OF EXISTING UTILITIES SHALL ALSO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL STATUTES GOVERNING SAFETY, HEALTH AND SANITATION. THE CONTRACTOR SHALL PROVIDE ALL SAFEGUARDS, SAFETY DEVICES, AND PROTECTIVE EQUIPMENT AND TAKE ANY OTHER NEEDED ACTIONS ON AS HIS OWN RESPONSIBILITY OR AS THE ENGINEER MAY DETERMINE REASONABLY NECESSARY TO PROTECT PROPERTY IN CONNECTION WITH PERFORMANCE OR WORK COVERED BY THE CONTRACT.

ALL WASTE FROM THE REMOVAL OF ASPHALT, CONCRETE, DRIVEWAYS, SIDEWALKS, CURBS, TREES, INLETS AND OTHER INCIDENTAL ITEMS SHALL BECOME THE SOLE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF IN A MANNER APPROVED BY THE ENGINEER.

THE CONTRACTOR SHALL SUBMIT A CONSTRUCTION TRAFFIC CONTROL PLAN, PRIOR TO ANY WORK.

ALL EXCAVATION, TRENCHING AND SHORING OPERATIONS SHALL COMPLY WITH THE REQUIREMENTS OF THE U.S. DEPARTMENT OF LABOR, OSHA, "CONSTRUCTION SAFETY AND HEALTH REGULATIONS" AND ANY AMENDMENTS THERETO.

THE HAND HOLES AT THE BASE OF THE POLES SHALL BE PLACED AT 135 DEGREE ANGLES FROM THE MAST ARMS IN ORDER TO AVOID CONFLICTS WITH THE PEDESTRIAN PUSH BUTTONS AND SIGNS BEING INSTALLED ON THIS PROJECT.

ALL TRAFFIC SIGNAL EQUIPMENT REMOVED SHALL BECOME THE PROPERTY OF THE CITY. IT SHALL BE DELIVERED TO THE CITY OF NORMAN AT 1311 DAVINCI STREET. THE PRICE BID SHALL INCLUDE THE REMOVAL OF ALL FOOTINGS BELOW GROUND LEVEL OR AS DIRECTED BY THE ENGINEER. FOOTINGS TO BECOME THE PROPERTY OF THE CONTRACTOR.

ALL TEMPORARY TRAFFIC CONTROL DEVICES SHALL MEET ODOT'S, "QUALITY STANDARDS FOR TEMPORARY TRAFFIC CONTROL DEVICES."

THE CONTRACTOR SHALL PROVIDE A PERSON TO BE ON 24 HOUR CALL AS NEEDED AS DETERMINED BY THE ENGINEER. THIS PERSON SHALL HOLD A CURRENT CERTIFICATION FROM THE AMERICAN TRAFFIC SAFETY SERVICE ASSOCIATION (ATSSA) OR THE OKLAHOMA TRAFFIC ENGINEERING ASSOCIATION (OTEA) AS A TRAFFIC CONTROL TECHNICIAN OR TRAFFIC CONTROL SUPERVISOR."

(C-6) THE STRUCTURAL DESIGN OF ALL POLES, MAST ARMS, HIGH-MAST POLES, AND OTHER SUPPORTS FOR SIGNS, LUMINAIRES, AND SIGNALS AS WELL AS THEIR CONNECTIONS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS. THE MANUFACTURER SHALL ENSURE THE FOLLOWING ARE APPLIED TO THE DESIGN:

THE MINIMUM DESIGN WIND SPEED AND DESIGN LIFE AS REQUIRED IN THE AASHTO SPECIFICATIONS;

THE CALCULATED STRESSES AND FORCES FROM THE DESIGN LOADINGS DO NOT EXCEED THOSE REQUIRED IN THE AASHTO SPECIFICATIONS;

A CATEGORY I FATIGUE IMPORTANCE FACTOR (I) FOR ALL STRUCTURES; NO VIBRATORY MITIGATION SHALL BE ALLOWED. TRUCK-INDUCED GUSTS SHALL BE APPLIED TO ALL OVERHEAD TRAFFIC SIGNAL SUPPORTS.

ALL MEMBERS ARE AT LEAST THE MINIMUM THICKNESS AS REQUIRED IN THE AASHTO SPECIFICATIONS;

LUMINAIRE MAST ARMS SHALL BE DESIGNED TO SUPPORT AT LEAST A 50 LB. (22.7 KG) LUMINAIRE WITH AN EFFECTIVE PROJECTED AREA OF 2.5 FT² (0.23 M²);

THE ANCHOR BOLT DESIGN AND AMOUNT OF ANCHOR BOLTS TO BE USED SHALL BE AS REQUIRED IN THE AASHTO SPECIFICATIONS.

SIGNAL MAST ARMS AND POLES SHALL BE DESIGNED FOR SPECIFIC SIGNAL HEAD AND SIGN PLACEMENT.

(C-7) UNLESS SITE SPECIFIC GEOTECHNICAL DATA IS AVAILABLE, FOUNDATIONS SHALL BE DESIGNED UTILIZING THESE PARAMETERS; SHEAR STRENGTH OF COHESIVE SOIL (C) OF 500 PSF, ANGLE OF INTERNAL FRICTION (Φ) OF 22 DEGREES, AND EFFECTIVE UNIT WEIGHT OF SOIL (Γ) OF 120 PCF.

MINIMUM HAND HOLE SIZE OF 3 INCH WIDTH BY 5 INCH HEIGHT.

TRAFFIC LIGHTING PAY QUANTITY NOTES

(TL-44) INCLUDED IN THE COST OF THIS ITEM, THE CONTRACTOR SHALL EITHER COMPLETELY REMOVE THE EXISTING CONCRETE LIGHT POLE FOOTING(S) OR CUT OFF THE TOP PORTION OF THE FOOTING(S) TO A MINIMUM OF ONE FOOT BELOW GRADE. THE RESULTING HOLE(S) SHALL BE BACKFILLED, COMPACTED AND ALL DEBRIS DISPOSED OF IN A MANNER APPROVED BY THE ENGINEER.

TRAFFIC SIGNING PAY QUANTITY NOTES

(TS-6) SHOP DRAWINGS FOR ATTACHING SIGNS TO LIGHT AND/OR SIGNAL POLES AND MAST ARMS SHALL BE SUBMITTED TO THE TRAFFIC ENGINEER FOR APPROVAL BEFORE FABRICATION. NO HOLES SHALL BE PERMITTED IN ANY LIGHT AND/OR SIGNAL POLE OR MAST ARM. THE PRICE BID SHALL INCLUDE ALL MATERIALS, LABOR, HARDWARE, AND INCIDENTALS NECESSARY TO COMPLETE THE WORK AS DESCRIBED.

(TS-19) QUANTITY SHOWN INCLUDES 0 L.F. TRAFFIC STRIPE (PLASTIC) (WHITE) AND 70 L.F. TRAFFIC STRIPE (PLASTIC)(YELLOW) AND WILL BE MEASURED BY THE LINEAR FOOT OF FOUR INCH (4") WIDE TRAFFIC STRIPE.

(TS-21) QUANTITY SHOWN INCLUDES 0 L.F. TRAFFIC STRIPE (PLASTIC) (WHITE) AND 50 L.F. TRAFFIC STRIPE (PLASTIC)(YELLOW) AND WILL BE MEASURED BY THE LINEAR FOOT OF EIGHT INCH (8") WIDE TRAFFIC STRIPE.

(TS-23) QUANTITY SHOWN INCLUDES 179 L.F. TRAFFIC STRIPE (PLASTIC) (WHITE) AND WILL BE MEASURED BY THE LINEAR FOOT OF TWENTY-FOUR (24") WIDE TRAFFIC STRIPE.

TRAFFIC SIGNAL PAY QUANTITY NOTES

(TC-25) ALL CONSTRUCTION TRAFFIC CONTROL WILL BE MPLEMENTED ACCORDING TO CONSTRUCTION PLANS, AND INSTALLED IN A MANNER APPROVED BY THE ENGINEER, IN ACCORDANCE WITH CHAPTER VI OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, (CURRENT EDITION), AND COMPLIANT WITH APPLICABLE O.D.O.T. STANDARD RAWINGS. PRICE BID OR THIS ITEM SHALL BE PAYMENT IN FULL FOR THE INSTALLATION, MAINTENANCE AND SUBSEQUENT REMOVAL OF ALL NECESSARY CONSTRUCTION TRAFFIC CONTROL DEVICES AND PAVEMENT MARKINGS REQUIRED FOR COMPLETION OF THE PROJECT.

ALL SIGNS AND BARRICADES, WHICH ARE SHOWN WITH TYPE "A" LIGHTS IN THE STANDARD DRAWINGS SHALL HAVE THE CORRESPONDING LIGHT ATTACHED DURING NON-DAYLIGHT HOURS.

(TP-1) PAYMENT FOR THIS ITEM WILL BE BASED ON PLAN QUANTITY. SEE THE 2009 SPECIFICATION FOR HIGHWAY CONSTRUCTION.

(ITS-2) THE INSTALLATION OF THE FIBER OPTIC CABLE, SPLICES, AND TERMINATIONS SHALL BE THE RESPONSIBILITY OF THE FIBER CONTRACTOR FOR THIS PORTION OF THE PROJECT. THE FIBER CONTRACTOR SHALL BE REQUIRED TO MEET ALL SPECIFICATIONS OF THE "FIBER OPTIC CABLE, TERMINATIONS, AND SPLICING REQUIREMENTS". NO WORK ON ANY PORTION OF THE FIBER OPTIC SYSTEM SHALL BE PERFORMED BY ANYONE OTHER THAN THE FIBER CONTRACTOR.

(ITS-6) THE FIBER OPTIC CABLE SHALL BE PULLED WITH MULE TAPE, BY NEPTCO, INC., OR AN APPROVED EQUAL. NO GREATER THAN A 600 POUND PULL STRENGTH.

(ITS-7) THE INSTALLED FIBER OPTIC CABLE SHALL BE OTDR TESTED AND SHALL MEET INDUSTRY STANDARDS. LIGHT LOSS AS TESTED SHALL BE NO GREATER THAN .10 DB FOR THE ENTIRE FIBER RUN.

(ITS-12) SPLICING WILL BE DONE BY THE FUSION WELD METHOD AND THE WELDING PROCESS SHALL BE SPECIFICALLY DESIGNED FOR SPLICING SINGLE-MODE FIBERS IN BOTH THE LVD AND DVD DESIGN. OPTIC LOSS PER SPLICE SHALL BE EQUAL TO OR LESS THAN .10 DB. OPTICAL LOSS FOR PIGTAIL SPLICES IN THE FIBER TERMINATION BOX SHALL BE LESS THAN OR EQUAL TO .8 DB.

(ITS-15) THE CONTRACTOR SHALL PROVIDE "AS-BUILT" DOCUMENTATION FOR ALL FIBER OPTIC CABLE ROUTES (TO/FROM), INDIVIDUAL FIBERS, TERMINATIONS, SPLICES, FINAL DESTINATIONS, AND OTDR READINGS.

(ITS-22) THE COST BID FOR THIS ITEM SHALL INCLUDE THE COST OF SHIELD ISOLATION PEDESTAL (RELIABLE SIP40), THE W-FLANGE POST, 2.5 LBS. FT., TWO FIBER OPTIC SIGNS, TAGGING AND IDENTIFYING OF EACH FIBER OPTIC CABLE AND THE #6 AWG GROUND WIRE RUN BETWEEN THE SHIELD ISOLATION PEDESTAL AND THE SPLICE POINT REGARDLESS OF ITS LOCATION IN A SPLICE BOX, A GROUND BOX, A 332 CABINET, A COMMUNICATION HUT, ETC. COST TO INCLUDE ALL APPURTENANCES AND MATERIAL NECESSARY TO CONNECT ALL SPLICES TO THE SHIELD ISOLATION PEDESTAL. (PEDESTAL STAKE MARCONI MS1342; GROUND ROD ERICO 6138529.)

(SP-1) POLE LOCATIONS SHALL BE APPROVED BY THE TRAFFIC ENGINEER PRIOR TO DRILLING OF THE BASES.

(SP-2) THE HEAD SPACING SHALL BE APPROVED BY THE TRAFFIC ENGINEER AFTER POLE BASES HAVE BEEN POURED.

(SP-3) LUMINAIRE SHALL BE INSTALLED AT END OF LUMINAIRE ARM, 110 VOLTS TO BE SUPPLIED ON SEPARATE CIRCUIT FROM SERVICE TO STANDARD BASE AND IDENTIFIED WITH YELLOW TAPE, 5 AMP FUSE TO BE INSTALLED IN SIGNAL BASE THE PAYMENT FOR INSTALLATION AND THE RELATED EQUIPMENT (250W LED LAMP, 120 V PHOTO CELL, IN LINE FUSE HOLDER, AND 5 AMP KTK FUSE) SHALL BE INCLUDED IN THE PAY ITEM MODULAR TRAFFIC SIGNAL MAST ARM AND POLE WITH LUMINAIRE EXTENSION.

(SP-4) THIS PROJECT WILL REQUIRE AUDIBLE SIGNAL CAPABILITIES. THE PEDESTRIAN PUSH BUTTON ASSEMBLY SHALL BE THE 2-WIRE NAVIGATOR ACCESSIBLE PEDESTRIAN SIGNAL (APS) AS MANUFACTURED BY POLARA ENGINEERING INC. OF FULLERTON CA., OR APPROVED EQUAL.

(SP-5) INCLUDES THE FOLLOWING ITEMS: AUDIBLE SYSTEM CENTRAL CONTROL UNITS, GTI LED COUNTDOWN PEDESTRIAN SIGNAL MODULES (16"x18") MANUFACTURED BY GENERAL ELECTRIC OR APPROVED EQUALS, AND HANDHELD REMOTE NAVIGATOR CONFIGURATOR. CCU'S SHALL BE 2-WIRE NAVIGATOR CENTRAL CONTROL UNITS MANUFACTURED BY POLARA ENGINEERING INC. OF FULLERTON, CA OR APPROVED EQUALS. PUSH BUTTON SIGNS SHALL BE MUTCD R10-3E OPTION T.

(SP-6) THE SURGE PROTECTORS TO BE SUPPLIED ON THIS PROJECT SHALL BE EATON INNOVATIVE TECHNOLOGY 60 AMP MODEL NO. HS-P-SP-120-60-RJ, OR APPROVED EQUAL.

(SP-7) ALL LED TRAFFIC SIGNAL LENSES SHALL BE FURNISHED AND INSTALLED ON THIS PROJECT. THE LED TRAFFIC MODULES, LENSES, AND ALL ASSOCIATED MATERIAL AND EQUIPMENT SHALL CONFORM TO I.T.E. VEHICLE TRAFFIC CONTROL SIGNAL HEAD (VTCSH) STANDARDS IN EFFECT AT THE TIME THAT THE ORDER IS PLACED. LED HEADS SHALL BE CAPABLE OF OPERATING WITHOUT A REFLECTOR. THE LED'S SHALL BE OF THE INCADESCENT LOOK.

(SP-8) THIS PROJECT INVOLVES THE INSTALLATION OF A VIDEO VEHICLE DETECTION SYSTEM. THEREFORE THE CONTRACTOR SHALL FURNISH AND INSTALL AN ECONOLITE AUTOSCOPE ENCORE MACHINE VISION SYSTEM OR APPROVED EQUAL WITH EASYLOCK CONNECTORS. ALL NECESSARY CABLES, HARNESSES, MATERIALS AND FITTINGS NECESSARY TO PROVIDE A COMPLETE AND OPERATING SYSTEM AT THE INTERSECTION. ALL CAMERAS, SUNSHIELDS, AND MOUNTING HARDWARE SHALL BE BLACK.

1. VIDEO DETECTION-GENERAL
   THIS SPECIFICATION SETS FOR THE MINIMUM REQUIREMENTS FOR A SYSTEM THAT MONITORS VEHICLES ON A ROADWAY VIA PROCESSING OF VIDEO IMAGES. THE DETECTION OF VEHICLES PASSING THROUGH THE FIELD-OF-VIEW OF AN IMAGE SENSOR SHALL BE MADE AVAILABLE TO A LARGE VARIETY OF END USER APPLICATIONS AS SIMPLE CONTACT CLOSURE OUTPUTS THAT REFLECT THE CURRENT REAL-TIME DETECTOR OR ALARM STATES (ON/OFF) OR AS SUMMARY TRAFFIC STATISTICS THAT ARE REPORTED LOCALLY OR REMOTELY. THE CONTACT CLOSURE OUTPUTS SHALL BE PROVIDED TO A TRAFFIC SIGNAL CONTROLLER AND COMPLY WITH THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) TYPE C OR D DETECTOR RACK OR TO INPUT FILE RACK STANDARDS.

THE SYSTEM ARCHITECTURE SHALL FULLY SUPPORT ETHERNET NETWORKING OF SYSTEM COMPONENTS THROUGH A VARIETY OF INDUSTRY STANDARD AND COMMERCIALLY AVAILABLE INFRASTRUCTURES THAT ARE USED IN THE TRAFFIC INDUSTRY. THE DATA COMMUNICATIONS SHALL SUPPORT DIRECT CONNECT, (MODEM), AND MULTI-DROP INTERCONNECTS. SIMPLE, STANDARD ETHERNET WIRING SHALL BE SUPPORTED TO MINIMIZE OVERALL SYSTEM COST AND IMPROVE RELIABILITY, UTILIZING EXISTING INFRASTRUCTURE AND EASE OF SYSTEM INSTALLATION AND MAINTENANCE. BOTH STREAMING VIDEO AND DATA COMMUNICATIONS SHALL OPTIONALLY BE INTERCONNECTED OVER LONG DISTANCES THROUGH FIBER OPTIC, MICROWAVE, OR OTHER COMMONLY USED DIGITAL COMMUNICATIONS TRANSPORT CONFIGURATIONS.

ON THE SOFTWARE APPLICATION SIDE OF THE NETWORK, THE SYSTEM SHALL BE INTEGRATED THROUGH A CLIENT-SERVER RELATIONSHIP. A COMMUNICATIONS SERVER APPLICATION SHALL PROVIDE THE DATA COMMUNICATIONS INTERFACE BETWEEN AS FEW AS ONE TO AS MANY AS HUNDREDS OF MACHINE VISION PROCESSOR (MVP) SENSORS AND A NUMBER OF CLIENT APPLICATIONS. THE CLIENT APPLICATIONS SHALL EITHER BE HOSTED ON THE SAME PC AS THE COMMUNICATIONS SERVER OR MAY BE DISTRIBUTED OVER A LOCAL AREA NETWORK OF PC'S USING THE INDUSTRY STANDARD TCP/IP NETWORK PROTOCOL. MULTIPLE CLIENT APPLICATIONS SHALL EXECUTE SIMULTANEOUSLY ON THE SAME HOST OF MULTIPLE HOSTS, DEPENDING ON THE NETWORK CONFIGURATION. ADDITIONALLY, A WEB-BROWSER INTERFACE SHALL ALLOW USE OF INDUSTRY STANDARD INTERNET WEB BROWSERS TO CONNECT TO MVP SENSORS FOR SETUP, MAINTENANCE, AND PLAYING DIGITAL STREAMING VIDEO.

DESIGN	CEM	02/16	BOYD ST. AND UNIVERSITY BLVD.
DRAWN	CEM	02/16	
CHECKED	NDT	02/16	NOTES
APPROVED			
SQUAD	GARVER		STATE JOB NO. 24285(04) SHEET NO. 3

TRAFFIC SIGNAL PAY QUANTITY NOTES (CONT.)
(SP-8 CONT)

1.1 SYSTEM HARDWARE
THE MACHINE VISION SYSTEM HARDWARE SHALL CONSIST OF THREE COMPONENTS:
1) A COLOR, 22X ZOOM, MVP SENSOR
2) A MODULAR CABINET INTERFACE UNIT
3) A COMMUNICATION INTERFACE PANEL.

ADDITIONALLY, A PERSONAL COMPUTER (PC) SHALL HOST THE SERVER AND CLIENT APPLICATIONS THAT ARE USED TO PROGRAM AND MONITOR THE SYSTEM COMPONENTS. THE CONTRACTOR SHALL NOT BE REQUIRED TO SUPPLY A PC TO THE CITY UNLESS SPECIFICALLY MENTIONED BY SPECIAL PROVISIONS AND/OR CONTRACT BID ITEM. THE REAL-TIME PERFORMANCE SHALL BE OBSERVED BY VIEWING THE VIDEO OUTPUT FROM THE SENSOR WITH OVERLAID FLASHING DETECTORS TO INDICATE THE CURRENT DETECTION STATE (ON/OFF). THE MVP SENSOR SHALL OPTIONALLY STORE CUMULATIVE TRAFFIC STATISTICS INTERNALLY IN NON-VOLATILE MEMORY FOR LATER RETRIEVAL AND ANALYSIS.

THE MVP SHALL COMMUNICATE TO THE MODULAR CABINET INTERFACE UNIT VIA THE COMMUNICATIONS INTERFACE PANEL AND THE SOFTWARE APPLICATIONS USING THE INDUSTRY STANDARD TCP/IP NETWORK PROTOCOL. THE MVP SHALL HAVE A BUILT-IN, ETHERNET-READY, INTERNET PROTOCOL (IP) ADDRESS AND SHALL BE ADDRESSABLE WITH NO PLUG IN DEVICES OR CONVERTERS REQUIRED. THE MVP SHALL PROVIDE STANDARD MPEG-4 STREAMING DIGITAL VIDEO. ACHIEVABLE FRAME RATES SHALL VARY FROM 5 TO 30 FRAMES/SEC AS A FUNCTION OF VIDEO QUALITY AND AVAILABLE BANDWIDTH.

THE MODULAR CABINET INTERFACE UNIT SHALL COMMUNICATE DIRECTLY WITH UP TO EIGHT (8) MVP SENSORS AND SHALL COMPLY WITH THE FORM FACTOR AND ELECTRICAL CHARACTERISTICS TO PLUG DIRECTLY INTO A NEMA TYPE C OR D DETECTOR RACK PROVIDING UP TO THIRTY-TWO (32) INPUTS AND SIXTY-FOUR (64) OUTPUTS OR A 170 INPUT FILE RACK PROVIDING UP TO SIXTEEN (16) CONTACT CLOSURE INPUTS AND TWENTY-FOUR (24) CONTACT CLOSURE OUTPUTS TO A TRAFFIC SIGNAL CONTROLLER. THE COMMUNICATION INTERFACE PANEL SHALL PROVIDE FOUR (4) SETS OF THREE (3) ELECTRICAL TERMINATIONS FOR THREE-WIRE POWER CABLES FOR UP TO EIGHT (8) MVP SENSORS THAT MAY BE MOUNTED ON A POLE OR MAST ARM WITH A TRAFFIC SIGNAL CABINET OR JUNCTION BOX. THE COMMUNICATION INTERFACE PANEL SHALL PROVIDE HIGH-ENERGY TRANSIENT PROTECTION TO ELECTRICALLY PROTECT THE MODULAR CABINET INTERFACE UNIT AND CONNECTED MVP SENSORS. THE COMMUNICATIONS INTERFACE PANEL SHALL PROVIDE SINGLE-POINT ETHERNET CONNECTIVITY VIA RJ45 CONNECTOR FOR COMMUNICATION TO AND BETWEEN THE MODULAR CABINET INTERFACE MODULE AND THE MVP SENSORS.

1.2 SYSTEM SOFTWARE
THE MVP SENSOR EMBEDDED SOFTWARE SHALL INCORPORATE MULTIPLE APPLICATIONS THAT PERFORM A VARIETY OF DIAGNOSTIC, INSTALLATION, FAULT TOLERANT OPERATIONS, DATA COMMUNICATIONS, DIGITAL VIDEO STREAMING, AND VEHICLE DETECTION PROCESSING. THE DETECTION SHALL BE RELIABLE, CONSISTENT, AND PERFORM UNDER ALL WEATHER, LIGHTING, AND TRAFFIC CONGESTION LEVELS. AN EMBEDDED WEB SERVER SHALL PERMIT STANDARD INTERNET BROWSERS TO CONNECT AND PERFORM BASIC CONFIGURATION, MAINTENANCE, AND VIDEO STREAMING SERVICES.

THERE SHALL BE A SUITE OF CLIENT APPLICATIONS THAT RESIDE ON THE HOST CLIENT/SERVER PC. THE APPLICATIONS SHALL EXECUTE UNDER MICROSOFT WINDOWS XP OR VISTA. AVAILABLE CLIENT APPLICATIONS SHALL INCLUDE:

MASTER NETWORK BROWSER: LEARN A NETWORK OF CONNECTED MODULAR CABINET INTERFACE UNITS AND MVP SENSORS, DISPLAY BASIC INFORMATION, AND LAUNCH APPLICATIONS SOFTWARE TO PERFORM OPERATIONS WITHIN THAT SYSTEM OF SENSORS.

CONFIGURATION SETUP: CREATE AND MODIFY DETECTOR CONFIGURATIONS TO BE EXECUTED ON THE MVP SENSOR AND THE MODULAR CABINET INTERFACE UNIT.

OPERATION LOG: RETRIEVE, DISPLAY, AND SAVE FIELD HARDWARE RUN-TIME OPERATION LOGS OF SPECIAL EVENTS THAT HAVE OCCURRED.

SOFTWARE INSTALL: RECONFIGURE ONE OR MORE MVP SENSORS WITH NEWER RELEASE OF EMBEDDED SYSTEM SOFTWARE.

STREAMING VIDEO PLAYER: PLAY AND RECORD STREAMING VIDEO WITH FLASHING DETECTOR OVERLAY.

DATA RETRIEVAL: FETCH ONCE OR POLL FOR TRAFFIC DATA AND ALARMS AND STORE ON PC STORAGE MEDIA.

COMMUNICATIONS SERVER: PROVIDE FAULT-TOLERANT, REAL-TIME TCP/IP COMMUNICATIONS TO/FROM ALL DEVICES AND CLIENT APPLICATIONS WITH FULL LOGGING CAPABILITY FOR SYSTEMS INTEGRATION.

2. FUNCTIONAL CAPABILITIES

2.1 MVP SENSOR
THE MVP SENSOR SHALL BE AN INTEGRATED IMAGING COLOR CCD ARRAY WITH ZOOM LENS OPTICS, HIGH-SPEED, DUAL-CORE IMAGE PROCESSING HARDWARE BUNDLED INTO A SEALED ENCLOSURE. THE CCD ARRAY SHALL BE DIRECTLY CONTROLLED BY THE DUAL-CORE PROCESSOR, THUS PROVIDING HIGH-QUALITY VIDEO FOR DETECTION THAT HAS VIRTUALLY NO NOISE TO DEGRADE DETECTION PERFORMANCE. IT SHALL BE POSSIBLE TO ZOOM THE LENS AS REQUIRED FOR SETUP AND OPERATION. IT SHALL PROVIDE JPEG VIDEO COMPRESSION AS WELL AS STANDARD MPEG-4 DIGITAL STREAMING VIDEO WITH FLASHING DETECTOR OVERLAY. THE MVP SHALL PROVIDE DIRECT REAL-TIME IRIS AND SHUTTER SPEED CONTROL. THE MVP IMAGE SENSOR SHALL BE EQUIPPED WITH AN INTEGRATED 22X ZOOM LENS THAT CAN BE CHANGED USING EITHER CONFIGURATION COMPUTER SOFTWARE. THE DIGITAL STREAMING VIDEO OUTPUT AND ALL DATA COMMUNICATIONS SHALL BE TRANSMITTED OVER THE THREE-WIRE POWER CABLE.

2.2 POWER
THE MVP SENSOR SHALL OPERATE ON 110/220 VAC, 50/60 HZ AT A MAXIMUM OF 25 WATTS. THE CAMERA AND PROCESSOR ELECTRONICS SHALL CONSUME A MAXIMUM OF 10 WATTS AND THE REMAINING 15 WATTS SHALL SUPPORT AN ENCLOSURE HEATER.

2.3 DETECTION ZONE PROGRAMMING
PLACEMENT OF DETECTION ZONES SHALL BE BY MEANS OF A PERSONAL COMPUTER (PC) WITH A WINDOWS XP OR VISTA OPERATING SYSTEM, A KEYBOARD, AND A MOUSE. THE PC MONITOR SHALL BE ABLE TO SHOW THE DETECTION ZONES SUPERIMPOSED ON IMAGES OF TRAFFIC SCENES.

THE DETECTION ZONES SHALL BE CREATED BY USING A MOUSE TO DRAW DETECTION ZONES ON THE PC MONITOR. USING THE MOUSE AND KEYBOARD IT SHALL BE POSSIBLE TO PLACE, SIZE, AND ORIENT DETECTION ZONES TO PROVIDE OPTIMAL ROAD COVERAGE FOR VEHICLE DETECTION. IT SHALL BE POSSIBLE TO DOWNLOAD DETECTOR CONFIGURATIONS FROM THE PC TO THE MVP SENSOR AND CABINET INTERFACE MODULE. TO RETRIEVE THE DETECTOR CONFIGURATION THAT IS CURRENTLY RUNNING IN THE MVP SENSOR, AND TO BACK UP DETECTOR CONFIGURATIONS BY SAVING THEM TO THE PC FIXED DISKS OR OTHER REMOVABLE STORAGE MEDIA.

THE SUPERVISOR COMPUTER'S MOUSE AND KEYBOARD SHALL BE USED TO EDIT PREVIOUSLY DEFINED DETECTOR CONFIGURATIONS TO PERMIT ADJUSTMENT OF THE DETECTION ZONE SIZE AND PLACEMENT, TO ADD DETECTORS FOR ADDITIONAL TRAFFIC APPLICATIONS, OR TO REPROGRAM THE MVP SENSOR FOR DIFFERENT TRAFFIC APPLICATIONS OR CHANGES IN INSTALLATION SITE GEOMETRY OR TRAFFIC REROUTING.

2.4 MODULAR CABINET INTERFACE UNIT
THE MODULAR CABINET INTERFACE UNIT SHALL PROVIDE THE HARDWARE AND SOFTWARE MEANS FOR UP TO EIGHT (8) MVP SENSORS TO COMMUNICATE REAL-TIME DETECTION STATES AND ALARMS TO A LOCAL TRAFFIC SIGNAL CONTROLLER. IT SHALL COMPLY WITH THE ELECTRICAL AND PROTOCOL SPECIFICATIONS OF THE DETECTOR RACK STANDARDS. THE CARD SHALL HAVE 1500 VRMS ISOLATION BETWEEN RACK LOGIC GROUND AND STREET WIRING.

THE MODULAR CABINET INTERFACE UNIT SHALL BE A SIMPLE INTERFACE CARD THAT PLUGS DIRECTLY INTO A 170 INPUT FILE RACK OR A NEMA TYPE C OR D DETECTOR RACK. THE MODULAR CABINET INTERFACE UNIT SHALL OCCUPY ONLY 2 SLOTS OF THE DETECTOR RACK. THE MODULAR CABINET INTERFACE UNIT SHALL ACCEPT UP TO SIXTEEN (16) PHASE INPUTS AND SHALL PROVIDE UP TO TWENTY-FOUR (24) DETECTOR OUTPUTS.

2.5 COMMUNICATIONS INTERFACE PANEL
THE COMMUNICATIONS INTERFACE PANEL SHALL SUPPORT UP TO EIGHT MVP'S. THE COMMUNICATIONS INTERFACE PANEL SHALL ACCEPT 110/220 VAC, 50/60 HZ POWER AND PROVIDE PREDEFINED WIRE TERMINATION BLOCKS FOR MVP POWER CONNECTIONS, A BROADBAND-OVER-POWER-LINE (BPL) TRANSCEIVER TO SUPPORT UP TO 10MB/S INTERDEVICE COMMUNICATIONS, ELECTRICAL SURGE PROTECTORS TO ISOLATE THE MODULAR CABINET INTERFACE UNIT AND MVP SENSORS, AND AN INTERFACE CONNECTOR TO CABLE DIRECTLY TO THE MODULAR CABINET INTERFACE UNIT.

THE INTERFACE PANEL SHALL PROVIDE POWER FOR UP TO EIGHT (8) MVP SENSORS, TAKING LOCAL LINE VOLTAGE 110/220 VAC, 50/60 HZ AND PRODUCING 110/220 VAC. 50/60 HZ, AT ABOUT 30 WATTS TO EACH MVP SENSOR. TWO 1/2-AMP SLO-BLO FUSES SHALL PROTECT THE COMMUNICATIONS INTERFACE PANEL.

3. SYSTEM INSTALLATION
THE SUPPLIER OF THE VIDEO DETECTION SYSTEM SHALL SUPERVISE THE INSTALLATION AND TESTING OF THE VIDEO DETECTION SYSTEM AS REQUIRED BY THE CITY OF NORMAN.

4. WARRANTY SERVICE AND SUPPORT
FOR A MINIMUM OF TWO (2) YEARS, THE SUPPLIER SHALL WARRANT THE VIDEO DETECTION SYSTEM. ONGOING SOFTWARE SUPPORT BY THE SUPPLIER SHALL INCLUDE SOFTWARE UPDATES OF THE MVP SENSOR, MODULAR CABINET INTERFACE UNIT, AND SUPERVISOR COMPUTER APPLICATIONS. THESE UPDATES SHALL BE PROVIDED FREE OF CHARGE DURING THE WARRANTY PERIOD. THE SUPPLIER SHALL MAINTAIN A PROGRAM FOR TECHNICAL SUPPORT AND SOFTWARE UPDATES FOLLOWING EXPIRATION OF THE WARRANTY PERIOD. THIS PROGRAM SHALL BE AVAILABLE TO THE CONTRACTING AGENCY IN THE FORM OF A SEPARATE AGREEMENT FOR CONTINUING SUPPORT.

(SP-9) POLYMER CONCRETE PULL BOXES SHALL BE USED. PRICE BID FOR PULL BOX INCLUDES ANY CONCRETE TO BE INSTALLED OR REMOVED AS WELL AS ANY SWEEPING 90° CONDUIT ELBOWS.

(SP-10) TO BE USED FOR TREE TRIMMING AS DIRECTED BY ENGINEER.

(SP-11) GENERAL DESCRIPTION
THE EQUIPMENT FURNISHED UNDER THIS SPECIFICATION SHALL BE THE LATEST PRODUCTION MODELS CONFORMING TO THE LATEST STANDARD SPECIFICATIONS OF THE OKLAHOMA DEPARTMENT OF TRANSPORTATION AND THE CITY OF NORMAN.

THE EQUIPMENT TO BE SPECIFIED IS A TESCO CLASS 22-46 BATTERY BACKUP UNIT, OR AN APPROVED EQUAL. THE BELOW LISTED SPECIFICATIONS ARE THE DESIRED MINIMUM. BIDDER'S EQUIPMENT SHOULD EQUAL OR EXCEED THESE SPECIFICATIONS. DEVIATIONS MAY BE ACCEPTED ONLY AS APPROVED BY CITY TRAFFIC ENGINEER.

1. GENERAL
THE EQUIPMENT SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA). ANY EQUIPMENT MANUFACTURER SHALL SUPPLY CERTIFICATION SHOWING THAT THE PARTICULAR MODEL OF EQUIPMENT INTENDED TO BE FURNISHED, HAS BEEN TESTED AND APPROVED BY A QUALIFIED INDEPENDENT TESTING LABORATORY PER REQUIREMENTS SPECIFIED IN THE NEMA STANDARD. A "QUALIFIED" INDEPENDENT TESTING LABORATORY IS DEFINED AS A LABORATORY WHICH CLEARLY SHOWS THAT IT IS CAPABLE OF PERFORMING THE TEST IN ACCORDANCE WITH THE NEMA. THE MANUFACTURER SHALL SUPPLY QUALIFICATION STATEMENTS AND/OR OTHER DOCUMENTATION THAT INDICATES THE LABORATORY IS PROFESSIONALLY RECOGNIZED, REPUTABLE IN NATURE, AND EQUIPPED WITH OR HAS ACCESS TO ALL NECESSARY TESTING APPARATUS TO SUPPLY A CERTIFIED LETTER WITH DELIVERY OF THE EQUIPMENT (IDENTIFIED BY LOCATION AND SERIAL NUMBER) INDICATING THAT THE PARTICULAR EQUIPMENT FURNISHED IS IDENTICAL TO THE EQUIPMENT THAT WAS TESTED AND APPROVED AND THAT ALL "COMPONENTS AND PARTS" USED IN ASSEMBLING THE EQUIPMENT ARE EQUAL OR SUPERIOR IN QUALITY TO THE ONES USED IN THE TESTING OF THE EQUIPMENT.

1.1 THE BATTERY BACKUP SYSTEM SHALL HAVE MANUFACTURER'S CERTIFICATES (IF NEEDED), WARRANTY OF SERVICE, INSTRUCTION BOOKS, SERVICE MANUALS, A LIST OF GENERIC PART NUMBERS FOR SERVICE PERSONNEL, AND COMPLETE INSTALLATION INSTRUCTIONS.

1.2 THIS SPECIFICATION APPLICABLE TO A SPECIFIC INTERSECTION COVERS ONE COMPLETE UNIT OF UNINTERRUPTIBLE POWER SUPPLY TO BE ATTACHED TO TRAFFIC SIGNAL CABINETS TO OPERATE THE SIGNAL DURING POWER FAILURES. EACH UNIT SHALL CONSIST OF ONE CONTROL ASSEMBLY, ONE POWER TRANSFER SWITCH, 24V STRING OF 18AH BATTERIES, ONE BATTERY CABINET WITH GENERATOR KIT INCLUDING BYPASS SWITCH AND RECEPTACLE COVER.

2. GENERAL EQUIPMENT
2.1 THE SYSTEM SHALL PROVIDE A 120 VAC 60 HZ PURE SINE WAVE. THE SYSTEM SHALL PROVIDE POWER FOR NORMAL SIGNAL OPERATION, FLASH OPERATION, AND NORMAL/FLASH COMBINATION MODE.

2.2 THE SYSTEM SHALL BE DESIGNED FOR OUTDOOR APPLICATIONS AND MEET THE ENVIRONMENTAL REQUIREMENTS AS IS STANDARD IN THE TRAFFIC INDUSTRY. IT SHALL CONFORM TO NEMA, NATIONAL ELECTRIC CODE (NEC), AND UNDERWRITERS LABORATORY (UL) STANDARDS.

2.3 THE UNINTERRUPTED POWER SUPPLY (UPS) SYSTEM SHALL INCLUDE ALL NECESSARY CABLES, WIRING HARNESSES, BATTERY CABLES, AND ALL COMPONENTS FOR PROPER OPERATION.

3. UPS PANEL MINIMUM
3.1 GENERATOR TRANSFER SWITCH WITH UPS BYPASS AND 30 AMP EXTERNAL REVERSE SERVICE PLUG.

3.2 UPS BYPASS AND UPS ISOLATION SWITCH.

3.3 DEADFRONT SAFETY PANEL BOARD WITH ALL SWITCHES, INDICATING FUSES, PLUGS, AND ISOLATION FUSES FOR EACH BATTERY PRE-WIRED WITH PHENOLIC NAMEPLATES.

3.4 ALL NAMEPLATES SHALL BE SCREWED ON PHENOLIC ENGRAVED TYPE.

3.5 ALL WIRE TERMINATING LUGS SHALL BE FULL WRAP AROUND TYPE.

3.6 ALL BATTERIES SHALL BE CAPTIVE SPACED FROM EXTERNAL CABINET SIDES IN EARTHQUAKE PROOF BUCKETS.

3.7 CABINET VENTILATION SHALL BE BY TWO (2) 4" X 1/4" LOUVERS TOP AND BOTTOM WITH ENCAPSULATED BUG SCREENS, CLEANABLE FILTERS, AND A 100CFM FAN TO COMPLETELY EXCHANGE AIR A MINIMUM OF 25 TIMES PER MINUTE.

3.8 ALL DC TERMINALS AND CONNECTIONS SHALL INCORPORATE SAFETY COVERS SUCH THAT THE SAFETY COVERS ARE IN PLACE FOR EVERY NORMAL MAINTENANCE MODE.

3.9 EVENT COUNTERS AND TOTAL RUN TIME COUNTERS.

DESIGN	CEM	02/16	BOYD ST. AND UNIVERSITY BLVD.
DRAWN	CEM	02/16	
CHECKED	NDT	02/16	NOTES
APPROVED			
SQUAD	GARVER		STATE JOB NO. 24285(04) SHEET NO. 4

TRAFFIC SIGNAL PAY QUANTITY NOTES (CONT.)

(SP-11 CONT)

4. UPS UNIT MINIMUM FEATURES
   - 4.1 1400 VA SHALL PROVIDE A TRUE SINE-WAVE OUTPUT WITH A MINIMUM RATING FOR WATTAGE OUTPUT OF 950 WATTS. UPS WILL FEATURE QUICK MAKE/BREAK CONNECTORS AND PLUGS (SYSTEMS REQUIRING HARD WIRING TERMINATION TO/FROM THE INVERTER ARE UNACCEPTABLE).
   - 4.2 UPS MUST PROVIDE FOR UTILITY SERVICE ISOLATION WHEN IN OPERATION.
   - 4.3 SURGE ENERGY WITHSTAND 480 JOULES, 6.5KA.
   - 4.4 COMMON MODE CLAMPING 0 NS 5 NS, TYPICAL UL 1449.
   - 4.5 CONDITIONED POWER-COMPUTER QUALITY.
   - 4.6 TRANSIENT LIGHTING PROTECTION = 160 JOULES.
   - 4.7 TRANSFER TO BATTERY TIME = 2 MS AND RETRANSFER TO UTILITY = 2 MS.
   - 4.8 EACH BATTERY SHALL BE 24 VOLTS 18 AH WITH HEAVY DUTY ANDERSON PLUGS AND ISOLATED FUSED (DEAD FRONT PANEL MOUNTED 30 AMP) CONNECTIONS TO THE UPS FOR GREATER SYSTEM RELIABILITY AND EASE OF MAINTENANCE. SERIES WIRING IS UNACCEPTABLE.
   - 4.9 FAN COOLING SHALL BE FUSED FOR LOCKED ROTOR CURRENT.
   - 4.10 COOLING AIR SHALL BE DUCTED TO COOL THE FRONT AND BACK OF EACH BATTERY WITH AIR SPACE ON ALL FOUR SIDES AND TOP OF EACH BATTERY.
   - 4.11 UPS COVERS SHALL BE 60% OPEN ON BOTH SIDES TO DIMINISH THE ENVIRONMENTAL EFFECTS OF EXTREME TEMPERATURE.
   - 4.12 INCLUDES RS-232, USB, AND DB9 COMPUTER INTERFACE PORTS.
   - 4.13 LOW VOLTAGE SAFETY DESIGN OF 24V DC (HIGHER VOLTAGE DC SYSTEMS ARE UNACCEPTABLE).
   - 4.14 TYPICAL BATTERY RECHARGE TIME: FROM FULL DISCHARGE TO 95% CAPACITY WITHIN 6 HOURS.
   - 4.15 WARRANTY: TWO (2) YEARS ON ALL BATTERY BACKUP SYSTEM COMPONENTS.

5. BATTERY SYSTEM
   - 5.1 BATTERIES SHALL BE MAINTENANCE-FREE AND SEALED 24V TYPE, ABSORBED GLASS MAT/VALVE REGULATED LEAD ACID (AGM/VRLA) AND CERTIFIED TO OPERATE IN TEMPERATURE RANGE OF -13 TO +165.2 DEGREES F.
   - 5.2 NUMBER OF BATTERIES AND AMP-HOUR RATING SHALL BE SUFFICIENT TO OPERATE THE BATTERY BACKUP SYSTEM IN FULL TIME SIGNAL OPERATION AT 950 WATTS FOR A MINIMUM OF 6 HOURS.
   - 5.3 BATTERIES SHALL BE PROVIDED WITH APPROPRIATE INTERCONNECT WIRING AND CORROSION-RESISTANT MOUNTING TRAYS AND BRACKETS FOR THE CABINET INTO WHICH THEY WILL BE INSTALLED.
   - 5.4 BATTERY CHARGING SYSTEM SHALL BE REGULATED AND TEMPERATURE COMPENSATED. BATTERY CHARGE MANAGEMENT SYSTEM SHALL BE PROVIDED FOR EACH BATTERY STRING.
   - 5.5 ALL INVERTER CONNECTIONS SHALL BE MADE WITHOUT THE USE OF TOOLS INCLUDING A/C INPUT, A/C OUTPUT, NORMALLY-OPEN, AND NORMALLY-CLOSED PROGRAMMABLE CONTACTS.
   - 5.6 BATTERIES SHALL BE FURNISHED WITH HEAVY-DUTY 50 AMP RATED SILVER-PLATED ANDERSON CONNECTORS AND A 100 AMP INTERNAL FUSE.
   - 5.7 BATTERIES SHALL BE WARRANTED FOR FULL REPLACEMENT FOR TWO (2) FULL YEARS.
   - 5.8 SYSTEM SHALL HAVE A HOT-SWAPPABLE BATTERY REPLACEMENT SYSTEM.
   - 5.9 BATTERY REPLACEMENT WARNING SYSTEM AUTOMATICALLY PERFORMS A SELF-TEST EVERY TWO WEEKS.

6. BATTERY CABINET
   - 6.1 BATTERY CABINET SHALL NOT EXCEED 46.0 INCHES H X 20.0 INCHES W X 10.25 INCHES D AND SHALL HOUSE ALL UNITS ASSOCIATED WITH BATTERY BACK-UP.
   - 6.2 BATTERY CABINET SHALL BE COMPLETELY ENCLOSED NEMA CABINET WITH FOUR SIDES, WELDED SEAMS, DETACHED FOR NEW INSTALLATIONS OR MOUNTABLE TO SIDE OF CONTROLLER CABINET FOR RETROFIT INSTALLATIONS, 0.125-INCH THICK ALUMINUM TYPE 5052-H32, POWDER-COATED BLACK (UNLESS SPECIFIED OTHERWISE ON THE PLANS), AND STURDY ALUMINUM SHELVES.
   - 6.3 ALL COVERS OR DOORS SHALL BE LOCKABLE. GENERATOR SET OPTION SHALL INCLUDE
   - 6.4 SHALL BE EQUIPPED WITH A LOCK KEYED WITH A #2 SIGNAL CABINET KEY. CABINET SHALL INCORPORATE A FULL-LENGTH PIANO HINGE, PAD-LOCKABLE DRAW LATCH, AND PAD-LOCKABLE WELDED-IN PLACE VANDAL-PROOF TABS RATED AT 2,000 POUNDS.
   - 6.5 AUTOMATIC TRANSFER SWITCH AND GENERATOR 30 AMP EXTERNAL REVERSE SERVICE PLUG.
   - 6.6 HEATER WITH THERMOSTAT.
   - 6.7 EXTERNAL INDICATING LIGHT INSTALLED INDICATING "ON BATTERY".

(SP-12) THIS PROJECT INVOLVES THE INSTALLATION OF FIBER OPTIC CABLE TO INTERCONNECT THE BOYD ST. TRAFFIC SIGNALS. FROM BERRY RD. TO CLASSEN BLVD.

1. PULL BOXES, SPLICE POINTS, FIBER LOCATING
   - 1.1 ALL FIBER OPTIC GROUND BOXES SHALL BE GB36 POLYMER CONCRETE. ALL SPLICE POINT LOCATIONS SHALL BE IN R48 POLYMER CONCRETE GROUND BOXES. THE 100-FOOT MAINTENANCE LOOP IN EACH R48 GROUND BOX SHALL BE COILED USING A FIGURE 8 METHOD TO PREVENT DAMAGE TO THE FIBERS AND SECURED TO THE SIDES OF THE GROUND BOX.
   - 1.2 PAY ITEM IS FOR SEVEN (7), 12 STRAND ARMORED PIG TAILS TO BE INSTALLED ON THIS PROJECT TO RUN FROM EACH SIGNAL CONTROLLER CABINET AT BERRY RD, AT FLOOD AVE, AT CHAUTAUQUA AVE, AT ELM AVE, AT UNIVERSITY BLVD, AT ASP AVE, AND AT CLASSEN BLVD TO THE NEARBY SPLICE BOXES AT EACH INTERSECTION.
   - 1.3 ALL FIBER OPTIC CABLE NEEDS TO BE ARMORED FIBER OPTIC CABLING. INSTALLATION DEPTH SHOULD BE BETWEEN 36" AND 48". IF INSTALLATION IS CONSTRAINED SUCH THAT THESE DEPTHS ARE NOT ACHIEVABLE, NO LESS THAN 24" DEPTH SHALL BE ALLOWED. COMMSCOPE TERRASPEED OR CORNING ODOT STANDARD WILL BE ACCEPTABLE. THE CITY REQUIRES NO. 14 GAUGE, STRANDED COPPER CABLE BE USED TO COMPLETE GROUNDING AND UTILITY LOCATE CAPABILITIES FROM THE CONTROLLER CABINET TO THE FIBER OPTIC CABLE IN GROUND. ONCE ATTACHED TO THE ARMORED JACKET ON THE FIBER, THE UTILITY LOCATE CAPABILITY NEEDS TO BE CONFIRMED CAPABLE FOR THE DISTANCE OF THE FIBER RUN. SHIELD ISOLATION PEDESTALS MUST BE USED TO PROVIDE EASE OF UTILITY LOCATING. CITY OF NORMAN FIBER OPTIC SIGNAGE (PAID FOR WITH PAY ITEM "818(G) 5570 (PL) FIBER OPTIC ROUTE SIGN INSTALLATION") PLACED ALONG THE PATH, AS WELL. THE CITY OF NORMAN CAN PROVIDE INFORMATION TO DEFINE THE SHIELD ISOLATION PEDESTALS, SIGNAGE, GROUND

2. FIBER
   THE PAY QUANTITY IS FOR 144 STRAND, ARMORED, SINGLE-MODE FIBER OPTIC CABLE TO BE RUN FROM BERRY RD. TO CLASSEN BLVD., AS SHOWN IN THE PLANS.

3. SPLICE ENCLOSURES
   SPLICE ENCLOSURES SHALL BE FULL COYOTE SPLICE ENCLOSURES, OR APPROVED EQUAL.

4. SPLICING RESPONSIBILITY
   - 4.1 SPLICING WILL BE REQUIRED AT JENKINS AVE INTO DESIGNATED PAIRS OF EXISTING FIBER. DIAGRAMS WILL BE PROVIDED WHEN NECESSARY TO THE SELECTED CONTRACTOR TO DEFINE THIS. 136 SPLICES ARE ANTICIPATED.
   - 4.2 SPLICES WILL BE REQUIRED TO BE DONE IN THE GROUND BOXES NEAR THE SIGNAL CONTROLLER CABINETS AT BERRY RD, FLOOD AVE, CHAUTAUQUA AVE, ELM AVE, UNIVERSITY BLVD, ASP AVE, AND CLASSEN BLVD. IN ADDITION, MISCELLANEOUS SPLICES ARE REQUIRED BACK TO THE CITY OF NORMAN STREETS DIVISION. THE TERMINATION POINTS WILL BE IN THE CONTROLLER CABINETS. GROUP 1 (BERRY TO UNIVERSITY) WILL HAVE 60 SPLICES AND 60 TERMINATIONS. GROUP 2 (ASP TO CLASSEN) WILL HAVE 24 SPLICES AND 24 TERMINATIONS. 24 SPLICES AT LINDSEY AND JENKINS, 24 SPLICES AT LINDSEY AND GEORGE, AND 24 TERMINATIONS AT STREETS.

5. PATCH PANEL
   - 5.1 PAY ITEM IS FOR THE INSTALLATION OF SEVEN (7) CORNING SINGLE-PANEL HOUSING, OR APPROVED EQUAL, 12 PORT WALL-MOUNTABLE PATCH PANEL. ALL 12 FIBERS SHALL TERMINATE AT EACH CONTROLLER USING SC CONNECTORS.
   - 5.2 ALSO INCLUDED IN THE PRICE BID FOR THESE PANELS SHALL BE THE COST OF SEVEN (7) CISCO IE-2000-8TC-G-B SWITCHES WITH LAN BASE IMAGE AND WITH SEVEN (7) SD-IE-1GB SD MEMORY CARDS. THESE SWITCHES WILL BE BOUGHT FROM AN AUTHORIZED CISCO DISTRIBUTOR IN THE CITY OF NORMAN'S NAME. ALL CISCO SWITCHES WILL INCLUDE ONE YEAR OF SMARTNET SERVICES CON-SNT-IE2K8TCG (SNTC-8X5XNBD IE 8 10/100, 2 TSFP) REGISTERED IN THE NAME OF CITY OF NORMAN.

6. MISCELLANEOUS
   IN ORDER TO DEVELOP A SERVICEABLE INSTALLATION, ADDITIONAL FIBER AND COMMUNICATION EQUIPMENT IS REQUIRED. THIS WILL BE PAID FOR UNDER ITEM 819 8780 AND INCLUDES FIBER OPTIC MODULES ARE NEEDED TO PLUG INTO THE SWITCHES. THIS PROJECT WILL REQUIRE FOUR (4) CISCO GLC-LH-SM (1000BASE-LX SFP, SMF, 1310NM, LC CONNECTOR).

(SP-13) THE 2-INCH HIGH DENSITY PE PIPE USED ON THIS PROJECT SHALL BE SDR 11.

(SP-14) FIBER SHOULD BE COMMSCOPE, LIGHTSCOPE, OUTSIDE PLANT, DOUBLE JACKET, SINGLE ARMORED, SINGLE MODE 144 STRAND AND 12 STRAND FIBER OR CORNING ALTOS, OUTSIDE PLANT, DOUBLE JACKET, SINGLE ARMORED, SINGLE MODE 144 STRAND AND 12 STRAND FIBER, OR APPROVED EQUAL.

(SP-15) THE PREEMPTION CONTROL SYSTEM SHALL INTERFACE WITH THE TRAFFIC CONTROLLER TO GIVE EMERGENCY VEHICLES APPROACHING THE INTERSECTION A GREEN INDICATION WITH ALL OTHER INDICATIONS BEING RED. ALL EQUIPMENT IN THE SYSTEM SHALL MEET NEMA ENVIRONMENTAL STANDARDS.

(SP-15 CONT)

THE SYSTEM SHALL USE AN OPTICOM MULTIMODE EMITTER CAPABLE OF OPERATING IN BOTH INFRARED (IR) OR GPS MODES. THE EMITTER IS PURCHASED AS PART OF THE SERIES 2000 VEHICLE EMITTER KIT WHICH INCLUDES A HIGH PRIORITY RADIO/GPS CONTROL UNIT, A MULTIMODE HIGH PRIORITY EMITTER, A VEHICLE INTERFACE CABLE, AND A VEHICLE HARDWARE INSTALLATION KIT. EQUIPMENT AT THE INTERSECTION SHALL INCLUDE A PHASE SELECTOR (MODEL 764), AN AUXILIARY INTERFACE PANEL (MODEL 768), A GPS RECEIVER/RADIO UNIT (MODEL 3100), AND A CONNECTION BETWEEN THE GPS RECEIVER/RADIO UNIT AND THE PHASE SELECTOR WITH MODEL 1070 CABLE. THE OPTICOM MULTIMODE MODEL 764 PHASE SELECTOR MAY BE USED IN IR ONLY APPLICATIONS, IN GPS ONLY APPLICATIONS, OR IN IR/GPS APPLICATIONS SIMULTANEOUSLY.

THE MANUFACTURER OR MANUFACTURER'S REPRESENTATIVE SHALL PROVIDE ASSISTANCE TO THE CONTRACTOR OR AGENCY INSTALLING THE EQUIPMENT AS TO THE BEST LOCATION FOR THE DETECTOR PLACEMENT AT EACH INTERSECTION INVOLVED WITH THE PROJECT. COSTS ASSOCIATED WITH THIS ASSISTANCE SHALL BE INCLUDED IN THE COST OF OTHER ITEMS. ALL EQUIPMENT MUST BE PLAINLY MARKED AS TO THE MANUFACTURER OF THE EQUIPMENT TO PROVIDE CLEAR IDENTIFICATION AS TO THE MANUFACTURER'S MODEL AND SERIAL NUMBER OF EACH UNIT. NEMA CERTIFICATION AND TEST REPORTS SHALL BE PROVIDED UPON REQUEST BY THE ENGINEER.

(SP-16) THE CONTROLLER(S) TO BE FURNISHED ON THIS PROJECT SHALL BE VEHICLE ACUATED SOLID STATE DIGITAL CONTROLLER WITH VOLUME DENSITY FEATURES. THE CONTRACTOR SHALL FURNISH THE CONTROLLER(S) AND MOUNTING FRAMES AS FOLLOWS:

INTERSECTION	TYPE	CONFLICT & USER FLASH
UNIVERSITY AVE. AT BOYD ST.	8P	ALL RED
CHAUTAUQUA AVE. AT BOYD ST.	8P	ALL RED
ASP AVE. AT BOYD ST.	8P	ALL RED

THE CONTROLLER(S) WITH 2P-4P CAPABILITY SHALL BE FURNISHED WITH 8 LOAD RECEPTACLE BAYS. CONTROLLER(S) WITH 5P-8P CAPABILITY SHALL BE FURNISHED WITH 16 LOAD SWITCH RECEPTACLE BAYS. ALL CORRESPONDING RECEPTACLE WIRING IN THE CABINET AND FIELD WIRING SHALL BE INSTALLED FOR THE CONTROLLER AS REQUIRED. EXCEPT FOR ADDITIONAL DETECTOR CONNECTING CABLES WHEN THE CONTROLLER IS EXPANDED. THE CONTROLLER(S) SHALL BE CAPABLE OF PERFORMING AS SHOWN ON PHASE & SEQUENCE DIAGRAMS. PEDESTRIAN ISOLATION SHALL BE PROVIDED IN THE CONTROLLER CABINET. ALL N.E.M.A. FUNCTIONS SHALL TERMINATE IN THE CONTROLLER CABINET.

CABINET SHALL HAVE A 120V RECEPTACLE INSTALLED INSIDE OF THE CABINET IN ADDITION TO OR IN LIEU OF A RECEPTACLE INSTALLED ON THE DOOR. ALSO, ALL CABINETS THAT ARE TO BE INSTALLED IN A SIGNAL INTERCONNECT SYSTEM SHALL HAVE A PULL-OUT COMPUTER SHELF AND DRAWER INSTALLED FOR LAPTOP USE AT THE CONTROLLER CABINET. CABINET SHALL BE POWDER-COATED BLACK.

(SP-17) CONTROLLER UNIT, CONFLICT MONITOR, AND VIDEO DETECTION SYSTEM SHALL EACH BE EQUIPPED WITH 10/100-IX ETHERNET COMMUNICATIONS PORT. CONTROLLER CABINET SYSTEM COST SHALL INCLUDE A RUGGEDIZED INDUSTRIAL ETHERNET SWITCH WITH (8) 10/100/1000-TX PORTS AND (2) 1000-FX SINGLE MODE FIBER OPTIC PORTS AND ONE CLC-LH-SM CISCO OPTICAL TRANSCEIVER TO CONNECT TO THE SWITCH. FIBER OPTIC PORTS SHALL HAVE TYPE "SC" CONNECTORS. ETHERNET SWITCH SHALL BE RUGGEDCOM RS-900C-HI-N-2SC10 OR PRE-APPROVED EQUAL. ETHERNET SWITCH SHALL BE SUPPLIED WITH (2) DUPLEX SINGLE MODE JUMPERS, WITH "SC MALE" CONNECTORS ON ONE END AND "ST MALE" CONNECTORS ON THE OTHER END.

CONTROLLER SHALL BE ECONOLITE ASC/3-1000 TS-2 TYPE I, WITH NTCIP FIRMWARE, AND SHALL BE FULLY COMPATIBLE WITH AND ABLE TO USE ALL THE FEATURES OF THE CITY'S CENTRACS ADVANCED TRAFFIC MANAGEMENT SYSTEM. EACH ETHERNET-EQUIPPED COMPONENT SHALL COME WITH A 3' CAT5E NETWORK CABLE FOR CONNECTING TO A SWITCH. EQUIPMENT SUPPLIER SHALL BE REQUIRED TO SUBMIT A UNIT TEST CERTIFICATION OF THE ENTIRE CABINET ASSEMBLY PRIOR TO INSTALLATION IN THE FIELD.

CONFLICT MONITOR SHALL BE A RENO 1600GE.

(SP-18) THIS ITEM INCLUDES ALL EQUIPMENT AND MATERIALS TO PROVIDE SERVICE FROM THE OG&E POWER SOURCE, TO BE DETERMINED AT A LATER DATE, TO THE CONTROLLER CABINET.

(SP-19) ALL PEDESTRIAN PUSHBUTTONS, PEDESTRIAN SIGNAL HEADS AND TRAFFIC SIGNAL HEADS ARE TO BE BLACK.

(SP-20) ALL SIGNAL POLE AND MAST ARM ASSEMBLIES SHALL CONFORM TO ODOT MINIMUM STANDARDS, INCLUDING WIND AND ICE LOADING. SIGNAL POLE, MAST ARM, AND LUMINAIRE ARM ASSEMBLIES SHALL BE PELCO PART NUMBERS SP-3056-OK-35, SP-3056-OK-40, SP-3056-OK-50, AND SP-3056-OK-25, THAT INCLUDE THE ORNAMENTAL POLE TOPS, ORNAMENTAL POLE BASES AND ANCHOR BOLTS. ALL POLES AND MOUNTING HARDWARE SHALL BE BLACK. ALUMINUM POLE TOPS AND POLE BASES SHALL BE POWDER COATED TEXTURED BLACK (P59) OVER HOT DIP GALVANIZE. ALL SIGNAL POLES THAT HAVE LUMINAIRES SHALL HAVE 4" X 6" REFINFORED HAND HOLE WITH GALVANIZED AND POWDER COATED P59 COVER AT THE MAST ARM. ALL SIGNAL POLES SHALL HAVE ITC ACCESS COMPARTMENT ASSEMBLY WITH BARRIER TYPE TERMINAL STRIP IN ACCORDANCE WITH PELCO PART NUMBER AP-1074-PNC TO INCLUDE ITC COVER ASSEMBLY WITH PELCO PART NUMBER AP-1087-P59

(SP-21) THE PEDESTRIAN POLES TO BE SUPPLIED ON THIS PROJECT SHALL BE 10" DIAMETER POLES AND SHALL ALSO MATCH THE DECORATIVE DESIGN OF THE SIGNAL POLES DESCRIBED IN NOTE SP-21.

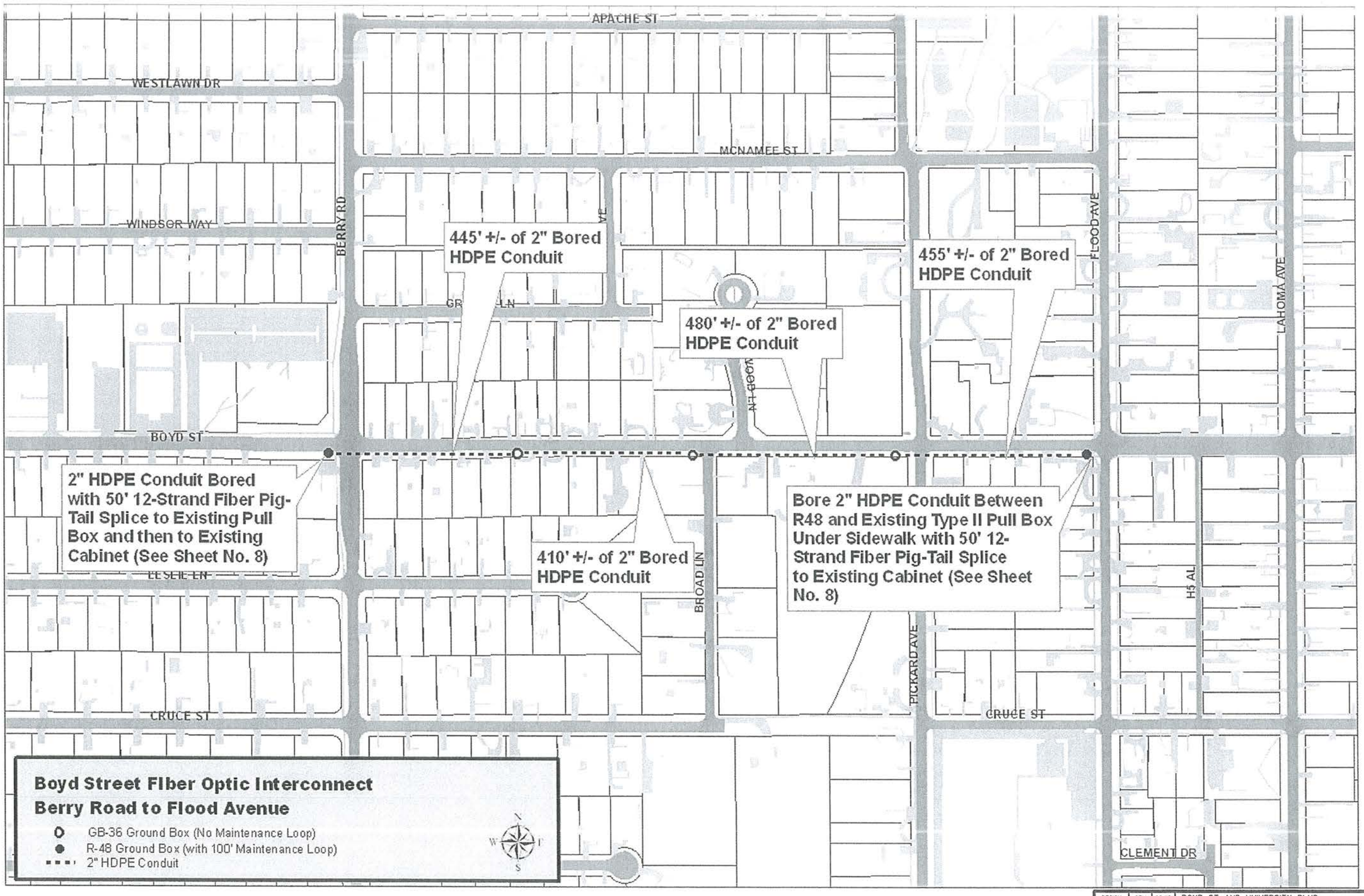
(SP-22) ANY LANE CLOSURES NEEDED DURING CONSTRUCTION SHALL BE IN ACCORDANCE WITH TYPICAL APPLICATIONS TA-22 OR TA-23 IN THE MUTCD.

DESIGN	CEM	02/16
DRAWN	CEM	02/16
CHECKED	NDT	02/16
APPROVED		
SQUAD	GARVER	

BOYD ST. AND UNIVERSITY BLVD.

NOTES

STATE JOB NO. 24285(04) SHEET NO. 5



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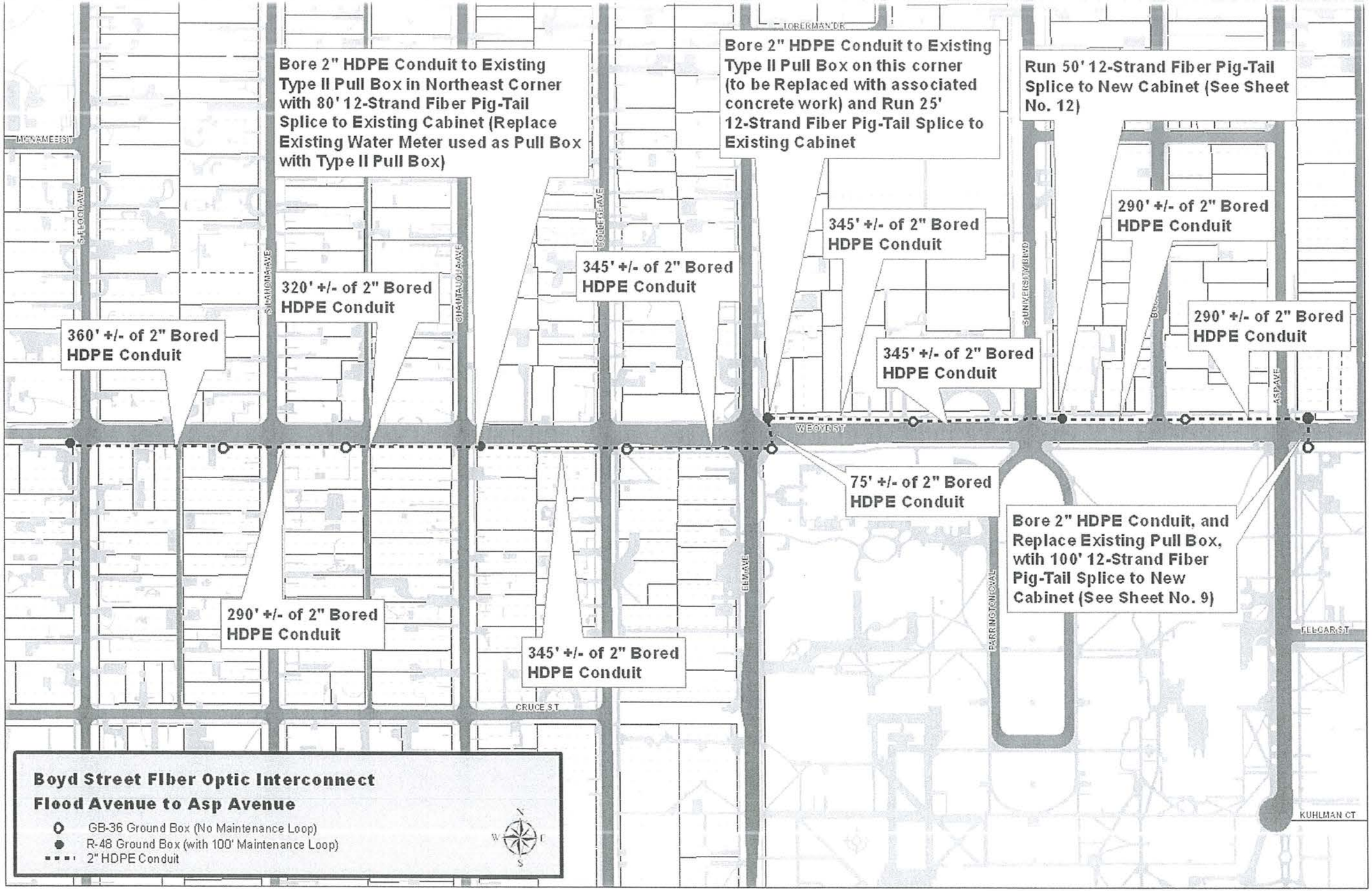
DRAWN	CEM	02/16
CHECKED	NDT	02/16
APPROVED		
SQUAD	GARVER	

BOYD ST. AND UNIVERSITY BLVD.

FIBER OPTIC INTERCONNECT

STATE JOB NO. 24285(04) SHEET NO. 6



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DRAWN	CEM	02/16	
CHECKED	NDT	02/16	FIBER OPTIC INTERCONNECT
APPROVED			
SQUAD	GARVER		STATE JOB NO. 24285(04) SHEET NO. 7

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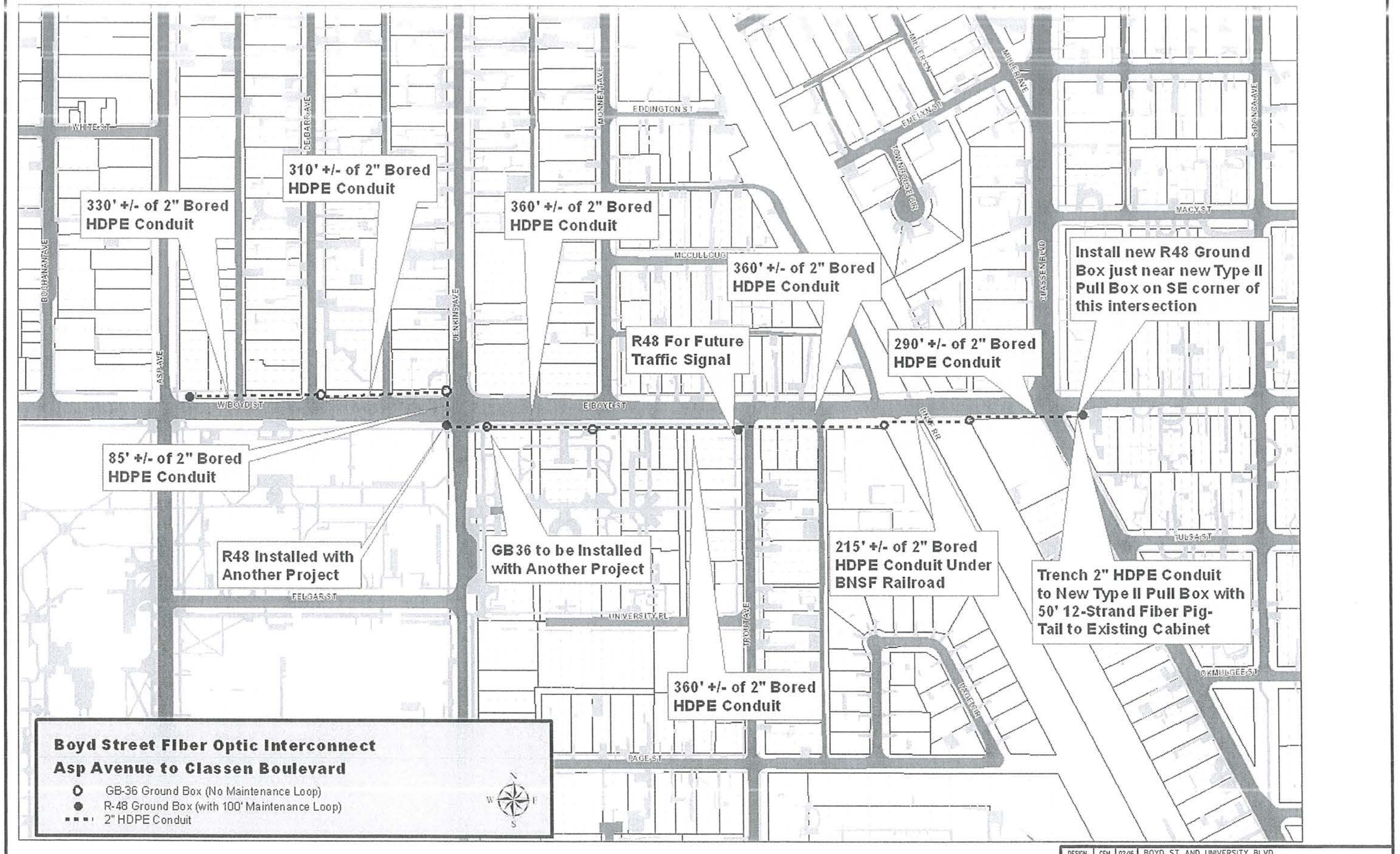
2/23/2016 CLEVELAND COUNTY BOYD ST.



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DRAWN	CEM	02/16	
CHECKED	NDT	02/16	FIBER OPTIC INTERCONNECT
APPROVED			
SQUAD	GARVER		STATE JOB NO. 24285(04) SHEET NO. 8

BOYD/CHAUTAUQUA SUMMARY OF WORK

BORES (3" CONDUIT)		CORNER	ESTIMATED WIRE QUANTITIES BY CORNER	
			5/C, 21/C, AND TERRA CAMERA WIRE	POWER WIRE
NORTH LEG	55' ESTIMATED	NE	CORNER TO SIGNAL CABINET-25' ESTIMATED	45' ESTIMATED
SOUTH LEG	55' ESTIMATED	NW	CORNER TO SIGNAL CABINET-80' ESTIMATED	0'
EAST LEG	75' ESTIMATED	SE	CORNER TO SIGNAL CABINET-100' ESTIMATED	0'
		SW	CORNER TO SIGNAL CABINET-180' ESTIMATED	0'

1. SE CORNER SCOPE OF WORK: REPLACE PULL BOX (WATER METER STYLE) WITH POLYMER TYPE II PULL BOX WITH APRON. INSTALL 90° ELBOW FOR CONDUIT FROM POLE BASE AND SIGNAL CABINET AT NEW PULL BOX. REPLACE 21/C WIRE, 5/C WIRE, AND TERRA CAMERA WIRE FROM POLE BASE TO SIGNAL CABINET.
2. SW, NE, AND NW CORNER SCOPES OF WORK: REPLACE PULL BOX (WATER METER STYLE) WITH POLYMER TYPE II PULL BOX IN SIDEWALK. THIS WILL REQUIRE CONCRETE REPLACEMENT AT NEW PULL BOX LOCATION. INSTALL 90° ELBOW FOR CONDUIT FROM POLE BASE AND SIGNAL CABINET AT NEW PULL BOX. REPLACE 21/C WIRE, 5/C WIRE, AND TERRA CAMERA WIRE FROM POLE BASE TO SIGNAL CABINET.
3. TOTAL LUMINAIRE WIRE (1/C NO. 10 ELECTRICAL CONDUCTOR) TO BE REPLACED TO ALL BASES WITH THE WORK IS 375 FEET. POWER WIRE AS SHOWN IS 1/C NO. 8 ELECTRICAL CONDUCTOR.
4. THIS INTERSECTION REQUIRES A NEW GALVANIZED CABINET ASSEMBLY WITH PAD. THE NEW LOCATION IS IMMEDIATELY NORTH OF THE EXISTING CABINET WITH SIMILAR DOOR ORIENTATION AS THE EXISTING CABINET. LOCATION TO BE DETERMINED IN THE FIELD. THIS RELOCATION WILL REQUIRE TWO NEW 3" CONDUITS AS WELL AS TWO 2" CONDUITS (ONE FOR POWER AND ONE FOR FIBER) BETWEEN THE NEW PULL BOX AND NEW CABINET LOCATIONS AND REMOVAL OF THE OLD CABINET PAD. THE NEW CABINET SHALL BE FULLY FURNISHED IN NATURAL FINISH ALUMINUM WITH A BATTERY BACK UP SYSTEM IN ACCORDANCE WITH CITY OF NORMAN SPECIFICATIONS. THE CABINET SHALL BE A TS2-1 CABINET EQUIPPED WITH AN ECONOLITE TAP, TIP, AND ALL NECESSARY CABLES AS WELL AS AN ECONCOLITE ASC/3-1000 CONTROLLER AND A RENO MMU 1600GE CONFLICT MONITOR.
5. REPLACEMENT OF CABINET INCLUDES REINSTALLATION OF CAMERA SYSTEM AND BATTERY BACK-UP SYSTEM TO NEW CABINET.

BOYD/BERRY SUMMARY OF WORK

BORES (3" CONDUIT)		CORNER	ESTIMATED WIRE QUANTITIES BY CORNER	
			5/C, 21/C, AND TERRA CAMERA WIRE	POWER WIRE
WEST LEG	50' ESTIMATED	NE	CORNER TO SIGNAL CABINET-160' ESTIMATED	0'
SOUTH LEG	65' ESTIMATED	NW	CORNER TO SIGNAL CABINET-75' ESTIMATED	0'
EAST LEG	65' ESTIMATED	SE	CORNER TO SIGNAL CABINET-100' ESTIMATED	0'
		SW	CORNER TO SIGNAL CABINET-30' ESTIMATED	45' ESTIMATED

1. NE CORNER SCOPE OF WORK: THIS CORNER DOES NOT HAVE A PULL BOX. INSTALL POLYMER TYPE II PULL BOX WITH APRON. INSTALL 90° CONDUIT ELBOW FOR CONDUIT FROM POLE BASE AT NEW PULL BOX. REPLACE 21/C WIRE, 5/C WIRE, AND TERRA CAMERA WIRE FROM POLE BASE TO SIGNAL CABINET.
2. NW AND SE CORNER SCOPE OF WORK: NEED TO REPLACE PULL BOX WITH POLYMER TYPE II PULL BOX WITH APRON. INSTALL 90° CONDUIT ELBOW FOR CONDUIT FROM POLE BASE AT NEW PULL BOX. REPLACE 21/C WIRE, 5/C WIRE, AND TERRA CAMERA WIRE FROM POLE BASE TO SIGNAL CABINET.
3. SW CORNER SCOPE OF WORK: NEED TO REMOVE AND REPLACE PULL BOX WITH POLYMER TYPE II PULL BOX IN SIDEWALK. THIS WILL REQUIRE CONCRETE REPLACEMENT AT NEW PULL BOX LOCATION. INSTALL 90° ELBOW FOR CONDUIT FROM POLE BASE AT NEW PULL BOX. REPLACE 21/C WIRE, 5/C WIRE, AND TERRA CAMERA WIRE FROM POLE BASE TO SIGNAL CABINET. INSTALL 2" HDPE CONDUIT FROM R48 GROUND BOX TO NEW PULL BOX AND 3" CONDUIT FROM NEW PULL BOX INTO CABINET. THIS WILL REQUIRE REMOVING A PORTION OF THE EXISTING CONCRETE CABINET PAD AND REPLACING ONCE THE CONDUIT IS INSTALLED.
4. POWER WIRE AS SHOWN IS 1/C NO. 8 ELECTRICAL CONDUCTOR.

BOYD/FLOOD SUMMARY OF WORK

1. INSTALL 2" HDPE CONDUIT FROM R48 GROUND BOX INTO EXISTING PULL BOX ON SW CORNER. THIS WILL INVOLVE SOME CONCRETE REPLACEMENT.
2. INSTALL NEW 3" CONDUIT FROM PULL BOX ON SW CORNER INTO CABINET. THIS WILL REQUIRE REMOVING A PORTION OF THE EXISTING CONCRETE CABINET PAD AND REPLACING ONCE THE CONDUIT IS INSTALLED.

BOYD/ASP SUMMARY OF WORK

1. THIS INTERSECTION REQUIRES A NEW BLACK (P59) CABINET ASSEMBLY WITH PAD. THE NEW LOCATION IS IMMEDIATELY SOUTH OF THE EXISTING CABINET WITH SIMILAR DOOR ORIENTATION AS THE EXISTING CABINET. LOCATION TO BE DETERMINED IN THE FIELD. THIS RELOCATION WILL REQUIRE TWO NEW 3" CONDUITS AS WELL AS TWO 2" CONDUITS (ONE FOR POWER AND ONE FOR FIBER) BETWEEN THE NEW PULL BOX AND NEW CABINET LOCATIONS AND REMOVAL OF THE OLD CABINET PAD. THE NEW CABINET SHALL BE FULLY FURNISHED IN POWDER COATED BLACK FINISH WITH A BATTERY BACK UP SYSTEM (ALSO IN A POWDER COATED BLACK CABINET) IN ACCORDANCE WITH CITY OF NORMAN SPECIFICATIONS. THE CABINET SHALL BE A TS2-1 CABINET EQUIPPED WITH AN ECONOLITE TAP, TIP, AND ALL NECESSARY CABLES AS WELL AS AN ECONCOLITE ASC/3-1000 CONTROLLER AND A RENO MMU 1600GE CONFLICT MONITOR. THE CABINET WILL ALSO NEED TO INCLUDE A POLARA CCU, FAILSAFE BOARD, AND ALL CABLES NEEDED TO RECONNECT THE POLARA APS BUTTONS EXISTING AT THE INTERSECTION.
2. REPLACEMENT OF CABINET INCLUDES REINSTALLATION OF CAMERA SYSTEM, POLARA PUSHBUTTON SYSTEM, AND A BATTERY BACK-UP SYSTEM TO NEW CABINET.

DESIGN	CEM	02/16
DRAWN	CEM	02/16
CHECKED	NDT	02/16
APPROVED		
SQUAD	GARVER	

BOYD ST. AND UNIVERSITY BLVD.

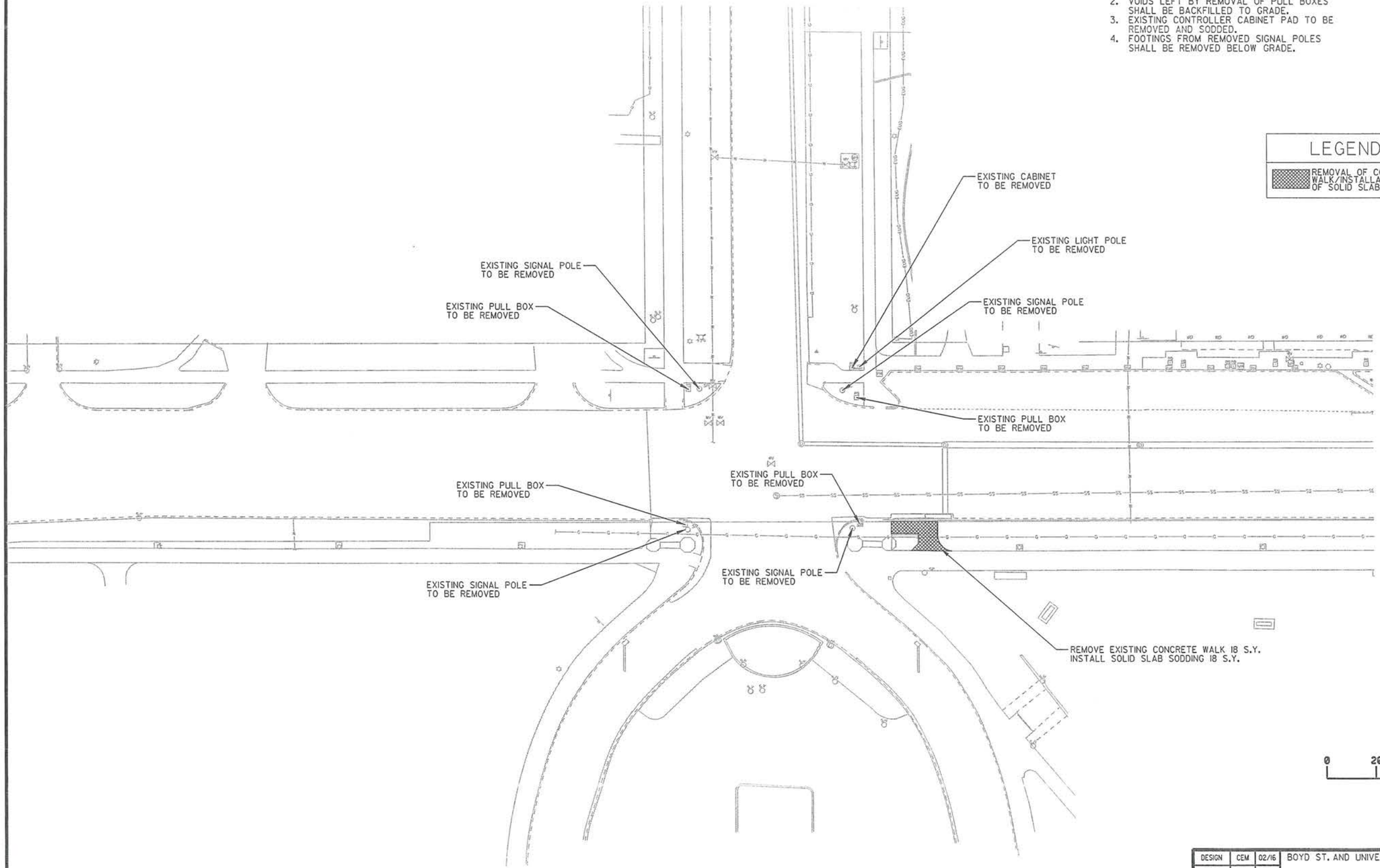
INTERSECTION SCOPE OF WORK

STATE JOB NO. 24285(04) SHEET NO. 9

NOTES:
1. CONTRACTOR TO CONTACT OG&E FOR POWER DISCONNECT TO EXISTING STREETLIGHT. CONTRACTOR IS TO REMOVE THE FOOTING FOR THE EXISTING STREETLIGHT BELOW EXISTING GRADE.
2. VOIDS LEFT BY REMOVAL OF PULL BOXES SHALL BE BACKFILLED TO GRADE.
3. EXISTING CONTROLLER CABINET PAD TO BE REMOVED AND SODDED.
4. FOOTINGS FROM REMOVED SIGNAL POLES SHALL BE REMOVED BELOW GRADE.

LEGEND

REMOVAL OF CONCRETE WALK/INSTALLATION OF SOLID SLAB SODDING



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SCALE

DESIGN	CEM	02/16
DRAWN	CEM	02/16
CHECKED	NDT	02/16
APPROVED		
SQUAD	GARVER	

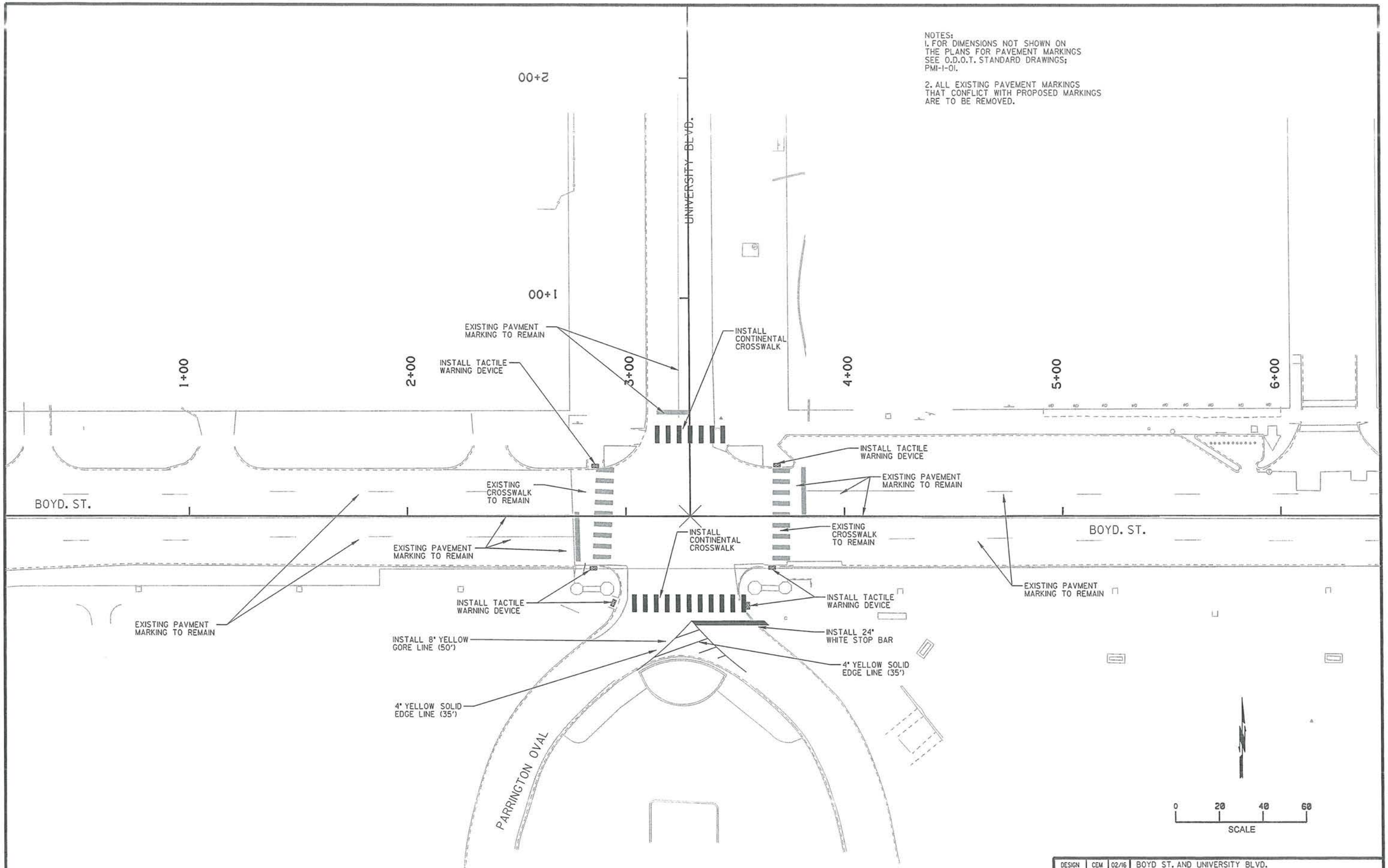
BOYD ST. AND UNIVERSITY BLVD.

REMOVAL AND INSTALLATION

STATE JOB NO. 24285(04) SHEET NO. 10

NOTES:
1. FOR DIMENSIONS NOT SHOWN ON THE PLANS FOR PAVEMENT MARKINGS SEE O.D.O.T. STANDARD DRAWINGS; PMI-1-01.

2. ALL EXISTING PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED MARKINGS ARE TO BE REMOVED.



DESIGN	CEM	02/16	BOYD ST. AND UNIVERSITY BLVD.
DRAWN	CEM	02/16	
CHECKED	NDT	02/16	STRIPING PLAN
APPROVED			
SQUAD	GARVER		STATE JOB NO. 24285(04) SHEET NO. 11

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2/23/2016 CLEVELAND COUNTY BOYD ST.

TABLE #1 SIGNAL HEADS

SIGNAL HEAD NUMBER	NUMBER & TYPE	MOUNTING	VISOR	BACKPLATE
1, 2, 4, 5, 6, 7, 8	7 - ONEWAY (S-6)	MAST ARM	V-1	B-2
3	1 - ONEWAY (S-19)L	MAST ARM	V-1	B-2
9, 10, 11, 12, 13, 14, 15, 16	8 - ONEWAY (S-20)	CLAMP	V-3	N/A

TABLE #2 MAST ARMS AND POLES

POLE	STATION	OFFSET	POLE TYPE	MAST ARM	FOOTING	MAST ARM SPACING (FROM ℄ OF POLE)
B	2+85	32' LT.	32' MH POLE	30' T.S. & 15' LMA	S-30	16, 24, 28
C	3+57	42' LT.	32' MH POLE	25' T.S. & 15' LMA	S-25	9, 21
D	3+91	32' RT.	32' MH POLE	30' T.S. & 15' LMA	S-30	16, 22, 28
E	2+78	30' RT.	32' MH POLE	50' T.S. & 15' LMA	S-50	39, 46, 49
F	2+96	43' LT.	10' PED POLE	-	F-2	-
G	3+66	32' LT.	10' PED POLE	-	F-2	-
H ✳	3+66	36' RT.	10' PED POLE	-	F-2	-
I ✳	2+93	36' RT.	10' PED POLE	-	F-2	-

✳ POLE LOCATIONS H AND I CAN NOT CHANGE. IF CONFLICTS ARISE THAT THE PED SIGNALS CAN NOT BE SEEN, MOUNTING ADJUSTMENTS WILL NEED TO BE CONSIDERED. FIELD VERIFICATION IS NEEDED PRIOR TO INSTALLATION.

TABLE #3 ELECTRICAL CABLE TO CONTROLLER "A" LOCATION

B - 21C/5C/VC/OC	C - 21C/5C/VC/OC	D - 21C/VC/OC
E - 21C/VC/OC	F - 7C/5C	G - 7C/5C
H - 7C/5C	I - 7C/5C	

CABLE TERMINAL IDENTIFICATION CODE

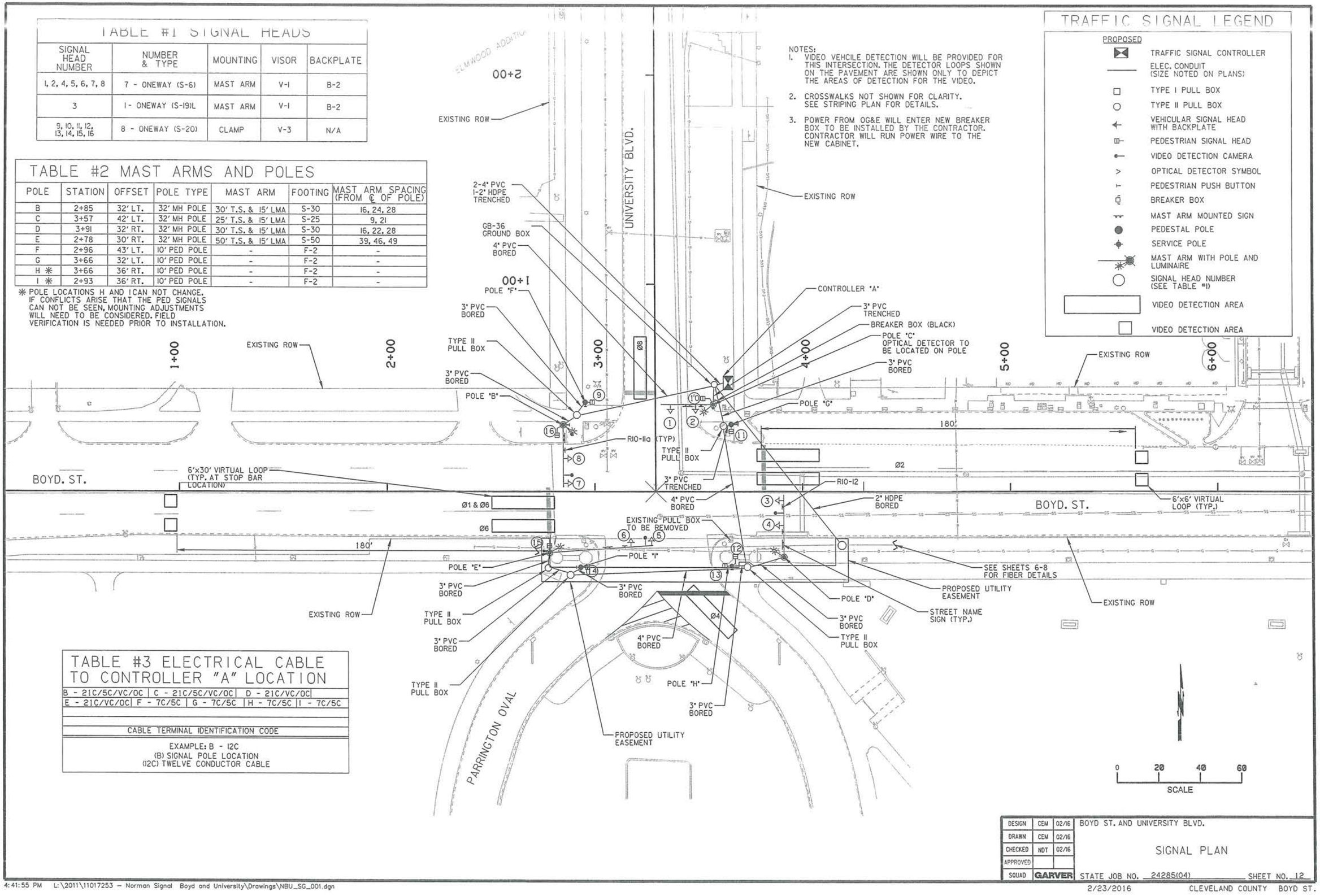
EXAMPLE: B - 12C
(B) SIGNAL POLE LOCATION
(12C) TWELVE CONDUCTOR CABLE

NOTES:
1. VIDEO VEHCILE DETECTION WILL BE PROVIDED FOR THIS INTERSECTION. THE DETECTOR LOOPS SHOWN ON THE PAVEMENT ARE SHOWN ONLY TO DEPICT THE AREAS OF DETECTION FOR THE VIDEO.
2. CROSSWALKS NOT SHOWN FOR CLARITY. SEE STRIPING PLAN FOR DETAILS.
3. POWER FROM OG&E WILL ENTER NEW BREAKER BOX TO BE INSTALLED BY THE CONTRACTOR. CONTRACTOR WILL RUN POWER WIRE TO THE NEW CABINET.

TRAFFIC SIGNAL LEGEND

PROPOSED

- TRAFFIC SIGNAL CONTROLLER
- ELEC. CONDUIT (SIZE NOTED ON PLANS)
- TYPE I PULL BOX
- TYPE II PULL BOX
- VEHICULAR SIGNAL HEAD WITH BACKPLATE
- PEDESTRIAN SIGNAL HEAD
- VIDEO DETECTION CAMERA
- OPTICAL DETECTOR SYMBOL
- PEDESTRIAN PUSH BUTTON
- BREAKER BOX
- MAST ARM MOUNTED SIGN
- PEDESTAL POLE
- SERVICE POLE
- MAST ARM WITH POLE AND LUMINAIRE
- SIGNAL HEAD NUMBER (SEE TABLE #1)
- VIDEO DETECTION AREA
- VIDEO DETECTION AREA



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SCALE

DESIGN	CEM	02/16	BOYD ST. AND UNIVERSITY BLVD.
DRAWN	CEM	02/16	
CHECKED	NDT	02/16	SIGNAL PLAN
APPROVED			
SQUAD	GARVER		STATE JOB NO. 24285(04) SHEET NO. 12

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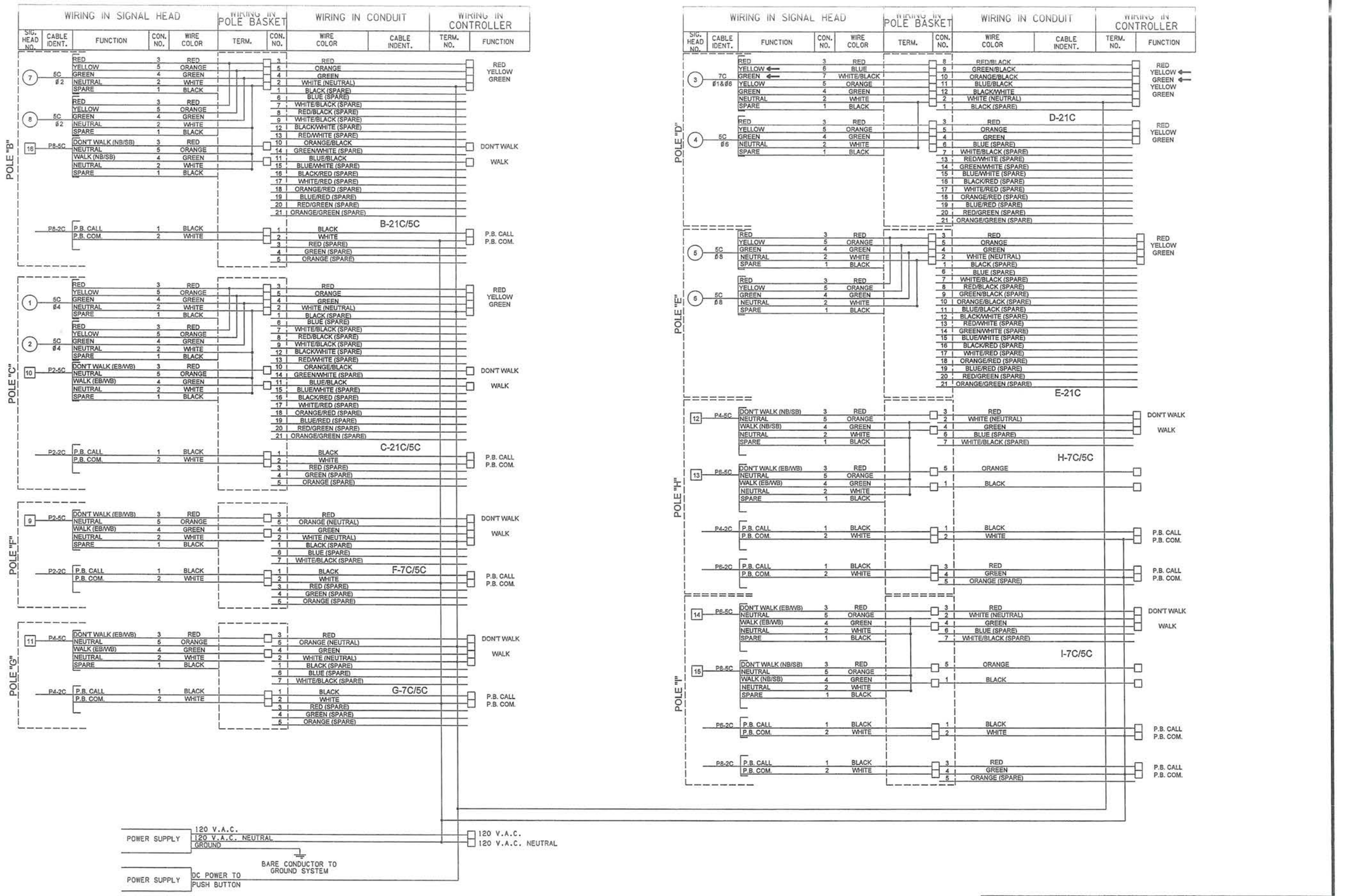
2/23/2016 CLEVELAND COUNTY BOYD ST.



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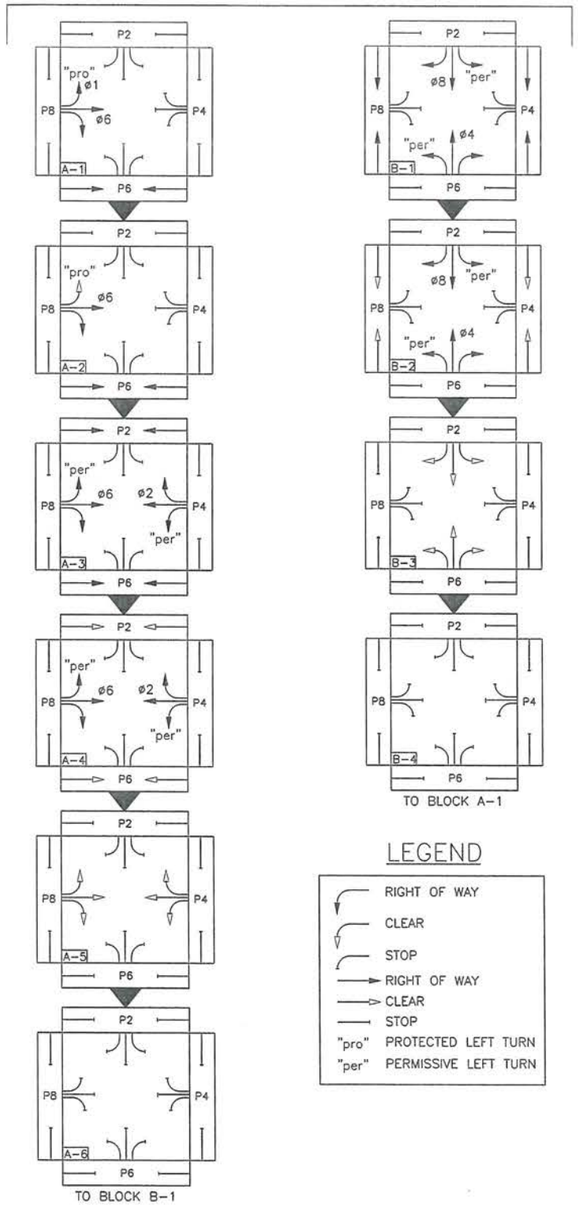
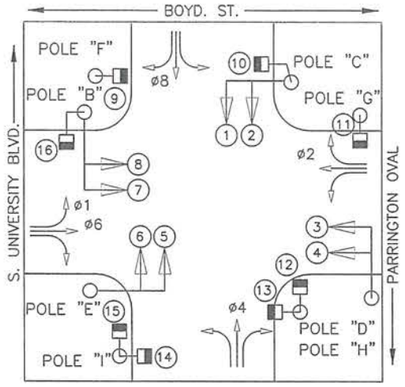
DRAWN	CEM	02/16	
CHECKED	NDT	02/16	WIRING
APPROVED			
SQUAD	GARVER		STATE JOB NO. 24285(04) SHEET NO. 13

PHASE DIAGRAM



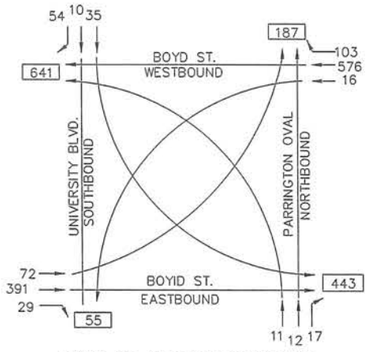
LEGEND

	RIGHT OF WAY
	CLEAR
	STOP
→	RIGHT OF WAY
⇢	CLEAR
—	STOP
"pro"	PROTECTED LEFT TURN
"per"	PERMISSIVE LEFT TURN

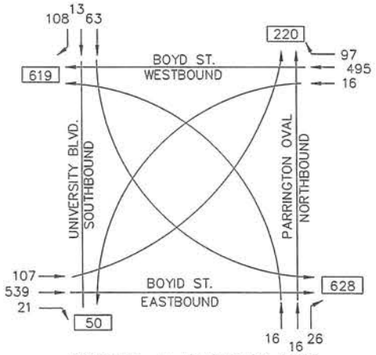


SEQUENCE

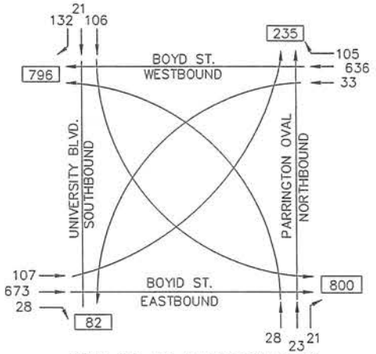
BLOCK NO.	PHASE DESIGNATION	SIGNAL HEAD NO. 1	2	3	4	5	6	7	8	9&10	11&12	13&14	15&16
A1	Ø1, Ø6 & P6 ROW	R	R	*G / G	G	R	R	R	R	DW	DW	W	DW
A2	Ø1 CLR Ø6 & P6 ROW	R	R	*Y / G	G	R	R	R	R	DW	DW	W	DW
A3	Ø2, Ø6, P2, & P6 ROW	R	R	G	G	R	R	G	G	W	DW	W	DW
A4	Ø2 & Ø6 ROW, P2 & P6 CLR	R	R	G	G	R	R	G	G	FDW	DW	FDW	DW
A5	Ø2 & Ø6 CLR	R	R	Y	Y	R	R	Y	Y	DW	DW	DW	DW
A6	ALL RED	R	R	R	R	R	R	R	R	DW	DW	DW	DW
B1	Ø4, Ø8, P4 & P8 ROW	G	G	R	R	G	G	R	R	DW	W	DW	W
B2	Ø4 & Ø8 ROW; P4 & P8 CL	G	G	R	R	G	G	R	R	DW	FDW	DW	FDW
B3	Ø4 & Ø8 CL	Y	Y	R	R	Y	Y	R	R	DW	DW	DW	DW
B4	ALL RED	R	R	R	R	R	R	R	R	DW	DW	DW	DW
	FLASHING RED	FR	FR	FR	FR	FR	FR	FR	FR				



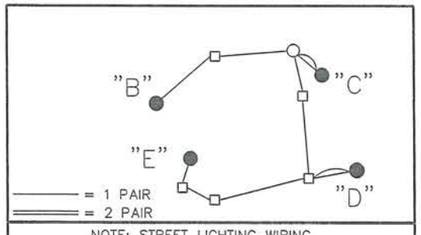
BOYD ST. AT UNIVERSITY BLVD.
TRAFFIC FLOW DIAGRAM
TRAFFIC VOLUME
AM PEAK



BOYD ST. AT UNIVERSITY BLVD.
TRAFFIC FLOW DIAGRAM
TRAFFIC VOLUME
MIDDAY PEAK



BOYD ST. AT UNIVERSITY BLVD.
TRAFFIC FLOW DIAGRAM
TRAFFIC VOLUME
PM PEAK



NOTE: STREET LIGHTING WIRING

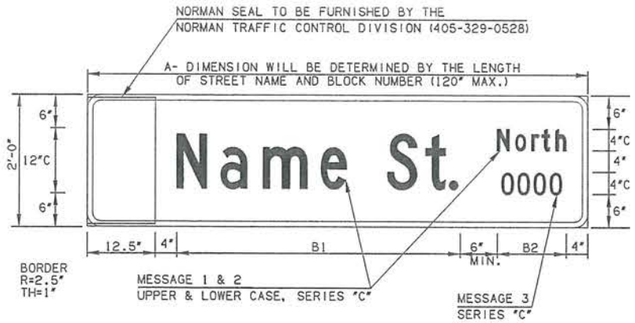
ONE PAIR EQUALS TWO CONDUCTORS (1/C-10AWG COPPER) ONE BLACK, ONE WHITE. CONDUCTORS SHALL BE SPLICED ONLY AT THE TERMINAL BLOCK AT EACH POLE BASE. A FUSE HOLDER SHALL BE PROVIDED IN THE HANDHOLE OF EACH COMBINATION TRAFFIC SIGNAL AND STREET LIGHT POLE. THE FUSE HOLDER SHALL BE INSTALLED IN THE LINE SIDE CONDUCTOR FOR THE LUMINAIRE. THE FUSE HOLDER SHALL BE A WATERPROOF INLINE FUSE HOLDER. IT SHALL BE SIMILAR TO BUSSMAN MFG. CO. TYPE "TRON" HEB. OR OTHER APPROVED EQUAL. COMPLETE WITH A PROPERLY SIZED TYPE KTK FUSE.

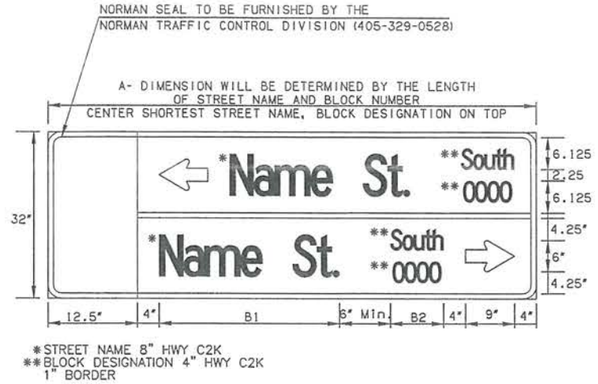
DESIGN	CEM	02/16
DRAWN	CEM	02/16
CHECKED	NDT	02/16
APPROVED		
SQUAD	GARVER	

BOYD ST. AND UNIVERSITY BLVD.

PHASING AND
STREET LIGHT WIRING

STATE JOB NO. 24285(04) SHEET NO. 14





*STREET NAME 8" HWY C2K
**BLOCK DESIGNATION 4" HWY C2K
1" BORDER

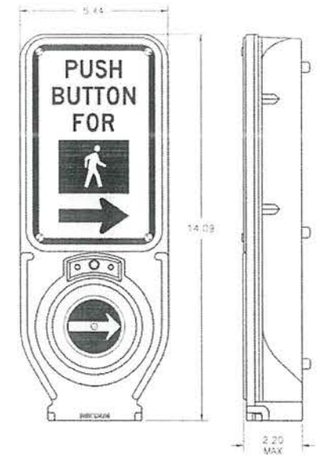
NOTES:

STREET NAME, DIRECTION AND BLOCK NUMBER SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY. FOR INDIVIDUAL STREET NAMES AND NUMBER SEE "SUMMARY OF ONE LINE STREET NAME SIGNS" AND "SUMMARY OF TWO LINE STREET NAME SIGNS" TABLES THIS SHEET. CONTRACTOR SHALL VERIFY "MESSAGE" INFORMATION WITH THE CITY OF NORMAN PRIOR TO CONSTRUCTION OF THE SIGNS.

REFLECTORIZED GREEN-BACKGROUND

REFLECTORIZED WHITE-MESSAGE AND BORDER

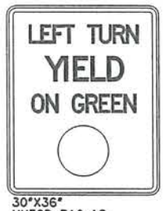
MAST-ARM MOUNTED STREET NAME SIGNS ARE TO BE 3M?S DIAMOND GRADE 3(CUBED), 4090, RETRO-REFLECTIVE SHEETING, OR EQUIVALENT.



ADA PUSH BUTTON STATION ASSEMBLY (ALL BLACK)

36"X48"
MUTCD R10-11a

24"X30"
MUTCD R10-11a



30"X36"
MUTCD R10-12

SUMMARY OF ONE LINE STREET NAME SIGNS

MESSAGE 1	MESSAGE 2	MESSAGE 3	POLE LOCATION	A (IN.)	HEIGHT (IN.)	B1 (IN.)	B2 (IN.)	SIGN AREA (S.F.)	TOTAL (S.F.)
BOYD ST	WEST	300	C	84	24	47.67	8.2	14.00	14.00
BOYD ST	WEST	400	E	84	24	47.67	8.2	14.00	14.00
								TOTAL	28.00

SUMMARY OF TWO LINE STREET NAME SIGNS

MESSAGE 1 TOP/BOTTOM	MESSAGE 2 TOP/BOTTOM	MESSAGE 3 TOP/BOTTOM	POLE LOCATION	A (IN.)	HEIGHT (IN.)	B1 (IN.) TOP/BOTTOM	B2 (IN.) TOP/BOTTOM	SIGN AREA (S.F.)	TOTAL (S.F.)
PARRINGTON OVAL/UNIVERSITY BLVD	-/SOUTH	-/500	B	114	32	53.86/54.69	-/9.83	25.50	25.50
UNIVERSITY BLVD/PARRINGTON OVAL	SOUTH/-	500/-	D	114	32	54.69/53.86	9.83/-	25.50	25.50
								TOTAL	51.00

SUMMARY OF STANDARD SIGNS

SIGN DESIGNATION	POLE LOCATION	A (IN.)	HEIGHT (IN.)	SIGN AREA (S.F.)	TOTAL (S.F.)
R10-11a	C & E	24	30	5.00	10.00
R10-11a	B & D	36	48	12.00	24.00
■ R10-3e	B, C, E, F, G, H, I & J	9	15	1.00	8.00
R10-12	D	30	36	7.50	7.50
				TOTAL	49.50

■ INCLUDED IN PAY ITEM 630 8000.

800-84
COUNTDOWN SIGN
OPTION T
9"X15"
Right/Left Arrow
MUTCD R10-3e

STANDARD SIGNS

DESIGN	CEM	02/16
DRAWN	CEM	02/16
CHECKED	NDT	02/16
APPROVED		
SQUAD	GARVER	

BOYD ST. AND UNIVERSITY BLVD.

SIGN DETAILS

STATE JOB NO. 24285(04) SHEET NO. 15