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Farmers Branch, Texas 75234

## City of Farmers Branch City Light Poles

Structural Condition Assessment

WJE No. 2024.2623.0

Dear Mr. Moffeit:

As requested, Wiss, Janney, Elstner Associates, Inc. (WJE), has completed a structural condition assessment of the city light poles within the requested parks in the Farmers Branch area. The parks included in the assessment were Gussie Field Watterworth Park, Oran Good Park, Squire Park, Farmers Branch Park, Jaycee Park, Mallon Park, Morningstar Park, Winn Park, and Dutch Village Park. The condition assessment was performed in accordance with our proposal dated May 31, 2024. This letter describes tasks performed, our findings, and recommendations.

### BACKGROUND AND DESCRIPTION

Seventy-five city light poles at nine parks (summarized in) owned by the City of Farmers Branch were evaluated using visual observations and nondestructive testing. Lighting at the various light poles is provided by luminaires mounted on poles ranging from 14 feet to 40 feet in height. Documentation such as specifications, submittals, maintenance history, and shop drawings for the poles and attached luminaires was not available to WJE.

The objective of our evaluation was to identify conditions that may affect the structural performance of the light poles, such as corrosion, cracked welds, impact damage, or other deterioration or distress in the portions of the poles accessible from the ground. Our observations were focused on the lower portion of the pole shaft and the base plate (where present), but overall observations were also made of pole configuration and general plumbness. The scope of services described in this report includes visual inspection of each of the included poles and ultrasonic thickness measurements of the light poles to detect possible section loss caused by corrosion.

Table 1. Summary of Lighting Poles

Facility	Pole Type	Number of Poles
Gussie Field Watterworth Park 2610 Valley View Ln, Farmers Branch, TX 75234	Steel, Aluminum	33
Oran Good Park 13301 Dennis Ln, Farmers Branch, TX 75234	Steel	16
Farmers Branch Park 13956 Dennis Ln, Farmers Branch, TX 75234	Steel	2
Squire Park 2560 Squire Pl, Farmers Branch, TX 75234	Steel	4
Jaycee Park 14229 Dennis Ln, Farmers Branch, TX 75234	Steel	7
Mallon Park 12297 Josey Lane, Farmers Branch, TX 75234	Aluminum	8
Morningstar Park 3600 Morningstar Lane, Farmers Branch, TX 75244	Steel	2
Winn Park 13880 Midway Road, Farmers Branch, TX 75234	Steel	2
Dutch Village Park 3020 Old North Road, Farmers Branch, TX 75234	Steel	1
	Total	75

## EVALUATION PROCEDURE

### Steel Site Lighting Pole Observation Methods

The following list summarizes the observation methods used to perform the pole evaluations of the steel site lighting poles.

1. The overall pole was visually reviewed for plumbness and damage.
2. Pole configuration, including foundation type, number of luminaires, base plate configuration, and approximate height, was documented.
3. Metal anchor bolt covers were removed, if present and accessible, to expose the base plate and anchor bolts. As necessary, dirt, debris, and/or corrosion product were also removed from the base plates and anchor bolts with brushes and hand tools. Grout pads beneath the base plates were recorded if present. Leveling nuts were noted if visible.
4. Hand hole covers were removed by WJE staff, except at poles with welded hand hole covers. Limited portions of the interior pole surfaces were examined by viewing through hand hole openings and/or through clear spaces below the poles. In many cases, observations were significantly limited by pole geometry and/or internal wiring.

5. Washers below each anchor bolt nut (where present) or the anchor bolt nuts (where washers were not present) were struck with a small hammer to identify anchor bolt nuts that were not fully tightened.
6. A DMS Go+ Ultrasonic Thickness Gauge was used to measure the pole wall thickness at five locations near the base of each steel pole. This device uses ultrasonic waves to measure material thickness nondestructively. Four of the measurements were located within 1 inch of the weld to the base plate, and a fifth control measurement was located approximately 12 inches above the base plate to establish the reference wall thickness.

### ***Classification of Corrosion***

Corrosion was visually classified as None (no visible corrosion on the surface), Minor (surface corrosion that had not yet advanced), Moderate (small, isolated areas of surface pitting or delamination), or Severe (relatively large areas of surface pitting or delamination, or areas of through-thickness corrosion).

Section loss due to corrosion was measured by comparing four measurements taken directly above the base plate weld, where corrosion is most commonly observed, with the reference wall thickness. For the purposes of this report, section loss will be referred to as follows: None (no section loss, with the four measurements similar to the reference thickness), Minor (section loss present but less than 10% in at least one face of the pole), Moderate (section loss between 10% and 20% in at least one face of the pole), and Severe (section loss greater than 20% in at least one face of the pole).

The visual classification of corrosion gives an initial idea, while the measured section loss provides a more accurate, quantitative assessment of the pole's condition. The measurements are used to determine how severe the corrosion is, and the visual observations help confirm these results.

### ***Pole Paint Condition***

The condition of the paint was classified as Sound (paint still intact and protective), Minimal Defects (some paint loss but still provides protection), or Failed (areas no longer protected by paint, leaving the pole exposed).

### ***Aluminum Site Lighting Pole Observation Methods***

Thirty-one of the site lighting poles at Gussie Field Watterworth Park, along with all eight site lighting poles at Mallon Park were cast aluminum site lighting poles. The anchor bolts and nuts were located within the pole base, or inside the pole itself. This limited access and our ability to check the nuts and anchor bolts for tightness. Wall thicknesses were not measured, and only visual observations were made.

## **FINDINGS AND OBSERVATIONS**

Representatives from WJE visited the facilities from the 13th to 15th of November 2024, to evaluate the pole bases. Sequential pole identification numbers were assigned during these observations. Detailed records of pole thicknesses are available upon request.

A summary of our observations and findings is provided below.

## Gussie Field Watterworth Park

Thirty-one aluminum and two steel poles of varying heights are located at the Gussie Field Watterworth Park. Figure 1 shows the locations of these poles. Three different aluminum pole and two different steel pole geometries were present at Gussie Field Watterworth Park (described in Table 2).

Aluminum poles are typically a square shaft welded to a square base. One type of base appears to be a permanent anchor bolt cover (Figure 2). The other type appears to be a hinged base that is then welded in place (Figure 3). Two poles (GP 32 and GP 33) are a fluted shaft with a decorative pole base anchored to a concrete foundation with galvanized anchor bolts. The two steel poles consist of either a square or round painted steel pole shaft with a steel base plate welded to the pole and anchored to a concrete foundation with steel anchor bolts (Figure 4 and Figure 6). Selected physical features of the poles and representative photos are presented in Table 2. A summary of our corrosion evaluation and visual observations is presented in Table 3.

Poles with severe corrosion in any of its components (pole, base plate, anchor bolts) or with elements that could pose a risk to the pole's integrity (dents, out of plumb, loose bolts, etc.) are highlighted in Table 3 with orange shading. Summary tables for the other parks in this report also use the same orange shading to identify defects that could pose a risk to the pole's integrity.

Table 2. Summary of the physical features of the poles at Gussie Field Watterworth Park.

Feature	Pole Identification				
	GP 1, 3, 7, 8, 10-13	GP 2, 5, 6, 9, 14-27, 29-31	GP 4	GP 28	GP 32, 33
Manufacturer	Unknown	Unknown	Unknown	Unknown	Unknown
Installation Year	Unknown	Unknown	Unknown	Unknown	Unknown
Approx. Pole Height	29 feet	16 feet	21 feet	31 feet	15 feet
Number of Luminaires	1	1	1	1	1
Shaft Cross-section - Bottom	6 in. Square	5 in. square	6 in. Square	7.5 in. Round	6 in. Round
Shaft Wall Thickness	-	-	0.175 in.	0.117	-
Material	Aluminum	Aluminum	Steel	Steel	Aluminum
Finish	-	-	Painted Steel	Painted Steel	-
Base Plate (BP)	Square	Square	Square	Square	-
BP Thickness	2-3/4 in.	3-3/4 in.	1-1/4 in.	1 in.	-
Anchor Bolts (AB)	-	-	4	4	4
AB Diameter	-	-	7/8 in.	3/4 in.	5/8 in.
Washers on AB?	-	-	Yes	No	Yes/no
Grout?	Yes	Yes	Yes	Yes	Yes

Table 3. Summary of corrosion evaluation and visual examinations at Gussie Field Watterworth Park.

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
GP 1	None	Sound	Yes	None	-	-
GP 2	None	Sound	No	None	-	-
GP 3	None	Sound	No	None	-	-
GP 4	Minor	Minimal Defects	No	Minor	None	No, 2 short
GP 5	None	Sound	No	None	-	-
GP 6	None	Sound	No	None	-	-
GP 7	None	Sound	No	None	-	-
GP 8	None	Sound	No	None	-	-
GP 9	None	Sound	No	None	-	-
GP 10	None	Sound	No	None	-	-
GP 11	None	Sound	No	None	-	-
GP 12	None	Sound	No	None	-	-
GP 13	None	Sound	No	None	-	-
GP 14	None	Sound	No	None	-	-
GP 15	None	Sound	No	None	-	-
GP 16	None	Sound	No	None	-	-
GP 17	None	Sound	No	None	-	-
GP 18	None	Sound	No	None	-	-
GP 19	None	Sound	No	None	-	-
GP 20	None	Sound	No	None	-	-
GP 21	None	Minimal Defects	No	None	-	-
GP 22	None	Sound	No	None	-	-
GP 23	None	Sound	No	None	-	-
GP 24	None	Sound	No	None	-	-
GP 25	None	Sound	No	None	-	-
GP 26	None	Sound	No	None	-	-
GP 27	None	Sound	No	None	-	-
GP 28	Severe (Figure 5)	Failed	No	Moderate	Moderate	Yes
GP 29	None	Sound	No	None	-	-
GP 30	None	Sound	No	None	-	-
GP 31	None	Sound	No	None	-	-
GP 32	None	Failed	No	None	None	No, 4 not engaged properly (Figure 7Figure 6)
GP 33	None	Failed	No	None	None	Yes

## Oran Good Park

Sixteen approximately 40-foot-tall light poles are located at Oran Good Park. Figure 8 shows the locations of these poles. Each of the poles consists of a square, painted steel pole shaft with a steel base plate welded to the pole and anchored to a concrete foundation with steel anchor bolts. A representative pole base is shown in Figure 9. Selected physical features of the poles are presented in Table 4. The summary of the corrosion evaluation and visual examinations are presented in Table 5.

Table 4. Summary of the physical features of the poles at Oran Good Park.

Feature	Pole Identification
	OP 1-17
Manufacturer	Groves
Installation Year	1988
Approx. Pole Height	39.5 feet
Number of Luminaires	2
Shaft Cross-section - Bottom	9 in. Round
Shaft Wall Thickness	0.11 in.
Material	Steel
Finish	Painted
Base Plate (BP)	Square
BP Thickness	-
Anchor Bolts (AB)	4
AB Diameter	3/4 in.
Washers on AB?	No
Grout?	Yes

Table 5. Summary of corrosion evaluation and visual examinations at Oran Good Park.

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
OP 1	Severe (through-thickness)	Minimal Defects	No	Moderate	Minor	Yes
OP 2	Severe (through-thickness)	Minimal Defects	No	Minor	Minor	Yes
OP 3	Severe (through-thickness) (Figure 9)	Minimal Defects	No	Minor	Minor	Yes

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
OP 4	Severe (through-thickness)	Minimal Defects	No	Minor	Minor	Yes
OP 5	Minor	Sound	No	Minor	Minor	Yes
OP6	Pole Not Found					
OP 7	Minor	Minimal Defects	No	Minor	Minor	Yes
OP 8	Severe	Minimal Defects	No	Minor	Minor	Yes
OP 9	None	Minimal Defects	No	Minor	Minor	Yes
OP 10	None	Minimal Defects	No	Minor	Minor	Yes
OP 11	None	Minimal Defects	No	Minor	Minor	Yes
OP 12	Minor	Minimal Defects	No	Minor	Minor	Yes
OP 13	None	Minimal Defects	No	Minor	Minor	Yes
OP 14	Minor	Minimal Defects	No	Minor	Minor	Yes
OP 15	Minor	Minimal Defects	No	Minor	Minor	Yes
OP 16	Minor	Sound	No	None	Minor	Yes
OP 17	None	Minimal Defects	No	Minor	Minor	Yes

## Farmers Branch Park

Two approximately 30-foot-tall light poles are located at Farmers Branch Park. Figure 10 shows the locations of these poles. Each of the poles consists of a square, painted steel pole shaft with a steel base plate welded to the pole and anchored to a concrete foundation with steel anchor bolts. A representative pole base is shown in Figure 11. Selected physical features of the poles are presented in. The summary of the corrosion evaluation and visual examinations are presented in Table 7.

Table 6. Summary of the physical features of the poles at Farmers Branch Park.

Feature	Pole Identification
	FB 1, 2
Manufacturer	Unknown
Installation Year	Unknown
Approx. Pole Height	14 feet
Number of Luminaires	1
Shaft Cross-section - Bottom	4 in. Square
Shaft Wall Thickness	0.110
Material	Steel
Finish	Painted
Base Plate (BP)	Square
BP Thickness	3/4 in.
Anchor Bolts (AB)	4
AB Diameter	5/8 in.
Washers on AB?	Yes
Grout?	Yes/No

Table 7. Summary of corrosion evaluation and visual examinations at Farmers Branch Park.

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
FB 1	Severe	Minimal Defects	No	None	Minor	Yes
FB 2	Minor	Minimal Defects	No	Minor	Minor	Yes

## Squire Park

Seven city poles are located at Squire Park. Figure 12 shows the locations of these poles. Two different geometries are present (described in Table 8). Each of the poles consists of a square, painted steel pole shaft with a steel base plate welded to the pole and anchored to the concrete foundation with galvanized anchor bolts. Representative pole base is shown in Figure 14. Selected physical features of the poles are presented in Table 8. The summary of the corrosion evaluation and visual examinations are presented in Table 9.



Table 8. Summary of the physical features of the poles at Squire Park.

Feature	Pole Identification	
	SP 1, 8	SP 6-7
Manufacturer	Unknown	Unknown
Installation Year	Unknown	Unknown
Approx. Pole Height	30 feet	26.5 feet
Number of Luminaires	1	2
Shaft Cross-section - Bottom	5 in. Square	5 in. Square
Shaft Wall Thickness	0.120 in.	0.120 in.
Material	Steel	Steel
Finish	Painted	Painted
Base Plate (BP)	Square	Square
BP Thickness	1 in.	1 in.
Anchor Bolts (AB)	4	4
AB Diameter	1 in.	1 in.
Washers on AB?	Yes	Yes
Grout?	No	No

Table 9. Summary of corrosion evaluation and visual examinations at Squire Park.

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
SP 1	Minor	Minimal Defects	No	Minor	Minor	Yes
SP 6	Severe	Failed (Figure 14)	No	Minor	None	Yes
SP 7	Minor	Minimal Defects	No	None	Minor	Yes
SP 8	Minor	Minimal Defects	No	Minor	Minor	Yes

## Jaycee Park

Seven city poles are located at Jaycee Park. Figure 15 shows the locations of these poles. Two different geometries are present (described in Table 10). Each of the poles consists of a square, painted steel pole shaft with a steel base plate welded to the pole and anchored to the concrete foundation with either steel (JP 5-7) or galvanized anchor bolts (JP 1-4). Representative pole base is shown in Figure 16 and Figure 17. Selected physical features of the poles are presented in Table 10. The summary of the corrosion evaluation and visual examinations are presented in Table 11.

Table 10. Summary of the physical features of the poles at Jaycee Park.

Feature	Pole Identification	
	JP 1-4	JP 5-7
Manufacturer	Unknown	Unknown
Installation Year	Unknown	Unknown
Approx. Pole Height	24 feet	30 feet
Number of Luminaires	2	1-2
Shaft Cross-section - Bottom	4 in. Square	5 in. Square
Shaft Wall Thickness	0.175 in.	0.120 in.
Material	Steel	Steel
Finish	Painted	Painted
Base Plate (BP)	Square	Square
BP Thickness	3/4 in.	3/4 in.
Anchor Bolts (AB)	4	4
AB Diameter	5/8 in.	5/8 in.
Washers on AB?	Yes	Yes
Grout?	No	No

Table 11. Summary of corrosion evaluation and visual examinations at Jaycee Park.

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
JP 1	None	Sound	No	Minor	Minor	Yes
JP 2	Minor	Minimal Defects	No	Minor	Moderate	Yes
JP 3	Minor	Sound	No	Minor	Minor	Yes
JP 4	Minor	Sound	No	Minor	Minor	Yes
JP 5	Minor	Failed	No	Minor	Minor	Yes
JP 6	Minor	Failed	No	Minor	Minor	Yes
JP 7	Minor	Failed	No	Minor	Minor	Yes

## Mallon Park

Eight approximately 15-foot-tall light poles are located at Mallon Park. Figure 18 shows the locations of these poles. Each of the poles consists of a fluted aluminum pole shaft cast as one piece with a decorative base and anchored to a concrete foundation with galvanized anchor bolts. A representative pole base is shown in Figure 19. Selected physical features of the poles are presented in Table 12. The summary of the corrosion evaluation and visual examinations are presented in Table 13.

Table 12. Summary of the physical features of the poles at Mallon Park.

Feature	Pole Identification
	MAP 1-8
Manufacturer	Unknown
Installation Year	Unknown
Approx. Pole Height	15 feet
Number of Luminaires	1
Shaft Cross-section - Bottom	4.2 in. Round
Shaft Wall Thickness	-
Material	Aluminum
Finish	-
Base Plate (BP)	-
BP Thickness	-
Anchor Bolts (AB)	4
AB Diameter	5/8 in.
Washers on AB?	Yes
Grout?	Yes

Table 13. Summary of corrosion evaluation and visual examinations at Mallon Park.

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
MAP 1	None	Sound	No	None	Minor	Yes
MAP 2	None	Sound	No	None	Minor	Yes
MAP 3	None	Sound	No	None	None	Yes
MAP 4	None	Sound	No	None	None	Yes
MAP 5	None	Sound	No	None	None	Yes
MAP 6	None	Sound	No	None	None	Yes
MAP 7	None	Sound	No	None	Minor	Yes
MAP 8	None	Sound	No	None	Minor	Yes

## Morningstar Park

Two approximately 31-foot-tall light poles are located at Morningstar Park. Figure 20 shows the locations of these poles. Each of the poles consists of a square, painted steel pole shaft with a steel base plate welded to the pole and anchored to a concrete foundation with steel anchor bolts. A representative pole base is shown in Figure 21. Selected physical features of the poles are presented in Table 14. The summary of the corrosion evaluation and visual examinations are presented in Table 15.

Table 14. Summary of the physical features of the poles at Morningstar Park.

Feature	Pole Identification
	MOP 1, 2
Manufacturer	KW
Installation Year	Unknown
Approx. Pole Height	31 feet
Number of Luminaires	1
Shaft Cross-section - Bottom	6 in. Square
Shaft Wall Thickness	0.110
Material	Steel
Finish	Painted
Base Plate (BP)	Square
BP Thickness	1 in.
Anchor Bolts (AB)	4
AB Diameter	3/4 in.
Washers on AB?	Yes
Grout?	No

Table 15. Summary of corrosion evaluation and visual examinations at Morningstar Park.

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
MOP 1	Minor	Minimal Defects	No	Minor	Minor	Yes
MOP 2	Minor	Minimal Defects	No	Minor	Minor	Yes

## Winn Park

Two approximately 30-foot-tall light poles are located at Winn Park. Figure 22 shows the locations of these poles. Each of the poles consists of a square, painted steel pole shaft with a steel base plate welded to the pole and anchored to a concrete foundation with galvanized anchor bolts. A representative pole base is shown in Figure 23. Selected physical features of the poles are presented in Table 16. The summary of the corrosion evaluation and visual examinations are presented in Table 17.

Table 16. Summary of the physical features of the poles at Winn Park.

Feature	Pole Identification
	WP 1, 2
Manufacturer	Unknown
Installation Year	Unknown
Approx. Pole Height	30 feet
Number of Luminaires	1
Shaft Cross-section - Bottom	5 in. Square
Shaft Wall Thickness	0.170
Material	Steel
Finish	Painted
Base Plate (BP)	Square
BP Thickness	1 in.
Anchor Bolts (AB)	4
AB Diameter	1 in.
Washers on AB?	Yes
Grout?	Yes

Table 17. Summary of corrosion evaluation and visual examinations at Winn Park.

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
WP 1	Minor	Sound	No	Minor	None	Yes
WP 2	Minor	Minimal Defects	No	Minor	None	Yes

## Dutch Village Park

One approximately 25-foot-tall light pole was located at Winn Park. Figure 24 shows the location of this pole. The pole consists of a square, painted steel pole shaft with a steel base plate welded to the pole and anchored to a steel pedestal box with steel bolts. The pedestal was anchored to a concrete foundation with steel anchor bolts. A representative pole base is shown in Figure 25. Selected physical features of the pole are presented in Table 18. The summary of the corrosion evaluation and visual examinations are presented in Table 19.

Table 18. Summary of the physical features of the poles at Dutch Village Park.

Feature	Pole Identification
	DV 1
Manufacturer	Unknown
Installation Year	Unknown
Approx. Pole Height	25 feet
Number of Luminaires	2
Shaft Cross-section - Bottom	4 in. Square
Shaft Wall Thickness	0.170
Material	Steel
Finish	Painted
Base Plate (BP)	Square
BP Thickness	3/4 in.
Anchor Bolts (AB)	4
AB Diameter	3/4 in.
Washers on AB?	Yes
Grout?	No

Table 19. Summary of corrosion evaluation and visual examinations at Dutch Village Park.

Pole ID	Pole Corrosion	Pole Paint Condition	Pole Dents	Base Plate Corrosion	Anchor Bolts Corrosion	Anchor Bolts Engaged
DV 1	None	Sound	No	Minor	None	Yes

## DISCUSSION

The extent of corrosion observed at the steel poles varied significantly, from no visible corrosion to section loss in several poles, to the development of holes through the wall thickness at more than one location. Corrosion was generally concentrated on the base plate and the vertical portion of the pole near the base plate. Several poles were observed with significant corrosion of either the interior or exterior pole surface without visible corrosion of the other surface.

Several conditions were present that are likely to contribute to increased corrosion of the lower portions of the poles. These included the use of grout beneath the poles and the use of anchor bolt covers over the bases of the poles. Additionally, many of the poles were installed directly on concrete pedestals without any leveling nuts. Also, there were missing hand covers on a few of the poles. All of these conditions contribute to corrosion by allowing water intrusion or trapping moisture inside the pole or around the lower portion of the pole exterior. Based on the concentration of severe corrosion on the

lower few inches of the poles, we believe that all four conditions were significant contributing causes of the relatively severe corrosion observed at several poles.

Severe steel section loss due to corrosion (i.e., thickness loss greater than 20 percent or through-thickness corrosion holes in one or more faces) was detected at eight of the seventy-five poles. These poles are located at Gussie Field Watterworth Park, Oran Good Park, Farmers Branch Park, and Squire Park.

Because the pole walls are relatively thin compared to the pole base plates, a seemingly small section loss (e.g., 0.05 inches) in the wall represents a significant percent of section loss. In contrast, a similar section loss for the base plates is an insignificant percent section loss and is particularly true when corrosion of the base plate is limited to the perimeter of the base plate.

At poles where corrosion initiated at the exterior surface, maintenance of the exterior coating can prevent new corrosion from developing, and the development of additional corrosion can be readily monitored by visual observations. Where considerable corrosion initiates at the interior surface, the rate of corrosion can be slowed by removing grout and anchor bolt covers to allow for drainage and ventilation of the pole, but a coating cannot be readily applied and maintained. Progression of the corrosion and imminent development of holes through the wall thickness can be identified with more detailed periodic observations. In addition to ultrasonic thickness measurements, observations of the interior, tapping with a hammer, and observation of the exterior pole surfaces for blistering can be used to monitor the development of additional corrosion.

One pole at Gussie Field Watterworth Park (GP 1) was observed to have a dent. The dent observed at the pole does not represent a significant reduction in the structural capacities of this pole and does not require remedial action at this time.

At Gussie Field Watterworth Park, two poles had anchor bolts that were not fully engaged. In addition to allowing pole rocking, bolts that are not fully engaged can contribute to pole deterioration by increasing fatigue stresses on the anchor rods and base plate. Pole GP 4 had short bolts the nuts were not fully engaged. Meanwhile, Pole GP 32 had notches in its base plate at the bolt locations, meaning that without washers, the bolts and nuts are not making proper contact with the base plate. To address these issues, the short anchor bolts on Pole GP 4 should be extended or replaced (one at a time) with properly designed adhesive anchor bolts, and washers should be added to Pole GP 32.

At the cast aluminum site lighting poles, corrosion of the pole is not a primary concern because aluminum is inherently resistant to corrosion. However, corrosion at the steel anchor bolts and nuts would represent a possible reduction in integrity of the anchor that may warrant replacement. That said, the corrosion observed on the anchor bolts and nuts was still minor. Additionally, flaking of the exterior coating was noted at two locations, which presents only an aesthetic concern. This issue may be addressed at the discretion of the City of Farmers Branch.

## CONCLUSIONS AND RECOMMENDATIONS

Based on our observations using visual and nondestructive testing, eight of the seventy-five poles were identified with conditions that require pole replacement, unless a detailed structural analysis is performed to demonstrate their structural adequacy in resisting design wind loads and fatigue stresses.

These poles had section loss meeting one of the following criteria:

- Thickness loss of at least 20 percent in one or more faces
- Through-thickness corrosion holes in one or more faces

## **Recommended Actions**

Implementation of these repairs in conjunction with the higher priority items listed below would increase the life span of the light poles and would likely result in overall cost savings. The items may also be addressed when practical as part of preventative maintenance.

### ***Drainage and Ventilation - Grout***

At Gussie Field Watterworth Park, Oran Good Baseball Fields, Farmers Branch Park, Mallon Park, Winn Park:

1. Provide weep holes in existing grout beneath pole bases or remove grout from beneath pole bases to allow for drainage and ventilation. Weep holes may be installed without additional evaluation of the poles. These holes should be located at the center of each of the four sides of the grout pad and extend to the void space under the pole. Care should be taken to avoid damaging the pole wiring during installation of the weep holes. If grout removal is preferred, the design of the base plates should be verified. While most light pole bases are designed assuming that grout is not used, this should be verified by reviewing shop drawings or performing calculations to ensure that grout removal will not result in excessive stress on the base plate. Additionally, verify that leveling nuts are present below the base plate by drilling small holes at each corner of the grout pad to probe for leveling nuts. Do not remove grout if leveling nuts are not present.

### ***Anchor Bolt Cover***

At Oran Good Park, Farmers Branch Park, Jaycee Park, Squire Park, Morningstar Park, Winn Park:

2. Remove anchor bolt covers from pole bases (where present). This will promote evaporation of moisture around the pole bases and help to reduce the rate of deterioration due to corrosion.

### ***Failed Paint***

At Gussie Field Watterworth Park and Jaycee Park:

3. Repaint pole exterior surfaces and base plates at poles with failed paint using a multi-coat, surface tolerant system to extend the remaining service life. Suitable products include Pro-Cryl Universal Primer with Sher-Cryl HPA High Performance Acrylic top coat, manufactured by Sherwin Williams, and Chembuild Series 135 Primer with Endura-Shield Series 73 top coat, manufactured by Tnemec. Pole surfaces should be prepared and coating should be applied according to the coating manufacturer's recommendations.



## Recommended Actions – High Priority

The following high priority items should be addressed within six months, as they are directly related to the structural performance of the light poles:

### Gussie Field Watterworth Park

1. Remove and replace pole GP 28 due to severe corrosion.
2. Remove and replace the short anchor bolts at pole GP 4 (one at a time).
3. Remove the nuts (one at a time), install flat washers, re-install and tighten the nuts at pole GP 32.

### Oran Good Park

4. Remove and replace pole OP 1, OP 2, OP 3, OP 4, and OP 8 due to severe corrosion.

### Farmers Branch Park

5. Remove and replace pole FB 1 due to severe corrosion.

### Squire Park

6. Remove and replace pole SP 6 due to severe corrosion.

## Poles Identified as High Priority for Maintenance or Replacement

Table 20 provides a summary of the poles categorized as high priority, along with their condition of concern.

Table 20. List of poles categorized as high priority for further action.

Facility	Pole ID	Condition of Concern
Gussie Field Watterworth Park	GP 28	Severe Corrosion
	GP 4	Two Bolts Not Engaged
	GP 32	Four Bolts Not Engaged
Oran Good Park	OP 1	Severe Corrosion
	OP 2	Severe Corrosion
	OP 3	Severe Corrosion
	OP 4	Severe Corrosion
	OP 8	Severe Corrosion
Farmers Branch	FB 1	Severe Corrosion
Squire Park	SP 6	Severe Corrosion

We recommend that the new replacement pole(s) be structurally designed by the manufacturer in accordance with AASHTO LRFD *Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, 1<sup>st</sup> edition (2015, with 2017 Revisions). Additionally, we recommend that new poles be designed and installed without grout beneath the base plate and without anchor bolt covers. It should

also be noted that galvanizing typically provides more durable corrosion protection than painting, and the use of hot dip galvanized poles and anchor bolts are recommended for maximum service life.

As an alternate to removal and replacement of poles with severe section loss that have not developed through-thickness holes, an engineer may be retained to perform a structural analysis to evaluate the adequacy of the poles to resist design wind loads and fatigue stresses.

## **Future Inspection**

WJE recommends that all light poles be evaluated regularly. At a minimum, we recommend that visual observations of the pole exterior and accessible interior surfaces be made at an interval not exceeding twelve months. The individual performing these inspections can be a trained City of Farmers Branch staff member or other qualified person. A written record of findings should be maintained for each pole. Atypical conditions noted should be brought to the attention of the pole manufacturer or a structural engineer in a timely manner. In addition, we recommend that all light poles be evaluated by an experienced structural engineer at intervals not exceeding five years.

Thank you for contacting WJE with regard to this matter. Please feel free to contact us if you have any questions.

Sincerely,

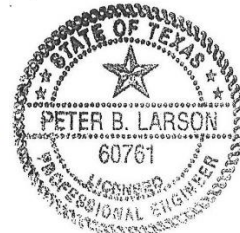
**WISS, JANNEY, ELSTNER ASSOCIATES, INC.**



Ali Jarekji, PhD, EIT  
Associate II



Peter B. Larson, PE  
Principal



February 20, 2025

AJ:ksm

## FIGURES

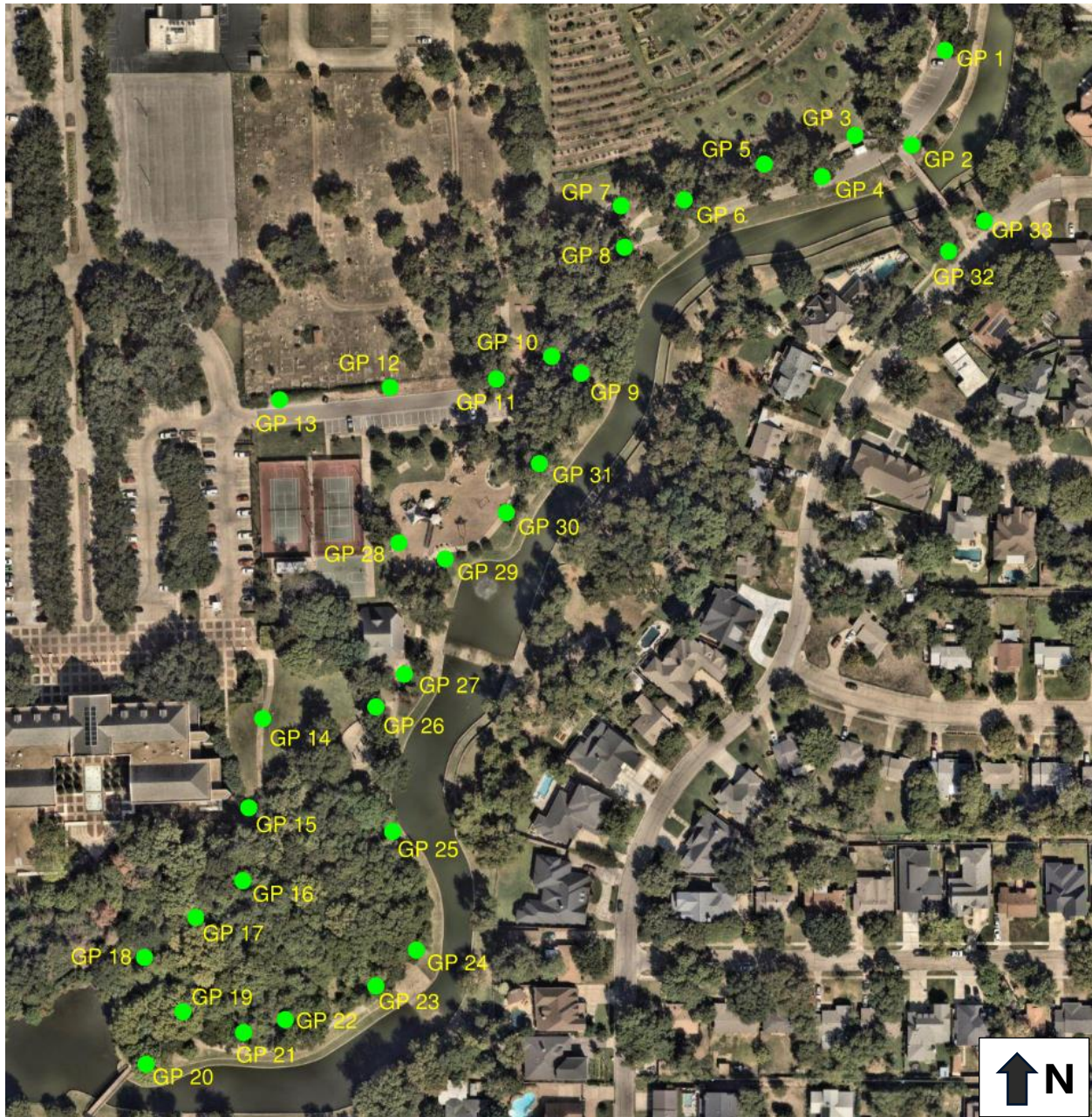


Figure 1. Overall view of Gussie Field Waterworth Park. The city poles are numbered GP 1 to GP 33 with green circles indicating the locations of poles included in evaluation. Image dated 10/03/2024, provided through Nearmap Subscription. Annotations by WJE.





Figure 2. Typical base of a 29-foot aluminum pole at Gussie Field Watterworth Park (GP 1). The orange arrow indicates dent in pole shaft.



Figure 3. Typical base of a 16-foot aluminum pole at Gussie Field Watterworth Park (GP 29).





Figure 4. Thirty-one-foot light pole base of pole GP 28 at Gussie Field Watterworth Park.

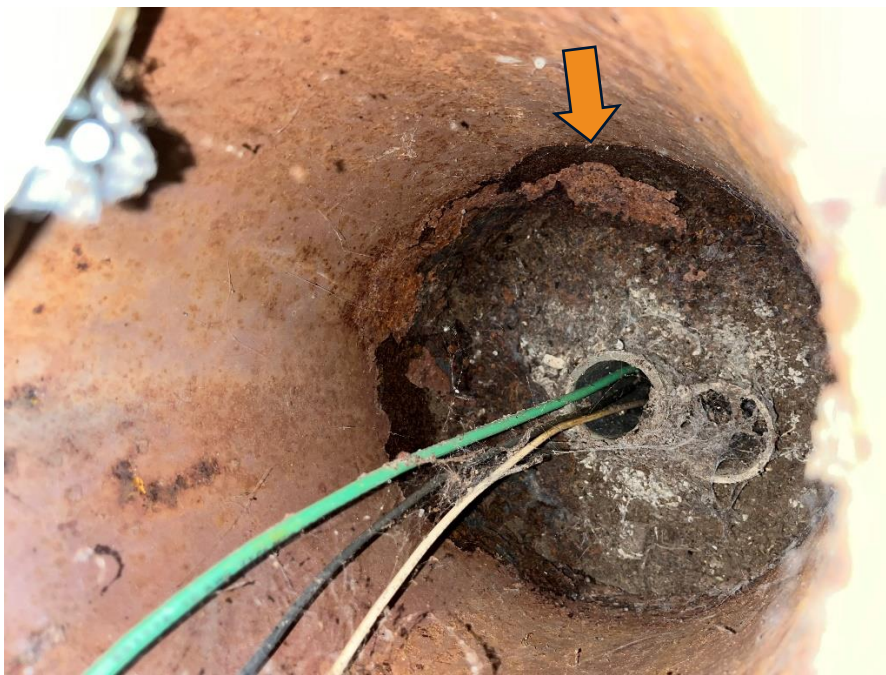


Figure 5. Interior image of pole GP 28 at Gussie Field Watterworth Park. The orange arrow indicates the corrosion and section loss this pole has experienced.





Figure 6. Typical base of a 15-foot aluminum pole at Gussie Field Watterworth Park (GP 32).

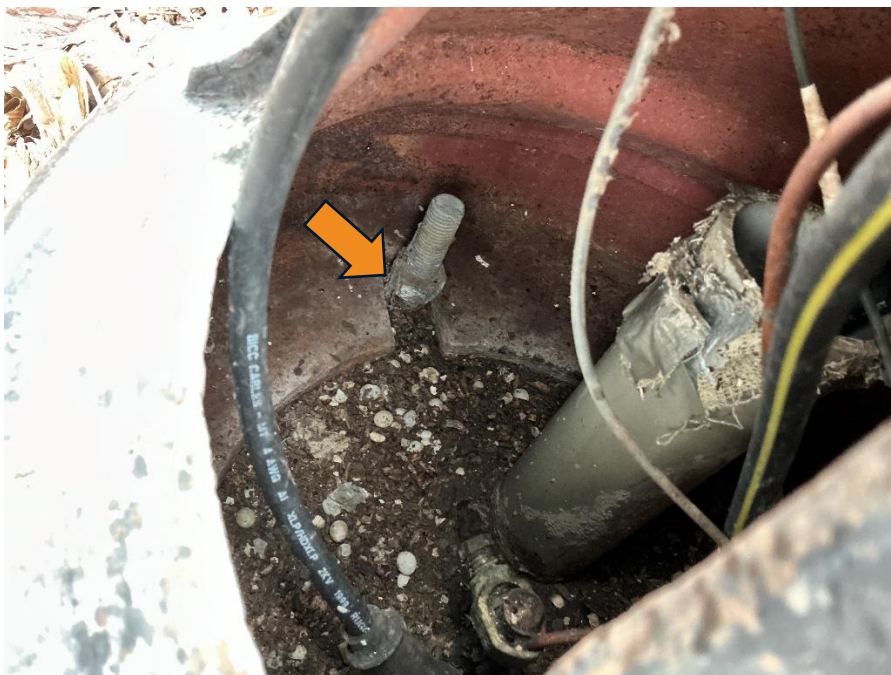


Figure 7. Interior image of pole GP 32 at Gussie Field Watterworth Park. The orange arrow indicates the missing washer and bolt not tight to base of pole.





Figure 8. Overall view of Oran Good Baseball Fields. Green circle annotations indicate locations of poles included in evaluation. Image dated 10/03/2024, provided through Nearmap Subscription. Annotations by WJE.





Figure 9. Through-thickness corrosion (orange arrow) at base of Pole OP 3 at Oran Good Park.



Figure 10. Overall view of Farmers Branch Park. The city poles included in the evaluation are numbered FB 1 and FB 2 with green circle annotations indicating the locations of poles. Image dated 02/07/2024, provided through Eagleview Connect Subscription. Annotations by WJE.





Figure 11. Typical 14-foot light pole base at Farmers Branch Park (FB 1).



Figure 12. Overall view of Squire Park. Green circle annotations indicate locations of poles included in evaluation. Image dated 01/17/2023, provided through Eagleview Connect Subscription. Annotations by WJE.





Figure 13. Typical 14-foot light pole base at Squire Park (SP 1).



Figure 14. Severe Corrosion at the base of pole SP 6 at Squire Park.



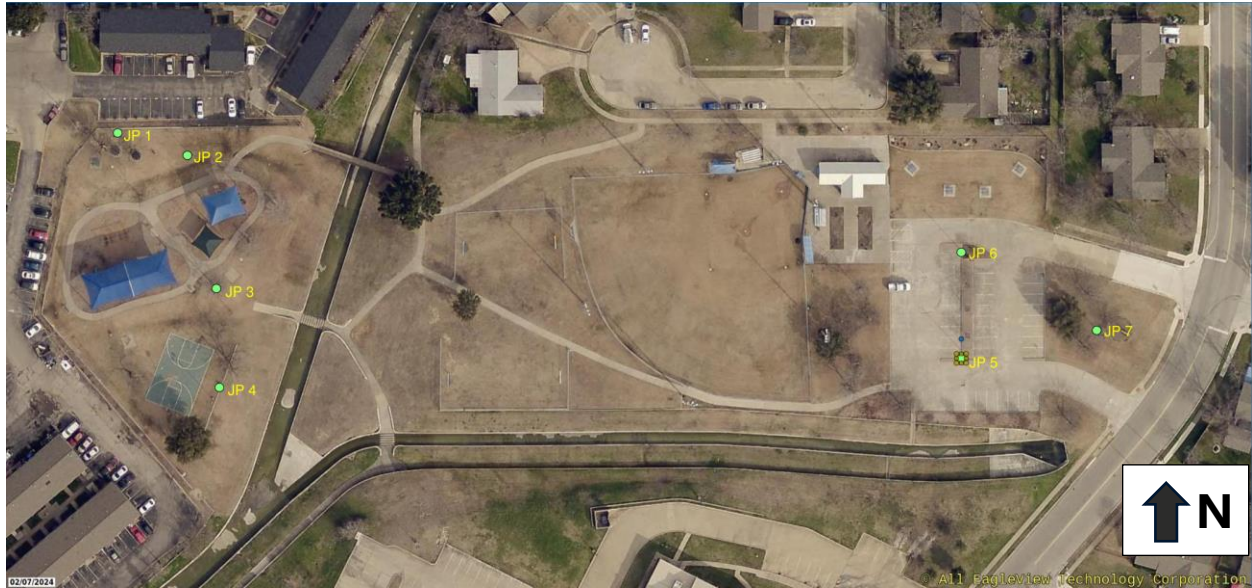


Figure 15. Overall view of Jaycee Park. Green circle annotations indicate locations of poles included in evaluation. Image dated 02/07/2024, provided through Eagleview Connect Subscription. Annotations by WJE.



Figure 16. Typical 30-foot light pole base at Jaycee Park (JP 5).





Figure 17. Typical 24-foot light pole base at Jaycee Park (JP 3).



Figure 18. Overall view of Mallon Park. Green circle annotations indicate locations of poles included in evaluation. Image dated 02/28/2024, provided through Eagleview Connect Subscription. Annotations by WJE.





Figure 19. Typical 15-foot light pole base at Mallon Park (MAP 6).

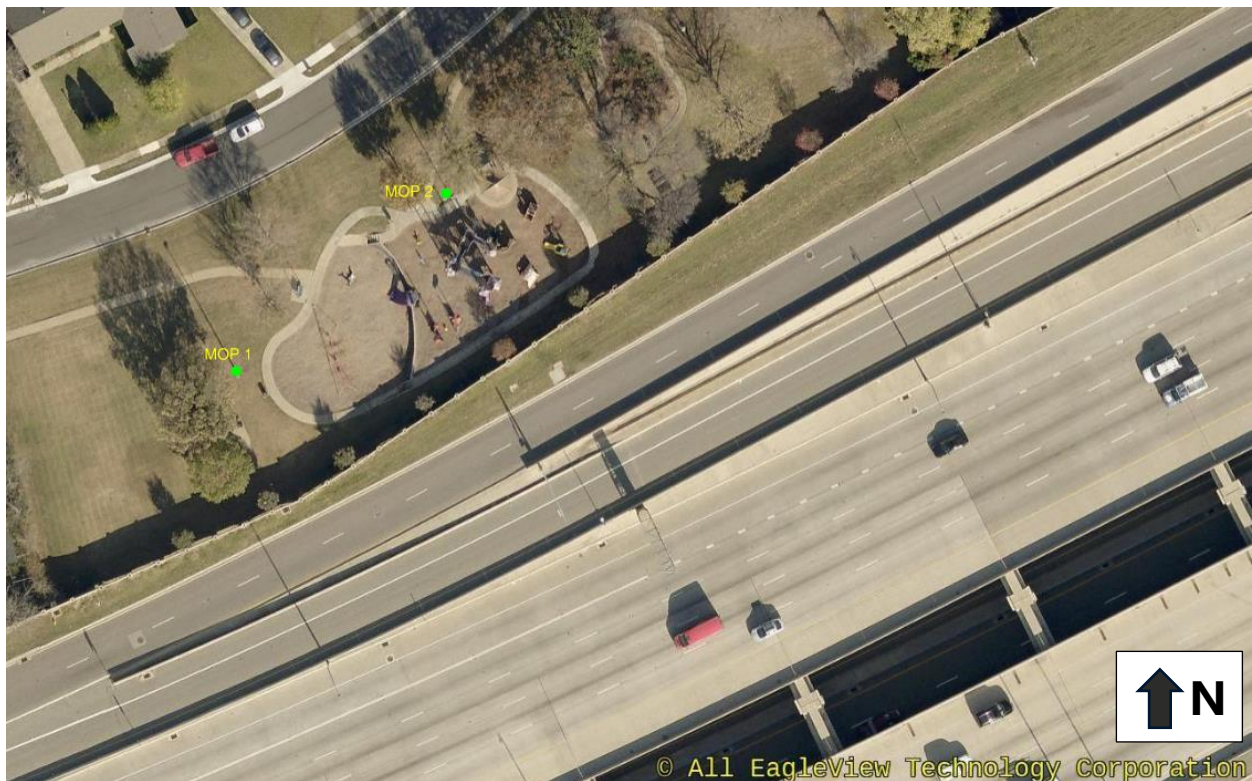


Figure 20. Overall view of Morningstar Park. Green circle annotations indicate locations of poles included in evaluation. Image dated 12/13/2021, provided through Eagleview Connect Subscription. Annotations by WJE.





Figure 21. Typical 31-foot light pole base at Morningstar Park (MOP 2).



Figure 22. Overall view of Winn Park. Green circle annotations indicate locations of poles included in evaluation. Image dated 01/17/2023, provided through Eagleview Connect Subscription. Annotations by WJE.





Figure 23. Typical 30-foot light pole base at Winn Park (WP 2).



Figure 24. Overall view of Dutch Village Park. Green circle annotations indicate locations of poles included in evaluation. Image dated 02/28/2024, provided through Eagleview Connect Subscription. Annotations by WJE.



Figure 25. Typical 25-foot light pole base at Dutch Village Park (DV 1).