

**ITEM 809 EMERGENCY VEHICLE PREEMPTION (ALTERNATE NO. 1) (CONT.)**

ALL PREEMPTION PLANS SHOULD BE PROGRAMMED TO PREVENT THE YELLOW TRAP. UNLESS AS DIRECTED BY THE DISTRICT TRAFFIC ENGINEER. YELLOW TRAP PREVENT WILL FORCE THE TRANSITION THROUGH YELLOW CHANGE AND RED CLEARANCE FOR RESOLUTION OF YELLOW TRAP IF ANY PHASE OPPOSING THE PREEMPTION CLEARANCE PHASE(S) IS ACTIVE AND DISPLAYING A GREEN OR FLASHING YELLOW ARROW INDICATION WHEN THE PREEMPTION PLAN IS ACTIVATED AND THE PREEMPTION CLEARANCE PHASE(S) ARE GREEN.

THE IR 270 NB RAMP / CEMETERY RD. INTERSECTION SHALL BE SUPPLIED WITH THE FOLLOWING COMPONENTS, EACH BID SEPARATELY:

- 1. ITEM 809 PREEMPTION RECEIVING UNIT (ALTERNATE NO. 1)
- 2. ITEM 809 PREEMPTION DETECTOR CABLE (ALTERNATE NO. 1)
- 3. ITEM 809 PREEMPTION PHASE SELECTOR
- 4. ITEM 809 PREEMPTION CONFIRMATION LIGHT, LED

THE CONTRACTOR SHALL SUPPLY THE ABOVE EMERGENCY VEHICLES WITH EMITTERS AT COST INCIDENTAL TO THE SYSTEM.

THE CITY SHALL BE SUPPLIED WITH SOFTWARE REQUIRED TO CALIBRATE, LOG, AND OPERATE THE SYSTEM. THE SOFTWARE SHALL BE CAPABLE OF OPERATING UNDER THE MOST RECENT WINDOWS OPERATING SYSTEM. TWO (2) OPERATING AND INSTRUCTION MANUALS SHALL BE SUPPLIED WITH THE SOFTWARE.

THE CONTRACTOR SHALL THOROUGHLY TEST THE INSTALLED SYSTEM. AS A MINIMUM, THE CONTRACTOR SHALL VERIFY THAT ALL CONNECTIONS ARE PROPERLY MADE TO THE CONTROLLER CABINETS. THE CONTROLLER SHALL CHECK THAT THE RANGE SETTING IS PROPER FOR EACH INTERSECTION. THE CONTROLLER SHALL DETERMINE THAT ALL PHASE SELECTORS ARE SELECTING THE PROPER PHASE AND TIMING ACCURATELY. THE CONTRACTOR SHALL VERIFY THAT ALL VEHICLE EMITTERS ARE BEING PROPERLY DETECTED.

PAYMENT FOR ITEM 809 EMERGENCY VEHICLE PREEMPTION (ALTERNATE NO. 1) SHALL BE MADE AT THE CONTRACT UNIT PRICE PER EACH PREEMPTION IN PLACE AND FULLY OPERATIONAL AS SHOWN IN THE PLANS, EXCEPT FOR THOSE ITEMS BID SEPARATELY.

**ITEM 809 PREEMPTION RECEIVING UNIT (ALTERNATE NO. 1)**

RECEIVING UNITS SHALL CONSIST OF A LIGHTWEIGHT, WEATHERPROOF AND DIRECTIONAL ASSEMBLY. EACH RECEIVING UNIT SHALL BE 360 DEGREE ADJUSTABLE. THE RECEIVING UNIT SHALL BE CAPABLE OF SENDING THE PROPER ELECTRICAL SIGNAL TO THE TRAFFIC SIGNAL CONTROLLER VIA THE PREEMPTION DETECTOR CABLE. RECEIVING UNITS SHALL BE SUPPLIED WITH MAST ARM MOUNTING HARDWARE AS SHOWN IN THE PLANS.

FURNISH PREEMPTION RECEIVING UNITS WITH 60-MONTH WARRANTIES OR FOR THE MANUFACTURER'S STANDARD WARRANTY WHICHEVER IS GREATER. ENSURE THAT THE WARRANTY PERIOD BEGINS ON THE DATE OF SHIPMENT TO THE PROJECT. ENSURE THAT EACH UNIT HAS A PERMANENT LABEL OR STAMP INDICATING THE DATE OF SHIPMENT.

PAYMENT FOR ITEM 809 PREEMPTION RECEIVING UNIT (ALTERNATE NO. 1) SHALL BE AT THE CONTRACT UNIT FOR EACH RECEIVING UNIT IN PLACE, COMPLETELY INSTALLED AT THE LOCATION SHOWN IN THE PLANS, WIRED, TESTED AND ACCEPTED.

**ITEM 809 PREEMPTION DETECTOR CABLE (ALTERNATE NO. 1)**

THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING PREEMPTION DETECTOR HOME RUN CABLE IN THE LOCATIONS SHOWN IN THE PLANS. IT SHALL CONNECT THE PREEMPT RECEIVING UNITS TO THE PHASE SELECTORS IN THE LOCAL CONTROLLER CABINET.

PREEMPTION DETECTOR CABLE SHALL CONFORM TO ODOT SPECIFICATION 632. ONLY ONE EXTERNAL SPLICE SHALL BE PERMITTED BETWEEN PREEMPTION RECEIVER UNIT AND CONTROLLER CABINET. THIS SPLICE SHALL MEET THE REQUIREMENTS OF C&MS 632.23 USING A WATERPROOF EPOXY SPLICE KIT. THE CABLE SHALL BE APPROVED FOR BOTH OVERHEAD AND UNDERGROUND USE. THE JACKET SHALL WITHSTAND EXPOSURE TO SUNLIGHT AND ATMOSPHERIC TEMPERATURES AND STRESSES REASONABLY EXPECTED IN NORMAL INSTALLATIONS.

PAYMENT FOR ITEM 809 PREEMPTION DETECTOR CABLE (ALTERNATE NO. 1) SHALL BE MADE AT THE CONTRACT UNIT PRICE PER FOOT FOR THE CABLE FURNISHED, IN PLACE, ALL CONNECTIONS MADE AND WIRING COMPLETED, TESTED AND ACCEPTED.

**ITEM 809 PREEMPTION PHASE SELECTOR**

THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING PREEMPT PHASE SELECTORS INCLUDING WIRING INTERFACE PANELS IN THE LOCAL CONTROLLER CABINET AND ALL OTHER ACCESSORIES THAT ARE NECESSARY TO MAKE THE PREEMPT PHASE SELECTORS COMPLETELY FUNCTIONAL AND OPERATIONAL

AS SHOWN IN THE PLANS. THIS ITEM SHALL INCLUDE THE EXTRA CABINET SPACE NECESSARY TO BE LOCATED IN THE LOCAL CONTROLLER CABINETS WHERE INDICATED IN THE PLANS.

THE PHASE SELECTORS SHALL CONSIST OF A MODULE OR MODULES THAT WILL PROVIDE THE NECESSARY INPUTS TO THE CONTROLLER. PHASE SELECTORS SHALL BE SUPPLIED WITH SUFFICIENT QUANTITIES OF CHANNELS TO PROVIDE PREEMPTION FOR ALL APPROACHES TO THE INTERSECTION SEPARATELY. POWER SHALL BE OBTAINED FROM THE PHASE SELECTOR OR PHASE SELECTOR POWER SUPPLY AND NOT FROM THE LOCAL CONTROLLER TIMER.

THE PHASE SELECTORS SHALL HAVE FRONT PANEL INDICATORS FOR ACTIVE PREEMPT CHANNEL STATUS. IT SHALL HAVE TEST SWITCHES TO ACTIVATE ALL PREEMPT CHANNELS.

FURNISH PREEMPT PHASE SELECTORS WITH 60-MONTH WARRANTIES OR FOR THE MANUFACTURER'S STANDARD WARRANTY WHICHEVER IS GREATER. ENSURE THAT THE WARRANTY PERIOD BEGINS ON THE DATE OF SHIPMENT TO THE PROJECT. ENSURE THAT EACH UNIT HAS A PERMANENT LABEL OR STAMP INDICATING THE DATE OF SHIPMENT.

PAYMENT FOR ITEM 809 PREEMPT PHASE SELECTOR SHALL BE MADE AT THE CONTRACT UNIT PRICE FOR EACH PHASE SELECTOR IN PLACE, COMPLETELY INSTALLED IN THE LOCAL CONTROLLER SHOWN IN THE PLANS, WIRED, TESTED AND ACCEPTED.

**ITEM 809 PREEMPTION CONFIRMATION LIGHT, LED**

THIS ITEM SHALL CONSIST OF FURNISHING AND INSTALLING PREEMPT CONFIRMATION LIGHTS INCLUDING HARDWARE AND ALL OTHER ACCESSORIES THAT ARE NECESSARY TO MAKE THE PREEMPT CONFIRMATION LIGHT COMPLETELY FUNCTIONAL AND OPERATIONAL AS SHOWN IN THE PLANS.

A CONFIRMATION LIGHT SHALL BE SUPPLIED THE IR 270 NB RAMP / CEMETERY RD. INTERSECTION TO INDICATE THAT THE EMERGENCY VEHICLE HAS ACHIEVED CONTROL OF THE TRAFFIC SIGNAL.

THE CONFIRMATION LIGHT SHALL BE A WEATHER TIGHT LIGHTING FIXTURE. IT SHALL BE SUPPLIED WITH A CLEAR GLOBE, LED LAMP AND MOUNTING HARDWARE TO ATTACH TO THE TRAFFIC SIGNAL MAST ARM. THE CONFIRMATION LIGHT SHALL BE POWERED BY A LOAD SWITCH IN THE TRAFFIC SIGNAL CONTROLLER. SIGNAL CABLE CONFORMING TO 732.19 SHALL BE USED FOR CONFIRMATION LIGHTS. A MINIMUM OF 4-CONDUCTOR CABLE SHALL BE USED WITH THE GREEN WIRE SERVING AS THE SAFETY GROUND CONDUCTOR. PAYMENT FOR ITEM 809 PREEMPT CONFIRMATION LIGHT, LED SHALL BE MADE AT THE CONTRACT UNIT PRICE FOR EACH LIGHT IN PLACE, COMPLETELY INSTALLED IN THE LOCATION SHOWN IN THE PLANS, WIRED, TESTED AND ACCEPTED.

**ITEM 809 ADVANCE RADAR DETECTION, AS PER PLAN (ALTERNATE NO. 1)**

THIS ITEM OF WORK SHALL CONSIST OF FURNISHING AND INSTALLING A WAVETRONIX SMARTSENSOR ADVANCE RADAR DETECTION UNIT (MODEL SS-200E). THE DETECTION UNIT SHALL INCLUDE THE FOLLOWING:

- 1. POWER SHALL BE PROVIDED FROM THE TRAFFIC CABINET.
- 2. ALL REQUIRED INPUTS CARDS SHALL BE INCLUDED IN THE TRAFFIC CABINET AND SHALL BE COMPATIBLE WITH CALTRANS, NEMA TS1 AND NEMA TS2 DETECTOR RACKS. THE CARDS SHALL PROVIDE TRUE PRESENCE DETECTOR CALLS OR CONTACT CLOSURE TO THE TRAFFIC CONTROLLER.
- 3. THE UNIT SHALL BE MOUNTED DIRECTLY TO A POLE OR MAST ARM, AS RECOMMENDED BY THE MANUFACTURER. CABLE(S) SHALL BE PROVIDED AS REQUIRED AND RECOMMENDED BY THE MANUFACTURER.
- 4. SURGE PROTECTION DEVICES, AS RECOMMENDED BY THE MANUFACTURER SHALL BE INCLUDED BOTH AT THE POLE WHERE THE UNIT IS LOCATED TO PROTECT THE UNIT AND IN THE TRAFFIC CABINET TO PROTECT THE CABINET ELECTRONICS.
- 5. THE MANUFACTURER'S REPRESENTATIVE SHALL BE ON SITE DURING INSTALLATION AND TESTING AND SHALL PROVIDE ON-SITE TRAINING ON THE SETUP, OPERATION AND MAINTENANCE OF THE UNIT.
- 6. A SERIAL TO ETHERNET COMMUNICATIONS MODULE AND ETHERNET CABLE (MINIMUM 7 FEET).
- 7. THE POWER SUPPLY AND COMMUNICATION MODULES SHALL BE SECURED TO A SINGLE PANEL THAT CAN BE MOUNTED INTERIOR TO THE TRAFFIC CABINET. THE PANEL SHALL INCLUDE MODULAR-PLUG STYLE CONNECTIONS FOR UP TO FOUR (4) SENSOR CABLES. ADDITIONAL SENSORS MAY BE HARD-WIRED TO THE COMMUNICATION MODULES, AS NECESSARY.

8. THE CONTRACTOR SHALL INSTALL THE RADAR DETECTION PRIOR TO MILLING/DISABLING EXISTING LOOPS.

9. THE INSTALLATION SHALL INCLUDE ALL CONTROLLER PROGRAMMING FOR COMPLETE INSTALLATION, WHICH INCLUDES MODIFICATIONS FOR REMOVAL OF EXISTING DETECTION.

PAYMENT FOR ITEM 809 ADVANCE RADAR DETECTION, AS PER PLAN (ALTERNATE NO. 1) SHALL BE MADE AT THE CONTRACT UNIT PRICE FOR EACH UNIT, COMPLETE AND IN PLACE INCLUDING ALL REQUIRED CABINET HARDWARE, MOUNTING BRACKETS, CABLES, CONDUIT, CONNECTIONS TESTED AND ACCEPTED, AND ANY OTHER NECESSARY HARDWARE TO ESTABLISH A FULLY FUNCTIONAL DETECTION SYSTEM.

**ITEM 809 STOP-LINE RADAR DETECTION, AS PER PLAN (ALTERNATE NO. 1)**

THIS ITEM OF WORK SHALL CONSIST OF FURNISHING AND INSTALLING WAVETRONIX SMARTSENSOR MATRIX DETECTION UNIT. THE DETECTION UNIT SHALL INCLUDE THE FOLLOWING:

- 1. POWER SHALL BE PROVIDED FROM THE TRAFFIC CABINET.
- 2. ALL REQUIRED INPUTS CARDS SHALL BE INCLUDED IN THE TRAFFIC CABINET AND SHALL BE COMPATIBLE WITH CALTRANS, NEMA TS1 AND NEMA TS2 DETECTOR RACKS. THE CARDS SHALL PROVIDE TRUE PRESENCE DETECTOR CALLS OR CONTACT CLOSURE TO THE TRAFFIC CONTROLLER.
- 3. THE UNIT SHALL BE MOUNTED DIRECTLY TO A POLE OR MAST ARM, AS RECOMMENDED BY THE MANUFACTURER. CABLE(S) SHALL BE PROVIDED AS REQUIRED AND RECOMMENDED BY THE MANUFACTURER.
- 4. SURGE PROTECTION DEVICES, AS RECOMMENDED BY THE MANUFACTURER SHALL BE INCLUDED BOTH AT THE POLE WHERE THE UNIT IS LOCATED TO PROTECT THE UNIT AND IN THE TRAFFIC CABINET TO PROTECT THE CABINET ELECTRONICS.
- 5. THE MANUFACTURER'S REPRESENTATIVE SHALL BE ON SITE DURING INSTALLATION AND TESTING AND SHALL PROVIDE ONSITE TRAINING ON THE SETUP, OPERATION AND MAINTENANCE OF THE UNIT.
- 6. A SERIAL TO ETHERNET COMMUNICATIONS MODULE AND ETHERNET CABLE (MINIMUM 7 FEET).
- 7. THE POWER SUPPLY AND COMMUNICATION MODULES SHALL BE SECURED TO A SINGLE PANEL THAT CAN BE MOUNTED INTERIOR TO THE TRAFFIC CABINET. THE PANEL SHALL INCLUDE MODULAR-PLUG STYLE CONNECTIONS FOR UP TO FOUR (4) SENSOR CABLES. ADDITIONAL SENSORS MAY BE HARD-WIRED TO THE COMMUNICATION MODULES, AS NECESSARY.
- 8. THE CONTRACTOR SHALL INSTALL THE RADAR DETECTION PRIOR TO MILLING/DISABLING EXISTING LOOPS.
- 9. THE INSTALLATION SHALL INCLUDE ALL CONTROLLER PROGRAMMING FOR COMPLETE INSTALLATION, WHICH INCLUDES MODIFICATIONS FOR REMOVAL OF EXISTING DETECTION.

PAYMENT FOR ITEM 809 STOP-LINE RADAR DETECTION, AS PER PLAN (ALTERNATE NO. 1) SHALL BE MADE AT THE CONTRACT UNIT PRICE FOR EACH UNIT, COMPLETE AND IN PLACE INCLUDING ALL REQUIRED CABINET HARDWARE, MOUNTING BRACKETS, CABLES, CONDUIT AND CONNECTIONS TESTED AND ACCEPTED.

**ITEM 625 BRACKET ARM, 8', AS PER PLAN (ALTERNATE NO. 2)**

THE PROPOSED BRACKET ARMS SHALL BE THE HIGH RISE STYLE AND SHALL BE POWDER COATED FEDERAL COLOR AMS-STD-595-37056 (DARK BRONZE) AND SHALL MEET ODOT SUPPLEMENTAL SPECIFICATION 916.

PAYMENT WILL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH OF ITEM 632 BRACKET ARM, 8', AS PER PLAN (ALTERNATE NO. 2) INCLUDING ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS TO MOUNT THE BRACKET ARM. THIS ITEM IS TO BE INCLUDED AS PART OF ITEM 816 VIDEO DETECTION SYSTEM, AS PER PLAN (ALTERNATE NO. 2) BID.

**ITEM 816 VIDEO DETECTION SYSTEM, AS PER PLAN (ALTERNATE NO. 2)**

IN ADDITION TO MEETING THE REQUIREMENTS OF ODOT SUPPLEMENTAL SPECIFICATIONS 816 AND 907, THE VIDEO DETECTION SYSTEM SHALL BE A GRIDSMART SYSTEM AS MANUFACTURED BY:

GRIDSMART  
15045 HARDIN VALLEY ROAD  
KNOXVILLE, TN 37932

THE SYSTEM SHALL INCLUDE THE FOLLOWING COMPONENT ITEMS AT A MINIMUM:

- 1 EACH GRIDSMART BELL CAMERA
- 1 EACH GRIDSMART GS2 PROCESSOR
- 1 EACH GRIDSMART PLUS MODULE
- 1 EACH SURGE PROTECTOR POWER PANEL FOR GRIDSMART VIDEO DETECTION SYSTEM
- 200 LF VIDEO COMPOSITE DETECTION AND RADAR CABLE WITH 600 VOLT INSULATION INCLUDES CONNECTORS

ALL MOUNTING HARDWARE AND OUTER CAMERA CASING SHALL BE PROVIDED BY THE CONTRACTOR WITH COSTS CONSIDERED INCIDENTAL TO THE PAY ITEM AND PAINTED TO MATCH THE SIGNAL SUPPORTS (DARK BRONZE).

TRAINING IN THE OPERATION, SETUP AND MAINTENANCE OF THE VIDEO DETECTION SYSTEM SHALL BE PROVIDED IN ACCORDANCE WITH SUPPLEMENTAL SPECIFICATION 816.05.

PAYMENT FOR ITEM 816 VIDEO DETECTION SYSTEM, AS PER PLAN (ALTERNATE NO. 2) SHALL BE AT THE CONTRACT PRICE FOR EACH UNIT COMPLETE AND IN PLACE INCLUDING ALL CONNECTIONS TESTED AND ACCEPTED. THE BRACKET ARM THAT EXTENDS FROM THE COMBINATION POLE IS INCLUDED AS PART OF THE ALTERNATE NO. 2 BID BUT IS SHOWN AS A SEPARATE LINE ITEM.

**ITEM 630 SIGN HANGER ASSEMBLY, MAST ARM, AS PER PLAN (ALTERNATE NO. 2)**

IN ADDITION TO REQUIREMENTS OF ITEM 630 SIGN HANGER ASSEMBLY, MAST ARM, AS PER PLAN (ALTERNATE NO. 1), THIS ITEM SHALL INCLUDE ALL NECESSARY HARDWARE FASTENERS INCLUDING STAINLESS CABLES VERSUS BANDING FOR ATTACHMENT TO THE MAST ARM. THE EQUIPMENT BRAND SHALL BE ASTRO-BRAC AS MANUFACTURED BY PELCO PRODUCTS, INC.

ALL MOUNTING HARWARE SHALL BE POWDER COATED FEDERAL COLOR AMS-STD-595-37056 (DARK BRONZE) AND SHALL MEET ODOT SUPPLEMENTAL SPECIFICATION 916.

PAYMENT SHALL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH OF ITEM 630 SIGN HANGER ASSEMBLY, MAST ARM, AS PER PLAN (ALTERNATE NO. 2) IN PLACE.

**ITEM 633 UNINTERRUPTIBLE POWER SUPPLY (UPS), 1000 WATT, AS PER PLAN (ALTERNATE NO. 2)**

IN ADDITION TO ITEM 633 UNINTERRUPTIBLE POWER SUPPLY (UPS), 1000 WATT, AS PER PLAN (ALTERNATE NO. 1), THE UPS SHALL BE ON THE TAP LIST AND SUPPLIED BY ALPHA TECHNOLOGIES.

**ITEM 633 CONTROLLER ITEM, MISC.: FIBER OPTIC ETHERNET TRANSCEIVER (ALTERNATE NO. 2)**

IN ADDITION TO REQUIREMENTS OF ITEM 633 CONTROLLER ITEM, MISC.: FIBER OPTIC ETHERNET TRANSCEIVER (ALTERNATE NO. 1), THIS ITEM SHALL BE MODEL IE4000-8GT4G-E AS MANUFACTURED BY LOGICALIS.

PAYMENT FOR ITEM 633 CONTROLLER, MISC.: FIBER OPTIC ETHERNET TRANSCEIVER (ALTERNATE NO. 2) SHALL BE MADE AT THE CONTRACT PRICE BID. PAYMENT SHALL BE FULL COMPENSATION FOR ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, TESTING, CERTIFICATIONS AND OTHER INCIDENTALS NECESSARY TO FURNISH COMPLETE IN PLACE, INCLUDING ALL CONNECTIONS MADE AND WIRING COMPLETE, TESTED AND ACCEPTED.

**ITEM 809 EMERGENCY VEHICLE PREEMPTION (ALTERNATE NO. 2)**

IN ADDITION TO ITEM 809 EMERGENCY VEHICLE PREEMPTION (ALTERNATE NO. 1), THE SYSTEM SHALL BE ON THE TAP LIST AND SUPPLIED BY GLOBAL TRAFFIC TECHNOLOGIES, LLC. THE IR 270 NB RAMP / CEMETERY RD. INTERSECTION SHALL BE SUPPLIED WITH THE FOLLOWING COMPONENTS AS PART OF THE ALTERNATE 2 BID, EACH BID SEPARATELY:

- 1. ITEM 809 PREEMPTION RECEIVING UNIT (ALTERNATE NO. 2)
- 2. ITEM 809 PREEMPTION DETECTOR CABLE (ALTERNATE NO. 2)
- 3. ITEM 809 PREEMPTION PHASE SELECTOR
- 4. ITEM 809 PREEMPTION CONFIRMATION LIGHT, LED


**ITEM 809 PREEMPTION RECEIVING UNIT (ALTERNATE NO. 2)**

IN ADDITION TO ITEM 809 PREEMPTION RECEIVING UNIT (ALTERNATE NO. 1), THE RECEIVING UNIT SHALL BE ON THE TAP LIST AND SUPPLIED BY GLOBAL TRAFFIC TECHNOLOGIES, LLC.

**ITEM 809 PREEMPTION DETECTOR CABLE (ALTERNATE NO. 2)**

IN ADDITION TO ITEM 809 PREEMPTION DETECTOR CABLE (ALTERNATE NO. 1), THE DETECTOR CABLE SHALL BE ON THE TAP LIST AND SUPPLIED BY GLOBAL TRAFFIC TECHNOLOGIES, LLC.

**TRAFFIC SIGNAL NOTES**

DESIGN AGENCY	
	CRAWFORD, MURPHY & TILLY, INC. 8105 WOODBURN STREET SUITE 100 COLUMBUS, OHIO 43235 www.cmtinc.com
DESIGNER	
GSH	
REVIEWER	
SAK 06/03/21	
PROJECT ID	
113655	
SHEET	TOTAL
57	66