City of Grand Island

Tuesday, September 24, 2013
Council Session

Item G-13

#2013-318 - Approving Bid Award for a Wireless Magnetometer Vehicle Detection System for the Streets Division of the Public Works Department

Staff Contact: John Collins, P.E. - Public Works Director

Council Agenda Memo

From: Shannon Callahan, Street Superintendent

Meeting: September 24, 2013

Subject: Approving Purchase of Wireless Magnetometer Vehicle Detection System and Designation of Sensys Networks as a Sole Source Provider for Future Purchases such systems and components.

Item #'s: G-13

Presenter(s): John Collins PE, Public Works Director

Background

The intersection of 13th and Webb Road is in need of concrete patching to ensure it remains safe for the traveling public. The signalized intersection is currently equipped with vehicle detection loops; the concrete repair quantity will be sufficient enough to require new loops but not enough to place the loops under the pavement, meaning they would need to be sawed into the pavement. Sawing signal loops into pavement is intrusive and can be detrimental to pavement condition giving water a place to enter and cause damage.

There are other options for detection at a signalized intersection of which each has its pros and cons (see Attachment 1). It was determined by the Public Works Department that the magnetometer detection would be the most appropriate for this intersection; due to the short installation time, long life cycle (approximately 10 years) and the ability to remove and re-install the sensors as more concrete repair is required in the future.

On September 6, 2013 the Streets Division of the Public Works Department advertised for bids for a Wireless Magnetometer Vehicle Detection System. The invitation to bid was also sent to seven (7) potential bidders.

Discussion

One (1) bid was received and opened on September 17, 2013. The Streets Division of Public Works Department and the Purchasing Division of the City Attorney's Office have reviewed the bids that were received. The bid by Sensys Networks of Berkeley, California meets all of the specifications. A summary of the bid is shown below.

Bidder	*Bid Price*
Sensys Networks of Berkeley, California	$22,539.00

Funds were budgeted for Fiscal Year 2013 and are available in Account No. 10033505-85325.

The bid price is below the estimate of $24,500.00.

Wireless magnetometer detection is a newer technology that is not produced by many companies. Sensys is the leading manufacturer that sells their products based on regional areas using a combination of vendors and direct selling. Nebraska is in a region in which Sensys Networks sells directly. This fact means many vendors will not bid on items outside of their jurisdiction and can make it difficult to produce competitive bidding. To ensure that components of the system can be purchased in a timely fashion the Public Works Division is proposing that in addition to awarding this bid that Sensys Networks be a sole source provider for future purchases of wireless magnetometer vehicle detection systems and its components.

Alternatives

It appears that the Council has the following alternatives concerning the issue at hand. The Council may:

1. Move to approve
2. Refer the issue to a Committee
3. Postpone the issue to future date
4. Take no action on the issue

Recommendation

City Administration recommends that the Council approve the bid award of a wireless magnetometer vehicle detection system to Sensys Networks of Berkeley, California in the amount of $22,539.00 and approve Sensys Networks of Berkeley, California as the sole source provider for wireless magnetometer vehicle detection systems and system components.

Sample Motion

Move to approve the bid award.

CITY OF GRAND ISLAND

Stacy Nonhof, Purchasing Agent

Working Together for a Better Tomorrow, Today

BID OPENING

BID OPENING DATE:	**September 17, 2013 at 2:00 p.m.**
FOR:	**Wireless Magnetometer Vehicle Detection System**
DEPARTMENT:	**Public Works**
ESTIMATE:	**$24,500.00**
FUND/ACCOUNT:	**10033505-85325**
PUBLICATION DATE:	**September 6, 2013**
NO. POTENTIAL BIDDERS:	**7**

SUMMARY

Bidder: **Sensys Networks**
Berkeley, CA

Bid Price: **$22,539.00**

cc: John Collins, Public Works Director
Mary Lou Brown, City Administrator
Stacy Nonhof, Purchasing Agent
Catrina DeLosh, PW Admin. Assist.
Jaye Monter, Finance Director
Shannon Callahan, Street Supt.

P1673

Slide 1

Department of Transportation

Traffic Division

Wireless Magnetometer Vehicle Detectors

- Wireless Detector History
- Testing and Development
- How They Work
- Installation
- Results
- Alternatives
- Maintenance

Signal Electronics
May 25, 2011

Slide 2

DOT Wireless Detector History

- May 2006, Contacted Sensys to Develop and Provide Stop Bar Detection
- August 2006 Installed First Beta Prototype at Signal Facility Test Bed.
- May 2007 First Active Intersection Installation
  - Observation and timing adjustments
- September 2007 Begin Full Deployment Along Edmondson Ave.
  - Nine semi-actuated intersections
- November 2007 Purchase equipment for 50 + Intersections
- 157 Installations to date

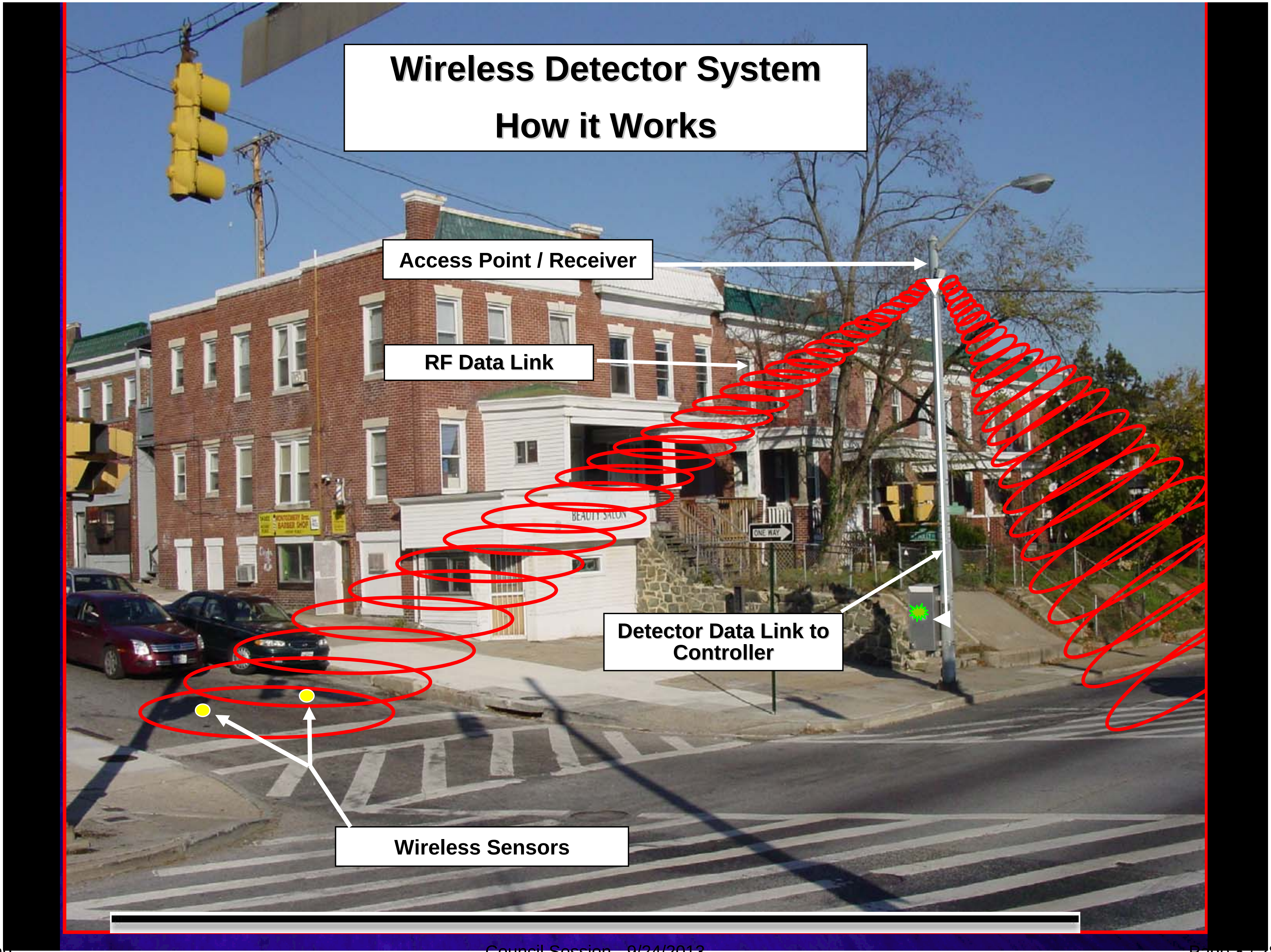
Slide 3

Test Results and Development

August 2006 Thru November 2007

- Testing Began - Simple Volume and Occupancy Counts.
  - Comparison with baseline loop detectors, data recorded and analyzed through system controllers
  - Sensors comparable with loops under all local weather conditions.
  - About 1% error.
- Stop Bar Capabilities Tested
  - Full presence mode tested and verified.
  - Optimum sensor placement and configuration established.
  - Sensor sensitivity improvements implemented to detect a wider variety of vehicles.
- Parked Vehicle Detection and Tune Out Tests (BDOT Requirement)
  - Tune out function tested and verified.
  - Firmware upgrade implemented for improved operation.

➤ **Wireless Detector System comparable to inductive loops in performance, functionality and stability.**


Wireless Detector System
How it Works
Access Point / Receiver
RF Data Link
Detector Data Link to Controller
Wireless Sensors
BEAUTY SALON
ONE WAY

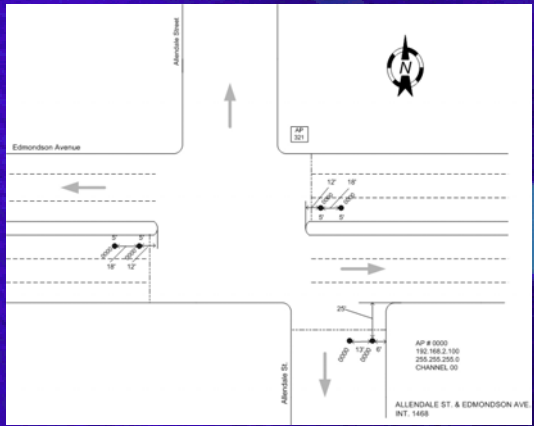
Slide 5

Installation
Set Up & Configuration

DOT CONFIGURATION			Allendale & Edmondson 1468
Operations			
Dot ID 16	Address 170	Lane	Position
07EF	3-15-3	W-S LT 3	1
8834	3-15-3	W-S LT 3	2
0832	3-15-2	E-N LT 3	1
0836	3-15-2	E-N LT 3	2
073E	3-15-1	SB 1	1
0821	3-15-1	SB 2	1
Example			
sensor	card - addr - det channel	SB curb lane	First sensor at stop bar
0000	3-15-1	SB 2	1

Notes: Lane is direction of travel plus lane number. Lane 1 is always curb lane in direction of travel. Example: 1 = curb, 2 = center, 3 = left, 4 = turn (in same direction of travel)

Position:
Stop Line sensor is sensor is 1 additional upstream sensors 2,3,4 ect.



The system is pre-configured in the shop to reduce field install time.

- Configuration tables produced.
- Installation drawings made to insure correct sensor placement
- The AP is set up and tested prior to being installed in the field.

➢ **Average set up time, out of the box to field ready is about one hour per intersection.**

Slide 6

Field Installation

- Access Point / Receiver fastened to signal pole 25 – 30 feet high
  - CAT-5 cable is installed from AP to Controller
  - Detector cards are installed in the control cabinet.
- Average install time 1 hour
- Final set up 20 minutes

- Each flush-mount sensor is installed using a core drill
  - 4” diameter hole
  - 2 ½” deep
- Less than 20 minutes install time per sensor
- Minimal lane closure time

➢ **Average field install time, per intersection – About three hours***

*Typical install is 1 AP with four sensors. Assumes no other maintenance required. Does not include travel time.

Slide 7

Detector Improvement Results

- Reduced Peak Travel Times Along Arteries
- Eliminate Unnecessary Main Street Stops
- Faster Return to main Street Green
  - Minimizes unnecessary side street green time
- Reliable Side Street Detection

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Alternatives + -

Wireless Technology

+ Good for actuated installations
+ Quick deployment, simple installation, relatively low cost
+ Accurate
+ Small footprint in roadway
+ Sensors may be retrieved from road

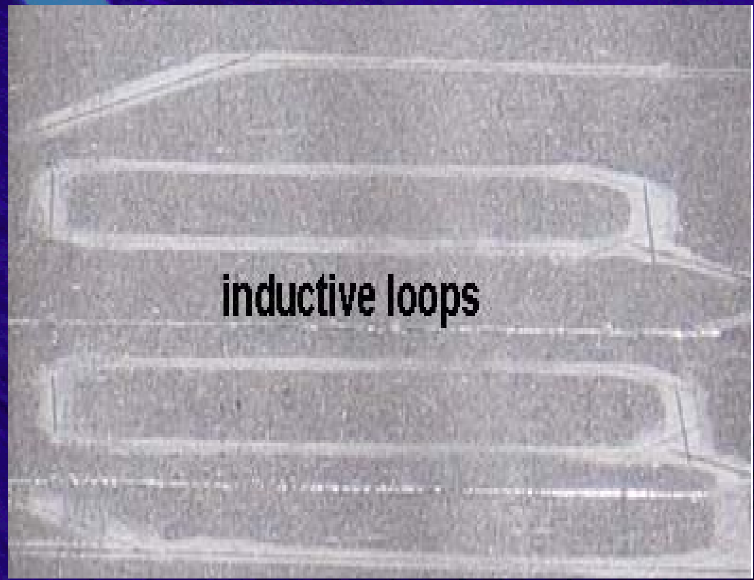
- Lap Top required for field diagnostics
- To Be Determined

Slide 9

Alternatives + -

- **Good Ol' Loops**
  - + Lowest equipment cost
  - + Accurate
  - + No special equipment for diagnostics

  - − Labor intensive and costly installation
  - − Large footprint, easily damaged



Slide 10

Alternatives + -

Video Detection

+ Wide coverage, multi-lane detection
+ Non-intrusive
+ Easy to change detection zones

– High cost for small intersections
– Extensive cabling required
– Special equipment for diagnostics
– Becomes maintenance intensive over time.

Slide 11

Maintenance

- **Let's Not Forget Pedestrian Detectors (Push Buttons)**
  - **Push buttons checked for proper operation during detector install**
  - **Defective buttons replaced**
  - **Defective wiring corrected or replaced**

- **There is no such thing as set it and forget it…For any System**
  - **Expect increased maintenance as equipment ages**
    - **Control Equipment**
    - **Detectors**
    - **Poles and Cabling**
    - **Signals**

Vehicle Detection Technologies

“The detector technologies used for signalized intersection control are inductive loops, magnetic detectors, passive infrared, ultrasonic, true-presence microwave radar and video detection processing. Detection technologies can be divided into two types: intrusive and non-intrusive. Intrusive detectors are laid in the pavement surfaces, while non-intrusive detectors are installed above the ground. Non-intrusive detectors observe traffic from above or from the side of a lane. They can be mounted on traffic signal mast arms, or over bridges or traffic lights, with a minimal disturbance to traffic flow during installation, maintenance and operation.

Inductive Loops

Inductive loops are the standard industry detectors. They are intrusive. When a vehicle passes over a loop or stays within a loop area, the inductance is reduced and is detected by a change in resonant frequency by the loop detection processor module. Inductive loops can be used alone or with any other traffic systems to provide information about vehicle presence.

Inductive loops provide accurate detection when they are installed accurately. Other advantages include environmental independence, low maintenance costs and inexpensive operation. However, the high failure rate, inflexibility and disruption of traffic flow during installation and maintenance of inductive loops are disadvantages that require a change in detecting technology.

Magnetic detectors

Magnetic detectors are intrusive and operate using wire coils embedded in the roadway. There are two types of magnetic detectors: active magnetic detectors, also known as magnetometers, and passive magnetic detectors. The working principle of magnetometers is similar to inductive loops, except the magnetometers have a coil of wires wrapped around the core. The earth's natural lines of flux pass through this coil. A voltage is caused by the deflection of the flux when a vehicle passes over the detector. The voltage is amplified and a signal is given, detecting the vehicle.

The advantages of these detectors are that they require low maintenance, are easy to install and are not affected by environmental conditions. They also provide a well-detected work zone. But these detectors are expensive and multiple-detectors must be installed to measure small vehicles such as motorcycles. Moreover, passive detectors do not detect the presence of a vehicle. Because of these disadvantages, they are not widely used.

Passive Infrared System

The passive infrared system is a non-intrusive detector that measures the energy emitted from an object (i.e. vehicle). A signal-processing algorithm is used to extract the information. In this system, no energy is emitted to detect the vehicle.

Its advantage is that it can operate both during the day and at night. It can be easily installed on the side or above a lane without causing a disruption to traffic. Disadvantages are its sensitivity to bad weather and ambient light conditions.

Ultra-Sonic Detectors

Ultra-sonic detectors are not very common in the United States. They operate by transmitting ultrasonic energy onto the object and measuring the reflected energy. Ultra-sonic detectors are used to obtain information regarding vehicle presence, speeds and occupancy.

One advantage of ultra-sonic detectors is that they work in all climatic conditions. They also provide fixed or portable mounting fixtures above the ground. The disadvantage of ultra-sonic detectors is the need for the devices to be mounted facing down and suspended above the vehicles. The detectors have difficulty in identifying vehicles moving alongside each other, and are susceptible to high wind speeds.

Microwave Radar

Microwave radars are not very common in the United States. Microwave radars use the energy reflected from the object within the field of view (FOV). They measure speeds, presence and occupancy by processing the information received.

The advantages of these detectors are that they can measure velocity directly and a single detector can be used to measure multiple lanes. The disadvantage is that they give false detection due to this multi-lane path.

Video Detection Systems

Video-detection systems are also considered non-intrusive. Video detection combines real-time image processing and computerized pattern recognition in a flexible platform. It uses a vision processor to analyze real-time changes in the image. In this system, cameras called image sensors capture images and provide a video signal to the vision processor. The video signal is analyzed and the results are recorded.

Video image detection is one of the primary alternatives to the traditional loop detector. It is becoming an increasingly common means of detecting traffic at intersections and interchanges. This is because video detection is often cheaper to install and maintain than inductive loop detectors at multi-lane intersections. In addition to speed, volume, queues and headways, it provides traffic engineers with many other traffic characteristics, such as level of service (LOS), space mean speed, acceleration and density. Video detection is also more readily adaptable to changing conditions at intersections (e.g., lane reassignment and temporary lane closure for work zone activities). This is one of the biggest advantages of video image detection. It provides traffic managers with the means to reduce congestion and improve roadway planning. Additionally, it is used to automatically detect incidents in tunnels and on freeways, thus providing information to improve emergency response times of local authorities. The main disadvantage of video image detection is that it is adversely affected by camera motion, daily changes in light level, seasonal changes in the sun's position and glare problems. Environmental factors like rain, snow and wind also affect its working capabilities, resulting in a significant number of false calls, missed calls and locked calls.

Installation of inductive loops vs. wireless magnetometers

Downside of inductive loops:

Pavement deterioration is accelerated. Whether in new pavement or having to cross old pavement to access a loop in a new concrete patch, the more sealant we use the sooner we will be back to replace more loops and pavement.

1. Pavement Distress. Shorten pavement life significantly when sawed in.
2. Wire breakage due to shifting joints and cracks in pavement.
3. Moisture in saw cuts/freeze thaw cycle. Literarily makes the pavement explode out of the corners of the loop.
4. Asphalt installations, normally good till next milling.
5. Wire insulation deterioration from moisture inside saw cuts.
6. Wire connections in pole bases and pull boxes, pull boxes can be water traps even the best connection will get moisture in them and start oxidizing.
7. Time it takes for installation/3 workers about 3 hours for a 6' x 12' loop. Disruption to traffic as some intersections have 7or 9 loops per direction of travel.
8. Occlusion of motorcycles and bicycles. Not enough metal to change induction to readable levels.

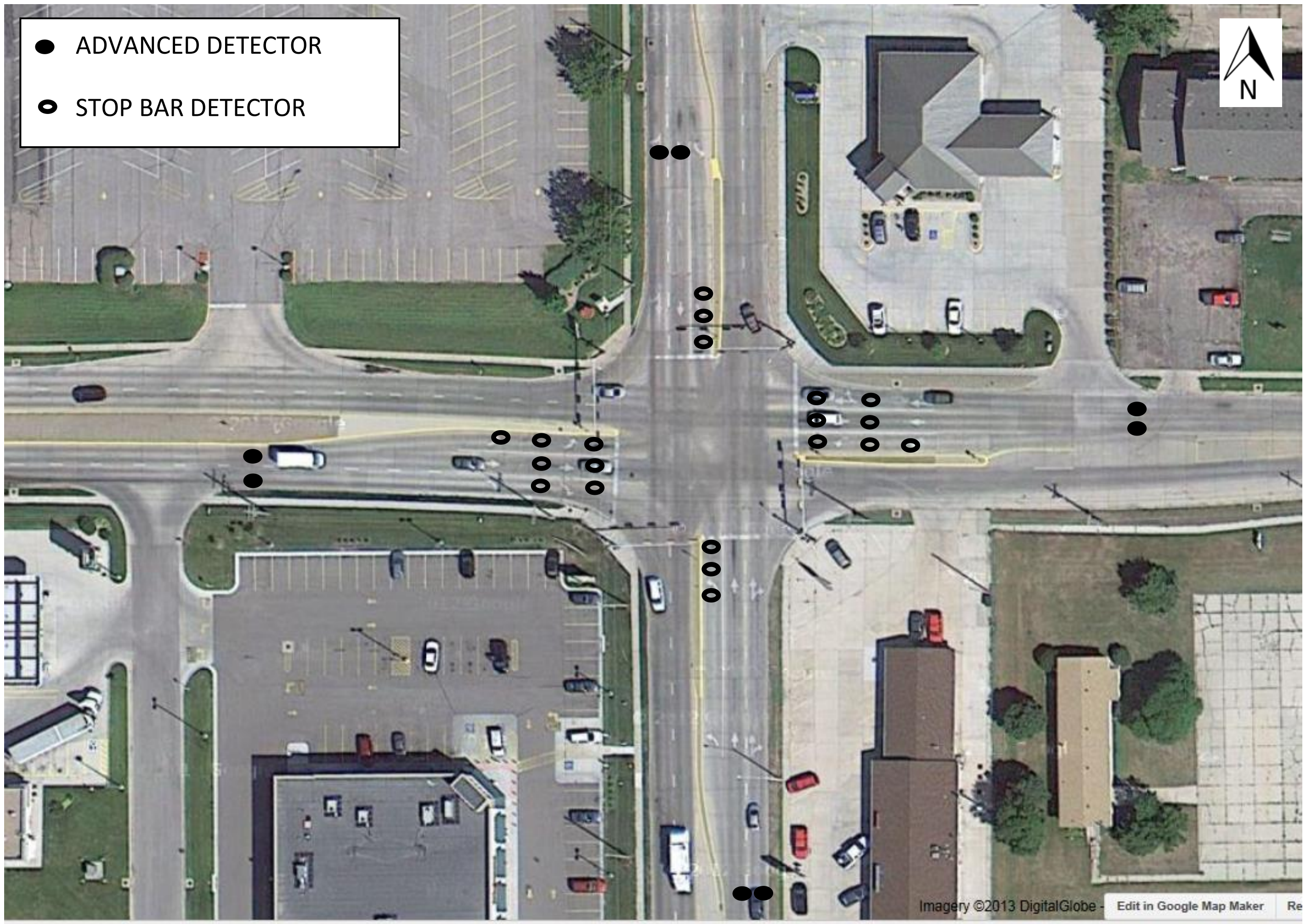
Downside of wireless magnetometers:

1. Occlusion of motorcycles and bicycles. Magnetometers are placed in the center of the lane and motorcycles and bike tend to use the edge of the lane.
2. Batteries in the magnetometers need to be replaced every 7 to 10 years and they have to be removed and re-epoxied into the roadway.
3. It is untried technology for the City of Grand Island at present. There would be a learning curve for the signal technicians involved.
4. Initial cost of installation needs to be considered.

Upside of inductive loops:
When properly installed under new pavement inductive loops are the most cost effective method of vehicle detection at signalized intersections.

Upside of wireless magnetometers:
Flush-mount in-pavement installation with no wires or lead-in cabling.
Fast and simple installation, installs in less than 10 minutes in small hole using a hammer or core drill. (4” (10 cm) diameter; 2 ¼” (5.7 cm) deep)
Covered with fast-drying epoxy to minimize road closures.
Extremely long battery life – average of 10 years.
Gives us the ability to do traffic counts by lane and access the information wirelessly via laptop or ITS (Intelligent Traffic System).
Can be removed for road repairs and replaced when finished or moved to a different location if an intersection is being replaced and loops can be installed beneath the pavement.

CITY OF GRAND ISLAND
ATTACHMENT 2 – INTERSECTION LAYOUT
FOR
WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM



**LOCATIONS ARE APPROXIMATE. LAYOUT ABOVE IS FOR GENERAL GUIDANCE ON INTERSECTION GEOMETRICS AND QUANTITY/TYPE OF DETECTORS.*

Attachment 3

13th St & Webb Rd - Traffic Signals
Vehicle Detection (stop bar only)
Labor and Material Estimate
7/17/2013

Detection Type	Number of Staff	Hours/Person/ Component	Number of Components	Labor Hours	Avg Cost/ Labor Hour	Labor Cost Est.	Material Cost Est.	Total Cost Est.
Inductive Loops	3	3	32	288	$20	$5,760	$6,000	$11,760
Video	3	30 (total per person)	na	90	$20	$1,800	$18,500	$20,300
Microwave	2	8 (total per person)	na	16	$20	$320	$19,098	$19,418
Magnetometer	2	0.25	20	10	$20	$200	$18,500	$18,700

*The numbers above are for stop bar detection only. Additional costs for advanced detection were difficult to compare since some of the above technologies do not work well for long distances.

Game Changing Technology

Flexible, dependable, low-cost, the Sensys Networks VDS240 wireless vehicle detection system uses magneto-resistive wireless sensors—with an unprecedented 10-year battery life—to detect vehicle presence and movement.

Our rugged, in-ground wireless sensors install in minutes, deploy in a matter of hours, and begin transmitting accurate, real-time detection data to signal controllers, traffic management centers, and traveler information systems. Installation is fast and simple, minimizing road closures and worker exposure, and greatly reducing operating and maintenance spending.

- In-pavement installation with no wires or lead-in cabling
- 10-year battery life
- Impervious to weather
- Rapid installation and deployment reduces road closures and worker exposure
- Patented, ultra-low "NanoPower" communications protocol
- Superior accuracy, dependability, and extensibility
- Universal platform for all traffic detection applications
- Self-calibrating, self-tuning
- Re-usable and remotely upgradeable
- Easily deployed in complex configurations
- Capable of over 300 million detections

Game Changing Technology

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Budget Saving Wireless Sensor Networks

Virtually maintenance free, and completely weather-independent, Sensys Networks' wireless sensors perform flawlessly in temperature extremes, are unaffected by glare, wind, rain, or snow, and require no maintenance once installed. Self-calibrating, all software upgrades are performed over the air.

Turnkey Vehicle Detection Solutions

Many of today's traffic detection applications are legacy systems from decades old deployments. These antiquated systems are expensive to acquire and maintain, limited by infrastructure capacity and roadway conditions, and poorly suited to scalability or integration. As a result, transportation agencies invest significant resources in their acquisition, customization, and maintenance.

In contrast, Sensys Networks' turnkey, wireless detection solutions are revolutionizing how transportation agencies obtain and utilize accurate, real-time data. With unprecedented access to dependable, cost-effective detection solutions.

Unlike inductive loops, VDS240 requires no trenching, and can be installed wherever detection is needed, regardless of pavement degradation.

Access Point Controller Card (APCC)

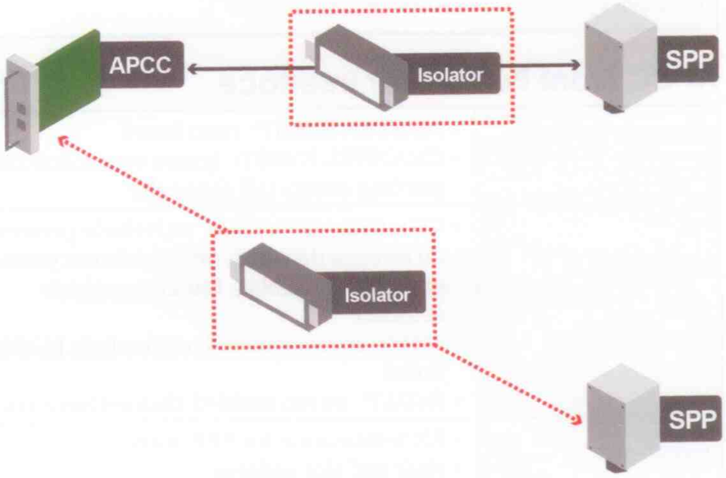
The Sensys Networks Access Point Controller Card (APCC) is a second generation controller card that maintains low power consumption, supports multiple radios, and allows for additional communication and processing power. The APCC, which is compatible with all of Sensys Networks VDS240 Wireless Vehicle Detection System products, receives and processes data from the sensors. The APCC then relays the sensor detection data to a roadside traffic controller or remote server traffic management system.

The APCC, along with the APCC radio, maintains two-way wireless links to an installation's sensors and repeaters, establishes overall time synchronization, and transmits configuration commands and message acknowledgements.

Types of APCC configurations. The APCC single-slot configuration consists of dual APCC radio ports, Sensys Networks Expansion (EX) port, and contact closure interface via backplane to a traffic controller. It also has dual USB 2.0 full speed host ports and 10/100Base-T network access. The APCC dual-slot configuration adds an SD memory card, real-time battery-backed clock, optional dual serial (DB9) interface*, and an optional second serial port or built in cellular modem.

* Full handshake control - COMM1 only

APCC system. The minimum APCC system consists of an APCC and one SPP radio. The system can also consist of multiple SPP radios and an isolator that offers electrical isolation up to 1500V, surge protection up to 1500V, and AC power cross protection.



Functions / Features

Sensys Networks radio communications
- To/from Sensys Networks APCC radio
- To/from Sensys Networks repeaters

Relay of sensor data
- Via contact closure signals to traffic controller
- Via IP connectivity (wired or wireless) to traffic management systems, upstream servers, etc.
- Integrated cellular data modem (optional)

Processing of sensor data
- Per-lane or per-vehicle data
- Data binning over selectable time intervals
- Data filtering (e.g., adaptive holdover)

Storage of sensor data
- Data buffering (event caching) 500 K
- Data storage (processed data) 1 M
- MMC/HCSD retractable memory (optional)

Master timebase for all supported wireless sensors
- Common clock for sensor timestamps
- Can be synchronized to NIST timing signals

Radio signal quality measurements
- Receive Signal Strength Indicator (RSSI, in dBm)
- Link Quality Index (LQI, figure of merit)

Firmware upgrades
- Can be upgraded via IP connectivity or via local PC connection
- Can deliver upgrades to all other Sensys Networks devices

Simple installation
- Any roadside location that provides adequate signal coverage to sensors/repeaters
- No special requirements regarding setback, relative angle of the sun, or mounting stability

Low power consumption

No calibration or adjustment required

1608 4th Street Suite 200 Berkeley CA 94710 | info@sensysnetworks.com | P 510.548.4620 F 510.548.8264

RP240-BH-LL Repeater

The Sensys Networks VDS240 Wireless Vehicle Detection System uses pavement-mounted magnetic sensors to detect the presence and movement of vehicles. The magneto-resistive sensors are wireless, transmitting their detection data in real-time via low power radio technology to a nearby Sensys Networks access point that then relays the data to one or more local or remote traffic management controllers and systems.

The Sensys Networks Repeater. In cases where one or more installed Sensys Networks wireless sensors are out of range of the nearest access point, one or more Sensys Networks repeaters can be used to provide a two-way relay between the out-of-range sensors and the access point. As many as two repeaters operating in tandem can be installed between a sensor and the access point. To simplify its deployment, a repeater is battery-powered and thus requires no wires or cabling.

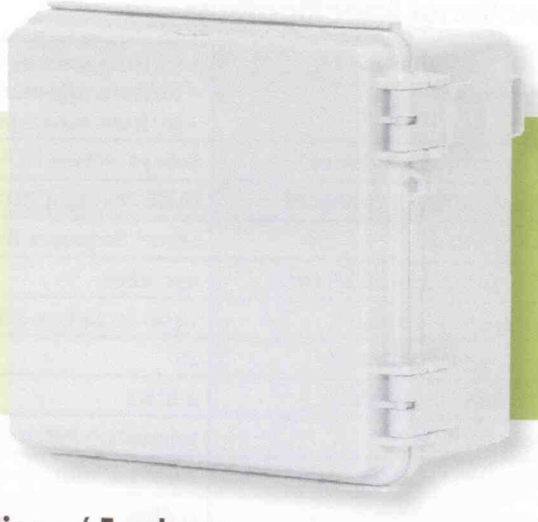
Extended Range and Coverage. A repeater extends the range and coverage of an installation's access point. Mounted by the roadside on a pole or other structure, the repeater must be positioned so that both the sensors to be supported by the repeater and the communicating repeater or access point are within view and within range.

The access point and repeater antennas each provide a 120° field of view, allowing considerable flexibility. For example, a repeater can be installed approximately 1000 feet (305 meters) from the access point, where each device can then support wireless sensors within 75 – 150 feet (23 – 46) meters. Alternatively, a repeater can be mounted on the same pole or mast as the access point, separated by 2 to 4 feet (0.6 to 1.2 meters) to ensure that they can communicate, but pointed in the opposite direction. The access point would then support the sensors and repeaters directly in front of it, while the repeater pointing in the opposite direction would support its own sensors as well as another repeater and its sensors.

Types of Repeaters. Sensys Networks currently offers two types of repeaters:

RP240-BH
- Nominal battery capacity of 57 Ah
- Recommended battery replacement every 2 years

RP240-BH-LL
- Nominal battery capacity of 171 Ah
- Recommended replacement every 7 years



Functions / Features

Relay of radio communications
- To/from wireless sensors
- To/from access point
- To/from another repeater

Extension of range and coverage of the access point
- Can be operated in tandem – one repeater and its supported sensors can communicate with another repeater and then to the access point
- Maximum single-hop range of ~1000 feet (305 meters) from supporting access point or repeater

Fully wireless operation – no cable connections
- Battery powered
- Low power consumption

Radio signal quality measurements (of each link to wireless sensor or tandem repeater)
- Receive Signal Strength Indicator (RSSI, in dBm)
- Link Quality Index (LQI, figure of merit 40-99)

Firmware upgrades over-the-air from access point

Simple installation
- Any roadside location that provides adequate signal coverage to sensors and the access point or repeater
- No special requirements regarding setback, relative angle of the sun or mounting stability

No calibration or adjustment required

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SENSYS networks

VSN240 Wireless Flush-Mount Sensor

The Sensys Networks VDS240 Wireless Vehicle Detection System uses wireless magneto-resistive sensors to detect the presence and movement of vehicles. The sensors – installed on the surface or in small holes cored in the roadway – transmit detection data in real-time via low-power radio technology to a nearby Sensys Networks access point. Vehicle detections are further relayed to a traffic signal controller, remote traffic management center, or other system.

The Sensys Networks Wireless Flush-Mount Sensor. Flush-mount sensors combine a state-of-the-art magnetometer and a low-power radio in a small, hardened plastic case suitable for installation directly in the pavement.

In typical traffic management applications, a sensor is placed in the middle of a traffic lane to detect the presence and passage of vehicles. Vehicle speeds and length are measured by two sensors installed in the same lane with the exact distance between them configured in software. The recommended distance between sensors depends on the range of expected speeds to be measured: for typical freeway applications, a separation of 20 to 24 feet (6.1 to 7.3 meters) is recommended; for typical arterial applications, a separation of 10 to 12 feet (3.1 to 3.7 meters) is preferred.

Advanced Magnetometer-Based Vehicle Detection. The state-of-the-art magneto-resistive sensing devices in each wireless sensor measure the x-, y-, and z-axis components of the Earth's magnetic field at a 128 Hz sampling rate. As vehicles come within range, changes in the x, y, or z axes of the measured magnetic field become apparent. When no vehicles are present, sensors continually measure the background magnetic field to estimate a reference. Each sensor automatically self-calibrates to the local environment, and to any long-term variations of the local magnetic field, by allowing this reference value to change over time.

Types of Wireless Sensors. Sensys Networks offers two types of flush-mount wireless sensors:

VSN240-F

- Flush-mount wireless sensor for in-pavement installation
- For all freeway, arterial, and signal control applications

VSN240-T

- Flush-mount wireless sensor for in-pavement installation
- For signal control applications only

Functions / Features

3-axis magnetometer for vehicle detection

- 128 Hz sampling rate
- Count and presence detection modes
- Modes for bicycle and motorcycle detection

Superior accuracy

Exceptional reliability

Flush-mount in-pavement installation with no wires or lead-in cabling

Fast & simple installation

- Installs in less than 10 minutes in small hole using a hammer or core drill
  - 4" (10 cm) diameter; 2 ½" (6.5 cm) deep
  - Covered with fast-drying epoxy
- Minimal lane closure time
- No saw cuts

Extremely long battery life – average of 10 years

- Rugged mechanical design
- Auto-calibration

Reliable 2-way radio communications with access point

- Uniquely addressable and configurable
- Firmware can be upgraded over-the-air

Can be readily deployed where other systems cannot be used

- Split roadways
- High water tables
- Damaged pavement

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SENSYS networks

CC & EX Contact Closure Cards

The Sensys Networks VDS 240 Wireless Vehicle Detection System uses pavement-mounted magnetic sensors to detect the presence and movement of vehicles. The magneto-resistive sensors are wireless, transmitting their detection data in real-time via low-power radio technology to a nearby Sensys Networks access point that then relays the data to one or more local or remote traffic management controllers and systems.

The Sensys Networks CC and EX Contact Closure Cards. The Sensys Networks VDS240 Wireless Vehicle Detection System can be used with Type 170, NEMA TS1, NEMA TS2, or Type 2070 ATC traffic controllers by installing one or more Sensys Networks contact closure cards into a detector shelf of the controller and connecting them to one or more Sensys Networks access points. The Sensys Networks Master (CC) and Expansion (EX) contact closure cards support this traffic controller interface, converting the real-time detection signals of the Sensys Networks wireless sensors supported by a access point into contact closure signals to the traffic controller.

Each CC and EX card provides one, two, three, or four channels, where each channel comprises an optically isolated contact closure relay and, if configured for TS2 operation, an additional contact closure relay to indicate the channel status. If the sensors supported by an access point require more than the four channels of a CC card, as many EX cards as required (up to 63) can be daisy-chained to the CC card, either via front-panel RJ45 jacks or via rewiring of the backplane connections. Multiple cards may also be needed if the traffic controller shelf has pre-defined functions or phases for each slot.

Each wireless sensor can be mapped to its own individual channel or up to 15 wireless sensors can be mapped to a single channel to effectively "OR" the sensor signals together so that if any of them detect a vehicle, the contact closure relay for that channel will close. In this way, a Sensys Networks VDS 240 Wireless Vehicle Detection System can be easily configured in the same way that inductive loops are configured to interface with a traffic controller.

Types of Contact Closure Cards. Sensys Networks offers two types of contact closure cards:

CC240, EX240

- Type 170 controllers
- Type 2070 controllers (without status relay)
- NEMA TS1 controllers
- Type 2070 controllers

CC/EX Card Functions/Features

Sensys Networks contact closure interface to traffic controller

- Type 170 controllers
- NEMA TS1 controllers
- Type 2070 controllers
- NEMA TS2 controllers

Plugs directly into input file or detector rack without any additional adapter

Up to four detection channels per card

- Optically isolated contact closure signals
- TS2 configuration includes status channels

Pulse or presence and delay or extension modes

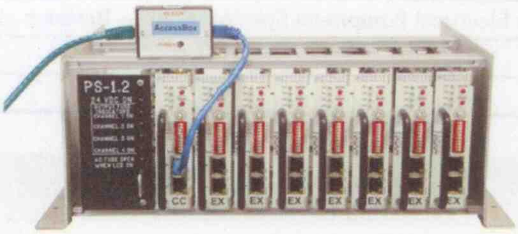
Easy installation

- Configured via access point using TrafficDOT
- Optionally configured via front panel switches
- Buzzer to assist in on-site verification

Sensys Networks AccessBox

Junction box wired in-line between CC card and access point

- Routes power from CC card to access point
- Routes vehicle detections to controller via CC card
- Provides wired IP port for WAN connection and/or local management



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RESOLUTION 2013-318

WHEREAS, the City of Grand Island invited bids for a Wireless Magnetometer Vehicle Detection System, according to bid specifications on file with the Public Works Department; and

WHEREAS, on September 17, 2013 one bid was received from Sensys Networks of Berkeley, California for the amount of $22,539.00; and

WHEREAS, Synsys Networks is the manufacturer of the Wireless Magnetometer Vehicle Detection System components specified on their bid sheet; and

WHEREAS, to streamline the process for future purchases of Wireless Magnetometer Vehicle Detection Systems and/or system components, it is requested that Sensys Networks be designated as the sole source provider for such technology and equipment.

NOW, THEREFORE, BE IT RESOLVED BY THE MAYOR AND COUNCIL OF THE CITY OF GRAND ISLAND, NEBRASKA, that the bid from Sensys Networks of Berkeley, California for Wireless Magnetometer Vehicle Detection System in the amount of $22,539.00 is hereby approved as the lowest responsible bidder; and

BE IT FURTHER RESOLVED, that Sensys Networks of Berkeley, California is hereby designated as the sole source provider for future purchases of Wireless Magnetometer Vehicle Detection Systems and/or system components.

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Adopted by the City Council of the City of Grand Island, Nebraska, September 24, 2013.

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Jay Vavricek, Mayor

Attest:

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RaNae Edwards, City Clerk

Approved as to Form ¤ ___________
September 20, 2013 ¤ City Attorney