



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION**

TRAFFIC OPERATIONS DIVISION
SUITE 1800, JAMES K. POLK BUILDING
505 DEADERICK STREET
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(615) 253-1122

CLAY BRIGHT
COMMISSIONER

BILL LEE
GOVERNOR

TO: Will Reid
Assistant Chief Engineer of Operations

FROM: Brad Freeze, Director of Traffic Operations

SUBJECT: **Proprietary Item Request and Justification**
City of Knoxville

- 1) **Traffic Signal Controllers and Malfunction Management Units (MMU)**
- 2) **Traffic Signal Ethernet Switches**
- 3) **Traffic Signal Battery Back-up System Equipment**
- 4) **Traffic Signal LED Vehicle and Pedestrian Luminaires**
- 5) **Traffic Signal Emergency Vehicle Preemption Equipment**
- 6) **Traffic Signal Spread Spectrum Radio Equipment**
- 7) **Traffic Signal Vehicle Detection Equipment**

- 1) **Traffic Signal Controllers and Malfunction Management Units (MMU):** The City of Knoxville is requesting that Naztec ATC controllers and the Naztec Malfunction Management Units (MMU) be used in all signalization projects within the City over the next three years where Federal and/or State funding are used. The controller equipment includes Series 900 ATC Model Number 980-B240 and the MMU equipment includes Model Number 516LE. The following are justification items for this request:

The City of Knoxville currently operates and maintains Naztec ATC controllers at 230 signalized intersections within the City's jurisdiction. This number includes the intersections currently under construction that will be completed by the end of 2019. The primary reason for this request is to insure that the full functionality of the ATC and MMU data transfer can be utilized. The current central control system will allow for other brands of ATC and MMU to be used, but limits the functionality and data that can be accessed through a central control system to the NTCIP protocols. By using the Naztec ATC controllers and MMUs with the central software, the City will continue to be able to access the full functionality of the MMU via the ATC controller and central system which will help reduce maintenance cost by being able to diagnosis and resolve maintenance issues without traveling to the location.

The City of Knoxville staff has been extensively trained to install, operate, maintain, program, and troubleshoot Naztec controllers. This allows our technicians to quickly diagnose problems with field units which reduces the time required to maintain the system overall and helps keep the system operational during heavy traffic times to insure maximum capacity of the synchronized system. By utilizing the Naztec controller as the standard for the City, there will be a cost savings in stocking replacement equipment which will result in faster and less costly repair.

- 2) **Traffic Signal Ethernet Switches:** The City of Knoxville is requesting that ComNet Environmentally Hardened Managed Ethernet Switch CNGESMS System equipment be used in all signalization projects within the City over the next three years where Federal and/or State funding are used. The following are justification items for this request:

The City of Knoxville currently operates and maintains ComNet Environmentally Hardened Managed Ethernet Switch CNGESMS System equipment at 56 signalized intersections within the City's jurisdiction. The City of Knoxville, in an effort to utilize existing copper telephone twisted pair communications, have required an Ethernet switch as part of the signalization system to increase communications speeds along these systems over the last few years. The City of Knoxville have found the ComNet Environmentally Hardened Managed Ethernet Switch CNGESMS equipment to be very reliable and cost effective in providing Ethernet communications over existing copper cable systems. In addition, the City of Knoxville currently has fixed price agreements in place that will allow the City to purchase this type of device over the next three years.

The City of Knoxville staff has been extensively trained to install, operate, maintain, and troubleshoot ComNet Environmentally Hardened Managed Ethernet Switch CNGESMS equipment. This allows our technicians to quickly diagnose problems with field units which reduces the time required to maintain the system overall and helps keep the system operational during heavy traffic times to insure maximum capacity of the synchronized system. By utilizing the ComNet Environmentally Hardened Managed Ethernet Switch CNGESMS equipment as the standard for the City, there will be a cost savings in stocking replacement equipment which will result in faster and less costly repair.

- 3) **Traffic Signal Battery Back-up System:** The City of Knoxville is requesting that UPStealth 1000 watt NEMA Battery Back-up System equipment be used in all signalization projects within the City over the next three years where Federal and/or State funding are used. The following are justification items for this request:

The City of Knoxville currently operates and maintains UPStealth 1000 watt NEMA Battery Back-up System equipment at 23 signalized intersections within the City's jurisdiction. The City of Knoxville has found this battery back-up system to be both reliable and functional due to the lack of need for a separate cabinet to store the batteries because the batteries are mounted underneath the top shelf in the control cabinet and not interfere with space needed for other cabinet components.

The City of Knoxville staff has been extensively trained to install, operate, maintain, program, and troubleshoot UPStealth 1000 watt NEMA Battery Back-up System equipment. This allows our technicians to quickly diagnose problems with field units which reduces the time required to maintain the system overall and helps keep the system operational during heavy traffic times to insure maximum capacity of the synchronized system. By utilizing the UPStealth 1000 watt NEMA Battery Back-up System equipment as the standard for the City, there will be a cost savings in stocking replacement equipment which will result in faster and less costly repair.

- 4) **Traffic Signal LED Vehicular and Pedestrian Luminaires:** The City of Knoxville is requesting that GE Gelcore Light Emitting Diode (LED) vehicular and pedestrian traffic signal luminaries be used in all signalization projects within the City over the next three years where Federal and/or State funding are used. The following are justification items for this request:

The City of Knoxville currently operates and maintains GE Gelcore Light Emitting Diode (LED) vehicular and pedestrian traffic signal luminaries at all signalized intersections within the City's jurisdiction which is over 12,000 LED traffic signal luminaires. Through independent testing, the City of Knoxville has found that this type of LED traffic signal luminaire performed as per the ITE specifications where others did not. In addition, the City of Knoxville currently has fixed price agreements in place that will allow the City to purchase this type of device over the next three years.

The City of Knoxville staff has been extensively trained to install, operate, maintain, and troubleshoot GE Gelcore Light Emitting Diode (LED) vehicular and pedestrian traffic signal luminaries. This allows our technicians to quickly diagnose problems with field units which reduces the time required to maintain the system overall and helps keep the system operational during heavy traffic times to insure maximum capacity of the synchronized system. By utilizing the GE Gelcore Light Emitting Diode (LED) vehicular and pedestrian traffic signal luminaries as the standard for the City, there will be a cost savings in stocking replacement equipment which will result in faster and less costly repair.

- 5) **Traffic Signal Emergency Vehicle Preemption Equipment:** The City of Knoxville is requesting that Traffic Systems Sonem emergency vehicle preemption equipment be used in all signalization projects within the City over the next three years where Federal and/or State funding are used. The following are justification items for this request:

The City of Knoxville currently operates and maintains Traffic Systems Sonem emergency vehicle preemption equipment at 55 signalized intersections within the City's jurisdiction. The City of Knoxville investigated several different types of preemption units (e.g. optically activated units, radio activated units and GPS activated units) and found that Traffic Systems Sonem emergency vehicle preemption equipment is the most reliable. The major advantage of the siren activated unit is that it requires no additional equipment to be installed on the emergency vehicles as they use the siren system that currently exists on the vehicle. By requiring only the use of the existing vehicle siren to activate the system, there is no additional cost to the stakeholder agencies utilizing the system. The desire of the City is to increase the efficiency of signal system as part of the Citywide Advanced Traffic Management System while providing quicker movement of the emergency vehicle through the system when needed.

The City of Knoxville staff has been extensively trained to install, operate, maintain, and troubleshoot Traffic Systems Sonem emergency vehicle preemption equipment. By utilizing this emergency vehicle preemption detection system as the standard for the City, there will be a cost savings in stocking replacement equipment and will result in faster and less costly repair. The City of Knoxville staff has been extensively trained to install, operate, maintain, program, and troubleshoot Traffic Systems Sonem emergency vehicle preemption equipment. By utilizing Traffic Systems Sonem emergency vehicle preemption equipment as the standard for the City, there will be a cost savings in stocking replacement equipment which will result in faster and less costly repair.

- 6) **Traffic Signal Spread Spectrum Radio Equipment:** The City of Knoxville is requesting that Microhard System spread spectrum radios be used in all signalization projects within the City over the next three years where Federal and/or State funding are used. The spread spectrum radio equipment includes Microhard System Model Number IPN920T 900 MHz radio system and antenna configurations. The following are justification items for this request:

The City of Knoxville currently operates and maintains Microhard System spread spectrum radios at 110 signalized intersections within the City's jurisdiction. This number includes the intersections currently under construction that will be completed by the end of 2019. The City of Knoxville currently has several systems that are using Microhard System spread spectrum radios to communicate from the local controller to the master control in the system. In order for the system to communicate properly the same type of radio needs to be used between these two critical units. As the City expands its spread spectrum communications networks in these areas, we will need to have reliable communications to maintain the coordination along these critical corridors. This will require that the radio communication is of the same type.

The City of Knoxville staff has been extensively trained to install, operate, maintain, and troubleshoot Microhard System spread spectrum radios. This allows our technicians to quickly diagnose problems with field units which reduces the time required to maintain the system overall and helps keep the system operational during heavy traffic times to insure maximum capacity of the synchronized system. By utilizing the Microhard System spread spectrum radios as the standard for the City, there will be a cost savings in stocking replacement equipment which will result in faster and less costly repair.

- 7) **Traffic Signal Vehicle Detection Equipment:** The City of Knoxville is requesting that Wavetronix traffic signal radar detection equipment be used in all signalization projects within the City over the next three years where Federal and/or State funding are used. The radar detection equipment includes both SmartSensor Matrix for stop bar detection and the SmartSensor Advance for advanced approach detection. This request is based on the necessity to provide highly reliable detection for the synchronization with the existing traffic signal systems operated and maintained by the City. The following are justification items for this request:

The City of Knoxville currently operates and maintains Wavetronix radar detection at 32 signalized intersections within the City's jurisdiction. The City utilizes Wavetronix radar detection units to replace other technologies due to their unreliability which has resulted in increased efficiency of signalized intersection operations within the Citywide Advanced Traffic Management System. Reliable detection is a key component in the City's efforts to provide a more efficient traffic signal system and to reduce air pollution within the Knoxville Area.

The City of Knoxville staff has been extensively trained to install, operate, maintain, and troubleshoot the Wavetronix detection system. This allows our technicians to quickly diagnose problems with field units which reduces the time required to maintain the system overall and helps keep the system operational during heavy traffic times to insure maximum capacity of the synchronized system. By utilizing Wavetronix traffic signal radar detection equipment as the standard for the City, there will be a cost savings in stocking replacement equipment and will result in faster and less costly repair.

I, Brad Freeze, Director of the Traffic Operations Division of the Tennessee Department of Transportation, do hereby certify that in accordance with the requirements of 23 CFR 635.411(a) (2) that the patented or proprietary items listed above are essential for the synchronization of existing facilities.



Assistant Chief Engineer of Operations

8/5/19
Date



March 29, 2019

Stephen K. Bryan, P.E., PTOE
Traffic Operations Division
James K. Polk Bldg., 12th Floor
505 Deaderick St.
Nashville, TN 37243

**RE: REQUEST FOR PROPRIETARY TRAFFIC SIGNAL PRODUCTS CERTIFICATION CITY OF KNOXVILLE
– NAZTEC ATC CONTROLLER AND NAZTEC MALFUNCTION MANAGEMENT UNITS (MMU) EQUIPMENT**

Dear Mr. Bryan:

The City of Knoxville Engineering Department is requesting that Naztec ATC controllers (ATC) and the Naztec Malfunction Management Units (MMU) be used in all signalization projects with the City over the next three years where Federal and/or State funding are used. The controller equipment is the Series 900 ATC Model Number 980-B240 and MMU equipment is the Model Number 516LE. Currently the City is installing this type of equipment with new development, new City projects, Federal and/or TDOT funded projects for the reasons listed below.

The City currently has 126 of the MMU and ATC controllers in the field. We expect to have 230 of the current 390 signalized intersections operating with these types of ATC and MMUs by the end of 2019 from previous purchases and additional purchases based on the proprietary letters previously submitted and approved by the Tennessee Department of Transportation. These proprietary letters would be used for purchases on the Advanced Transportation Management Study (ATMS) project currently underway for Kingston Pike, as well as the Broadway and Chapman Highway corridors. This project should be complete by 2020. This project also includes Congestion Mitigation and Air Quality (CMAQ) funding. The primary reason for this request is to insure that the full functionality of the ATC and MMU data transfer can be utilized. The current systems allow for other brands of ATC and MMU to be used but limits the functionality and data that can be accessed through a central control system to the NTCIP protocols. By using the ATC controllers and MMUs with the central software, the City will be able to access the full functionality of the MMU via the ATC controller and central system which will help reduce maintenance cost by being able to diagnosis and resolve maintenance issues without traveling to the location. As part of the City-wide deployment of ATC controllers and MMUs, our staff has been exclusively trained on the programming, maintenance, and troubleshooting of these types of units. Standardization with these proprietary products means the City can better maintain Knoxville's Transportation Management System.

Thank you for considering this request.

Sincerely,

A handwritten signature in black ink that reads "James R. Hagerman".

James R. Hagerman, P.E.
Engineering Director



March 29, 2019

Stephen K. Bryan, P.E., PTOE
Traffic Operations Division
James K. Polk Bldg., 12th Floor
505 Deaderick St.
Nashville, TN 37243

**RE: REQUEST FOR PROPRIETARY TRAFFIC SIGNAL PRODUCTS CERTIFICATION
CITY OF KNOXVILLE – COMNET ETHERNET SWITCH**

Dear Mr. Bryan:

The City of Knoxville Engineering Department would like to request proprietary product certification for ComNet Environmentally Hardened Managed Ethernet Switch CNGE5MS System Equipment. Currently the City is installing this type of equipment with new development, new City projects and TDOT funded projects for the reasons listed below.

The City of Knoxville, in an effort to utilize existing copper telephone twisted pair communications, required an Ethernet switch as part of the system to increase communications speeds along these systems over the last few years. We currently operate 56 intersections with ComNet Environmentally Hardened Managed Ethernet Switch CNGE5MS Equipment. We have found the system to be very reliable and cost effective in providing Ethernet communications over existing copper cable systems. We currently have fixed price agreements in place that will allow the City to purchase this type of unit over the next three years. Also, as part of the City-wide deployment of Ethernet switch Equipment our staff has been exclusively trained on the programming, maintenance, and troubleshooting of these units. Standardization with these proprietary products means the City can better maintain Knoxville's Transportation Management System and reduce equipment damage and down time.

Thank you for your consideration of this request.

Sincerely,


James R. Hagerman, P.E.
Engineering Director



March 29, 2019

Stephen K. Bryan, P.E., PTOE
Traffic Operations Division
James K. Polk Bldg., 12th Floor
505 Deaderick St.
Nashville, TN 37243

**RE: REQUEST FOR PROPRIETARY TRAFFIC SIGNAL PRODUCTS CERTIFICATION
CITY OF KNOXVILLE – UPSTEALTH BATTERY BACK-UP SYSTEM EQUIPMENT**


Dear Mr. Bryan:

The City of Knoxville Engineering Department would like to request proprietary product certification for UPStealth 1000 watt NEMA Battery Back-up System Equipment. Currently the City is installing this type of equipment with new development, new City projects and TDOT funded projects for the reasons listed below.

The City of Knoxville, in an effort to provide battery back-up systems, has utilized UPStealth 1000 watt NEMA Battery Back-up System over the last few years. We currently operate 23 intersections with UltraPower Stealth UPStealth 1000 watt NEMA Battery Back-up System. We have found the system to be both reliable and cost effective. We have found that the system works very well and due to the lack of need for a separate cabinet to store the batteries, it is very cost effective. The nickel-zinc battery chemistry allows the back-up batteries to be stored in the control cabinet and the batteries do not adversely affect the circuit boards in the control cabinet or the traffic signal control equipment. The design of the battery storage also does not require additional space in the cabinet for the expressed storage of batteries but has the ability to mount underneath the top shelf in the control cabinet as to not interfere with space needed for other cabinet components. The battery back-up provides for continuous operation of the traffic signal even during times of power outages from thunderstorms, utility interruption during utility maintenance and during times of emergency management when power is not available to reduce the potential for crashes but also to maintain preemption for emergency vehicle for up to four hours of operation. The other advantage is that the batteries can be charged and exchanged in the event more than four hours is needed. The use of battery back-up also allows for orderly control of traffic during the times previously mentioned. Also, as part of the City-wide deployment of battery back-up systems, our staff has been exclusively trained on the programming, maintenance, and troubleshooting of these units. Standardization with these proprietary products means the City can better maintain Knoxville's Transportation Management System and reduce equipment damage and down time.

Thank you for your consideration of this request.

Sincerely,


James R. Hagerman, P.E.
Engineering Director



March 29, 2019

Stephen K. Bryan, P.E., PTOE
Traffic Operations Division
James K. Polk Bldg., 12th Floor
505 Deaderick St.
Nashville, TN 37243

**RE: REQUEST FOR PROPRIETARY TRAFFIC SIGNAL PRODUCTS CERTIFICATION
CITY OF KNOXVILLE – LIGHT EMITTING DIODE (LED) TRAFFIC SIGNAL LUMINAIRES**

Dear Mr. Bryan:

The Engineering Department would like to request proprietary product certification for the GE Gelcore Light Emitting Diode (LED) vehicular and pedestrian traffic luminaires. Currently the City is installing this type of equipment with new development, new City projects / upgrades and TDOT funded projects for the reasons listed below.

The City of Knoxville currently uses this type of LED luminaire Citywide which is approximately 12,000 luminaires. Based on independent testing in our initial purchases, the City found that this type of LED performed as per the ITE specifications where others did not. The City's over 15 years of experience with other traffic signal LED luminaires that have been installed on various projects, as compared to the GE brand Gelcore, has proven that GE is the most reliable brand. The GE brand has proven to reduce maintenance cost and provide continuous operation of the luminaires. The City also had a fixed price agreement in place that will allow the City to purchase GE Brand Gelcore LEDs for an additional three years.

The City is currently in the second year of a seven year re-lamping cycle with the GE Gelcore LED.

Thank you for considering this request.

Sincerely,

A handwritten signature in black ink that reads "James R. Hagerman".

James R. Hagerman, P.E.
Engineering Director



March 29, 2019

Stephen K. Bryan, P.E., PTOE
Traffic Operations Division
James K. Polk Bldg., 12th Floor
505 Deaderick St.
Nashville, TN 37243

**RE: REQUEST FOR PROPRIETARY TRAFFIC SIGNAL PRODUCTS CERTIFICATION
CITY OF KNOXVILLE – SONEM EMERGENCY VEHICLE PREEMPTION EQUIPMENT**

Dear Mr. Bryan:

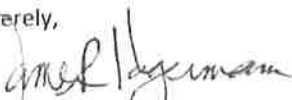
The City of Knoxville Engineering Department would like to request proprietary product certification for Sonem Emergency Vehicle Preemption Equipment. Currently the City is installing this type of equipment with new development, new City projects and TDOT funded projects for the reasons listed below.

The City of Knoxville, in an effort to provide emergency vehicle preemption, has utilized Sonem 2000 preemption equipment over the last several years. We currently operate 55 intersections that have Sonem 2000 preemption equipment. We have found the system to be reliable. We have also investigated several different types of preemption units, e.g., optically activated units, radio activated units, and GPS activated units, and we have found the major advantage of the siren is that it requires no additional equipment to be installed on the emergency vehicles to utilize the system. The need for emergency vehicle preemption is evident in all emergency response situations where time is of the essence and can mean the difference between life and death. By requiring only the use of the existing vehicle siren to activate the system, there is no additional cost to the agencies utilizing the system and all the equipment maintenance remains the responsibility of the City of Knoxville while allowing the following agencies to use the service, e.g., Law Enforcement, Fire/Rescue, Ambulance Services, etc., on a first-come first-serve basis. The desire of the City is to increase the efficiency of the signal system as part of the City wide Advanced Transportation Management System while providing a more efficient movement of the emergency vehicle through the system when needed.

Also, as part of the City-wide deployment of emergency vehicle preemption systems our staff has been exclusively trained on the programming, maintenance, and troubleshooting of these units. Standardization with these proprietary products means the City can better maintain Knoxville's Transportation Management System and reduce emergency vehicle travel times through the system.

Thank you for considering this request.

Sincerely,



James R. Hagerman, P.E.
Engineering Director



March 29, 2019

Stephen K. Bryan, P.E., PTOE
Traffic Operations Division
James K. Polk Bldg., 12th Floor
505 Deaderick St.
Nashville, TN 37243

**RE: REQUEST FOR PROPRIETARY TRAFFIC SIGNAL PRODUCTS CERTIFICATION
CITY OF KNOXVILLE – WAVETRONIX RADAR DETECTION EQUIPMENT**

Dear Mr. Bryan:

The City of Knoxville Engineering Department would like to request proprietary product certification for the Wavetronix Radar Smart Sensor Matrix Detection Equipment. Currently the City is installing this type of equipment with new development, new City projects / upgrades and TDOT funded projects for the reasons listed below.

The City of Knoxville over the last several years has had experience with in-ground detection loops, video detection and radar detection technology. The most reliable radar detection system we have utilized is the Wavetronix Radar Detection System. We currently have 32 intersections operating with Wavetronix Radar Detection Systems within the City. The need for reliability in vehicle, bicycle and pedestrian detection directly relates to the overall capacity of the intersections under traffic signal control and the problems associated with the detection reliability can reduce the overall intersection capacity by as much as 50% or more (ITE, The Traffic Signal Detector Handbook). The result is longer delays and stop time for vehicles both along the corridor and the side streets. These delays and stop times cause increased fuel consumption and emissions along these corridors resulting in increased levels of air pollution. The desire of the City is to increase the efficiency of signalized intersections as part of the City-wide Advanced Transportation Management System. Reliable detection is a key component in the City's efforts to provide a safer, more efficient traffic system and to reduce air pollution within the City of Knoxville Area. Also, as part of the deployment of the Wavetronix Radar Detection System, our staff has been exclusively trained on the programming, maintenance, and troubleshooting of these units.

We will still be utilizing some of the other methods of detection, e.g., in-ground loops and video, but when utilizing radar detection this is our preference based on our past experience.

Thank you for considering this request.

Sincerely,


James R. Hagerman, P.E.
Engineering Director