GENERAL REQUIREMENTS

The purpose of this specification and the associated plans is to install a semi-actuated traffic signal at the proposed Kienle Drive and U.S. Route 36 (E. Ash Street) intersection in the City of Piqua, Ohio. These plans and specifications are to result in the installation of a complete traffic signal as defined herein. The traffic signal shall operate according to the requirements of the Ohio Manual of Uniform Traffic Control Devices (OMUTCD) and shall be timed to accommodate traffic at the intersection.

The Ohio Department of Transportation Construction and Material Specification dated January 1, 2002, shall govern this project (except when otherwise noted) even though this is not an ODOT project. Items listed shall conform to the State of Ohio Department of Transportation Construction and Materials Specification Manual, to the ODOT Office of Traffic Engineering Standard Construction Drawings, and to any Supplemental Specifications and/or specific requirements noted.

Bidders shall comply with all applicable provisions of the Ohio Revised Code and Administrative Code.

ITEM 105 INSPECTION OF WORK

In addition to Item 105.11, all materials and each part or detail of the work shall be subject to inspection by the Engineer or his representative. The locations and/or positions of the following items shall be inspected by the Engineer prior to installation.

1. Location of strain poles
2. Position of bagged signal heads
3. Location of pavement cutting for loop detectors
4. City required inspections for concrete work
5. City required inspections for electrical work

The City shall be notified a minimum of 24 hours in advance of the need for inspection. Final inspection of the completed project prior to turn on is also required.

Any work done without inspection of the above mentioned items may be ordered removed and replaced at the Contractor's expense. The cost of satisfying the inspection requirements will be incidental to the project and included in the unit cost of each item.

ITEM 106 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS

In addition to Item 106.01, the Contractor shall submit to the City of Piqua catalog cuts for all traffic signal components furnished for this project. The City of Piqua must provide written acceptance for each component before the Contractor may order the material.

ITEM 614 MAINTENANCE OF TRAFFIC SIGNAL/FLASHER INSTALLATION

The Contractor shall be responsible for maintaining traffic signal/flasher installations within the project under the following conditions:

1. 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. The Contractor shall be responsible for the entire installation (at an intersection) from the time his operations first disturb the installation until the installation has been subsequently removed or modified and the work is accepted.

2. 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.

GENERAL

The Contractor shall correct as quickly as possible all outages or malfunctions. He shall provide the maintaining agency and the 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. All lamp outages, cable outages, electrical failures, equipment malfunctions and misaligned signal heads shall be corrected to the satisfaction of the Engineer with the signal back to service within four hours after the Contractor has been notified of the outage.

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 Engineer with the signal back in service within 8 hours after the Contractor's notification 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 8-hour period, and shall make permanent repairs or replacement as soon thereafter 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 responsible for the damage.

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, any subsequent billings to the city for Police Services shall be deducted from monies due or to become due the contractor.

The Contractor shall provide the maintenance service entirely with his forces.

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. When a traffic signal must be taken out of service by the Contractor due to construction procedures, this outage shall not exceed 4 hours and shall not include the hours of 7 to 9 AM and 4 to 6 PM. 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 the Contractor, by the installation of temporary "STOP" signs on the side streets.

Any vehicular traffic signal head, either new or existing which will be out of operation shall be covered in the manner described in 632.24.

DOCUMENTATION

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;
5. Time of completion of the 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, AS PER PLAN.

ITEM 625 CONCRETE PULL BOX

Construct and install concrete pull boxes as shown on the plans for all pull boxes and ensure that the cover has the word "TRAFFIC" formed on the surface or displayed on an attached metal plate according to ITEM 725.09.

ITEM 632 VEHICULAR SIGNAL HEAD WITH LED UNITS (BY SECTION), 12" LENS, (BY TYPE), AS PER PLAN

In addition to the requirements of Item 632 and 732, the signal heads shall be erected in accordance with Standard Construction Drawing TC-85.20 (05/01/00). Each signal face shall be oriented to its traffic approach and locked in place by a 3-prong tri-stud device incorporated in the signal housing and support hardware if mounted on span wires. Item 732.01 is modified for the project as follows:

All signal heads shall be erected with balance adjusters and positioned so the fixtures hang plumb at a clearance of 16 feet (distance from the bottom of the signal head to pavement) and/or the signal head is correctly aimed at approaching traffic. Steel drop pipes or adjustable signal head hangers may be required if the elevation of adjacent signals on the same approach differ by more than 9 inches.

All signal heads are to be 12-inch aluminum painted federal highway yellow and furnished with 12-inch cutaway visors with hood type fasteners secured to the body of the signal head.

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LED, light emitting diode, signal lamp units shall meet the requirements of ODOT Supplemental Specification 872. All lamp units shall be the 12 inch (300 mm) size. LED signal lamp units shall be provided for the following lens types: circular RED, circular YELLOW, circular GREEN, YELLOW arrow, GREEN arrow.

The LED units shall be manufactured by Dialight, as follows, and shall be warranted for 5 years against defects.

Red, Dialight #433-1210-003
Yellow, Dialight #433-3230-001
Red, Dialight #433-2279-001

The Contractor shall provide The Engineer, in writing, the LED manufacturer name, serial number, part number, description of lamp, and date of manufacture for all LED units to be used in the traffic signal heads prior to installation, for acceptance and warranty purposes. The information shall be sent to the following location:

City of Piqua
Attn: Amy Havenar
201 W. Water Street
Piqua, Ohio 45356

Payment will be made at the contract unit price bid per each of ITEM 632 VEHICULAR SIGNAL HEAD WITH LED UNITS (BY SECTION), 12" LENS, (BY TYPE), AS PER PLAN.

ITEM 632 PEDESTRIAN SIGNAL HEAD WITH LED LAMP UNITS, TYPE D2, AS PER PLAN

This specification covers LED pedestrian signal module 16" housings. In addition to the requirements of CMS 632 and 732, the following requirements shall also apply: Pedestrian signals shall be full man/hand overlay with clamshell mounting and a black (non-painted) polycarbonate housing.

LED, light emitting diode, signal lamp units shall meet the requirements of Supplemental Specification 872. All lamp units shall be the 16 inch size. The LED Units shall be manufactured by Dialight, #430-6472-001.

The Contractor shall provide the City of Piqua, in writing, the LED manufacturer name, serial number, part number, description of lamp, and date of manufacture for all LED units to be used in the traffic signal heads prior to installation, for acceptance and warranty purposes. The information shall be sent to the following location:

City of Piqua
Attn: Amy Havenar
201 W. Water Street
Piqua, Ohio 45356

The pedestrian signal heads shall be attached to the pole using plates bolted (not banded) to the strain poles. Payment will be made at the contract unit price bid per each of ITEM 632 PEDESTRIAN SIGNAL HEAD, TYPE D2, AS PER PLAN.

ITEM 632 PEDESTRIAN PUSHBUTTON, AS PER PLAN

In addition to Items 632.08 and 732.06, the pedestrian pushbutton shall be of a large button design that is recommended by the American Disabilities Act (ADA). The pedestrian pushbutton shall be a yellow "bulldog" pushbutton type, manufactured by Polara Engineering, Inc.

Pedestrian pushbuttons shall be furnished and installed by the contractor including pedestrian actuation signs by bolting (not banding) to the strain poles. Payment will be made at the contract unit price bid per each of ITEM 632 PEDESTRIAN PUSHBUTTON, AS PER PLAN.

ITEM 632 STRAIN POLE, TYPE TC-81.10, DESIGN 6, AS PER PLAN

In addition to Item 632.16 and Item 732.12, the Contractor shall furnish and install a strain pole in accordance with ODOT Standard Construction Drawing TC-81.10 (5/01/00).

1. A 2" weatherhead is to be furnished in addition to the standard 2" weatherhead at the top of Pole P1. The second weatherhead does not require a blind half coupling; the Contractor may field drill the pole above the messenger wire point of attachment and install a weatherhead using a close nipple, 2 locking nuts, and a bushing.

2. Two 3" conduit ells are to be furnished for installation in the strain pole foundation. See the Pole Orientation table and the respective signal plan for additional conduit ells and the appropriate sizes.

Payment will be made at the contract unit price bid per each of ITEM 632 STRAIN POLE, TYPE TC-81.10, DESIGN 6, AS PER PLAN.

ITEM 632 POWER SERVICE, AS PER PLAN

In addition to Section 632.23, electric power shall be obtained from the City of Piqua at the location indicated in the plan. The Contractor shall be responsible for providing a 2" galvanized conduit from the controller to the power service point, as directed by the Engineer. The contractor shall provide 5 feet of coiled slack at the splice point for connections to be made by City personnel. Disconnect switches shall be furnished and installed by the Contractor, as directed by the Engineer.

Payment for trench, conduit, and power cable will be made at the unit bid price for those items. All other material, equipment, and incidentals necessary for making power service connections will be considered incidental and included with ITEM 632 POWER SERVICE, AS PER PLAN.

ITEM 632 INTERCONNECT CABLE, MISC.: INTERCONNECT CABLE, INTEGRAL MESSENGER WIRE TYPE 12 PAIR, NO. 19 AWG, SOLID REA (PE-38), AS PER PLAN

The integral messenger type interconnect cable shall meet the requirement of Item 732.19. The messenger support part of the cable is to be removed where the cable is contained in controllers, cabinets, poles, and conduits or supported on messenger wire installed for other purposes. The messenger and jacket web is to be neatly removed by the use of a tool specifically designed and sized for this purpose such that there is no damage to the jacket and shield of the cable. Deviations from the cable routing shown in the plan, for the sole purpose of reducing the amount of lashing rods to be removed, will not be permitted.
The interconnect plans sheets show the proposed cable types and locations for the project. The contractor shall remove the existing interconnect cable and splice boxes if the proposed interconnect cable follows the existing interconnect cable path. The interconnect cable should be installed 2.5 feet below the neutral power cable or 1 foot above communication type cable. Coordination with the City of Piqua Electric Department is the responsibility of the contractor to determine actual mounting heights throughout the project.
No splices will be permitted between intersections.
Interconnect cable shall be tested before equipment is connected to the controller. Line loss tests are required to be performed as follows in addition to the testing required as a part of Item 632.28. Line loss tests shall be performed on each pair, 1 through 6, and be made through the entire length of the installed cable. These tests shall be done with a telephone line test instrument, such as a "Lineman - Model 1067" made by Helper Instrument Company of Indian Harbor Beach, Florida or equal and shall be done by injecting an input signal at zero (0) dB at one end of the pair and measuring the dB loss with a second tester at the other end of the pair. Termination at the end of a pair is to be with a 600-Ohm resistor across the pair. This procedure shall be done at each of three (3) frequencies, 404 Mhz, 1004 Mhz, and 2804 Mhz, on each of the six (6) cable pairs.
The results showing the dB loss at each frequency on each pair shall be recorded. A copy shall be furnished to the Engineer for future comparison and troubleshooting. The attenuation on each pair shall not exceed 1.25 at 1000 Hz-dB per 1.0-mile loop. The records and readings of the tests are to be provided to the Engineer.
The contractor shall terminate any interconnect cable pairs not used on a molded self extinguishing plastic connecting block at each cabinet. The block as manufactured by Siemon or equal shall be mounted to the side of each cabinet by means of a bracket or adhesive and is included as part of this interconnect cable item. Two termination blocks shall be needed for this project: one at Kienle Drive and one at the Taco Bell signal.

All additional labor, equipment, and material that may be necessary to complete the work as specified shall be provided by the contractor. Payment will be made at the contract unit price bid per foot for Item 632 Interconnect Cable.

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ITEM 633 CONTROLLER UNIT, TYPE TS2/A1, WITH CABINET, TYPE TS2, AS PER PLAN

In addition to Item 633.07 and Item 733.02, the controller shall meet, as a minimum, all applicable sections of the NEMA Standards Publication No. TS2-1992. This specification shall govern where differences occur in the ODOT Standard Construction and Material Specification. The TS2 Type 1 controller shall be furnished by Econolite Control Products, Inc.with the most recent software and provide all features of the latest model available:

The microcomputer-based controller shall be capable of operating as full or semi-actuated volume density control with pedestrian timing in either an isolated location or as part of a coordinated system of controllers. The controller unit shall be furnished in accordance with NEMA TS 2 Type 1 (1992) standards and shall be connected to an Malfunction Management Unit (MMU) and to rack mounted detector amplifiers (RENO Type 1200 SS Two Channel Model C) in a NEMA TS 2 cabinet.

Local Controller Equipment

The local controller shall be able to operate time of day patterns and shall be able to function in a coordinated system with the East Ash Street signals. The local controller shall be a ASC/2S, NEMA TS2 Type 1 actuated traffic controller manufactured by Econolite Control Products, Inc.

The MMU shall be manufactured by EDI, series MMU-16E. The following functionality shall be provided with the controller:

1. The controller shall provide a LCD display and shall use an English menu format for data entry and information display. The LCD shall be a multiple angle display that has an adjustable intensity with backlighting.

2. Time base coordination (TBC) shall be provided and operate on programmed command (time of day), manual command, and automatically if communication with the traffic responsive master should be interrupted.

3. The controller unit shall maintain user programmable variables in non-volatile EEPROM memory to assure continued safe and efficient controller operation after recovery from a power loss. No batteries shall be required for retention of traffic parameters. The EEPROM module shall be as a minimum socket mounted to the microprocessor board.

4. The controller shall have the capability of regaining coordination without forcing the intersection to free operation if a pedestrian walk and clearance interval exceeds a programmed split. The offset transition period shall not exceed 6 cycle lengths regardless of the transition method selected.

5. Traffic responsive coordination patterns may be selected by either of the following 2 methods: a cycle-split-offset (COS) pattern or by a specific timing plan.

6. The pedestrian clearance interval shall be user programmable in the local controller to permit extending the flashing DONT WALK interval through the yellow change interval and/or the all-red clearance interval.

7. The user shall be able to program all timing parameters and emergency vehicle preemption and railroad preemption for the local controller through the keyboard and a laptop computer.

8. The pedestrian WALK and DONT WALK intervals shall be timed with the associated NEMA phase and shall operate independently of the opposite ring. Pedestrian movements shall be fully operational with the respective lead/lag vehicular movements and maintain progression.

Cabinet Equipment

The cabinets shall be unpainted natural aluminum, commercially smooth and free of defects that would impair serviceability or detract from general appearance. The cabinets shall be furnished fully equipped with the following features ready for controller installation as required:

1. The cabinet shall be furnished with two removable shelves mounted on adjustable channels. All mounting hardware shall be included.

2. A door alarm/light switch shall be furnished and installed in the cabinet. A 60W incandescent lamp shall be furnished and installed with a 14-inch (minimum) flexible arm to illuminate the field terminals. The lamp shall be wired to either a 15 amp ON/OFF toggle switch mounted on the power panel or to a door activated switch mounted near the top of the door.

3. The cabinet shall be furnished with load switches for a 12-position backboard to allow for maximum phase utilization for which the cabinet is designed. All load switches shall be supported by a bracket extending at least half the length of the load switch.

4. All controller and MMU cables shall be of sufficient length to allow the units to be placed on either shelf or on the top of the cabinet in the operating mode. Connecting cables shall be sleeved in a braided nylon mesh. The use of exposed tie-wraps or interwoven cables are unacceptable.

5. The cabinet shall be equipped with a momentary pushbutton contact switch for substituting manual operation of internal timing for automatic interval timing. The switch is to be mounted on a 5 foot minimum flexible weatherproof extension cord in accordance with Item 733.03.A.2(j).

6. The cabinet shall be of a door in door type with a #1 key for the police door and a corbin type tumble lock keyed for a #2 key on the main door. A resealable pouch shall be mounted to the inside door of the cabinet and shall be sufficient to accommodate one complete set of wiring, signal, and timing plans.

7. All cabinet configurations shall be provided with enough RS-485 Port 1 communication cables to allow full capabilities of that cabinet. Each communication cable connector shall be a 15 pin metal shell D subminiature type with a shielded cable suitable for RS-485 communications.

8. The cabinet shall include an Econolite, BIU-64, TS2 Bus Interface unit and shall be powered by an Econolite PS-2412, Power Supply Unit.

9. The controller test panel should be equipped with the following switches (TS1) as a minimum per ODOT Item 733.03:

   * Signal shutdown switch
   * Flash Control Switch (BIU#2-Input 3)
   * Run/stop time switch (BIU#1-Input 1)
   * Automatic/manual transfer switch (BIU#1-I/O 20)
   * Coordinated/free switch (BIU#2-Input 7)

10. Telemetry interface harnesses and interface panels as needed to communicate with the central office monitor and to operate the coordinated signal system shall be furnished. The contractor shall be responsible for ensuring reliable communication between the master controller (and local controller) and the central office monitor.

11. A socket mounted communication line transient protection device shall be supplied with the telemetry interface panel. The device shall be an EDCO Model PC642C-0080 or equal. The transient protection device shall be wired in series with the telemetry communication circuit.

12. A 25 terminal, 4 clip, push type connecting block that is suitable for No. 19 AWG wire (as manufactured by Siemons Corp., or equal) shall be furnished and mounted in the cabinet to terminate unused twisted copper interconnect cable.

13. Mark and tag all field cabinet wiring inside the controller.

Detector test switches shall be provided for each vehicular and pedestrian phase. The switches shall be capable of placing manual calls into the controller during activated operation. The switches shall be in parallel with the vehicular detector relay closure and pedestrian pushbutton circuits.

The eight (8) phase (12 position) cabinet shall be ground mounted and furnished with cabinet mounting hardware. The cabinet shall have a nominal cabinet dimension of 51"H x 36"W x 18"D (+2"/-0"for all dimensions).

Controller and Cabinet Testing

The Contractor shall perform bench testing of the components of this section on the controller cabinet. Testing of the conflict monitor shall be done by the Contractor before installing the intersection controller and cabinet in the field. Software and firmware shall be loaded on the controller and checked for correct operation of timing plans, phasing schemes, and pre-empts.

Testing of components by the Contractor for proper operation shall include the following minimum requirements:

1. Fan & thermostat operation.
2. Door closer switch operation.
3. MMU test.
4. Force hardwire conflicts for all phase combinations to verify stop timing and conflict indication.
5. GFI receptacle test.
6. Police panel operation.

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7. Maintenance panel operation.
8. Detectors.
9. Test for phase operation, sequence and interval length on min recall, max recall and no call.
10. Shelves, mounting.
11. All panels, mounting.
12. ATSI MMU test to document the MMU operation. The test results are to be logged and furnished to the City Engineer.
13. Proper flash sequence.
14. Auxiliary equipment operation.
15. Cabinet lamp.
16. Signal output are to be tested while connected to a min 60 watt load on each signal indication.
17. Telemetry Interconnect

Repairs/corrections, if required, shall be made by the Contractor and recorded before delivery. The Engineer shall also be notified of any problems. The controller is to operate without problems on minimum recall of all minor phases for 48 hours with full load on each output. (Note that testing also requires operation with detectors in a no call and call to maximum configuration).

A written report stating the cabinet intersection number, date and time of test, signed off by the technician who performed the tests, shall be submitted to the Engineer upon successful completion of the above tests. The successful testing shall be demonstrated to the Engineer prior to installation if requested. The test area may be erected at a location determined by the Contractor. All costs related to inspect and observe the bench testing shall be included as part of controller testing.

The controller and all related components shall be in perfect working order and ready for installation/operation at the specified intersection as a result of the work described in this item. The cost for the controller and cabinet testing shall be included in the price of the controller furnished complete.

Documentation

Two (2) complete sets of Wiring Diagrams and Parts Lists shall be provided for each cabinet.

1. User manuals

2. Device programming manuals

3. Wiring diagrams and parts lists

4. Installation and Diagnostic Manuals

Software or firmware updates shall be accompanied by complete documentation that references an upgrade version, provides a list of improved capabilities with the upgrade, and provides a list of problems resolved with the upgrade (if applicable). All functions, features, and capabilities not addressed shall operate as intended before the upgrade was implemented. All software and firmware upgrades and new releases for features furnished as a part of this contract shall be free of charge for two (2) years after the completion of the 10-day performance burn test.

Payment will be made at the contract unit price bid per each of ITEM 633 CONTROLLER UNIT, TYPE TS2/A1, WITH CABINET, TYPE TS2, AS PER PLAN in place including all connections, system analysis, tested and accepted.

ITEM 633 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 due to poor workmanship or defective equipment shall be borne by the Contractor. Customary manufacturer's guarantees for all items shall be turned over to the Engineer following acceptance of the equipment.

The contractor shall provide "As-Built" plans of the traffic signal installation to the City of Piqua within 90 days of completion of the signal installation.

The cost of guaranteeing satisfactory operation of the traffic control system will be incidental to the project and included in the unit cost of each item.

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SIGNAL PHASING

PHASE 2&6	PHASE 4&8
Nb & Sb	Eb & Wb
ACTUATED	NON-ACTUATED

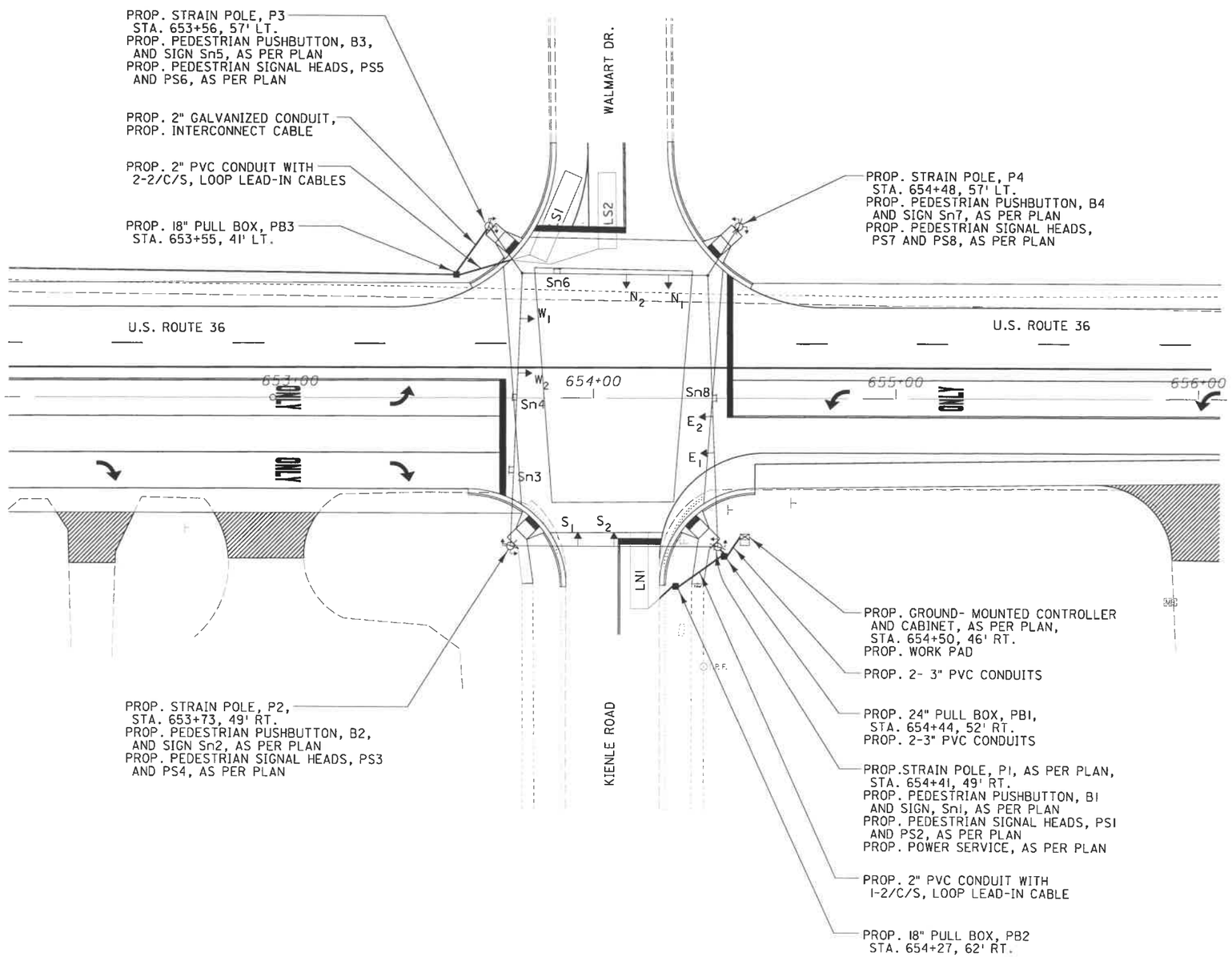
PROPOSED SIGNAL HEAD
N1, N2, S1, S2, E1, E2, W1, W2

PROPOSED R3-5L-30
Sn3, Sn6

PROPOSED R3-5R-30
Sn4, Sn8

PROPOSED PEDESTRIAN SIGNAL HEAD
PS1, PS2, PS3, PS4, PS5, PS6, PS7, PS8

PROPOSED R10-H4d-9
Sn1, Sn2, Sn5, Sn7

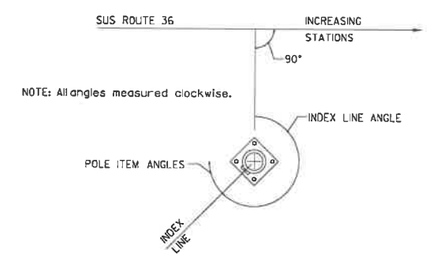


POLE ORIENTATION

POLE NO.	ODOT DESIGN NO.	POLE HEIGHT (FT)	INDEX LINE ANGLE (DEG)	ANGLE (DEG) FROM INDEX LINE: PEDESTRIAN SIGNAL	PEDESTRIAN PUSHBUTTON	WEATHERHEAD	CONDUIT ELL	BLIND COUPLING	POWER SERVICE
P1	6	30	135°	135°/225°	180°	180°	0°	- °	45°
P2	6	30	225°	135°/225°	180°	180°	- °	- °	- °
P3	6	30	135°	135°/225°	180°	180°	90°	- °	- °
P4	6	30	225°	135°/225°	180	180°	- °	- °	- °

LOOP DETECTOR UNIT SUMMARY

LOOP	SIZE	TURNS	CONNECT TO PHASE	PRESENCE/ PULSE	LOCK/ NON-LOCK	(E)XTEND/ (D)ELAY
LS1	6'x30'	3	6	PRESENCE	NON-LOCK	8.0 SEC(D)
LS2	6'x25'	3	6	PRESENCE	NON-LOCK	2.0 SEC(D)
LN1	6'x25'	3	2	PRESENCE	NON-LOCK	2.0 SEC(D)



HORIZONTAL SCALE IN FEET
0 10 20 40

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TRAFFIC SIGNAL PLAN
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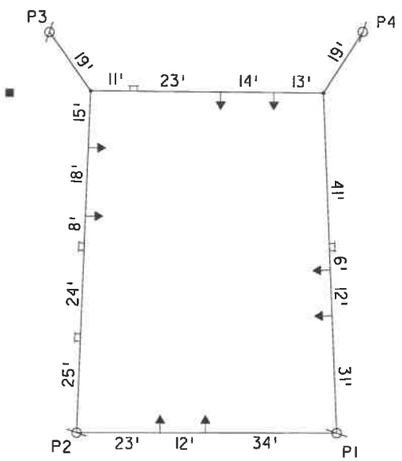
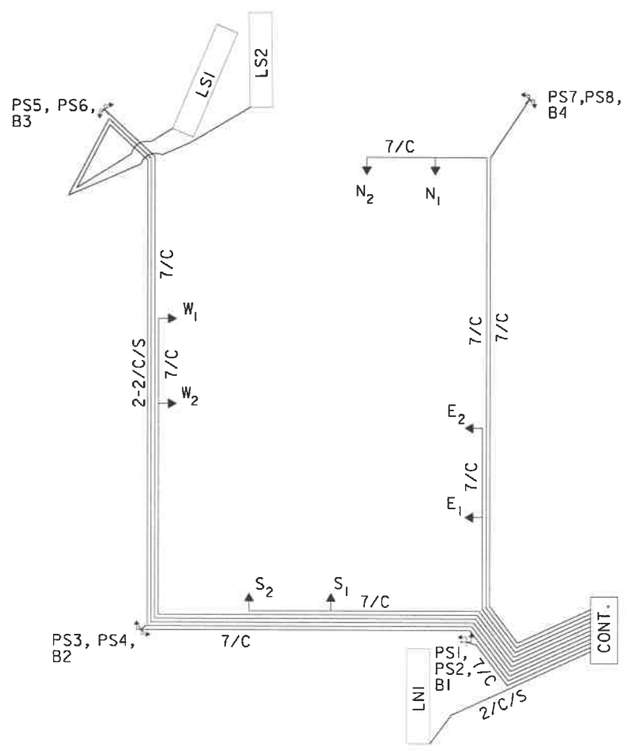


SPAN WIRE DIAGRAM



WIRING DIAGRAM

SUB-SUMMARY

ITEM	QUAN.	UNIT	DESCRIPTION
625	810	FT	Conduit, 2", 725.04
625	50	FT	Conduit, 2", 725.05
625	30	FT	Conduit, 3", 725.05
625	5	EACH	Pullbox, 725.08, 18"
625	1	EACH	Pullbox, 725.08, 24"
625	690	FT	Trench
625	185	FT	Trench in Paved Areas
625	5	EACH	Ground Rod
630	4	EACH	Sign Hanger Assembly, Span Wire , Type 1
630	30	SQFT	Sign, Flat Sheet
632	8	EACH	Vehicular Signal Head With LED Units, 3-Section, 12" Lens, 1-Way, As Per Plan
632	8	EACH	Pedestrian Signal Head With LED Units, Type D2, As Per Plan
632	8	EACH	Covering of Vehicular Signal Head
632	8	EACH	Covering of Pedestrian Signal Head
632	3	EACH	Detector Loop
632	360	FT	Messenger Wire, 7 Strand, 3/8" Diameter With Accessories
632	1325	FT	Signal Cable, 7 Conductor, No. 14 AWG
632	2000	FT	Interconnect Cable, Misc.: Interconnect Cable, Integral Messenger Wire, Type 12 Pair, No. 19 AWG, Solid REA (PE-38), As Per Plan
632	685	FT	Loop Detector Lead-In Cable, 2 Conductor, No. 14 AWG
632	75	FT	Power Cable, 2 Conductor, No. 6 AWG
632	1	EACH	Power Service, As Per Plan
632	3	EACH	Strain Pole, Type TC-81.10, Design 6
632	1	EACH	Strain Pole, Type TC-81.10, Design 6, As Per Plan
632	4	EACH	Strain Pole Foundation
632	200	FT	Signalization, Misc.: Lashing Rods
633	1	EACH	Controller Unit, Type TS2/A1, With Cabinet Type TS2, As Per Plan
633	1	EACH	Cabinet Foundation
633	1	EACH	Controller Work Pad

TRAFFIC SIGNAL CONTROLLER TIMING CHART

INTERSECTION U.S. 36 AT KIENLE RD.

START UP
START IN: Y/R FLASH ○; ALL RED ●
TIME FOR FLASH OR ALL RED 5 sec
FIRST PHASE(S) # 2 & # 6
COLOR DISPLAYED: GREEN ●; YELLOW ○

DUAL ENTRY ●
REST IN RED: RING 1 ○ ; RING 2 ○

OVERLAP PHASES	A	B	C	D

INTERVAL OR FEATURE		CONTROLLER MOVEMENT No. 1	2	3	4	5	6	7	8
INTERSECTION MOVEMENT			Nb		Eb		Sb		Wb
MINIMUM GREEN (INITIAL)	(SEC.)		7		22		7		22
*ADDED INITIAL	(SEC/ACTUATION)								
MAXIMUM INITIAL	(SEC.)								
PASSAGE TIME (PRESET GAP)	(SEC.)		3.0		-		3.0		-
TIME BEFORE REDUCTION	(SEC.)								
*MINIMUM GAP	(SEC.)								
*TIME TO REDUCE	(SEC.)								
MAXIMUM GREEN I	(SEC.)		25		30		25		30
MAXIMUM GREEN II	(SEC.)		30		40		30		40
YELLOW CHANGE	(SEC.)		3.0		4.3		3.0		4.3
ALL RED CLEARANCE	(SEC.)		2.5		1.0		2.5		1.0
WALK	(SEC.)		7		7		7		7
PED. CLEAR THRU YELLOW	(SEC.)		20		15		20		15
MAXIMUM GREEN III	(SEC.)								
ADJUST	(SEC.)								
LIMIT	(SEC.)								
SET	(SEC.)								
CLEAR	(SEC.)								
RECALL	MAXIMUM (NO/YES)		NO		YES		NO		YES
	MINIMUM (NO/YES)		NO		NO		NO		NO
	PEDESTRAIN (NO/YES)		NO		YES		NO		YES
MEMORY	(ON/OFF)								
CALL TO NON-ACTUATED	No. 1				X				X
	No. 2								

NOTE 1: MAX II SHALL BE ACTIVE BETWEEN 16:00 AND 18:00.

NOTE 2: DURINGFLASH CONDITIONS, PHASES 4 AND 8 SHALL FLASH YELLOW, 2 AND 6 RED.

COORDINATION TIMING

TIME	PHASE 1	2	3	4	5	6	7	8	CYCLE/ OFFSET
	-	25	-	45	-	25	-	45	70/* %
	-	30	-	60	-	30	-	60	90/* %
	-	40	-	60	-	40	-	60	100/* %
									%
									%
									%
									%
									%
TRANSFER									

* OFFSETS TO BE SUPPLIED BY THE CITY OF PIQUA.

N

HORIZONTAL SCALE IN FEET 0 10 20 40

CALCULATED GWA
CHECKED KRM

TRAFFIC SIGNAL PLAN
U.S. ROUTE 36**AND KIENLE RD.

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