“To improve is to change; to be perfect is to change often”

- *Winston Churchill*

3.0 Needs Assessment

Based upon the summary and evaluation of the existing traffic management system components a typical needs assessment process was conducted. This activity of identifying gaps in the system based upon current status and desired goals and objectives is typical and similar to what many agencies conduct during a major system upgrade. From the day to day working knowledge of all portions of the current system and staff involvement with maintenance and operations, a list of high level needs categories was identified as shown below:

1. Arterial Traffic Management
    - Improve operations for all modes of transportation
    - Improve efficiency of the traffic signal system
    - Improve efficiency of engineering, operations, and maintenance staff
2. System Safety
    - Improve safety for all modes of transportation
    - Improve safety for drivers making left turns
    - Improve safety for pedestrians at intersections and mid-block locations
    - Improve safety for bicyclists at signalized intersections
    - Improve safety and operations for drivers during winter driving conditions
    - Improve safety for drivers and pedestrians by reducing speed-related crashes
    - Improve safety for drivers by reducing vehicle-to-vehicle crashes
3. Communications Systems
    - Improve performance of the traffic signal system
    - Improve efficiency of engineering and maintenance staff
    - Improve security and scalability of network to support traffic signal system goals
4. Incident Management
    - Improve operations for drivers during incidents
    - Improve safety for the public and emergency response personnel
    - Improve incident clearance time to restore roadways to normal operations
5. Traveler Information Systems
    - Improve operations for drivers by dissemination of real time transportation information
6. Public Transportation
    - Improve operations for transit vehicles at traffic signals
    - Improve safety for transit vehicles
7. Maintenance and Construction Operations
    - Reduce failures of traffic signal system components
    - Improve efficiency of technician staff
    - Improve safety and efficiency of traffic approaching and moving through work zones
    - Improve efficiency of staff and equipment during maintenance and winter operations
    - Improve preventative maintenance
    - Improve asset/infrastructure monitoring capabilities

Table 7 summarizes the high-level needs, constraints, and expectations for these categories. Priority for each need was identified as high (H), medium (M), or low (L). In addition, the existing status of the fulfillment was identified as nonexistent (N), partially complete (P), or complete (C).

TABLE 7 – PRIORITY AND STATUS OF NEEDS, CONSTRAINTS, AND EXPECTATIONS

NO.	NEEDS, CONSTRAINTS, AND EXPECTATIONS	PRIORITY	STATUS
1.0	**ARTERIAL TRAFFIC MANAGEMENT**		
1.01	Replace controllers	H	N
1.02	Install upgraded software on controllers	H	N
1.03	Provide additional space in cabinets for additional components	M	P
1.04	Integrate traffic signals into a single traffic control system software	H	P
1.05	Integrate ITS field devices into a single management software	H	N
1.06	Designate central location for signal timing databases	H	C
1.07	Provide ability to easily update controller settings in the field	M	P
1.08	Improve system operation monitoring	H	P
1.09	Provide access to management software to various staff in various locations	H	P
1.10	Improve ability to remotely modify signal timing	H	P
1.11	Provide notification of detector failures	H	P
1.12	Deploy timing plans to groups of intersections simultaneously	M	P
1.13	Receive automatic notifications for coordination errors	H	P
1.14	Setup alarm notifications for user-defined thresholds for various parameters	H	P
1.15	Download user-friendly operational reports on signal system operations (such as communications failures), timing data, and traffic data	M	P
1.16	Provide alarms for excessive queuing	L	N
1.17	Develop an automated logging system	H	N
1.18	Automatically archive data	H	P
1.19	Conduct traffic flow monitoring in real time	H	P
1.20	Obtain access to existing freeway monitoring capabilities	L	P
1.21	Provide high-quality real-time traffic information	M	N
1.22	Provide timely congestion and incident information to public	M	N
1.23	Provide the public with limited access to traffic management tools and activities	H	N
1.24	Integrate traffic data collection software with traffic signal system modeling software	M	N

NO.	NEEDS, CONSTRAINTS, AND EXPECTATIONS	PRIORITY	STATUS
1.25	Integrate traffic signal system modeling software with ATMS software	M	N
1.26	Improve signal coordination	H	P
1.27	Maintain high-quality coordination	H	P
1.28	Provide the ability to modify coordination correction modes	M	P
1.29	Conduct traffic data collection from permanent stations	M	N
1.30	Measure signal timing performance	H	N
1.31	Provide dynamic lane assignment based on user-defined traffic data inputs	L	N
1.32	Develop special event timing	H	P
1.33	Install adaptive traffic control on certain corridors	H	N
1.34	Provide adequate staffing to perform functions	H	P
1.35	Provide adequate staff training	H	N
1.36	Develop interagency agreements	M	P
1.37	Evaluate future vehicle-to-vehicle communications systems	L	N
1.38	Evaluate pedestrian and bicycle concerns	M	N
2.0	**SYSTEM SAFETY**		
2.01	Provide automatic notifications for power outage and cabinet knockdowns	H	N
2.02	Provide the ability to implement flashing yellow arrow operation for permissive turns within management software	H	N
2.03	Provide the ability to implement a pedestrian beacon within management software	H	P
2.04	Provide the ability to implement pedestrian scramble operation within management software	H	P
2.05	Provide the ability to implement audible or accessible pedestrian features within management software	H	P
2.06	Implement detection and develop timing specific to bicycles	H	N
2.07	Provide anti-icing systems on high-volume approaches with steep grades	L	P
2.08	Monitor speeds in real-time and conduct data collection at speed feedback sign locations	L	N
3.0	**COMMUNICATIONS SYSTEMS & INTEGRATION**		
3.01	Increase speed, bandwidth, and reliability of field to field communications	H	P

NO.	NEEDS, CONSTRAINTS, AND EXPECTATIONS	PRIORITY	STATUS
3.02	Increase speed, bandwidth, and reliability of center to field communications	H	P
3.03	Provide staff in the field access to network	H	P
3.04	Provide the ability to transmit video	H	P
3.05	Provide central information clearinghouse	M	N
3.06	Develop interagency agreements	M	P
3.07	Provide communications to all signals	H	P
3.08	Provide remote access to the traffic signal network for management, software upgrades, and troubleshooting	H	P
3.09	Develop and implement network security protocols	H	P
3.10	Develop traffic signal IP schema/architecture for participating	H	P
3.11	Evaluate IP schema/architecture	M	P
4.0	**INCIDENT MANAGEMENT**		
4.01	Improve incident detection	M	N
4.02	Verify and monitor incidents	H	P
4.03	Provide staff to actively monitor and coordinate	H	P
4.04	Improve incident response coordination between agencies	H	P
4.05	Reduce traffic delays for emergency response vehicles	H	P
4.06	Develop methods for deployment of incident management for select corridors	M	N
4.07	Provide better coordination for ending incident management activities	M	N
5.0	**TRAVELER INFORMATION SYSTEMS**		
5.01	Provide traveler information on the roadside	H	P
5.02	Provide quality real-time congestion-related information	M	N
5.03	Improve and expand traveler information delivery methods	M	N
5.04	Improve procedures to get accurate information disseminated in a timely manner	H	N
5.05	Provide better work zone information and notification	H	P
6.0	**PUBLIC TRANSPORTATION**		
6.01	Provide transit priority at signals	L	N
6.02	Provide information exchange to/from transit agency	M	N

NO.	NEEDS, CONSTRAINTS, AND EXPECTATIONS	PRIORITY	STATUS
6.03	Use AVL data for traffic management	M	P
6.04	Provide transit ETA information	L	P
7.0	**MAINTENANCE AND CONSTRUCTION OPERATIONS**		
7.01	Conduct preventative maintenance on traffic signals at regular intervals	H	P
7.02	Standardize traffic control equipment	H	P
7.03	Standardize cabinet setup	H	P
7.04	Improve coordination on construction notification and information distribution	M	P
7.05	Improve work zone traffic handling plans	M	P
7.06	Monitor traffic remotely in and around work zones	M	P
7.07	Provide weather and pavement data collection to aid winter operations	M	P
7.08	Provide automated vehicle locations systems for maintenance and construction operations vehicles	L	N

Priority: H – High, M – Medium, L – Low; Status: N – Nonexistent, P – Partial, C – Complete

The above items provide further discussion topics and the continued identification of system needs and opportunities to greatly improve the daily function of the overall team and equipment. Through the identification of self-assessment gaps, future system improvement strategies were developed including required resources to provide the citizens of Lincoln with improved mobility citywide.