Downtown Lighting and Signals Upgrade

Municipality of Anchorage
Project No. 14-48

Reconnaissance Study

August 2018

Prepared for:
Municipality of Anchorage
Project Management and Engineering Department

Prepared by:

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RECONNAISSANCE STUDY

For
Municipality of Anchorage
Project No.: 14-48
Downtown Lighting and Signals Upgrade

Prepared by:

8/14/18

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NOTICE TO USERS

This report reflects the thinking and design decisions at the time of publication. Changes frequently occur during the evolution of the design process, so persons who may rely on information contained in this document should check with the Municipality of Anchorage for the most current report. Contact the Project Manager, Duane Maney at 907-343-8221 for this information.

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Abbreviations

ADA	Americans with Disability Act
AEDC	Anchorage Economic Development Corporation
ATM	Alaska Traffic Manual
CBD	Central Business District
CSMP	Core Streets Master Plan
DCM	Design Criteria Manual
DOT&PF	Alaska Department of Transportation & Public Facilities
DSR	Design Study Report
LED	Light Emitting Diode
MASS	Municipality of Anchorage Standard Specifications
ML&P	Municipal Light and Power
MOA	Municipality of Anchorage
MUTCD	Manual on Uniform Traffic Control Devices
NEC	National Electrical Code
NFPA	National Fire Protection Association
OSHP	Official Streets and Highways Plan
ROW	Right of Way

Executive Summary

This Reconnaissance Study presents the findings of the field evaluation of the Municipality of Anchorage (MOA) downtown traffic signal and street lighting systems. Where the systems were found to be deficient, the report identifies potential improvement projects, prioritized based on potential safety risks, condition of the facilities, and compliance with design criteria.

The project area extends from L Street to Ingra Street and from 10th Avenue to 1st Avenue. The field evaluation effort was conducted by obtaining the MOA's lighting system database and supplementing it with condition assessments of light poles, junction boxes, load centers, traffic signal controllers, and traffic signal poles. The condition assessments included photographs, qualitative condition ratings, electrical code assessments, and conformance to current design criteria. In addition, lighting systems were evaluated using representative lighting cases to determine lighting levels across the study area and compared with Design Criteria Manual (DCM) recommendations.

Findings

Overall, approximately 27-percent of the evaluated objects received a poor rating. This was mostly due to poor condition of conduit, junction boxes, and grounding (aggregating to 60-percent), and poor condition of signal controllers (51-percent). Junction box deficiencies were largely caused by corrosion of the conduits or physical damage to the lid or structure of the junction box. Signal controller deficiencies were primarily back panel circuitry that had failed or was at high risk of failing. Signal poles, light poles, and load centers were generally in fair to good condition, with only 5- to 12-percent of those objects rated as poor.

Electrical code deficiencies were primarily due to inadequate grounding.

Most traffic signals meet current standards. Four locations should have additional signal heads installed to meet Alaska Traffic Manual and DCM guidance. Fifty of the 52 study area traffic signals feature the out-dated NEMA TS-1 cabinets, although all intersections have modern controllers in the cabinets.

Most of the lighting does not meet standards for the level of pedestrian activity in the area. Many of the roads also do not meet standards for the vehicular traffic either, particularly the higher volume, higher classification roadways. In addition, 38 blocks have no mid-block lighting and do not meet DCM standards.

Recommendations

There are a number of deficiencies MOA should address as soon as practicable, including replacing missing pole handhole covers, installing junction box lid bonding jumpers, replacing certain load centers that have substandard grounding, and providing a load center for the traffic signal at 4th Avenue and C Street. These are the highest priority improvements recommended to reduce risks to the public and staff working on these systems.

In addition to these actions, MOA should work to systematically bring the signal and lighting systems in the project area into compliance with current safety and design standards. To that end, the following system rehabilitation projects are recommended, and listed in priority order. Projects should replace most or all of the lighting and signal systems in the areas listed. Estimates and project descriptions are broken down further in section 4.3.

Priority	Project Location	Estimate (2018 $)
1	4th Avenue - L Street to A Street	$20,078,000
2	3rd Avenue - L Street to Barrow Street	$8,765,000
3	4th Avenue - A Street to Ingra Street	$6,890,000
4	6th Avenue - L Street to Cordova Street	$15,302,000
5	5th Avenue - L Street to Cordova Street	$16,231,000
6	F Street - 3rd Avenue to 5th Avenue	$1,467,000
7	E Street - 2nd Avenue to 4th Avenue	$1,435,000
8	Ingra Street - 3rd Avenue to 10th Avenue	$4,050,000
9	L and I Streets - 3rd Avenue to 10th Avenue	$4,127,000
10	A and C Streets - 3rd Avenue to 10th Avenue	$5,674,000
11	West Spot Fix Project	$3,444,000
12	7th Avenue - L Street to Cordova Street	$6,016,000
13	G Street - 5th Avenue to 7th Avenue	$1,351,000
14	5th Avenue - Cordova Street to Ingra Street	$3,954,000
15	East Spot Fix Project	$3,128,000
16	2nd Avenue - H Street to 1st Avenue	$2,789,000
17	3rd Avenue - Barrow Street to Ingra Street	$2,690,000
18	8th Avenue - L Street to Cordova Street	$3,928,000

19	6th Avenue - Cordova Street to Ingra Street	$3,335,000
20	Infill Lighting (Blocks with no Lighting)	$11,027,000
21	Infill Lighting (Blocks with Utility Only Lighting)	$25,256,000

1 Introduction

The Downtown Lighting and Signals Upgrade Reconnaissance Study has been prepared by Kinney Engineering, LLC to identify aging and deteriorating lighting and signal equipment in the Anchorage Central Business District (CBD) and to recommend phased upgrades to such equipment where necessary.

Municipal staff have seen increasing instances of failing components such as corroded pole bases, improperly grounded electrical wiring and conduits, and other components not meeting current safety and design standards. This report documents the condition and location of the street lighting and traffic signal components in the CBD. In addition, this effort audits the systems' compliance with current codes and standards. The resulting inventory will enable the Municipality of Anchorage (MOA) to proactively maintain the infrastructure, rather than reactively address problems when they unexpectedly arise, thereby reducing life-safety risks, enhancing public safety, and reducing maintenance and operating costs.

This study extends from 1st Avenue to 10th Avenue, and from Ingra Street to L Street, as shown in Figure 1. Items inventoried include streetlights, pedestrian lights, junction boxes, load centers, traffic signal poles, and traffic signal controllers in the right of way. Privately-owned and utility-owned facilities were not included.

Using the collected data, this study identifies potential improvement projects to replace substandard system components. The projects are prioritized based on potential safety risks, condition of the facilities, and compliance with design criteria.

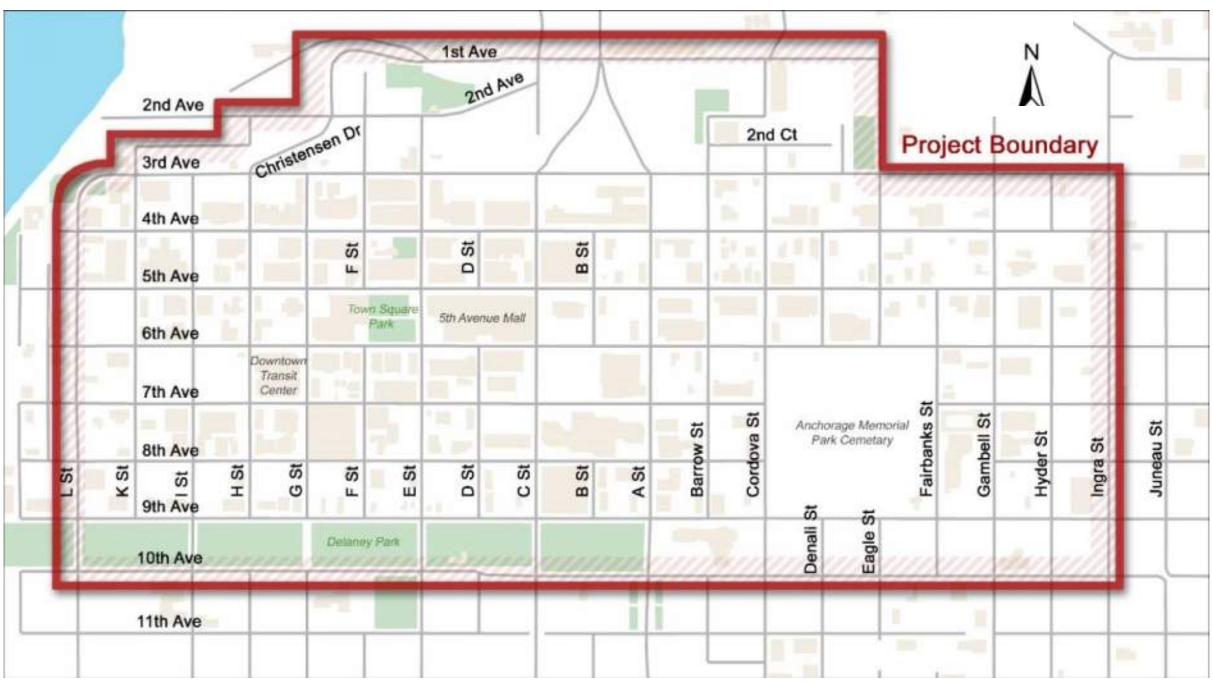


Figure 1 - Project Area Map

1.1 Background

Anchorage's downtown traffic signal and lighting systems date back to the 1960s, with a myriad of updates occurring since the 1980s. Signal poles with bridge-style mast arms from the 1960s era are reaching the end of life, and pier-style foundations from this era are spalling and suffering from mechanical damage. 1980s era green-painted signal and illumination poles are exhibiting a high degree of rust, with at least one instance of a pedestrian light pole falling over. MOA maintenance does not have replacement parts for these types of poles, meaning span-wire temporary signals would have to be installed if one of these signal poles were to fail.

Much of the existing underground wiring for the illumination system on 3rd and 4th Avenue is direct buried and has failed over time. Power was re-routed overhead as a temporary expedient fix. Over time, this quick fix has become a permanent feature along these roadways. In addition, MOA Street Light Maintenance reports that two to four green decorative pedestrian poles are lost each year to vandalism, corrosion, or errant vehicles. They also test poles each spring prior to the flower basket deployment.

In 2001, MOA commissioned the Anchorage Downtown Area Traffic Signal System Rehabilitation Study to inventory and analyze the conditions of the signal systems downtown. The study included detailed structural inspections at a dozen signalized intersections. That study identified a number of deficiencies, many of which have been remedied in the intervening years. Remaining "high priority" deficiencies identified under the 2001 study include:

- 3rd and Eagle Street – all signal poles
- 4th and L Street – northwest signal pole
- 4th and Cordova Street – all signal poles
- 4th and Gambell Street – southeast and southwest poles
- 4th and Ingra Street – northeast and southeast poles
- 5th and L Street – southeast pole
- 5th and Gambell Street - southeast and southwest poles
- 5th and Ingra Street – southwest pole
- 6th and H Street – southeast and southwest poles
- 6th and C Street – southeast and southwest poles
- 6th and A Street – northwest and north east poles
- 6th and Gambell Street – southeast foundation

In addition to the known physical deficiencies, the Anchorage Economic Development Corporation (AEDC), through its Live.Work.Play initiative, has identified improved outdoor lighting as a desired technique to improve public safety. Separately, the MOA is working to identify street lighting throughout the city eligible to retrofit for light emitting diode (LED) in an effort to reduce electricity and maintenance costs.

1.2 Area Zoning, ROW, and Ownership

The project area is primarily zoned for commercial use, with pockets of "public lands and institutions" zoning at parks, schools, and the Anchorage Memorial Park Cemetery. Residential zoning exists south of 10th Avenue, and south of the cemetery.

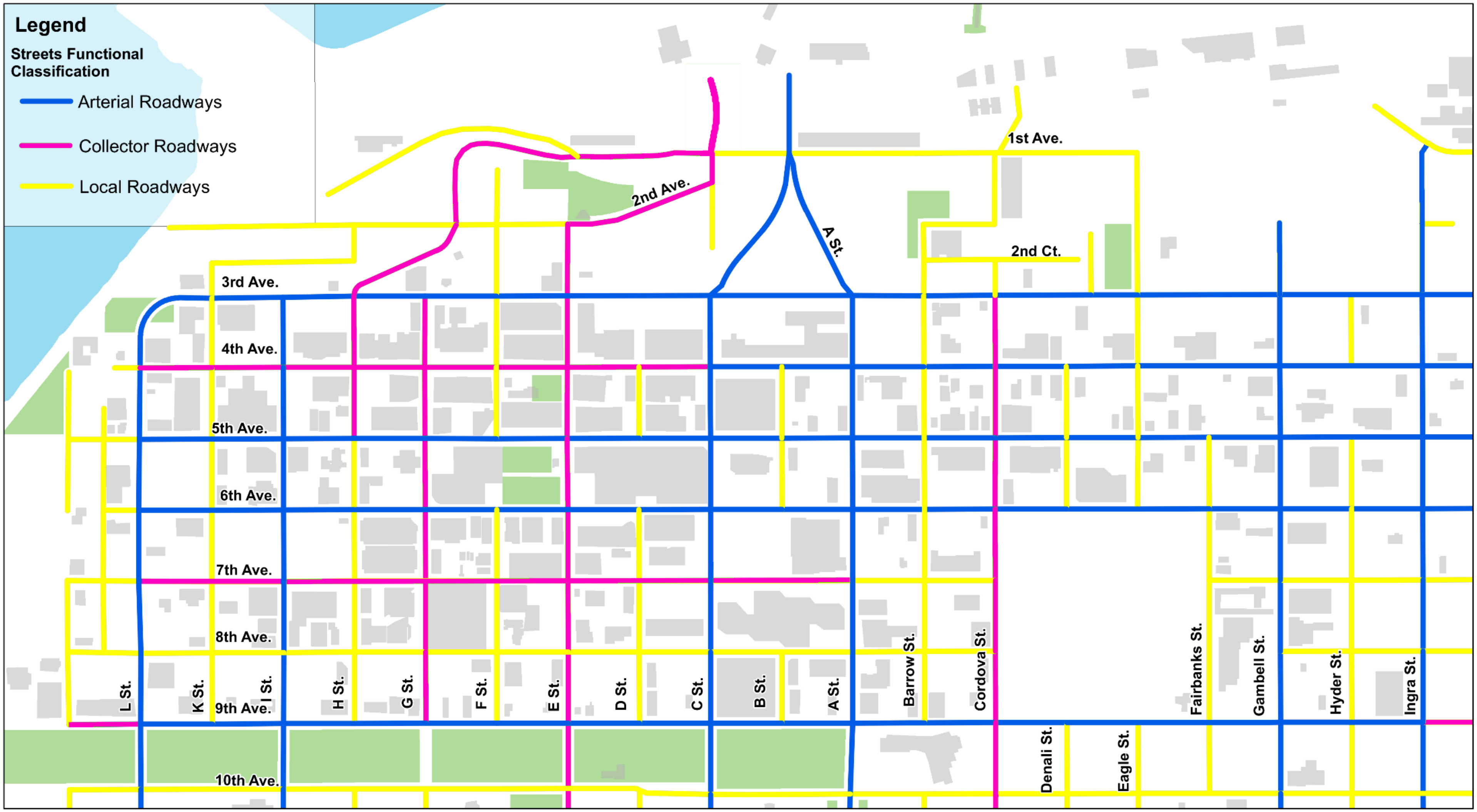
Figure 2 on page 4 shows the functional classifications of the streets in the project area as identified in the 2014 Official Streets and Highways Plan (OSHP).

Right of way (ROW) is generally 60 feet wide, although ROW along 4th and 5th Avenue varies up to 80 feet. Streets are generally about 42 feet wide, with the remaining ROW used for sidewalks.

MOA owns and maintains most of the ROW in the study area. The Alaska Department of Transportation and Public Facilities (DOT&PF) has traditionally been assumed to own and maintain 5th and 6th Avenues, A Street, C Street, and L and I Streets south of 5th Avenue. However, the actual ownership of these roads is currently not clear and still being reevaluated. The impacts of road ownership are:

- New lighting within DOT&PF ROW will require permits from DOT&PF and likely a maintenance agreement, affirming that MOA will pay for and maintain any improvements in DOT&PF's ROW.
- Further discussion about which design standards to use – that may depend on who owns the road or who maintains the improvements.

Many systems downtown are owned by one entity and maintained by another under a Transfer of Responsibilities Agreement (TORA). This report focused on identifying conditions and deficiencies, so confirming ownership and TORA coverage was not included.



0 310 620 930 Feet

SCALE

N

Figure 2 – CBD Functional Classification Map

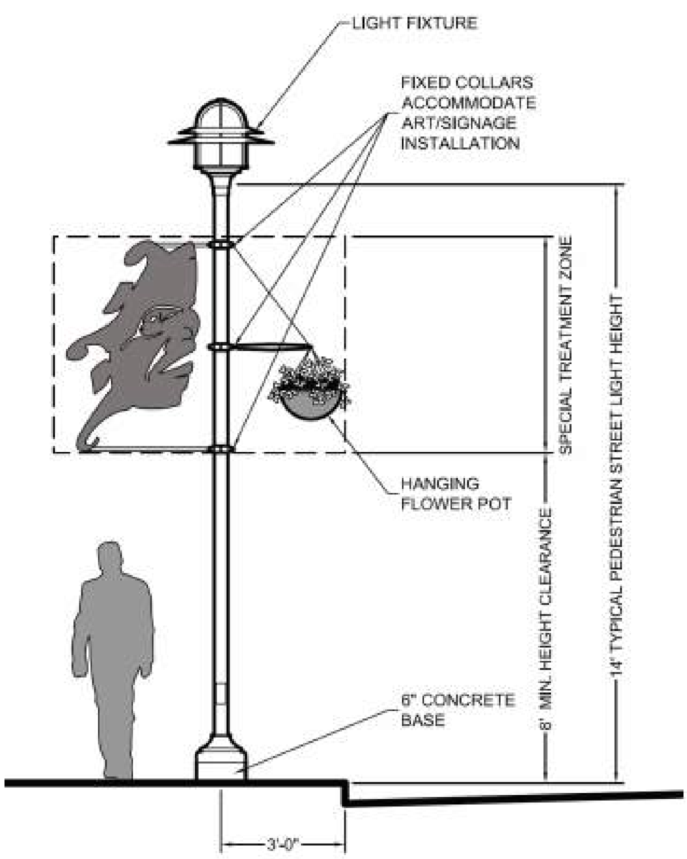
Data is from MOA Official Streets and Highways Plan

Prepared By:

1.3 Area Plans and Organizations

The *2007 Downtown Comprehensive Plan* calls for streetscape treatments for the downtown major roadway corridors. The plan also calls for a network of high quality street environments that provide continuous, safe, and universal pedestrian access. An appendix to the *Downtown Comprehensive Plan*, the *Core Streets Master Plan* (CSMP), recommended standardized light fixtures in the CBD. The "Historic District", along 4th Avenue, F Street from 5th to 3rd Avenues, E Street from 4th to 3rd Avenues, and D Street from 5th to 4th Avenues, is recommended to feature post-top "acorn" style fixtures and use Pantone 560C (dark forest green) colored street furniture. It should be noted that this fixture type no longer meets the MOA design standards for glare and uplighting.

The recommendation for the rest of the CBD includes post-top mounted pedestrian fixtures (similar to the Lumec Candela or Architectural Area Lighting Spectra fixtures) and Pantone 7545C (silver-blue) colored street furniture. The CSMP discourages the use of cobra head street



CSMP-Recommended fixture for downtown Anchorage, including pole layout, in silver-blue. Figure from CSMP

CSMP-Recommended fixture for "Historic District" in dark forest green. Image from CSMP

Figure 3 - CSMP Light Fixture Recommendations

lighting, and recommends that “high level” street lighting only be used at intersections. The CSMP further recommends elevating the foundations a few inches to minimize pole base damage from maintenance activities, installing pedestrian light fixtures 14 to 15 feet above grade, and installing the lights at least 3 feet (on-center) from the face of curb.

Furthermore, the CSMP recommends sidewalks include decorative concrete or pavement in the “buffer zone” and standard concrete in the “movement zone”. The movement zone is typically 8 to 12 feet wide, and the buffer zone, if it exists, is typically up to 4 feet wide and starts 1.5 feet from the back of curb.

The Anchorage Downtown Partnership, Ltd (ADP) manages the Downtown Improvement District, which is nearly coincident with the study area. ADP is developing branding schemes for each of the unique areas of downtown. The branding includes features such as pole-mounted banners, signs, and public art. In addition, ADP staff perform security, maintenance, and cleaning activities throughout downtown. MOA should coordinate with ADP when developing improvements in the downtown area to ensure streetscape improvements meet the needs of the downtown landowners and to take advantage of ADP staff’s on-the-ground observations and maintenance concerns.

Greater Anchorage Incorporated (GAI) is the organization responsible for the Anchorage Fur Rendezvous festival and World Championship Sled Dog Races each winter. GAI is also working on developing 4th Avenue, near D Street, as a “Mushing District”, which would include an archway over 4th Avenue to designate the start of the downtown dog mushing events, plaques and/or banners celebrating the history of dog mushing in Anchorage and Alaska, and related street furniture. While not directly affecting the facilities evaluated by this reconnaissance study, there may be benefits to both GAI and MOA by coordinating efforts on any potential improvements.

2 Existing Conditions Assessment

For existing conditions, we evaluated the current state of the signals, lighting, and load centers that feed these systems by inventorying various elements. The collected data will serve as the basis from which to develop improvement recommendations.

2.1 Data Collection Methodology

This project collected data on junction boxes, load centers, light poles, traffic signal poles, and traffic controller cabinets in the project area during the summer of 2016. The project started with the MOA's existing database, and collected data in the field using iPads loaded with ArcGIS Collector application. Data from the iPads were uploaded and synched to online databases at the office. Location, condition, and photos for each feature were collected. Additional data collected for each feature is as follows:

Electroliers

Luminaire Type

Lens Type

Number of luminaires on pole

Set back from curb

Pole Type

Bolt Circle

Luminaire Wattage

Luminaire Source

Luminaire Height

Foundation Type

Photocell

Pole Base Connection Type

Handhole Cover

Pole Material

Pole Condition

Luminaire Condition

Signal Poles

Pole Type

Bolt Circle

Mast Arm Length

Mast Arm Mounting Height

Luminaire Type

Luminaire Height

Luminaire Wattage

Luminaire Source

Foundation Type

Set back from curb

Handhole Cover

Pole Color

Luminaire Mast Arm Length

Junction Boxes

- Type
- Junction Box Material
- Lid Bonding
- Marker Ball
- Entering Conduit Size
- Entering Conduit Material
- Grounding Bushings
- Lid to Conduit Clearance
- System (Lighting or Traffic)
- Junction Box Condition
- Conduit Quantity
- Conduit Condition
- Ground Rod

Traffic Controllers

- Controller Type/Size
- Type of Foundation
- Grounding Condition
- Controller Condition
- Entering Conduit Material
- Equipment Installed in Each Controller
- Number/Size of Conduit

Load Centers

- Age (if known)
- Photocell
- System (Signal, Lighting, Both)
- Thermostat/Heater
- Master Breaker Rating
- Load Center Condition
- Conduit Condition
- Grounding Condition
- Panel Schedule
- Amps
- Voltage

Most of the data collected were objective data points. Data that could not be readily determined was not recorded. Pedestrian luminaire wattage, in particular, was not often available. In addition, foundation and anchor bolts were frequently not visible on pedestrian poles, making it impossible to rate them. Feature condition is a qualitative measure, with a "poor" rating indicating that the item should be replaced (either due to condition or due to it being unmaintainable), "fair" indicating that the item is in a serviceable condition, but is showing signs of aging and wear, and "good" indicating that the item shows few signs of wear and/or is near new condition. Some features also included an "excellent" rating, indicating that it appeared to be in near-new condition.

2.2 Lighting Systems

The lighting systems downtown consist of a mixture of decorative light poles with puck luminaires, standard galvanized steel poles with cobra head luminaires, and traffic signal pole mounted luminaires to light the roadway. In addition, pedestrian scale lighting has been installed in much of the CBD from 3rd Avenue to 7th Avenue, and from C Street to G Street. Common pole and fixture configurations are shown on Figure 4 and Figure 5.

2.2.1 Pedestrian and Roadway Lighting

Field teams collected data and made assessments on each component of the roadway lighting systems. The condition of these features are summarized below.

2.2.2 Poles

Roadway light poles were observed to have various levels of damage ranging from rust on painted poles, to dents and gashes in the metal from vehicle impacts. The project area contained ratings for pedestrian and roadway light poles as shown in Table 1.

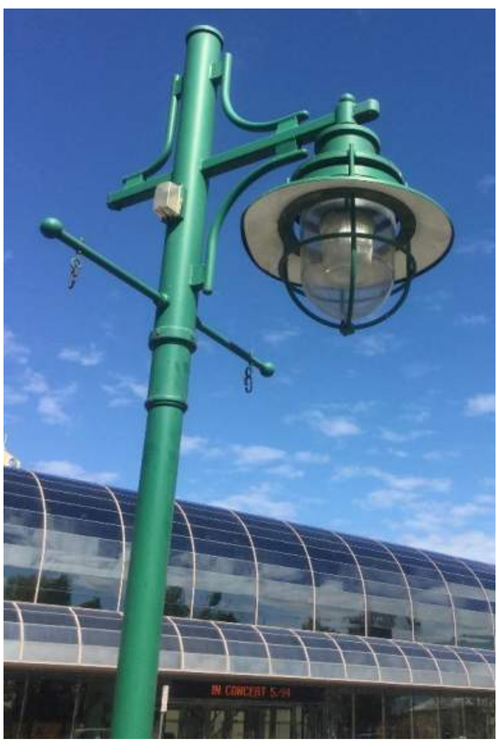
Table 1 – Light Pole Condition

Excellent	Good	Fair	Poor
117	642	178	72

Excellent poles exhibited new or like new characteristics such as no rust and very little dirt accumulation, and glossy finish with no apparent surface oxidation. Good light poles had a flat or oxidized finish appearance and may also have small signs of rust. Fair light poles had dents or dings but showed few signs of being structurally compromised. Poor condition poles had large gashes, dents that caused the poles to no longer be plumb, or heavy damage to the pole or pole base.

9th Avenue Near E Street

4th Avenue Near K Street



5th Avenue Near F Street

F Street Near 7th Avenue

Figure 4 - Existing Pedestrian Light Fixtures

5th Avenue Puck Lights

L Street Double Cobra Head

L Street Cobra Head (with overhead power feed)

Figure 5 - Existing Street Light Fixtures

The poles in poor condition exhibited different wear depending on the type and age of the pole. The green poles with puck style heads had rust on the bottom 5 feet of the pole where abrasion or chemicals had worn off the paint. Poles mounted on pier block foundations showed signs of spalling, likely due to freeze-thaw conditions and deicing agents. Many of the pier-style foundations exhibit severe spalling. As a result, many of the anchor bolts are exposed (i.e., no longer embedded in the concrete), raising questions about their structural stability. The project team views pier style light pole foundations as a high priority for replacement. Galvanized steel poles with bases below or integrated into the sidewalk also showed signs of rust, wear from over-tightening (as evidenced through stripped bolt threads), and fatigue on the anchors. Anchor nuts were also observed to be loose on one or more anchor bolts, though not regularly. The anchor bolts along 4th Avenue showed the most signs of rust and wear, indicating higher need for replacement.

In addition to the condition ratings, we collected data on missing handhole covers. Throughout the CBD, 112 handhole covers were missing (as shown in Figure 6).

Figure 9 maps the light poles by condition and ownership. Ownership data was polled from the MOA GIS and not confirmed for this project. In addition, not all Municipal Light and Power (ML&P)-owned poles were inventoried for this project. MOA and DOT&PF have entered into TORAs that may shift responsibility for maintaining or paying for different lights. ML&P lights are generally paid for by MOA under a “flat rate” system, which is approximately $2,250 per light per year.

Figure 6 - Spalled Concrete Pier Foundation and Missing Handhole Cover

Figure 7 - Green Puck Light Pole with Rust

Figure 8 - Pedestrian Pole with Failing Foundation

2.2.3 Bases and Foundations

Base types and affixing methods varied. Along 9th Avenue were slip bases, along 10th Avenue were direct embedded poles, and along most other corridors fixed bases were observed. Pier style pre-cast light pole foundations were noted to be heavily degraded along 3rd and 4th Avenues. Pedestrian light pole anchor bolts and nuts were not visible along 4th, 5th, and 6th Avenues. Since most of the foundations are obscured from view (either entirely or partially), they were not subjectively rated. However, there have been reports of pedestrian light poles along 4th Avenue falling over due to failed anchor bolts. The failure mode was corrosion, which is consistent with the observed state of the underground conduit and junction boxes.

2.2.4 Luminaires

Luminaires had varying levels of deterioration mainly due to age. Table 2 summarizes the condition of these luminaires.

Table 2 – Luminaire Condition

Excellent	Good	Fair	Poor
152	631	171	55

Luminaires in excellent condition exhibited new or like-new qualities such as being LED or showing clean, clear lens and lamp. Good condition luminaires had no defects or damage and showed few signs of age. Fair condition luminaires showed signs of age. Poor condition luminaires were broken, damaged, or showed yellowing in the lens color, due to prolonged exposed to ultra-violet light, either from sun exposure or the use of metal-halide or mercury-vapor lamps.

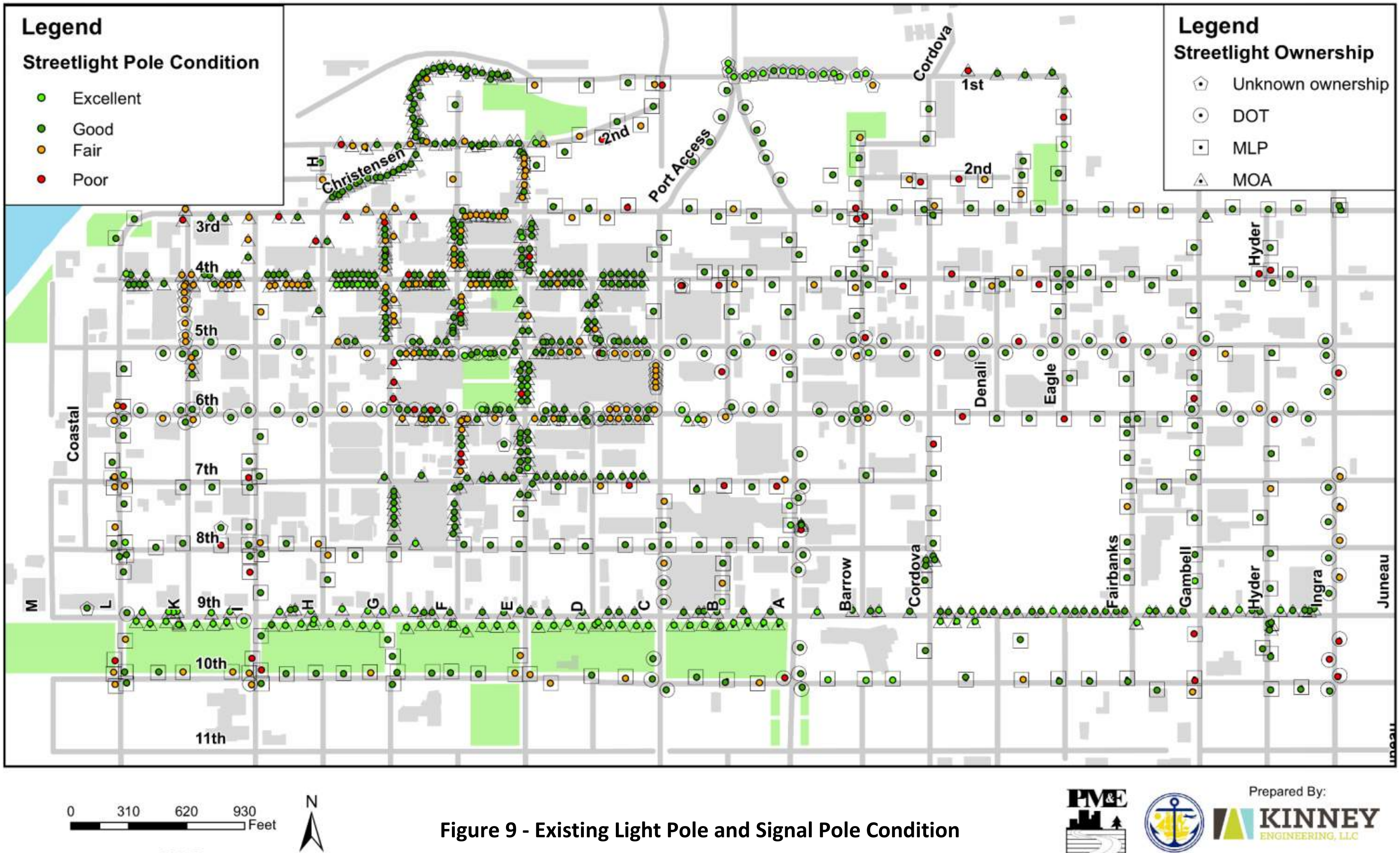


Figure 9 - Existing Light Pole and Signal Pole Condition

Visual inspection only – does not reflect foundation or non-visible defects
Ownership data is from MOA GIS – Downloaded August 9, 2018

2.3 Junction Boxes and Conduit

This section presents the existing condition of junction boxes and conduit ends for both lighting and signal systems. Of the 1,186 junction boxes in the CBD, 814 were opened and visually inspected.

2.3.1 Junction boxes

Junction boxes were inspected for the signs of damage and deterioration; such as cracked/broken ductile iron lids, failing lid supports, and cracked/crumbling cementitious junction box material. Table 3 shows the rated condition of junction boxes inspected. Figure 10 shows the junction box locations and associated rated condition.

Table 3 – Junction Box Condition

Excellent	Good	Fair	Poor	Not Rated
43	765	205	139	34

2.3.2 Conduit

Conduit inside of junction boxes was evaluated for deterioration, grounding, and bonding. The conduit condition was rated separately from the grounding system. Conduit condition was rated as either Excellent, Good, Fair, or Poor, based on the degree of corrosion observed and remaining zinc coating material on the conduit. Aluminum conduit was not encountered, but PVC and HDPE were encountered for junction boxes that share conductors for site lighting such as at the veteran's memorial and the Eisenhower memorial.

Most of the observed conduit was in fair to good condition. The notable exception was conduit in areas where flower pots are hung on light poles. Conduit in those areas is generally in poor condition and highly corroded.

Table 4 – Conduit Condition

Excellent	Good	Fair	Poor	Not Rated
35	240	242	297	372

The bonding and grounding components were evaluated for condition as well. Excellent ratings were assigned to junction boxes when the conduit contained a bare or insulated equipment ground conductor (minimum #8 AWG) with connection to a grounding bushing. Conduit grounding in good condition may have had signs of deterioration on the materials, but proper grounding methods were followed. Conduit grounding and bonding that are rated as being in fair condition used proper methods, but the metals or bushings had degraded over time. When the equipment ground conductor and bonding was found to be broken, not present, or installed improperly (e.g. grounding conductor smaller than the minimum size), the conduit bonding and grounding was rated as poor.

Table 5 – Grounding Condition

Excellent	Good	Fair	Poor	Not Rated
17	131	160	467	411

Thirty-two-percent of junction boxes were observed to have less than 6 inches between the top of conduit and bottom of junction box lid. This is less than the minimum required by Municipality of Anchorage Standard Specifications (MASS). MOA Signal maintenance has found that inadequate clearance can lead to cable insulation damage and increased likelihood of shorts between cables and the junction box lids. Approximately 15-percent of junction boxes were observed to have unbonded lids <u>and</u> inadequate clearance to the conduit, meaning a short between the conductors and lid is more likely to result in a shock hazard.

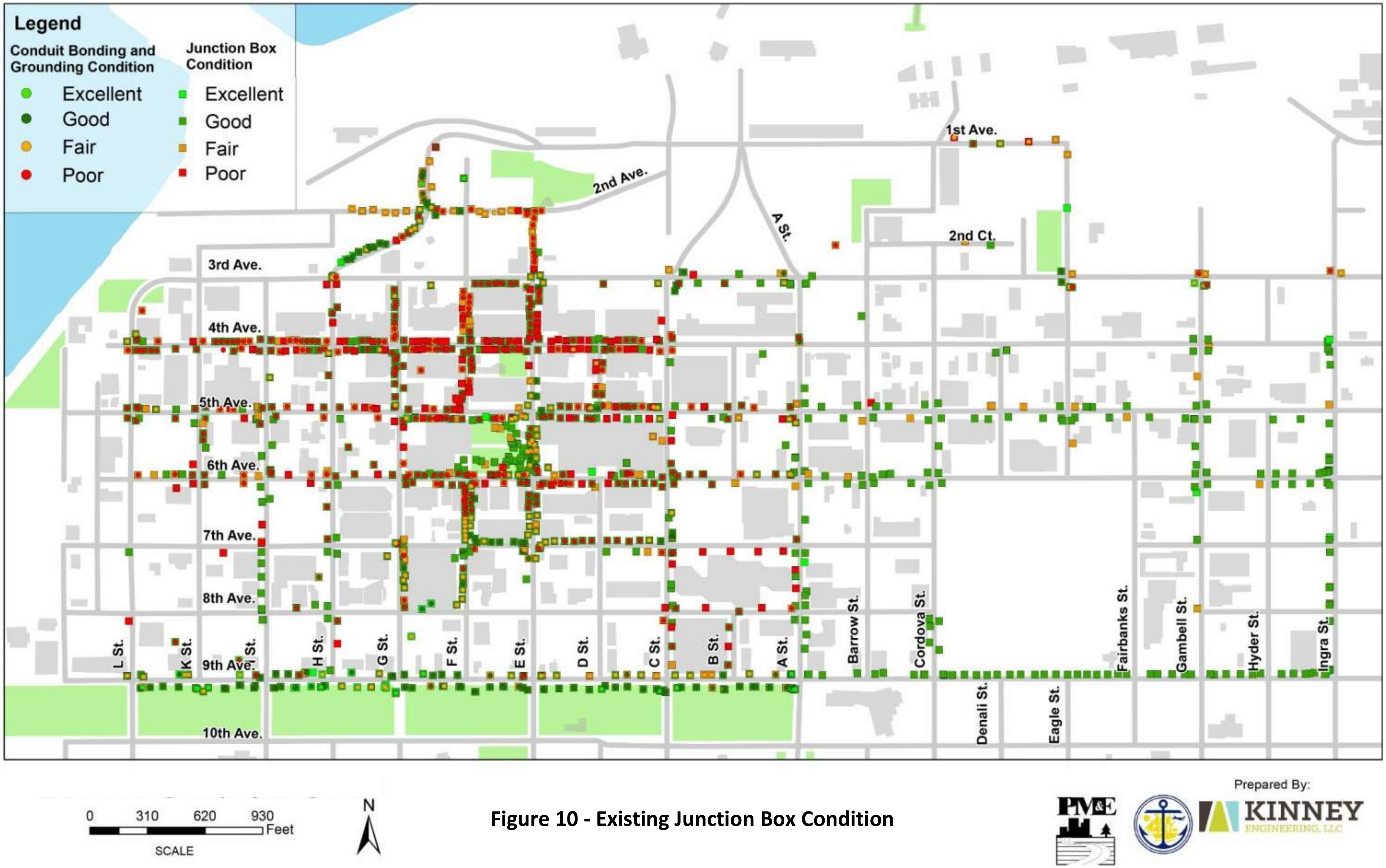


Figure 10 - Existing Junction Box Condition

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2.4 Traffic Signal Systems

The traffic signal systems study included attending site visits with MOA Signal Maintenance; reviewing as-builts; and visually inspecting signal poles, heads, pole bases, controller bases, controller grounding, and signal controller cabinets and back panels. Most signals in the downtown Anchorage CBD are two-phase, although some signals on 3rd and 9th Avenues operate with more phases to accommodate left turn or one-way/ two-way conversions

2.4.1 Traffic Signal Poles

Traffic signal poles were found to be in generally good condition as shown in Figure 11. Several intersections with 1980s era signal poles and damage from vehicles collisions do not likely meet current load standards, but are well maintained. Table 6 contains the condition ratings of the signal poles.

Table 6 – Traffic Signal Pole Condition

Good	Fair	Poor
160	43	41

2.4.2 Traffic Signal Pole Foundations

Traffic signal pole foundations were generally concrete and in fair to good condition. Bolt circle diameters varied from 14-inch to 24-inch.

2.4.3 Traffic Signal Controller Cabinets

Traffic signal controller cabinets and their attached back panels were among the oldest street appurtenances encountered. Traffic controller cabinets along 3rd and 4th Avenues have older fuse style back panels. Traffic signal maintenance no longer stocks this style of back panel and parts are difficult to find. Cabinets with gold back panels and bus-style fused circuits often had evidence of small fires and old, unused wiring.

One traffic controller, at the intersection of 4th Avenue and C Street, appears to be on an unmetered power service fed directly from ML&P. Table 7 contains the condition ratings of the traffic signal control and back panels.

Table 7 – Traffic Signal Controller and Back Panel Condition

Good	Fair	Poor
20	6	27

2.4.4 Traffic Signal Controller Foundations

The traffic signal controller foundations with basements were recorded. The number of conduit penetrations and their respective sizes were also logged.

2.4.5 Traffic Signal Controller Conduit Grounding

Conduits were inspected for signs of wear, and grounding was inspected for the cabinet and conduits. Cabinets were all grounded. Code requires an equipment grounding conductor, which was present on newer cabinets. Older cabinets only used grounding bushings on the entering conduits. Some grounding rails were too small to accept the equipment ground conductor, so a pigtail was used to connect the grounding conductor to the rail. Cabinets showing varying levels of wear but still in serviceable condition were rated as good or fair. New cabinets with intact grounding systems were rated as excellent. Poor condition was assigned to cabinets with no visible grounding conductor entering, without conduit bushings, and/or when a grounding conductor reducer was connected to the grounding rail. Table 8 contains the condition ratings of the traffic signal controller grounding.

Table 8 – Traffic Signal Controller Grounding Condition

Excellent	Good	Fair	Poor
11	12	22	8

2.4.6 Traffic Signal Controller Internal Components

The internal components of each traffic signal cabinet were inventoried. See Appendix B for a schedule by intersection.

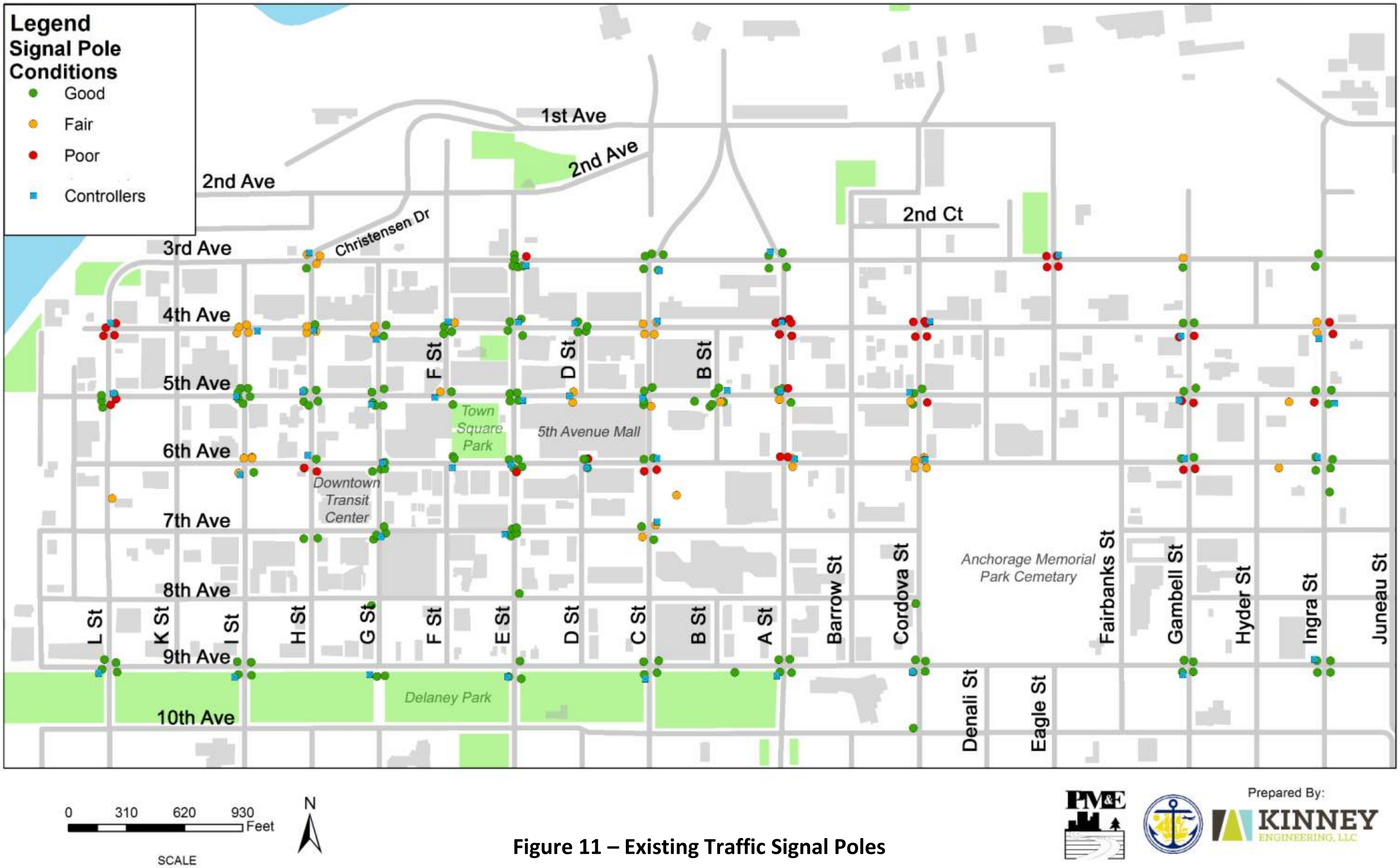

Figure 11 – Existing Traffic Signal Poles

2.5 Power Source Systems

Power source systems include load centers supplying the lighting and traffic signal systems, load center foundations, and the conduit and grounding in the foundations.

2.5.1 Load Centers

The load center conditions were rated by panel. Each panel in multi-panel load centers received a rating, but only the lowest rated panel was included in the summary below. 1980s load centers were not listed service equipment and were rated poor. Skyline load centers were also rated poor since they cannot be repaired. Eight load centers were not rated because they could not be opened. Table 9 summarizes the condition of the load center.

Table 9 – Load Center Panel Condition

Excellent	Good	Fair	Poor	Not Rated
13	15	3	11	8

Several of the poor condition load centers were recommended for replacement during the 2001 inventory.

Only one of the observed load centers had an arc flash warning label as required by the National Electrical Code (NEC). NEC and NFPA 70E compliant labels will need to be installed in load centers as they are modified or replaced.

2.5.2 Grounding

The field team inspected the load centers for appropriate grounding. The most common ground deficiency was a lack of secondary ground rod. Only one of the observable load center foundations had two ground rods installed; however, they were spaced too close together. MASS requires installation of two ground rods for each load center. Note that NEC allows for one ground rod, provided the resistance to earth is 25 ohms or less. Resistance testing was not completed as part of this investigation.

Four locations had no observable ground bus, main bonding jumper, and/or grounding system and should be considered high priorities for replacement. These load centers are located at 6th Avenue/Gambell Street, 4th Avenue/D Street (midblock location), F Street south of 2nd Avenue, and 4th Avenue/Ingra Street. These locations were all rated as poor condition.

2.5.3 Internal Components

Data collection included the internal components of each load center. Recorded data included Main Breakers (trip rating in Amps), Thermostat and Heater, Multipole position switch, Panel schedule, age, and the voltage and amperage of the panel boards.

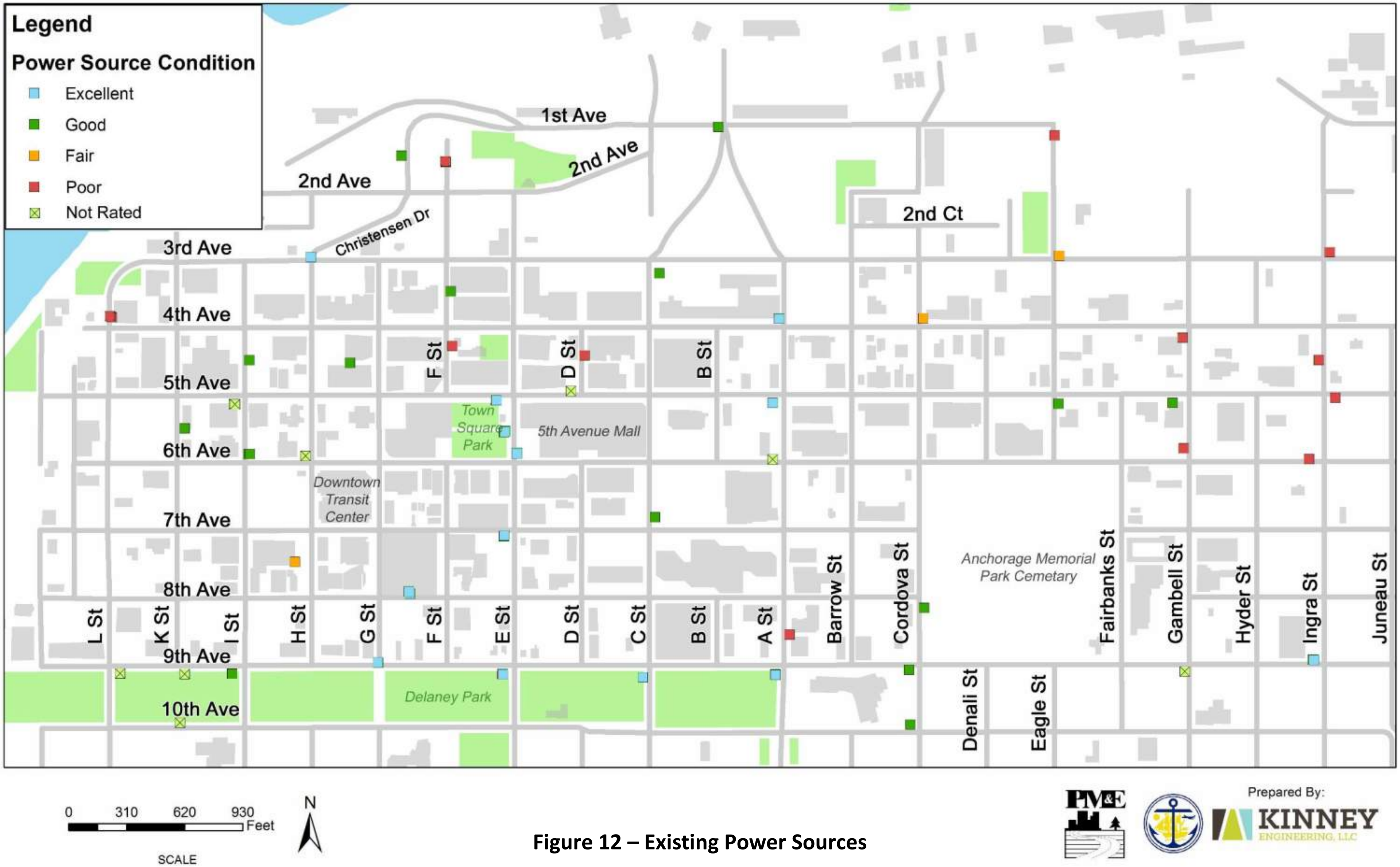

Figure 12 – Existing Power Sources

3 Design Standards Assessment

The design standards assessment consisted of three main components: design standards compliance with the Alaska Traffic Manual (ATM) and Design Criteria Manual (DCM), electrical code compliance with the National Electrical Code (NEC or NFPA 70) published by the National Fire Protection Association (NFPA), and lighting compliance with the DCM.

3.1 Electrical Code Requirements

This section discusses the NEC requirements as applied to load centers, traffic controllers, junction boxes, and conduits in these structures.

3.1.1 Grounding and Bonding

NEC article 250.4(A) requires non-current carrying conductive materials that enclose conductors or equipment to be bonded to ground. As such, both the metal cover (lid) and any exposed conductive surfaces need to be grounded. For load centers and Type II and III junction boxes, this includes the cover's metal frame imbedded in the concrete (Type IA junction boxes do not have metal frames). None of the evaluated load centers or junction boxes have the frame grounded, though most do have the cover grounded (the condition of the cover ground is highly variable). Most of the Type I and IA junction boxes lack a cover ground, and it is assumed that it was either never installed or lost to corrosion.

A brief internet search found specific reference to a cover frame grounding requirement in construction standards for Illinois Department of Transportation, Washington State Department of Transportation, and Seattle City Light.

3.1.2 Load Centers

NEC article 250 requires services to be grounded with a main bonding jumper and have a ground rod resistance to earth of 25 ohms or less if only one ground rod is installed. Several of the large cabinet style load centers lack a main bonding jumper, and only a few load centers have more than one ground rod. Those that do have two ground rods do not meet the 6-foot ground rod spacing requirement. Testing would need to be completed to see if the 25-ohm requirement is being met. MASS Division 80 requirements exceed NEC requirements by requiring 8-feet between ground rods, and require larger, longer rods.

3.2 ATM and DCM Traffic Signal Requirements

This section discusses the ATM and DCM requirements as applied to signalized intersections.

3.2.1 Quantity of Signal faces

The quantity of signal faces was checked for each approach to each traffic signal against the ATM and DCM. Most signals were found to comply with both manuals' traffic signal head quantity with a few exceptions:

- Northbound Ingra at 5th Avenue

    - Minimum corrective action: install additional overhead northbound through signal. Center all signals above lanes.
- Southbound G Street at 9th Avenue
    - Minimum corrective action: install additional side-mount signal on far right for southbound movement.

3.2.2 Clearances

Traffic signal mast arm clearances were checked for compliance with the ATM and DCM, which require signals be at least 18 feet above the road. The in-situ signal elevations were determined using the mast arm mounting heights and the signal indication offsets from pole centerlines. Signals calculated to be within one foot of the minimum 18-foot clearance were field checked with a laser range finder for compliance. All signals were found to comply with the standards.

3.2.3 Signal Visibility

The required visibility for traffic signals depends on the 85th percentile speed of traffic on the given intersection approach. In the CBD, the highest that should be is 35 miles per hour, which requires a signal visibility of 390 feet. Most roads in the project area are posted for 30 miles per hour or less, requiring visibility at 325 feet. Traffic signal heads were all found to meet sight distance guidelines in the project area for sight obstructions.

3.2.4 Controller equipment

The ATM requires that a schematic, maintenance log, and current signal timing be stored in the traffic signal cabinet or in non-volatile memory on the controller. Schematics and maintenance logs were present at all controller locations. Our field personnel did not check signal timings.

Current MOA practices involve using NEMA TS2-2 controller cabinets with Econolite ASC/3 traffic controllers. Among other things, the modern cabinets have a self-contained shelf-mount power supply module and feature two-way communications between most of the cabinet microprocessor systems. The older model cabinets have built-in power supplies, which have a much higher risk of catching fire than the new, modular designs.

Most of the cabinets in the project area are NEMA TS1 cabinets. All of these older cabinets have been retrofitted with the Econolite ASC/3 controllers, but still lack most of the benefits of the TS2-2 cabinet specifications. The cabinets at 9th Avenue/Gambell Street and 9th Avenue/Ingra Street are modern NEMA TS2 cabinets.

3.2.5 Telemetry interconnect

All of the signal cabinets are connected to MOA’s traffic signal interconnect system. Most of the cabinets featured punch-down style terminal blocks when the field inventory was conducted. MOA Signal Maintenance reports that they have all subsequently been upgraded to screw type terminal blocks. At locations where three or more interconnect cables meet there is a separate interconnect cabinet mounted to the controller cabinet to make room for the connections.

Current MOA practice is to use a TCP/IP-based interconnect system to each controller cabinet. This allows for higher-bandwidth communication than the old system and the ability to easily communicate with multiple devices in the cabinet. The TCP/IP interconnect typically uses fiber-optic cable or 25-pair copper cable between traffic signals. At the time of the field inventory, only the 9th Avenue corridor had the TCP/IP interconnect at each controller, using the Actellis VDVSL modems and 25-pair copper cable. Since that time, MOA Signal Maintenance reports that all of the other project area cabinets have been retrofit with TCP/IP modems.

3.3 Lighting Requirements

Current lighting design requirements in Anchorage are defined in Chapter 5 of the MOA DCM, adopted in January 2007. The criteria vary depending on road classification and pedestrian volumes, with different criteria for roadways and sidewalks/pedestrian areas. Road classifications are based on the OSHP, while pedestrian volumes have been assumed based on the CSMP. All facilities in the CSMP study area, which is bounded by 7th Avenue, 3rd Avenue, G Street, and C Street, are assumed to have a high pedestrian conflict, and medium conflict is used outside of this area.

Table 10 – DCM Recommended Lighting Values for Roadways

Road Classification	Pedestrian Level	Average Illuminance (foot-candles, min)	Uniformity (average/min, maximum)	Veiling Luminance (vmax/min, maximum)
Arterial	High	1.7	3.0	0.3
	Medium	1.2	3.0	0.3
Collector	High	1.2	4.0	0.4
	Medium	0.9	4.0	0.4
Local	High	0.9	6.0	0.4
	Medium	0.7	6.0	0.4

Illuminance values have been used for the purposes of this report, rather than luminance, due to the relatively low speeds allowed in the CBD.

Table 11 - DCM Recommended Lighting Values for Pedestrian Facilities Adjacent to Roads

Pedestrian Level	Average Horizontal Illuminance (foot-candles, min)	Uniformity (average/min, maximum)	Vertical Illuminance (foot-candles, min)
High	2.0	4.0	1.0
Medium	0.5	4.0	0.2

Vertical Illuminance is measured 5 feet above the ground surface in both directions parallel to the main pedestrian flow.

3.3.1 Existing Light Levels

A number of factors affect lighting levels, and they can be broadly separated into two categories: lighting configuration and area characteristics. Lighting configuration includes pole locations, pole heights, spacing, fixture types, wattages, and mast arm lengths. Area characteristics include the number and width of lanes, width of sidewalks, and overall ROW width. In an effort to cost-effectively evaluate the lighting systems in the project area, we identified four lighting cases that are similar to a number of blocks throughout the CBD. These four locations and their existing characteristics are summarized in the Table 12 and Table 13 on page 28.

We evaluated the lighting output for each case using AGi32 lighting analysis software. Luminaire assumptions included a standard light loss factor of 0.72 for HPS, and generally type III medium cutoff distributions. Light levels were analyzed on the roadway as well as the sidewalks. Parking lanes, if present, were excluded from the calculations. The results are summarized in Table 14. The full analysis documentation from the AGi32 program is also included in Appendix A – Lighting Analysis.

In general, the calculated roadway lighting levels exceed the average illuminance levels required for the cases analyzed. Veiling luminance is met in all cases. Uniformity is not met on case 4 for arterial or collector streets but is met for the other cases on all road classifications.

For the sidewalk lighting levels, the values listed are for the poorer lit of the two walkways for each street. All cases provide enough light to meet medium pedestrian level horizontal illuminance standards, and all cases except case 2 meet high pedestrian volume standards for horizontal illuminance. However, uniformity standards are only met for cases 2 and 3 for both medium and high pedestrian volumes. Vertical illuminance is only met for medium pedestrian volumes for case 1. All other cases fail to meet vertical illuminance standards.

Generally, a higher mounting height may decrease the illuminance values while improving uniformities.

Figure 13 through Figure 16 are photos exhibiting the roadway, pedestrian facilities, and lighting physical layouts shown in Table 12 and Table 13.

Table 12 - Representative Existing Lighting Systems

Case	Location	System	Pole Height	Arm	Luminaire
1	4th Avenue, D to E Street	Street: Puck Pedestrian: Acorn	Street: 30 foot Pedestrian: 10 foot	Street: 2 foot Pedestrian: 1 foot	Street: 400W HPS Pedestrian: 100W HPS
2	8th Avenue, E to F Street	Street: Utility Pole Cobra Head	30 foot	12 foot	250W HPS
3	L Street, 7th to 8th Avenue	Street: Staggered with Double Cobra Head	38 foot	6 foot	400W HPS
4	Ingra Street, 8th to 9th Avenue	Street: Staggered with Single Cobra Head	30 foot	6 foot	400W HPS

Table 13 - Representative Existing Roadway Configurations

Case	Location	Travel Lanes & Widths	Parking Lanes & Widths	Sidewalks & Width
1	4th Avenue, D to E Street	2 Lanes - 12 ft.	2 Lanes - 10 ft.	Both Sides - 18 ft.
2	8th Avenue, E to F Street	2 Lanes - 12 ft.	2 Lanes - 8 ft.	Both Sides - 6 ft.
3	L Street, 7th to 8th Avenue	3 Lanes - 12 ft.	1 Lane - 8.5 ft.	Both Sides - 6 ft.
4	Ingra Street, 8th to 9th Avenue	4 Lanes - 10.5 ft.	None	Both Sides - 5 ft.

Table 14 - Calculated Lighting Levels for Analysis Cases

Case	Location	Street Lighting Results			Sidewalk Lighting Results		
		Average Illuminance (fc)	Uniformity Ratio (avg/min)	Veiling Luminance Ratio	Average Illuminance (fc)	Uniformity Ratio (avg/min)	Min. Vertical Illuminance (fc)
1	4th Avenue, D to E Street	3.3	3.0	0.2	2.5	12.7	0.3
2	8th Avenue, E to F Street	1.9	2.7	0.1	0.6	2.8	0.0
3	L Street, 7th to 8th Avenue	4.6	1.8	0.3	3.7	1.7	0.1
4	Ingra Street, 8th to 9th Avenue	2.7	5.4	0.1	1.9	4.8	0.0

Figure 13 - 4th Avenue Street View

Figure 14 - 8th Avenue Street View

Figure 15 - L Street View

Figure 16 - Ingra Street View

Based on the analysis cases, the illuminance levels generally meet standards throughout the project area. Uniformity is variable. Sidewalk lighting standards are not consistently met, and vertical illuminance is not met anywhere. Our recommendation for any roadway or pedestrian lighting upgrades is to take a phased approach, possibly street by street. There likely exists a capacity for cost savings through retrofits with LED fixtures, especially given the areas of exceedingly high average illuminance and existing mounting heights and spacings that would naturally accommodate LED distributions. In most areas, the roadway lighting is, or could be, adequate to light the sidewalks as well. Pedestrian scale lighting for the sidewalks is usually preference based, but should be considered in the areas of poor uniformity in the roadway lighting and in the downtown “core area”. Any upgrades to the existing street lighting infrastructure or changes in roadway geometry should always be accompanied by a new lighting analysis that considers the latest fixture technologies, MOA luminaire standardization, and design criteria.

3.3.1.1 Lighting Levels Map

Figure 17 represents the assumed overall downtown lighting conditions based on our analysis of the four representative locations.

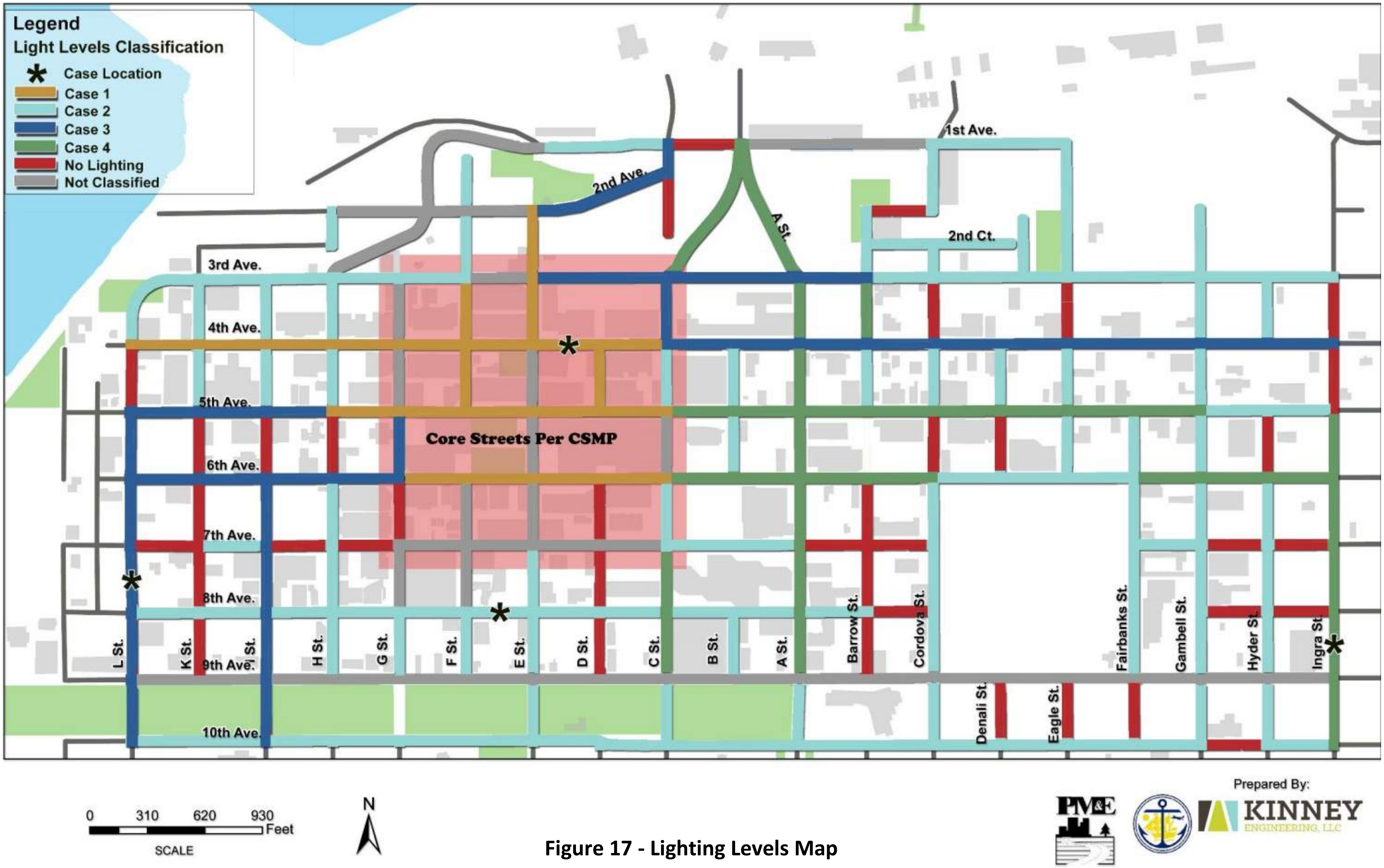

Figure 17 - Lighting Levels Map

4 Recommended Actions

Based on our observations and discussions with affected agencies, the MOA should consider making improvements to the downtown lighting and signal systems. Improvements are necessary to reduce the risk of injury to the public and municipal maintenance workers, to enhance the reliability of the infrastructure, and to meet current standards.

Specific infrastructure improvement recommendations are discussed in section 4.3. However, before equipment is replaced, MOA should evaluate the policies and design standards used for signal and lighting equipment in the downtown area.

4.1 Agency Coordination

During development of this report, several topics were raised affecting the area lighting and traffic signal systems that require coordination between several area agencies.

- Right of Way Ownership. DOT&PF has long been assumed to own the rights of way for major downtown corridors, including 5th Avenue, 6th Avenue, L Street, I Street, C Street, A Street, Gambell Street, and Ingra Street. That may be an incorrect assumption. Ownership of these corridors needs to be determined since that affects design standards (such as what type of light pole base to use), maintenance responsibilities, and capital funding options. In addition, DOT&PF has permit requirements for work in their ROW, both for MOA projects and for any utility relocations that may need to take place.

- Construction Coordination. Many agencies construct improvements in downtown Anchorage, including AWWU, ML&P, DOT&PF, and private entities. Coordinating improvements to be constructed at the same time as other projects may save money, will reduce the disruption to the public, and will reduce the likelihood of new improvements being demolished shortly after installation. In addition, DOT&PF may not permit new excavation in their ROW for several years after a road has been newly paved.

  MOA could benefit by obtaining planned project schedules regularly, and well in advance of planned construction, to identify potential to coordinate construction activities. Even if funding is not available to construct all of the signal and lighting improvements in an area, providing some of the underground infrastructure while an area is under construction could be beneficial.

- Maintenance Costs and Practices. MOA, DOT&PF, ML&P and ADP are each involved with maintaining the downtown infrastructure. However, ADP is not involved with capital improvements, and often one entity will construct improvements while another maintains them. There may be benefits to coordinating maintenance activities to ensure that the practices employed do not reduce the longevity of the infrastructure (e.g., possibly use non-corrosive ice melt). Additionally, MOA and DOT&PF should explore

TORA updates to ease the administrative and cost burden of administering them. One suggestion would be to eliminate the need for separate electric meters and load centers for different electrical systems.

4.2 Develop Downtown Design Standards

MOA may be able to improve system longevity, reduce maintenance costs, and better comply with changing industry standards and codes by updating their design criteria in the project area. The resulting Design Framework would be specific to the downtown area – they may not be appropriate in other parts of Anchorage. Some of the suggestions listed below may improve longevity or functionality but not be cost effective due to costs or increased maintenance burdens. Any design changes will need to be validated by MOA's various functional groups and maintenance departments. Some of the topics may warrant public input as well.

4.2.1 Lighting

4.2.1.1 LED Fixtures for New Street and Pedestrian Lights

Most of the light fixtures evaluated feature HPS lamps. MOA and ML&P)are currently working on transitioning outdoor lighting to LED light fixtures. MOA's 2013 bid tabs reveal that, at that time, LED lights tend to cost 50-percent more than HPS or metal halide fixtures. However, 2013 is the most recent year that HPS fixtures were purchased for an MOA capital project. The cost premium is offset by several benefits provided by LED fixtures:

- LEDs can usually meet standards while using 50-percent less electricity
- LEDs are rated to last 50,000 to 100,000 hours, or 2 to 4 times as long as HPS lamps.
- LED fixtures can be fitted with remote monitoring and dimming controls

Based on the 2017 ML&P electric rates of 16.5 cents per kilowatt hour, reducing power usage for a 250-watt HPS luminaire (290 watts with ballast loss) by half over a 50,000 hour fixture life would save nearly $1,200 in power costs. In addition, since the LED fixtures do not require relamping as often, costs for maintaining the lighting system will be up to 90-percent less, based on anecdotal evidence from MOA Street Light Maintenance.

LED fixtures also offer the benefit of customizable color temperatures and visible colors. A currently un-adopted update to the DCM Chapter 5 on lighting specifies color temperature (CCT) for LED fixtures to be in the range of 3500-4300 Kelvin correlated color temperature (K). This is consistent with industry standards moving to lower color temperature street lighting. The downtown design standards should take advantage of ongoing research to implement a lighting standard that maximizes efficiency and user safety while minimizing negative indirect effects on people or wildlife.

4.2.1.2 Remote Monitoring and Control Systems for Street Lighting

Remote monitoring and control systems for lighting involve installing a module on each light fixture that communicates wirelessly with a gateway radio that enables two-way communication between the light fixture and a central server. Benefits of this system include automated maintenance logs, alerts when fixtures fail, and the ability to lower light levels (and power usage) during low traffic volume times, or raise them during special events or times.

MOA's lighting criteria are dependent on pedestrian volumes. If the fixtures are dimmable, the lighting system can be designed for the highest anticipated pedestrian volumes and set to dim during lower-volume time periods. Dimming the lights by one third for 5 hours per night could reduce power costs by $200 over the life of a 50,000-hour fixture at current power rates. Dimming has the added benefit of extending the life of LEDs. However, this would require updates to the DCM.

Lighting specified for downtown should be at least compatible with control technology. Since the control systems are proprietary, MOA and DOT&PF will need to agree to a system and concept of operations before any system could be implemented.

4.2.2 Signal Pole Replacements

The bridge-style traffic signal poles downtown have reached the end of their serviceable life. Current signal pole standards have 24-inch base plates, which is larger than most of those used downtown. The current foundation standard is a 42-inch diameter cast-in-drilled-hole (CIDH) concrete cylinder up to 12 feet deep. MASS specifically prohibits pile foundations for signal poles.

The larger foundation footprints mean the base plate protrudes at least 3 feet from the ROW (assuming the foundation is installed up against the ROW), which pose challenges to Americans with Disabilities Act (ADA) compliance on narrow (6-feet or less) sidewalks. As an alternative to the standard specification traffic signal poles and base plates, it may be possible to use poles supported on both sides of the intersection, similar to the existing bridge-style signal poles. Since these structures would not have a high moment reaction at the foundation, the foundation and baseplates could be smaller than standard, possibly reducing intrusion into the sidewalk by 6 to 12 inches. Detailed structural calculations would be required to determine the exact sizing. In addition, these types of poles are more difficult to maintain than standard cantilevered poles. MOA Signal Maintenance staff would need to be consulted on any areawide pole design standards.

4.2.2.1 Bridge Pole Replacement – Single Chord and Pole Structure

This style of pole would most closely replace the existing traffic signal bridge poles in place in Downtown Anchorage and reduce the footprint of the pole baseplate and foundation by distributing the load over two corners of the intersection rather than one corner. The connection from the horizontal chord to the vertical pole would either need to be seated on a flange, bolted to a gusseted box flange plate, or a pinned connection like the existing connections.

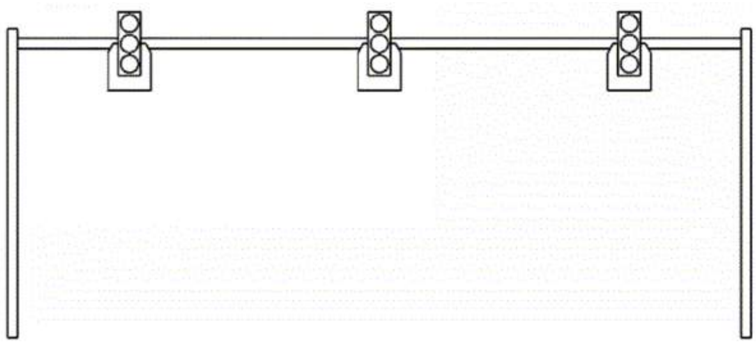

Figure 18 - Single Chord and Pole Traffic Signal

4.2.2.2 Bridge Pole Replacement – Monotube Pole Structure

This style of pole would provide a smaller footprint like the chord and pole structure in Figure 18, but does not provide a natural mounting point for combination with a light pole. This pole configuration would provide a different aesthetic than the existing bridge poles in Downtown Anchorage. The pole configuration provides a simpler connection method as vertical poles bend into a single chord.

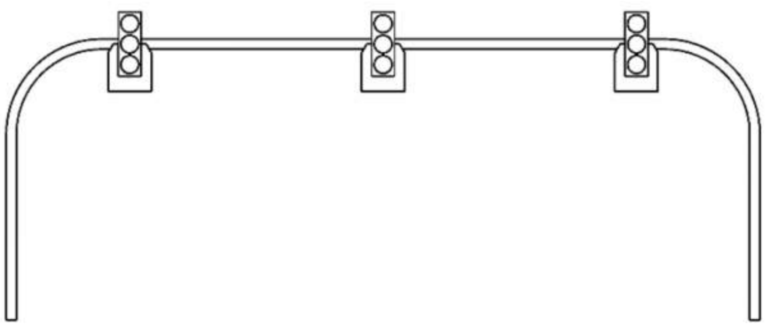

Figure 19 – Monotube Pole Traffic Signal

4.2.3 Other Design Standard Considerations

4.2.3.1 MASS Updates to Meet Code

Updates to MASS are necessary to ensure future installations meet current electrical code.

- Metal junction box lid frames need to be furnished with a grounding lug, so the frames can be bonded to the grounding system as required by NEC article 250.4(A). This applies to signal and load center foundations, and Type II and III junction boxes.
- Some load centers need to be provided with arc flash labeling compliant with NFPA 70E. The evaluation to determine the need for the label could be done by the electrical engineer of record or the electrical contractor and will only result in labels in isolated circumstances. The NFPA 70E label is in addition to the arc flash labeling already required by NEC.

- The second ground rods for load centers, as required by MASS Article 80.4.3 and Detail 80-4, should be added to detail 80-3. In addition, MASS needs to state that these ground rods must be bonded together.

4.2.3.2 Conduit

The existing conduit systems are comprised of rigid metal conduit (RMC), which is MOA's standard. Unfortunately, the RMC conduit has not held up well downtown, with many locations exhibiting accelerated corrosion. However, RMC does offer good protection from physical damage and can act as a secondary electrical ground when properly bonded.

MOA should explore options to reduce or avoid conduit corrosion downtown. This could include reducing the likelihood of corrosive conditions (e.g., preventing water and ice melt from entering junction boxes, or requiring use of less corrosive ice melt), or using non-corrosive conduit materials like high-density polyethylene (HDPE) conduit. These and other options should be explored further to determine if the challenges associated with the changes would be worth the increased longevity of the conduit system.

4.2.3.3 Interconnect

As corridors are updated, the signal interconnect system will be replaced as well. MOA should consider whether to use fiber optic or copper interconnect cables. Traditionally, interconnect systems have used 25-pair copper cable. However, some areas of Anchorage have been fitted with fiber-optic interconnect. The main benefit of using fiber optic cable is increased data bandwidth. The additional bandwidth will help "future-proof" MOA's system and enable the use of technology such as traffic cameras. In addition, other jurisdictions are using their fiber optic networks to provide data service to other municipal entities (e.g., as a back-haul route for smart lighting systems, or telecom for real-time transit signs). The disadvantages to using fiber include the higher skill levels required to build and maintain the network, and that it is more expensive to install. MOA Signal Maintenance has expressed interest in a connection between downtown and the central traffic control system, but stated that installing fiber throughout the entire area is probably not worth the added installation and maintenance expense.

4.3 Rehabilitation Project Priorities

Infrastructure replacement recommendations were developed using the following priorities:

- address code violations that present potential life-safety risks,
- replace poor condition infrastructure,
- upgrade systems to current design criteria

In general, these recommendations were grouped into potential projects based on proximity and corridor continuity.

4.3.1 Priority Action Items

There are a number of deficiencies MOA should address as soon as practicable. Many of these are relatively simple improvements that will reduce the potential for the public to come into contact with conductive equipment. These should be done separately from the corridor projects. These improvements are as follows:

- Replace missing handhole covers. This work should be addressed more quickly than the rehabilitation projects so as to limit public exposure to the wiring systems.
- Systematically install junction box lid bonding jumpers. This effort should be focused on junction boxes where there is substandard clearance between the lid and the conduit. These locations have the highest risk of the junction box lids becoming energized. Improvements would generally include a new ground rod, grounding jumper, and conduit bushings where required.
- Replace the load centers that have substandard grounding systems. These are located at 6th Avenue/Gambell Street and 2nd Avenue/F Street. There are two along 4th Avenue that also need to be replaced at D Street and Ingra Street, but since 4th Avenue is a high-priority improvement corridor, those load centers can be replaced with the corridor projects.
- Add a load center for the traffic signal and lighting at 4th Avenue at C Street.

MOA Street Light Maintenance is contractually required to use ML&P forces to address maintenance work in the project area. This may affect the availability of staff to complete the work. Another approach might be to use capital funds and hire an outside contractor.

The locations of the identified deficiencies are displayed on Figure 20. Many of them fall along the 4th Avenue corridor, which is identified below as the highest priority corridor for improvements. As a result, the individual items in that corridor can be improved under the corridor project.

4.3.2 Corridor Improvements

To prioritize corridors, all elements (light poles, traffic signal poles, junction boxes, load centers, and traffic controllers) that received a rating of either fair or poor were aggregated by block. The poles were rated based on their general appearance, lack of vehicular damage, and being plumb. Some portions of the study area, such as 4th Avenue, are known to have aging infrastructure, but this is not readily apparent since much of it is hidden beneath the sidewalk and the poles were recently treated with touch-up paint when the field inventory occurred. The condition of the underground foundation and anchor bolts in locations like this is known to be questionable, however it was not rated as it would require intensive inspection methods, which were beyond the scope for this study. The general condition of these older foundations was inferred based on the condition of the underground infrastructure (i.e., conduit and junction boxes) nearby. When underground infrastructure condition did not agree with the above ground rating (such as when the underground had a poor rating, but the above ground had a good rating) the underground rating took precedence when deciding project priority.

Blocks with the highest number of poor and fair elements were ranked as the highest priority, and remaining blocks ranked from there. Blocks were then grouped into projects based on street characteristics and highest-need breakpoints by the project team. Projects are ranked according to these highest-need projects. Each improvement corridor is discussed below individually, and shown on Figure 21. Blocks without lighting infrastructure, shown on Figure 17, will need improvements to meet lighting standards, but do not currently have electrical infrastructure that present any risk to the public. Discussion on installing lighting in these locations is included at the end of this section.

Project costs shown assume that all of the conduit and impacted sidewalk in each project area is replaced as part of the project. It is likely that conduit in some of the more recently lighted areas of downtown can be reused. However, conduit does have a finite life, and the ability to use the conduit will depend on the timing of the rehabilitation project. For that reason, we chose the more conservative approach of assuming it has to be replaced.

Environmental permits are not expected to impact any of the projects listed below. It is important to note that some of the work will take place near or adjacent to historical and culturally sensitive sites. These projects are not likely to impact the integrity of any of these important sites.

The project costs assume that utility conflicts can be avoided and relocations or adjustments will not be required. This will have to be determined on a project by project basis, since locating utilities was beyond the scope of this report.

Ultimate project size, scope, and coverage area will likely vary by funding and existing circuiting. This should be determined on a project by project basis and documented in a project specific design study report or memorandum.

If projects need to be broken up, repackaged, or opportunities arise for smaller areas to be advanced for various reasons, Table 15 breaks down approximate costs for a standard block with 6-foot wide sidewalks.

Table 15 – Single Block Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
One block without pedestrian lighting					
$61,000	$11,000	$253,000	$84,000	$61,000	$470,000
One block with pedestrian lighting					
$81,000	$11,000	$337,000	$111,000	$81,000	$621,000
Stand-alone Traffic Signal					
$86,000	$0	$497,000	$150,000	$110,000	$843,000

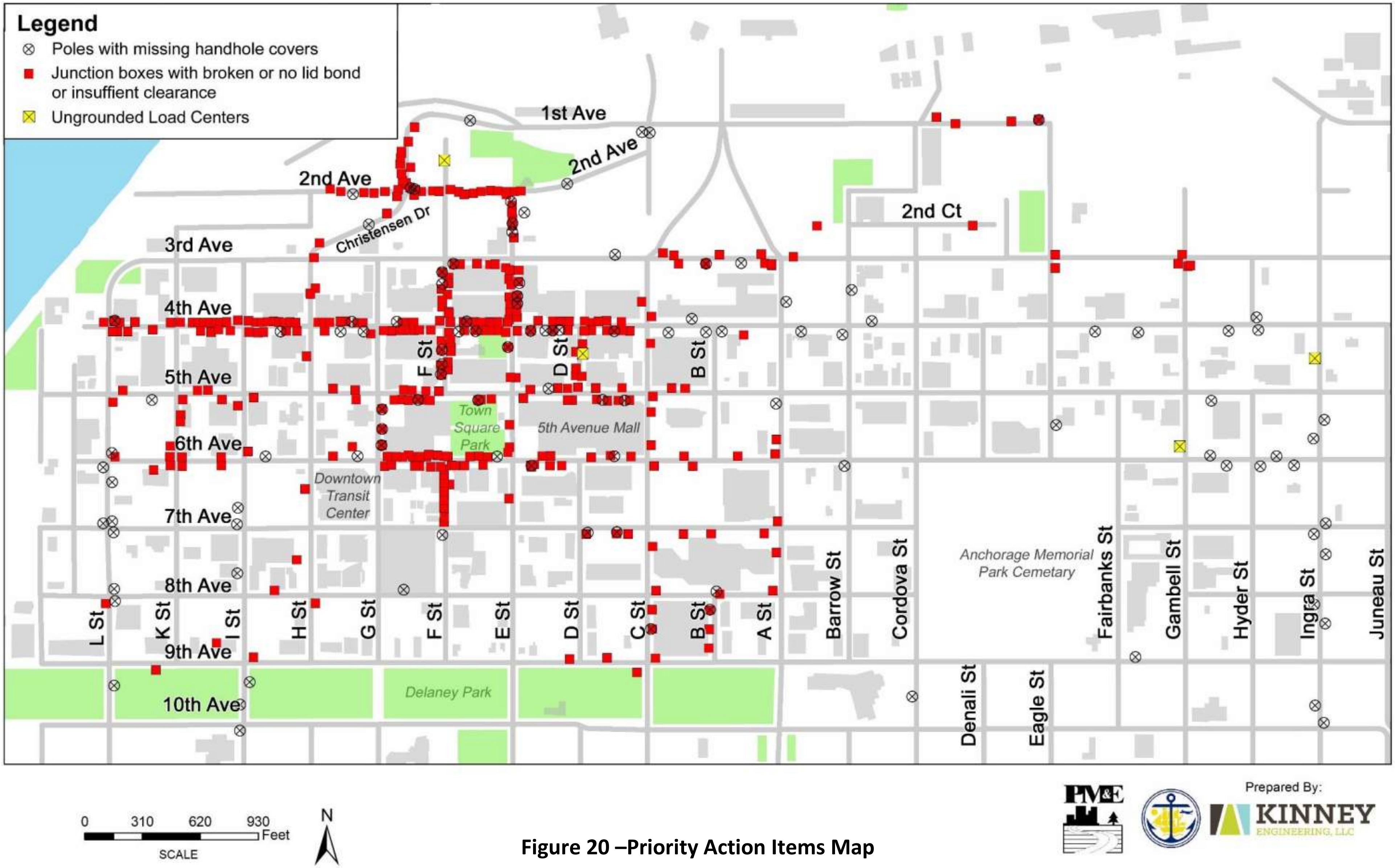

Figure 20 –Priority Action Items Map

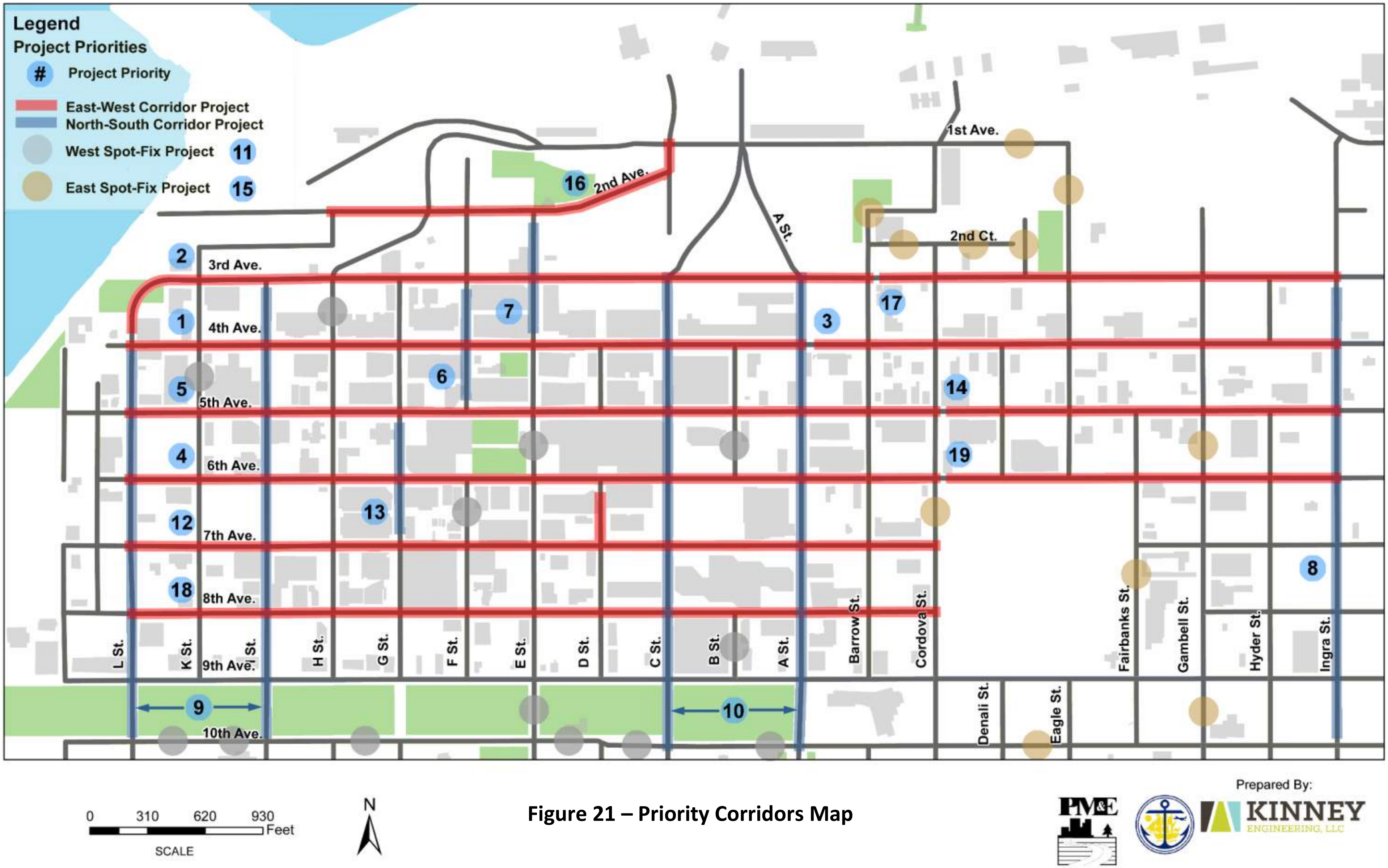

Figure 21 – Priority Corridors Map

4.3.3 4th Avenue, L Street to A Street / Priority 1

This project replaces all junction boxes, roadway and pedestrian light poles, trenching and conduit, traffic signal systems, sidewalks, curb and gutter, curb ramps, repaving trenches, and crosswalk striping. The underground infrastructure and traffic signals in particular are near the end of their maintainable life and the damaged poles and junction boxes represent a potential life-safety risk. This project addresses the highest number of poorly rated elements as well as improves maintainability. It will also address two of the high-priority load centers identified at the beginning of this section.

4.3.3.1 Utility Conflicts

There are no conflicts with overhead electrical utilities.

4.3.3.2 ROW Requirements

Additional ROW is required at the northwestern quadrant of the 4th Avenue and A Street intersection to install a new signal pole foundation at the back of sidewalk.

4.3.3.3 Project Estimated Cost

Table 16 - 4th Avenue, L Street to A Street Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$2,611,000	$11,000	$11,253,000	$3,584,000	$2,619,000	$20,078,000

4.3.4 3rd Avenue, L Street to Barrow Street / Priority 2

This project replaces all junction boxes, roadway and pedestrian light poles, trenching and conduit, sidewalks, curb and gutter, curb ramps, repaving trenches, crosswalk striping, and the H Street traffic signal. The purpose of this project is to replace the damaged and aging infrastructure along 3rd Avenue. Pier style light pole foundations, junction boxes, direct bury electric and overhead electric, and direct embed wooden light poles at the back of curb are prevalent. Many of the wooden light poles were transferred to MOA ownership from ML&P and do not meet standards. Though this project ranked slightly lower for number of deteriorated poles and junction boxes replaced, the life-safety risk of this corridor was high due to the deteriorated pier style light pole foundations.

4.3.4.1 Utility Conflicts

At the intersection of 3rd Avenue and Barrow Street there are overheard electric lines running along the east side intersection. The existing light pole located on the southeastern quadrant is in close proximity to the overhead lines, which may require removal of the pole.

4.3.4.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.4.3 Project Estimated Cost

Table 17 - 3rd Avenue, L Street to Barrow Street Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$1,140,000	$11,000	$4,906,000	$1,565,000	$1,143,000	$8,765,000

4.3.5 4th Avenue, A Street to Ingra Street / Priority 3

This project replaces all junction boxes, roadway light poles, traffic signal systems, and install or replace underground conduit. Trenching in the sidewalk and roadway to install the new conduit will require reconstruction of curb and gutter, sidewalk, curb ramps, and repaving of roadway crossings. The purpose of this project is to replace aging infrastructure along 4th Avenue that uses above ground conductors to power the light poles. The traffic signal systems are also out of date and showing wear. Bridge style signal mast arms are present and the traffic controller foundations are in poor condition. This project addresses poor and fairly rated lighting and traffic signal systems along 4th Avenue and will bring these systems up to current standards. Though this project ranked slightly lower for number of deteriorated poles and junction boxes replaced, the life-safety risk of this corridor was high due to the deteriorated pier style light pole foundations.

4.3.5.1 Utility Conflicts

At the intersection of 4th Avenue and Gambell Street there are overhead electric lines running along the west side of the intersection. The existing signal pole luminaire in the southwestern quadrant and light pole in the northwestern quadrant do not appear to have proper clearance from the overhead lines. The new signal pole may not be able to accommodate a luminaire due to the lack of options for moving the pole location. Replacing the light pole with a pedestrian signal pole may be needed because the pedestrian signal heads needs to remain in line with pedestrian crossing. Adding another luminaire to the northeastern signal pole is an option to provide sufficient lighting at the intersection.

4.3.5.2 ROW Requirements

Additional ROW is needed to install a larger signal pole foundation at the back sidewalk in the southeastern and southwestern quadrants of 4th Avenue and Cordova Street. This will provide proper access according to ADA requirements. To remedy the conflicts with overhead electric lines, additional ROW may also be needed.

4.3.5.3 Project Estimated Cost

Table 18 - 4th Avenue, A Street to Ingra Street Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$985,000	$11,000	$4,381,000	$1,350,000	$1,009,000	$7,736,000

4.3.6 6th Avenue, L Street to Cordova Street / Priority 4

This project replaces all junction boxes, roadway and pedestrian light poles, trenching and conduit, traffic signal systems, sidewalks, curb and gutter, curb ramps, repaving trenches and crosswalk striping. The purpose of this project is to replace the damaged and aging infrastructure along 6th Avenue. Rusting and damaged light poles and junction boxes are prevalent. Bridge style signal poles with older traffic signal controllers are also present. This project addresses the second highest number of fair and poorly rated elements as well as improves maintainability. This may be a DOT&PF corridor.

4.3.6.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.6.2 ROW Requirements

At multiple intersections along 6th Avenue, signal and light pole foundations will be installed at the back of the sidewalk to provide adequate ADA clearances. This will require additional ROW. The conflicts are located in the northwestern quadrant of 6th Avenue and I Street and H Street intersections, and the southwestern quadrant of the 6th Avenue and A Street intersection.

4.3.6.3 Project Estimated Cost

Table 19 - 6th Avenue, L Street to Cordova Street Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$1,950,000	$11,000	$8,695,000	$2,650,000	$1,996,000	$15,302,000

4.3.7 5th Avenue, L Street to Cordova Street / Priority 5

This project replaces all junction boxes, roadway and pedestrian light poles, trenching and conduit, traffic signal systems, sidewalks, curb and gutter, curb ramps, repaving trenches and crosswalk striping. Rusting and damaged light poles and junction boxes are prevalent. Bridge style signal poles with older traffic signal controllers are also present and need to be replaced. This may be a DOT&PF corridor.

4.3.7.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.7.2 ROW Requirements

New signal pole foundations are larger than the existing ones. These larger foundations will be installed at the back of sidewalk to provide adequate ADA clearances and will likely require additional ROW. The conflicts are located in the northeastern quadrant of 5th Avenue and I Street, H Street, and A Street intersections.

4.3.7.3 Project Estimated Cost

Table 20 - 5th Avenue, L Street to Cordova Street Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$2,111,000	$11,000	$9,095,000	$2,897,000	$2,117,000	$16,231,000

4.3.8 F Street, 3rd Avenue to 5th Avenue / Priority 6

This project replaces all junction boxes, roadway and pedestrian light poles, trenching and conduit, sidewalks, curb and gutter, curb ramps (if they are midblock), repaving trenches and crosswalk striping. The purpose of this project is to replace the damaged and aging infrastructure along F Street. Rusting and damaged green light poles with puck lights, junction boxes, and Acorn style pedestrian light poles are prevalent. This project addresses fair and poorly rated lighting systems along F Street, filling in the sidewalk and junction improvement done by the east/west corridor projects.

4.3.8.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.8.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.8.3 Project Estimated Cost

Table 21 - F Street, 3rd Avenue to 5th Avenue Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$191,000	$11,000	$812,000	$262,000	$191,000	$1,467,000

4.3.9 E Street, 2nd Avenue to 4th Avenue / Priority 7

This project replaces all junction boxes, roadway and pedestrian light poles, trenching and conduit, sidewalks, and curb and gutter. Rusting and damaged green light poles with puck lights and Acorn style pedestrian light poles are prevalent. This project addresses fair and poorly rated lighting systems along E Street, filling in the sidewalk and junction improvement done by the east/west corridor projects.

4.3.9.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.9.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.9.3 Project Estimated Cost

Table 22 - E Street, 2nd Avenue to 4th Avenue Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$187,000	$11,000	$794,000	$256,000	$187,000	$1,435,000

4.3.10 Ingra Street, 3rd Avenue to 10th Avenue / Priority 8

This project replaces all of the lighting along Ingra Street and the traffic signals at 5th Avenue and 6th Avenue. The condition of the existing systems is fair, but the lighting along this high-volume corridor has poor uniformity and very low vertical illuminance. This means that people and obstructions in the road are difficult to see in the dark. This project will also replace several poor condition load centers.

4.3.10.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.10.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.10.3 Project Estimated Cost

Table 23 – Ingra Street, 3rd Avenue to 10th Avenue Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$527,000	$11,000	$2,261,000	$723,000	$528,000	$4,050,000

4.3.11 L and I Streets, 3rd Avenue to 10th Avenue / Priority 9

This project replaces all of the lighting system along L and I Streets. The traffic signals along these corridors are scheduled for replacement under earlier projects. The lighting system is primarily flat-rate ML&P electroliers. Lighting in this corridor provides inadequate vertical illumination on the sidewalk.

4.3.11.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project. However, most of the lighting in this corridor is owned by ML&P and will require coordination with them to retire their facilities.

4.3.11.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.11.3 Project Estimated Cost

Table 24 – L and I Streets, 3rd Avenue to 10th Avenue Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$537,000	$11,000	$2,304,000	$737,000	$538,000	$4,127,000

4.3.12 A Street and C Street, 3rd Avenue to 10th Avenue / Priority 10

This project replaces all junction boxes, roadway poles, and will install underground conduit. Trenching in the sidewalk and roadway to install the new conduit will require reconstruction of curb and gutter, sidewalk, curb ramps, and repaving of roadway crossings. The purpose of this project is to replace rusting and damaged light poles and junction boxes, and to underground the power system. These may be DOT&PF corridors.

4.3.12.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.12.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.12.3 Project Estimated Cost

Table 25 - A Street and C Street, 3rd Avenue to 10th Avenue Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$738,000	$11,000	$3,172,000	$1,013,000	$740,000	$5,674,000

4.3.13 West Spot Fix / Priority 11

This project replaces junction boxes, and roadway and pedestrian light poles with a poor rating or fair condition rating while leaving the existing conduit runs in place. The purpose of this project is to replace rusted, damaged, and/or out date light poles and junction boxes. This project addresses fair and poorly rated individual locations rather than a corridor throughout the Downtown Lighting and Signal Upgrade’s project area west of A Street.

4.3.13.1 Utility Conflicts

On H Street between 8th Avenue and 9th Avenue, there is a light pole in close proximity to overhead power lines. Moving the light pole to the north will provide sufficient clearance from the overhead lines.

4.3.13.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.13.3 Project Estimated Cost

Table 26 - West Spot Fix Estimated Cost

Preliminary Design	Utilities	Construction	Contract Administration	Contingencies	Total
$448,000	$11,000	$1,921,000	$615,000	$449,000	$3,444,000

4.3.14 7th Avenue, L Street to Cordova Street / Priority 12

This project replaces all junction boxes, roadway light poles, and install or replace underground conduit. Trenching in the sidewalk and roadway to install the new conduit will require reconstruction of curb and gutter, sidewalk, curb ramps, and repaving of roadway crossings. The purpose of this project is to replace rusting and damaged light poles and junction boxes and provide infill lighting along 7th Avenue. Pedestrian light poles along 7th Avenue are in good condition and will not be replaced. This project addresses fair and poorly rated lighting systems along 7th Avenue, installs lighting on 5 un-lit blocks, and replaces several blocks of ML&P flat rate lighting.

4.3.14.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.14.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.14.3 Project Estimated Cost

Table 27 - 7th Avenue, L Street to Cordova Street Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$782,000	$11,000	$3,364,000	$1,074,000	$785,000	$6,016,000

4.3.15 G Street, 5th Avenue to 7th Avenue / Priority 13

This project will add pedestrian light poles and replace all junction boxes, roadway poles, and conduit. Trenching in the sidewalk and roadway to install the new conduit will require reconstruction of curb and gutter, sidewalk, curb ramps, and repaving of roadway crossings. The purpose of the project is to replace rusting and damaged green light poles with puck lighting and their junction boxes, and to add roadway and pedestrian lighting on both sides of the roadway. Adding pedestrian light poles implements the vision of the downtown comprehensive plan.

4.3.15.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.15.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.15.3 Project Estimated Cost

Table 28 - G Street, 5th Avenue to 7th Avenue Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$176,000	$11,000	$747,000	$241,000	$176,000	$1,351,000

4.3.16 5th Avenue, Cordova Street to Ingra Street / Priority 14

This project replaces all junction boxes, roadway light poles, traffic signal systems, and conduit. Trenching in the sidewalk and roadway to install the new conduit will require reconstruction of curb and gutter, sidewalk, curb ramps, and repaving of roadway crossings. The purpose of the project is to replace rusting and damaged green light poles with Pucks and their junction boxes. The traffic signal systems are also out of date and beginning to show wear. Bridge style signal poles are present and the traffic controller foundations are in poor condition. This project addresses poor and fairly rated lighting and traffic signal systems along 5th Avenue and will bring these systems up to current standards. There are also non-standard wood light poles that will be replaced. This may be a DOT&PF corridor.

4.3.16.1 Utility Conflicts

At the intersection of 5th Avenue and Gambell Street there are overhead electric lines running along the western side of the intersection. This prevents placing luminaires on all quadrants of the intersection. Changing the location of the northwest signal pole may allow for the installation of a luminaire, but the amount it can move will be limited by the need to keep the pedestrian signal in line with pedestrian crossing. If the current signal pole layout is used, the mast arms will need to be long enough to accommodate an overhead street sign on the right hand side of southbound and westbound traffic, according to the Manual on Uniform Traffic Control Devices (MUTCD) standards.

4.3.16.2 ROW Requirements

Additional ROW may be needed at the intersection of 5th Avenue and Gambell Street to remedy the conflicts with overhead electric lines.

4.3.16.3 Project Estimated Cost

Table 29 - 5th Avenue, Cordova Street to Ingra Street Estimate Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$514,000	$11,000	$2,207,000	$706,000	$516,000	$3,954,000

4.3.17 East Spot Fix / Priority 15

This project replaces all junction boxes and roadway and pedestrian poles at the identified locations. The purpose of this project is to replace rusted, damaged, and/or out date light poles and junction boxes. This project addresses fair and poorly rated lighting systems throughout the Downtown Lighting and Signal Upgrade’s project boundary not covered in other project corridors east of A Street.

4.3.17.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.17.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.17.3 Project Estimated Cost

Table 30 - East Spot Fix Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$407,000	$11,000	$1,744,000	$558,000	$408,000	$3,128,000

4.3.18 2nd Avenue, H Street to 1st Avenue / Priority 16

This project replaces all junction boxes, roadway and pedestrian light poles, and install underground conduit. Trenching in the sidewalk and roadway to install the new conduit will require reconstruction of curb and gutter, sidewalk, curb ramps, and repaving of roadway crossings, but is only needed to replace overhead power feeds. Existing conduit will be reused, where it exists. The purpose of this project is to remove out of date pedestrian light poles and light poles using above ground conductors.

4.3.18.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.18.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.18.3 Project Estimated Cost

Table 31 - 2nd Avenue, H Street to 1st Avenue Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$363,000	$11,000	$1,553,000	$498,000	$364,000	$2,789,000

4.3.19 3rd Avenue, Barrow Street to Ingra Street / Priority 17

This project replaces utility pole-mounted lighting along 3rd Avenue and the Eagle Street traffic signal. This project addresses the need to bring the lighting and signal systems along 3rd Avenue up to current standards.

4.3.19.1 Utility Conflicts

There are overhead electric lines running along the northern side of 3rd Avenue. Lighting will need to be installed on the south side of the road, and any pedestrian lights on the north side of the road will be designed to maintain proper clearance to the overhead utilities. At the intersection of the 3rd Avenue and Gambell Street, the luminaire located on the northwestern quadrant is in conflict with overhead lines. Moving it to a different location will allow for a light pole with a standard length mast arm.

4.3.19.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.19.3 Project Estimated Cost

Table 32 - 3rd Avenue, Barrow Street to Ingra Street Estimated Cost

Preliminary Design	Utilities	Construction	Contract Administration	Contingencies	Total
$350,000	$11,000	$1,498,000	$480,000	$351,000	$2,690,000

4.3.20 8th Avenue, L Street to Cordova Street / Priority 18

This project replaces light poles, existing utility lighting and add infill lighting along 8th Avenue. The purpose of this project is to install LED luminaires that will result in a cost savings and add lighting to increase pedestrian safety. This project will upgrade 8th Avenue to current standards for lighting.

4.3.20.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.20.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.20.3 Project Estimated Cost

Table 33 - 8th Avenue, L Street to Cordova Street Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$511,000	$11,000	$2,193,000	$701,000	$512,000	$3,928,000

4.3.21 6th Avenue, Cordova Street to Ingra Street / Priority 19

This project replaces all junction boxes, roadway light poles, traffic signal systems, and install or replace underground conduit. Trenching in the sidewalk and roadway to install the new conduit will require reconstruction of curb and gutter, sidewalk, curb ramps, and repaving of roadway crossings. The purpose of the project is to replace rusting and damaged light poles and their junction boxes. The traffic signal systems are also out of date and beginning to show wear. The intersection of Gambell Street and 6th Avenue is not designed to current standards. This project addresses the small number of poor and fairly rated lighting and traffic signal systems along 6th Avenue and will bring these systems up to current standards.

4.3.21.1 Utility Conflicts

At 5th Avenue and Gambell Street, overhead electrical lines run along the west side of the intersection. The line heights will need to be measured to determine if the utilities will need to be adjusted to accommodate new signal poles.

4.3.21.2 ROW Requirements

Additional ROW will likely be necessary in the northwest and northeast quadrants of the 6th Avenue and Gambell Street intersection to accommodate new signal poles and maintain ADA access. ROW may also be required in the southwest corner of the 6th Avenue and Ingra Street intersection for the same reason.

4.3.21.3 Project Estimated Cost

Table 34 - 6th Avenue, Cordova Street to Ingra Street Estimated Cost

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$434,000	$11,000	$1,860,000	$595,000	$435,000	$3,335,000

4.3.22 Infill Lighting Upgrades / Priority 20

This project installs new junction boxes, light poles, light pole foundations, conduit, conductors, and trench along existing ROW where there is currently no mid-block lighting, which covers approximately 24 blocks throughout the project area.

Infill improvements should be considered when work is done on adjacent corridors or if new development is constructed on adjacent parcels, as that will probably be a more cost-effective time to address these deficiencies.

4.3.22.1 Utility Conflicts

There are no conflicts with overhead electrical utilities expected for this project.

4.3.22.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.22.3 Project Estimated Cost

Table 35 - Infill Lighting Upgrades Estimated Cost (24 city blocks)

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$1,464,000	$11,000	$6,072,000	$2,016,000	$1,464,000	$11,027,000

There are 24 blocks without lighting and not in one of the corridor projects. Adding lighting to every block would cost approximately $10,416,000. In addition, there are another 55 blocks that have utility lighting or are otherwise not scheduled for improvement. None of these blocks meet standards for pedestrian lighting. Improving all of the blocks with substandard, utility lighting would cost approximately $23,870,000

4.3.23 Utility Lighting Upgrades / Priority 21

This project installs new junction boxes, light poles, light pole foundations, conduit, conductors, and trench along existing ROW where there is currently sparse mid-block lighting mounted on utility poles. Lighting on these blocks does not meet current standards for sidewalk lighting. This condition covers approximately 55 blocks throughout the project area.

Utility lighting upgrades should be considered when work is done on adjacent corridors or if new development is constructed on adjacent parcels, as that will probably be a more cost-effective time to address these deficiencies.

4.3.23.1 Utility Conflicts

Improvements on these segments will require coordination with the utility to retire their facilities.

4.3.23.2 ROW Requirements

All work for this project will take place in the existing ROW.

4.3.23.3 Project Estimated Cost

Table 36 – Utility Lighting Upgrades Estimated Cost (55 city blocks)

Survey and Design	Utilities	Construction	Contract Administration	Contingencies	Total
$3,355,000	$11,000	$13,915,000	$4,620,000	$3,355,000	$25,256,000

4.4 Potential Funding Sources

Given the extent of the improvements required to bring all of the signal and lighting systems up to current standards, MOA will likely need to take advantage of a wide variety of funding sources. These may include:

- Bonds. Subject to approval by voters, bond funding has very little restrictions on its use.

- State Grants. Similar to bond funding, this is can also be virtually unrestricted, depending on the specific grant language. With the state continuing to run budget deficits, it is unlikely that much, if any, grant funding will be available for these improvements.
- AMATS Transportation Improvement Program. Funding through AMATS is competitive, based on how well a project fulfills documented transportation system needs and complies with area planning documents. AMATS is a federally funded program, requiring the project to follow the federal project development processes. This adds more complexity to the project design process compared to grant or bond funded projects.
- Highway Safety Improvement Program (HSIP). Funding through the HSIP is based on crash statistics and likely potential for improvements to cost-effectively reduce crashes. DOT&PF reports that there may be segments and intersections downtown with crash patterns that would benefit from improved lighting. MOA will need to work with the DOT&PF Traffic staff to determine segment eligibility and to develop nomination materials. Since it is a federally funded program, HSIP projects are required to follow the federal project development process. This adds more complexity to the project design process compared to grant or bond funded projects.
- Preventive Maintenance. The preventive maintenance program is a federally funded program to cost-effectively extend the useful life of highway facilities. The Alaska Highway Preconstruction Manual specifically includes “systematic replacement and/or upgrades of light and signal poles, light fixtures, signal heads, signal bulbs or LEDs near the end of their service life, and bases” as eligible for PM funding.

Federally funded programs require a more detailed project development process, including compliance with the National Environmental Policy Act. As a result, projects funded under these programs may take a year or more longer to deliver than projects without federal funding.

5 References

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