

A photograph of a city street in Milwaukee. In the foreground, there are ornate black streetlights with multiple lanterns. A black traffic light pole with a green light and a pedestrian crossing signal is on the right. A silver car is parked on the street. In the background, there are historic buildings with many windows. A sign for 'MILWAUKEE ST' is visible on the left. The text 'City of Milwaukee Department of Public Works Street Lighting Program' is overlaid in large yellow letters. The date 'February, 2015' is at the bottom right.

# City of Milwaukee Department of Public Works Street Lighting Program

February, 2015





# Existing Street Lighting Facilities

DPW Street Lighting Program

February, 2015

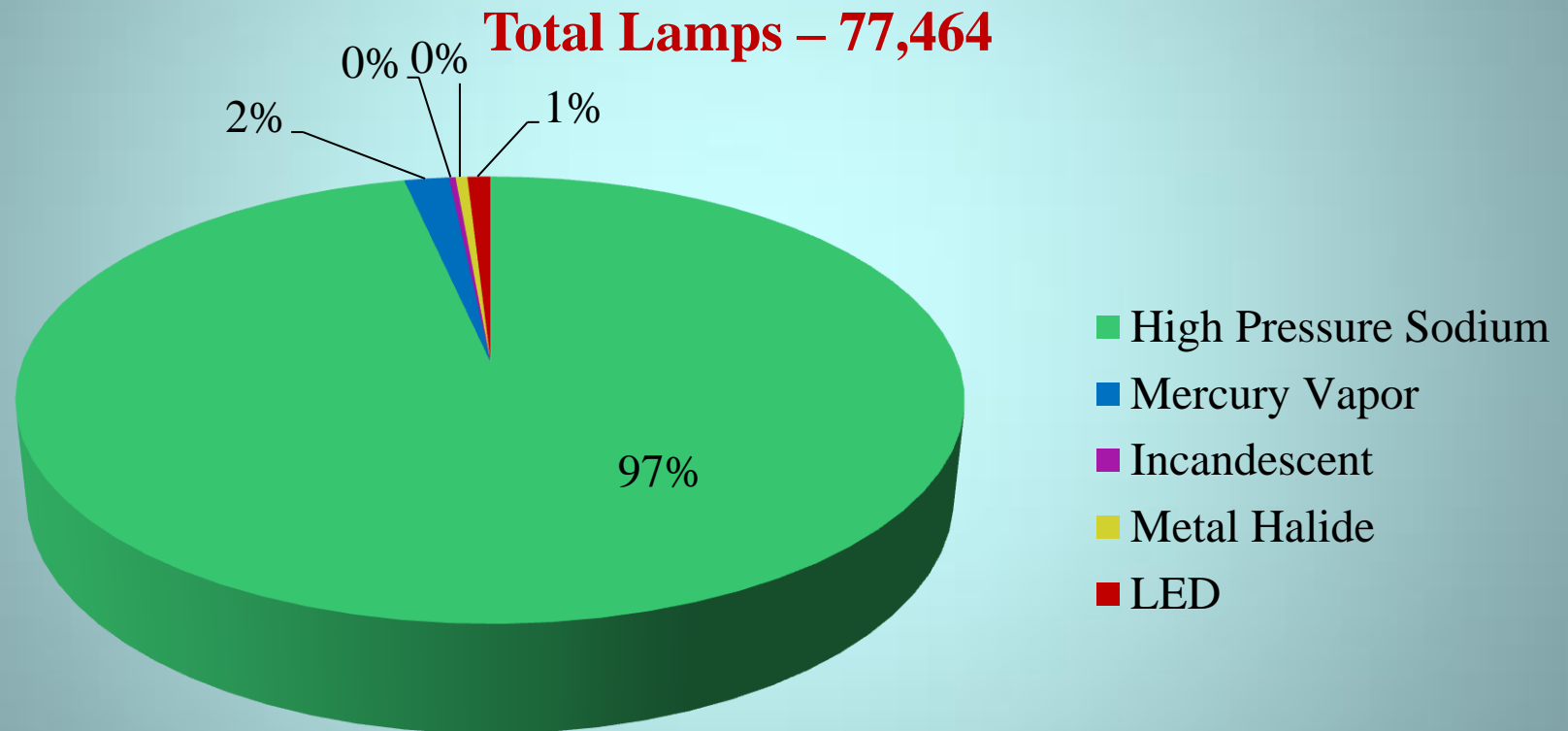
# Street Lighting Facilities

(As of January 1, 2015)

- 1,291 Miles of Lighted Streets
- 251 Substations and Enclosures
- 68,109 Street Lights
  - 26,202 “Series” Lights
  - 41,907 “Multiple” Lights
- 8,786 Alley Lights
- 569 Specialty Lights
- 77,464 Total Lights Maintained by DPW

# Street and Alley Light Lamp Types

(As of January 1, 2015)



# Capital Improvement Program Elements

- Paving Related Improvements
- Neighborhood Lighting Program
  - Street and Alley Light Upgrades
  - Series Circuit Replacement
  - Substation and Enclosure Repair and Replacement
  - Master Control System Upgrade
- Uncollectible Knockdowns

# Other Funding Sources for Street Lighting Capital Improvement Projects (2014 and 2015)

- Connecting Highway Paving Projects
- Wisconsin DOT Freeway Projects
  - Zoo Interchange
  - I-94/43 North/South Bridges Rehabilitation
  - Hoan Bridge / Lake Interchange Reconstruction
  - Stadium Freeway Bridges Rehabilitation





# Paving Related Improvements

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# Paving Related Functions

- Represents approximately 2/3 of Street Lighting Program Expenditures
- Cable and Other Underground Equipment Typically Damaged During Curb Removal on Paving Projects
- Work Performed During Paving
  - Place Cable and Other Facilities Overhead Prior To Paving to Maintain Lighting Operation During Construction
  - Protect and Adjust Facilities as Necessary for Equipment Remaining in Place
  - Restore/Upgrade Facilities During Various Stages of a Paving Project





# 2014 and 2015 Neighborhood Lighting Elements

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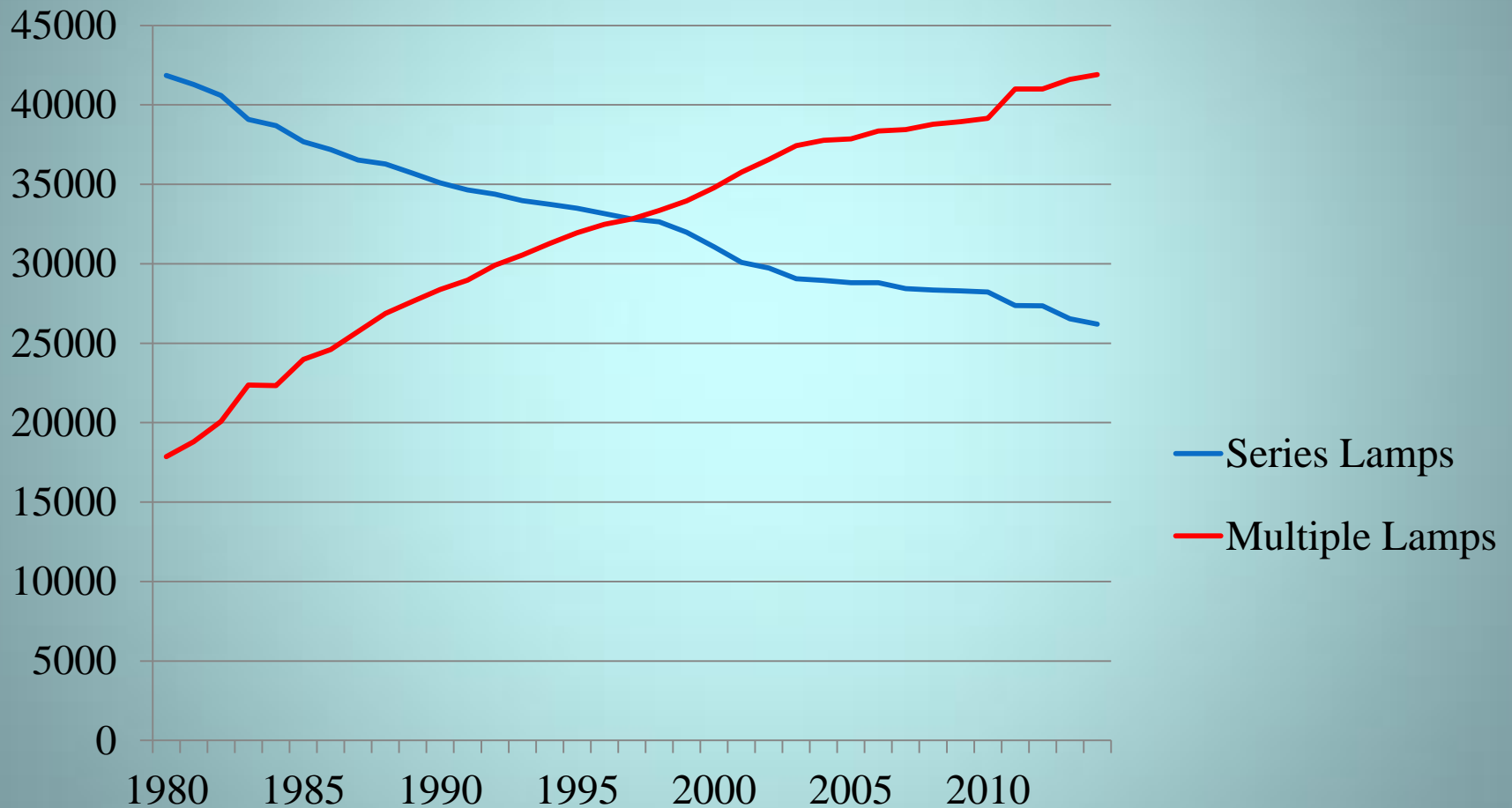
# Series Circuit Replacement

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# Comparison of Number of Lamps on Series and Multiple Circuits

1980 through 2014



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# Series Circuit Replacement

- Outdated Technology Used Initially in the late 1910's and Early 1920's
- Designed Primarily for Use with Incandescent Lighting
- High Voltage System
- Aging Cable Plant Prone to Failure
- Transition Began to More Modern Multiple Circuitry in the 1950's
- Approximately 60% of Street Lights Currently Operating on Multiple Circuitry

# Comparison of Circuit Outages 1 Year Before and 1 Year After Series Conversion

- WX Substation
  - Outages Before: 40
  - Outages After: 11
- T-31-C
  - Outages Before:
  - Outages After:
- ND Substation
  - Outages Before: 49
  - Outages After: 11

# Series Circuit Replacement: 2014

- Beginning in 2014, Circuit Pairs Chosen for Conversion Based on the Performance and Rate of Failure of Individual Circuits
- 4 Series Circuits Were Replaced from the “T-11-S” Enclosure Located at Plainfield and 51st Was In 2014
- Operates and Provides Electrical Energy to 330 Street Lights
- 239 Outages from January 1, 2009 through December 31, 2013 Prior to Circuit Replacement





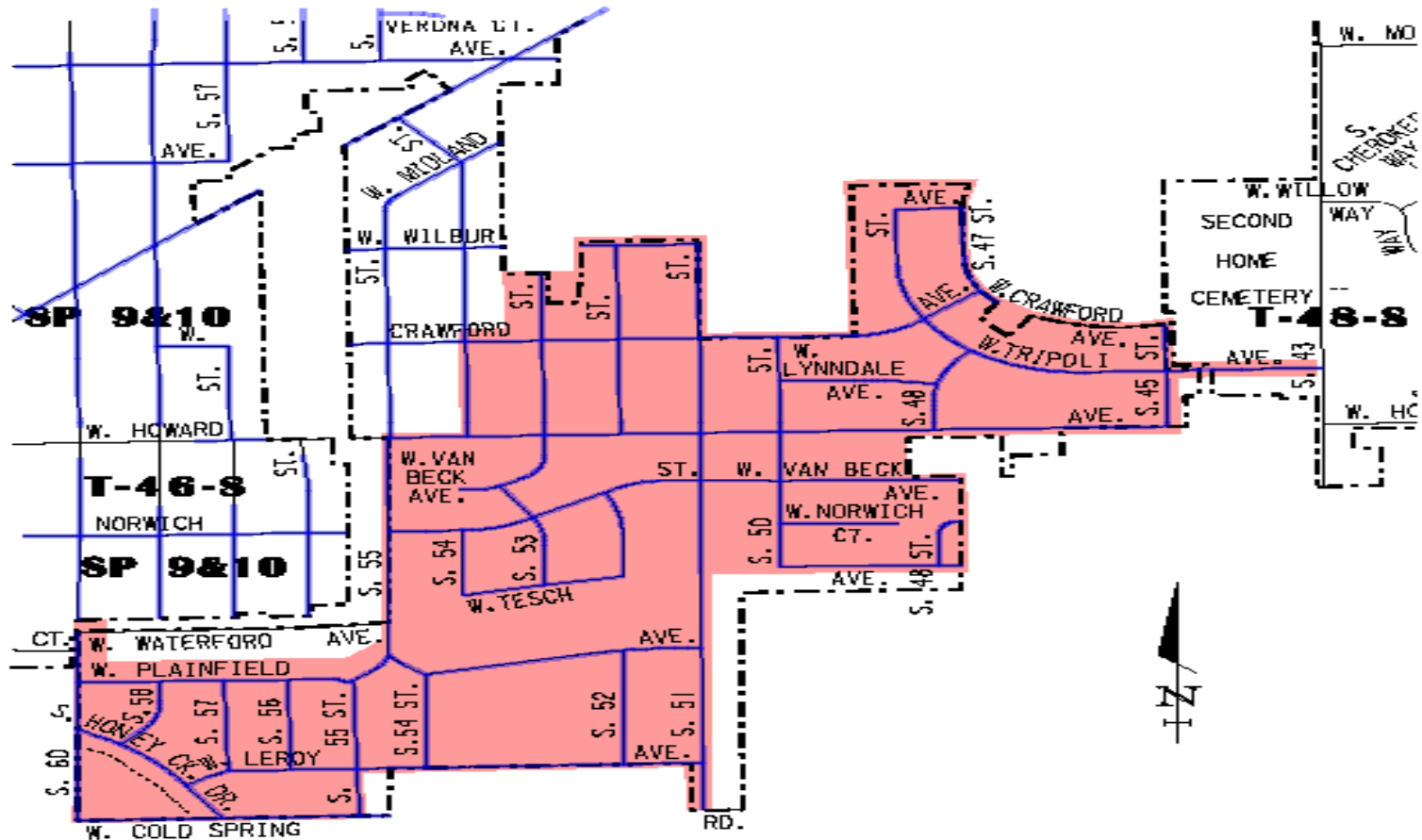
**CIRCUIT T-11-S AREA**



**SERIES CIRCUITRY**



**CITY OF MILWAUKEE LIMITS LINE**

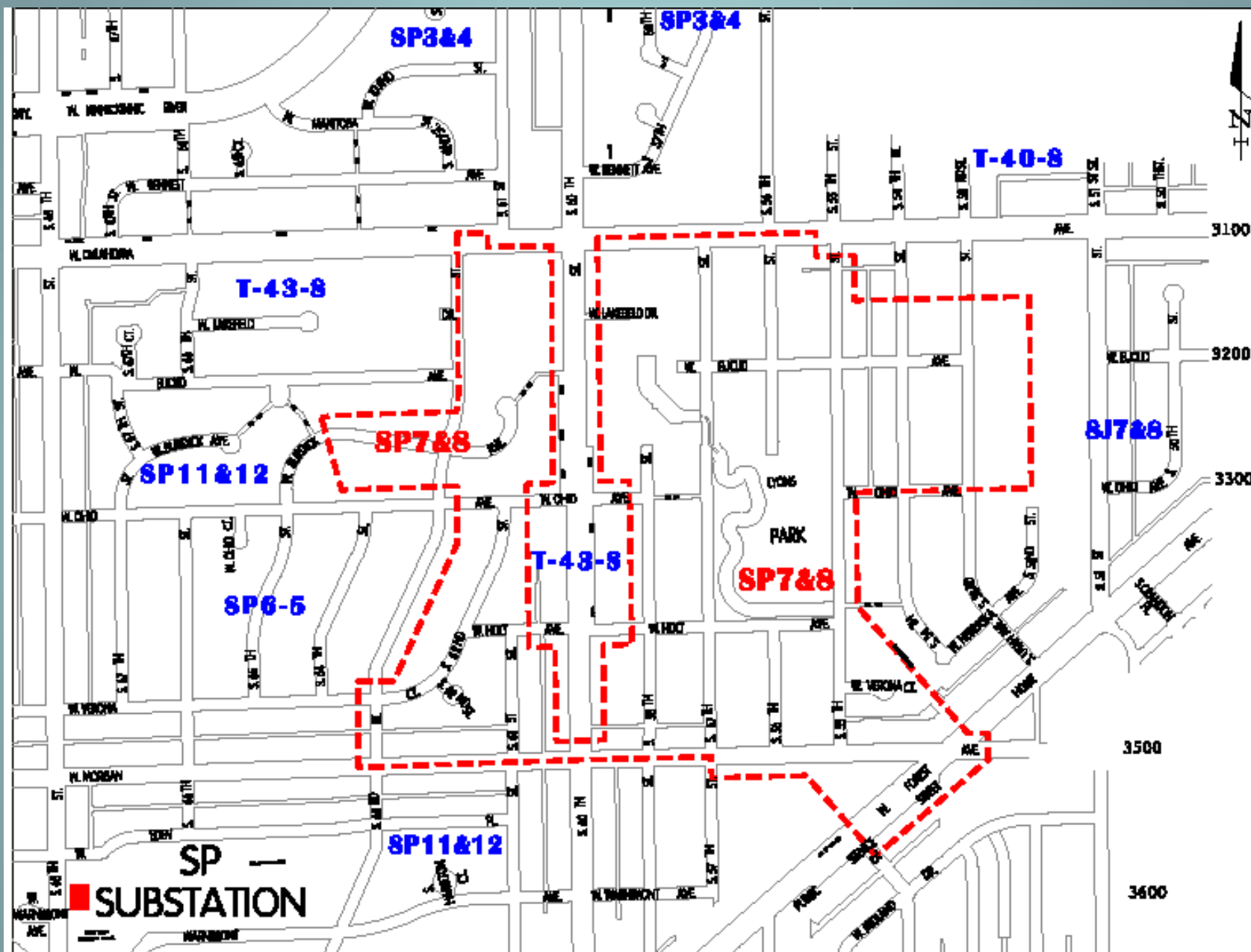


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FEBRUARY 6, 2014

# Series Circuit Replacement: 2014 /2015

- Work Followed on the Replacement of Circuits 7 and 8 from the “SP” Substation Located at Warnimont and 68<sup>th</sup> in Late 2014
- Provides Electrical Energy to 183 Street Lights
- 92 Outages, Including 47 Cable Failures, from January 1, 2012 through October 31, 2014
- Work Anticipated to be Completed in 2015



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# Series Circuit Replacement: 2015

- Design of the Replacement of Series Circuits 3 and 4 from the “T-1-NW” Substation Located at 7137 N. Teutonia Avenue, with Construction Anticipated in 2015
- Provides Electrical Energy to 114 Street Lights
- 50 Outages, Including 32 Cable Failures, from January 1, 2012 through October 31, 2014



# Other Series Circuits Being Monitored for Priority of Replacement

- Based on Outages from January 1, 2012 to October 31, 2014:
  - SR 15/16, located at Martin Lane And 1st, 50 Outages with 32 Circuit Failures
  - NM 7/8, located at Villard And 51<sup>st</sup>, 44 Outages with 27 Circuit Failures
  - NJ 9/10, located at Hampton And 20<sup>th</sup>, 43 Outages with 24 Circuit Failures
  - NK 13/14, located at Burleigh And 85<sup>th</sup>, 39 Outages with 23 Circuit Failures
  - NR 19/20, located at Congress And 80<sup>th</sup>, 60 Outages with 21 Circuit Failures



# Street Lighting Substations and Enclosures



01.30.2014

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# Substation and Enclosure Replacement and Repair

- Replace Deteriorated Enclosures
  - Necessary due to deterioration from Weather and Environmental Conditions
- Replace or Upgrade Major Electrical Components
- \$125,000 Included in 2015 Program





# Street Lighting Master Control System Replacement

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# Status of Master Control System Replacement

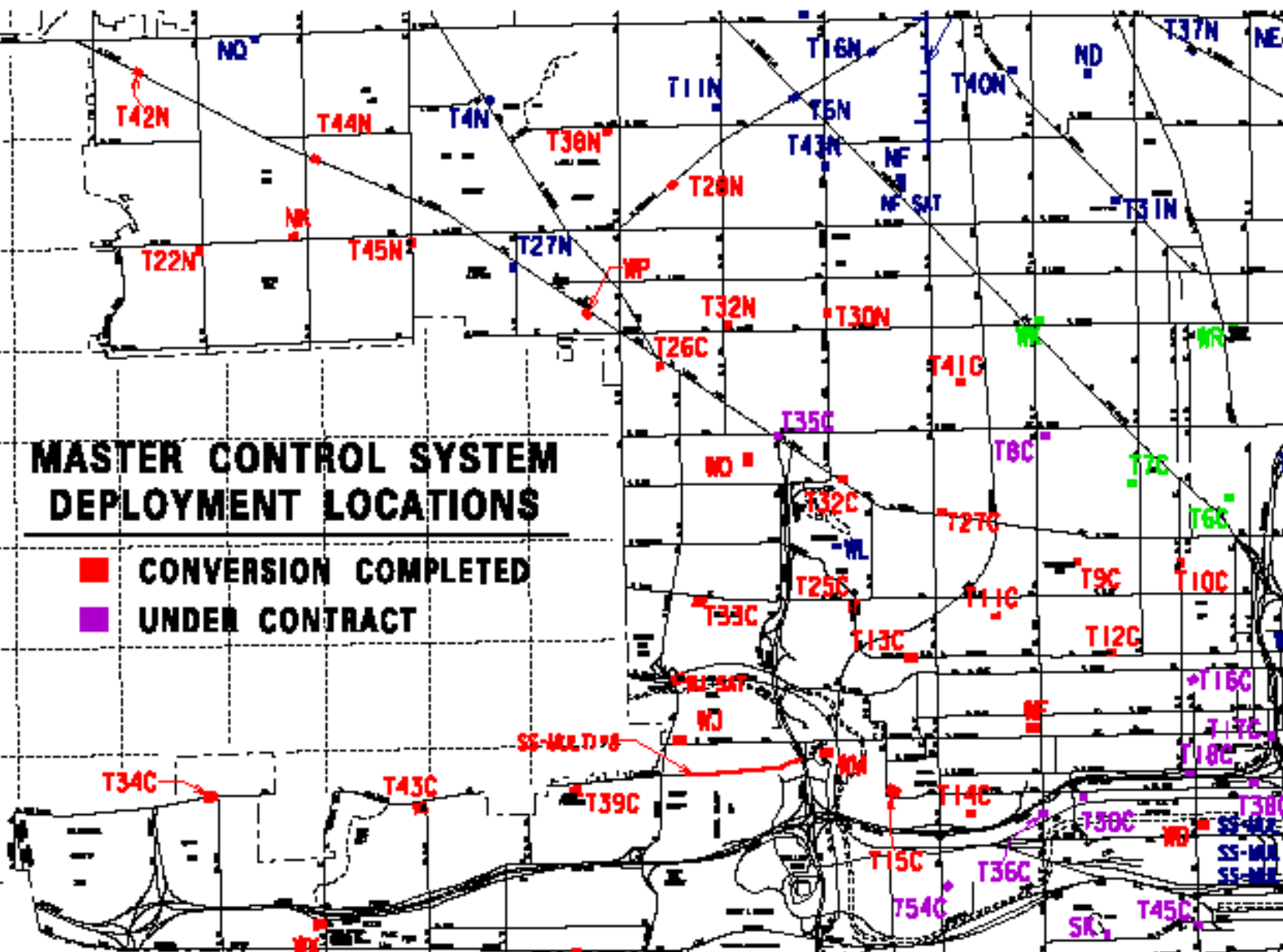
- Advanced Computer Based Master Control System Currently Being Deployed
  - Operational at 62 Stations
  - Design of an Additional 13 Stations currently progressing, and Anticipated to be Let to Contract in 2015
  - Additional Stations to be Brought On-Line as Future Funding Permits



00 CAPITOL  
 00 MELVINA  
 00 VIENNA ABERT  
 00 NASH  
 00 FINN  
 00 KEEFE  
 00 TOWNSEND  
 00 CONCORDIA  
 00 ALER  
 00 BURLEIGH  
 00 CHAMBERS  
 00 LOCUST  
 00 HADLEY  
 00 CENTER  
 00 CLARKE  
 00 WRIGHT  
 00 MEINECKE  
 00 NORTH  
 00 GARFIELD  
 00 LLOYD  
 00 BROWN  
 00 RESERVOIR - VINE  
 00 VINE  
 00 WALNUT  
 00 GALENA  
 00 CHERRY  
 00 VLIET  
 00 MC KINLEY  
 00 JUNEAU  
 00 HIGHLAND  
 00 STATE  
 00 KILBOURN  
 00 WELLS  
 00 WISCONSIN  
 00 MICHIGAN  
 00 CLYBOURN  
 00 ST PAUL  
 00 MT VERNON  
 00 PARK HILL  
 AIRVIEW - CANAL  
 00 DIXON  
 00 ADLER  
 00 MAIN

## MASTER CONTROL SYSTEM DEPLOYMENT LOCATIONS

■ CONVERSION COMPLETED  
 ■ UNDER CONTRACT



**FAIRVIEW - CANAL**

700 SCHLINGER

900 WALKER  
1100 WASHINGTON  
1300 MADISON

1400 GREENFIELD

1500 ORCHARD  
1600 LAPHAM  
1700 MITCHELL  
1800 MAPLE

1900 BURNHAM

2000 ROGERS  
2100 BECHER  
2200 GRANT

2300 LINCOLN

2400	HAYES	LINDS
2500	ARTHUR	CONWAY
2600	HARRISON	OTJEN

2700 CLEVELAND

2600 MONTANA  
2900 DAKOTA [DAHO  
3000 MONTANA

3100 OKLAHOMA

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3200 EVCLID
3300 OHIO
3400 HOLT

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3500 MORGAN

3600 WARNIMONT  
3700 WILBUR  
3800 CRAWFORD

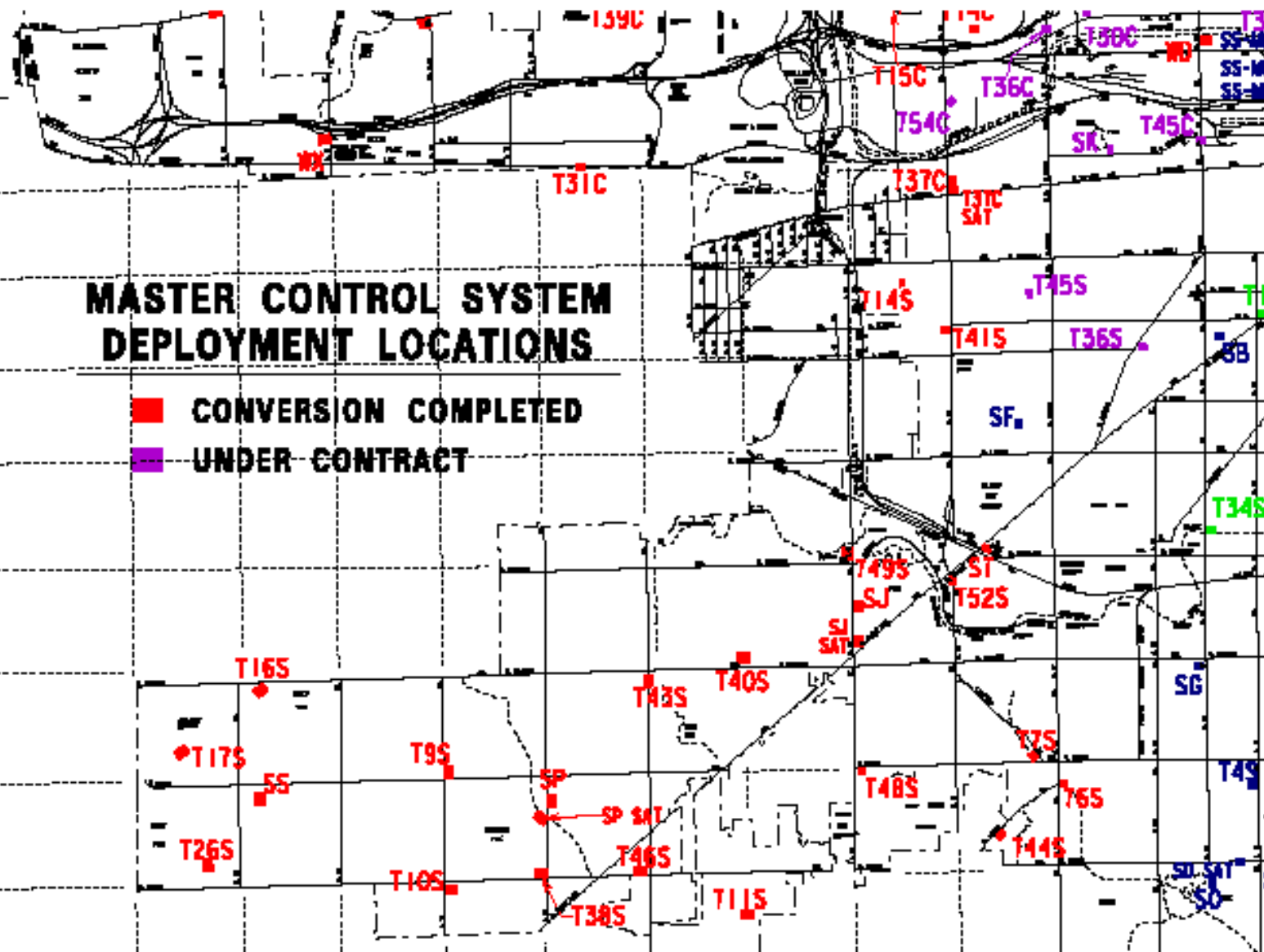
3900 HOWARD

4000 NORWICH VAN BECK  
4100 WATERFORD

## MASTER CONTROL SYSTEM DEPLOYMENT LOCATIONS

**■ CONVERSION COMPLETED**

**■ UNDER CONTRACT**



# Other Pole, Cable and Equipment Upgrades



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# Other Pole, Cable and Equipment Upgrades

- Provides Funding to Address Needs Not Funded Under Other Budget Elements
- Replace Deteriorated Poles
- Replace Failing Cable

# Uncollectable Knockdowns



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**February, 2015**

# Uncollectable Pole and Equipment Knockdowns

- Applied to the Cost of Equipment Replacement Resulting From Traffic Accidents, Vandalism or Other Damage when Costs Cannot be Recovered from Parties Responsible For Damage
- Total Expenditures of \$520,000 (+41%) for this Purpose in 2014 to Date (\$370,000 in 2013)