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May 2, 2022

Lisa Felice
Executive Secretary
Michigan Public Service Commission
7109 West Saginaw Highway
Lansing, MI 48917

RE: In the matter on the Commission's own motion of the investigation into the response of the DTE Electric Company to recent storm damage service territory
Case No: U-20169

Dear Ms. Felice:

Pursuant to the MPSC's Order in Case No. U-20169, please find attached DTE Electric Company's 2021 Storm Report. If you have any questions, please feel free to contact me.

Very truly yours,

Paula Johnson-Bacon

Digitally signed by Paula Johnson-Bacon
Date: 2022.05.02 17:18:33 -04'00'

Paula Johnson-Bacon

PJB/cdm
Encl.

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter on the Commission's own motion of the investigation into the response of the DTE Electric Company to recent storm damage in its service territory	)))))	Case No. U-20169

Report of DTE Electric Pursuant to the MPSC's Order in Case No. U-20169

On May 17, 2018 the Commission issued an order opening this docket to investigate DTE Electric Company's (DTE Electric) response to a severe windstorm that occurred in its service area on May 4, 2018. Given ongoing concerns over the safety and reliability of DTE Electric's distribution system, the Commission directed DTE Electric to file a detailed report in this docket by June 29, 2018. The Commission further directed the Staff to file an evaluation of DTE Electric's report in this docket by August 10, 2018 and invited all interested persons to file comments on DTE Electric's report and/or the Staff's evaluation in this docket by September 7, 2018.

On January 11, 2019, DTE Electric and the Staff entered into a settlement agreement focused on safety and reliability. The parties agreed that DTE Electric shall:

1. Provide additional first responder personnel as necessary to meet timeframes set forth in R 460.723(1) and (2);
2. Participate in a state-wide initiative coordinated by the Staff and involving all Michigan utilities to jointly improve downed wire response processes;
3. Develop and implement a process to track causes of downed wires;
4. Contract with the National Energy Foundation (NEF) to deliver education to kindergarten through fifth grade students, as well as provide additional funding to the NEF, and to the Michigan Fire Service Instructors Association to purchase electrical safety equipment and provide training to local fire departments in DTE Electric's service territory;

5. Explore potential opportunities to partner with civil infrastructure renewal projects to eliminate rear-lot distribution construction and associated hazards;
6. File an annual report in this docket that includes the following:
    a. A discussion of the improvements made to DTE Electric's downed wire response times, the total number of downed wires, and number of first responders trained. For each storm having over 50,000 outages, the company shall provide the number of first responders, including the number of Secure First and Wire Guard personnel deployed and a graph of the reported downed wires per hour/day during the storm and the average downed wire response time for the storm;
    b. A one-time report describing the company's plan to develop and implement a process to track the causes of downed wires;
    c. The first two annual reports will describe how many students received training and education on the hazards of electricity under the NEF contract and how many fire departments in the company's service territory received training;
    d. The findings and conclusions of the audit process to validate the quality of securing downed wires as described in DTE Electric's September 7, 2018 report;
    e. Estimated target backlog percentage and other progress toward reducing the company's distribution maintenance backlog; and
    f. Proof of concept pilot findings to address accessibility and reliability issues related to rear-lot overhead construction as discussed in the September 7, 2018 report and in response to the Staff's #5 recommendation to the company.

Annual report for Item #6 in this docket shall be filed within 120 days after the end of each calendar year, with the final report to be filed no later than April 29, 2024. This is DTE Electric's report to meet the filing requirement for 2022[1].

[1] This report covers activity from 2021.

6-a. A discussion of the improvements made to DTE Electric's downed wire response times, the total number of downed wires, and number of first responders trained. For each storm having over 50,000 outages, the company shall provide the number of first responders, including the number of Secure First and Wire Guard personnel deployed and a graph of the reported downed wires per hour/day during the storm and the average downed wire response time for the storm;

Since developing and implementing an automated dispatch tool (Chat Bot) for use by wire down teams in 2020, DTE Electric recognized the need to be able to implement real time changes to Chat Bot (e.g., distance constraints, assigning specific job types to specific crew types, addition of new questions, and batch dispatching). To address this need, we have implemented 143 Chat Bot code changes. Prior to these enhancements, Chat Bot changes would take up to two months to implement. Chat Bot is now capable of automatically uploading remarks and updating sub-types for service-drop jobs. Historically, DTE Electric Dispatchers gathered this information and uploaded it into our InService database, a process that delayed field resources from moving on to the next job.

An enterprise-wide effort began in 2021 to increase the number of employees to secure downed wires from 235 to 800, and the number of contract-responders from 40 to 600. It is important to note that these resources will be trained and qualified to identify wire down hazards, tape the site, communicate with customers, and stand by jobs if applicable. These resources will also allow our linemen to perform restoration work instead of spending time on wire downs. Our complement of Dispatchers also increased from 15 to 50. Instructor-led and web-based training has been refined and integrated into our corporate learning system.

To ensure field resources are efficiently moving from job to job, a backup support system of 30 contract cut crews was established in the fourth quarter of 2021. An additional 20 cut crews were added in the first quarter of 2022.

DTE Electric is investing in leading edge meteorology modeling tools and in additional weather stations to improve forecast accuracy and specific location impacts. Faster, more accurate, and more specific detail will help to improve our field resource planning ahead of the storm, a key input to lowering wire down response times.

In 2021, DTE Electric experienced 13 storm events, as detailed below in Table 1.

Table 1 – 2021 Storm Wire Down Event Detail

Storm #	Customers Affected	Number of Wire Downs
2021001	88,280	782
2021002	190,163	1,443
2021003	210,224	1,650
2021004	46,042	467
2021005	141,135	1,392
2021006	498,350	5,915
2021007	59,444	481
2021008	47,326	329
2021009	28,649	281
2021010	80,911	725
2021011	40,897	541
2021012	218,616	2,146
2021013	175,857	1,870

Currently, a total of 3,600 employees and contractors are trained to effectively respond to wire downs, as broken down in Table 2 below.

Table 2 – Number of Wire Down Resources

Function	Current State
DTE Lineman	411
Contract Lineman	303
Secure First	790
Contractors	788
Single Damage Assessment	587
Damage Assessment	290
Underground	117
EFO	129
Service Restoration	185
Total	**3,600**

In 2021, DO experienced nine events where the number of affected customers exceeded 50,000. Reported wire downs on an hourly basis are summarized in Figures 1 through 9 below.

Figure 1 – Incoming Wire Downs, Storm 2021001

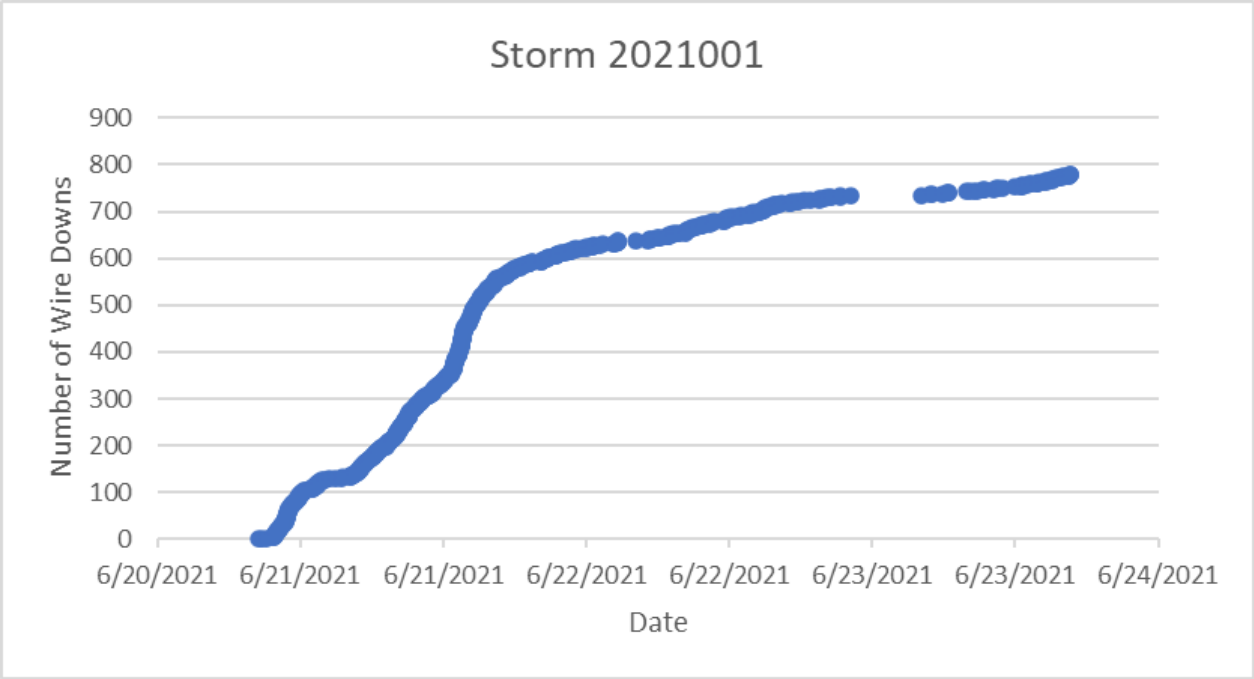


Figure 2 – Incoming Wire Downs, Storm 2021002

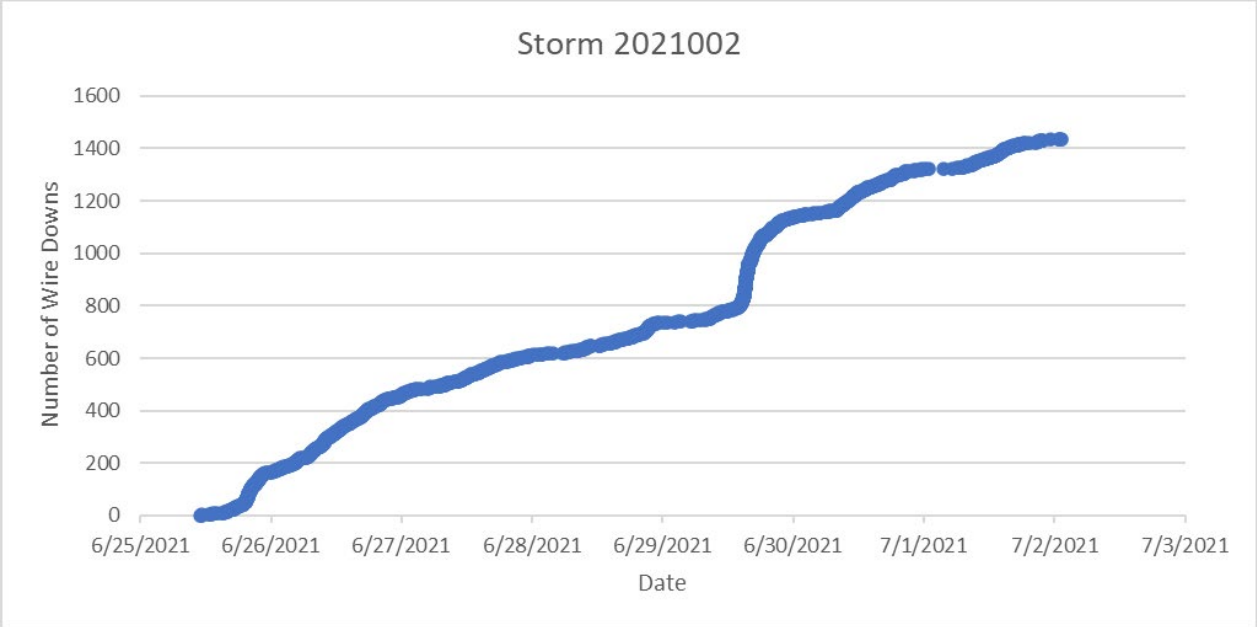


Figure 3 – Incoming Wire Downs, Storm 2021003

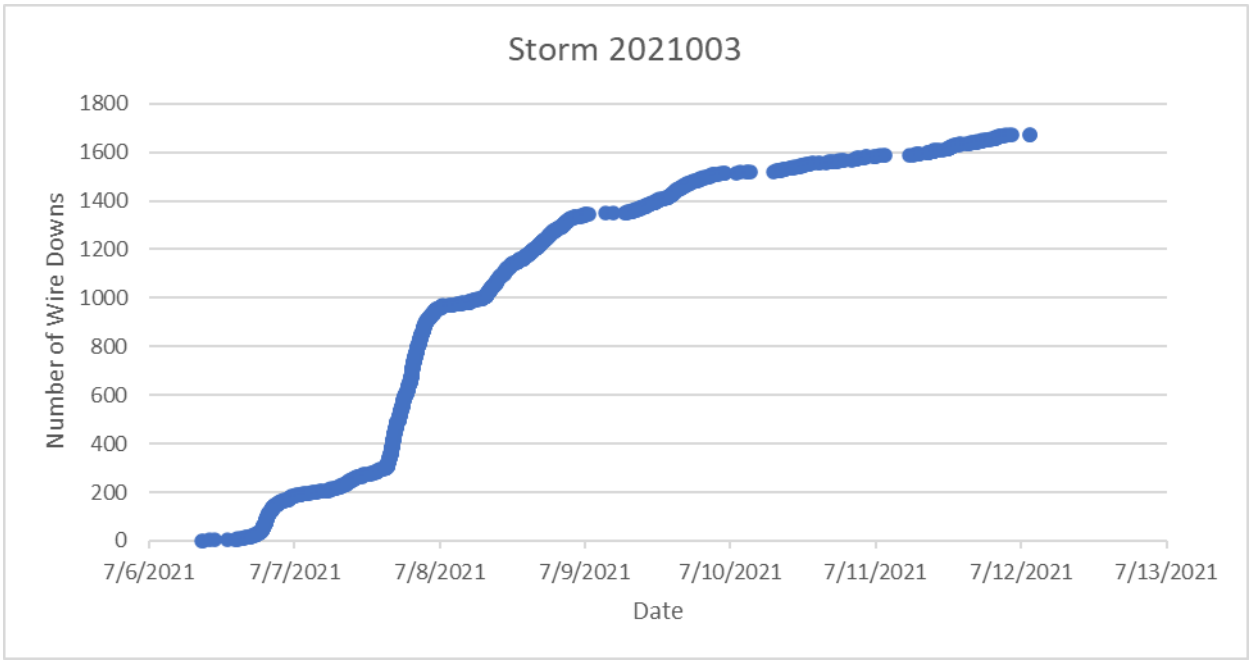


Figure 4 – Incoming Wire Downs, Storm 2021005

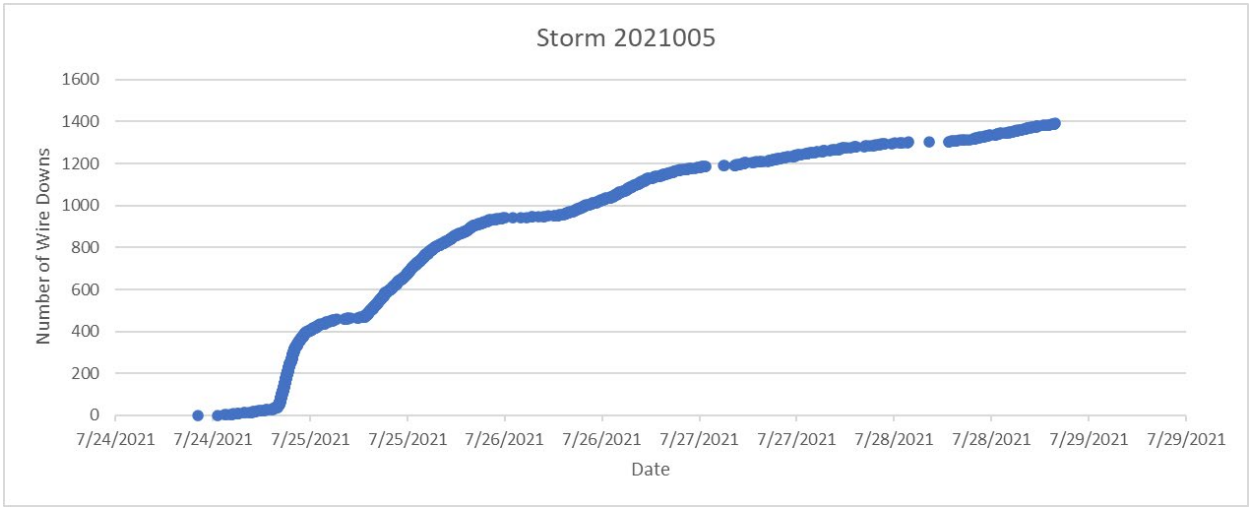


Figure 5 – Incoming Wire Downs, Storm 2021006

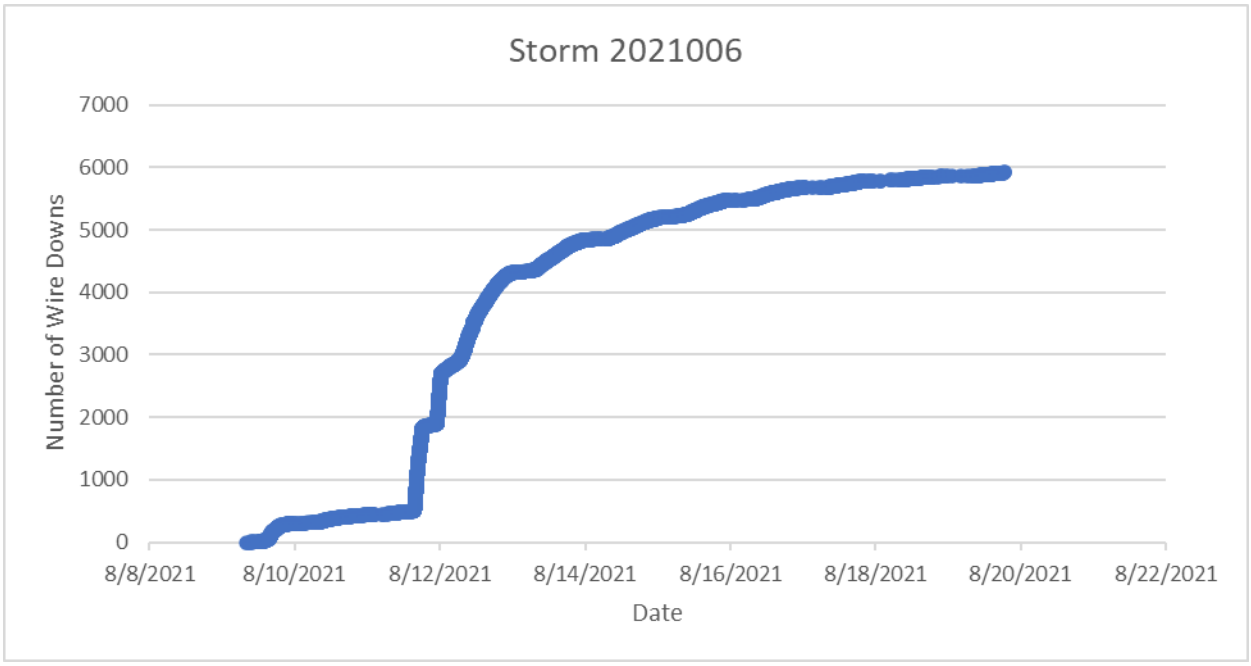


Figure 6 – Incoming Wire Downs, Storm 2021007

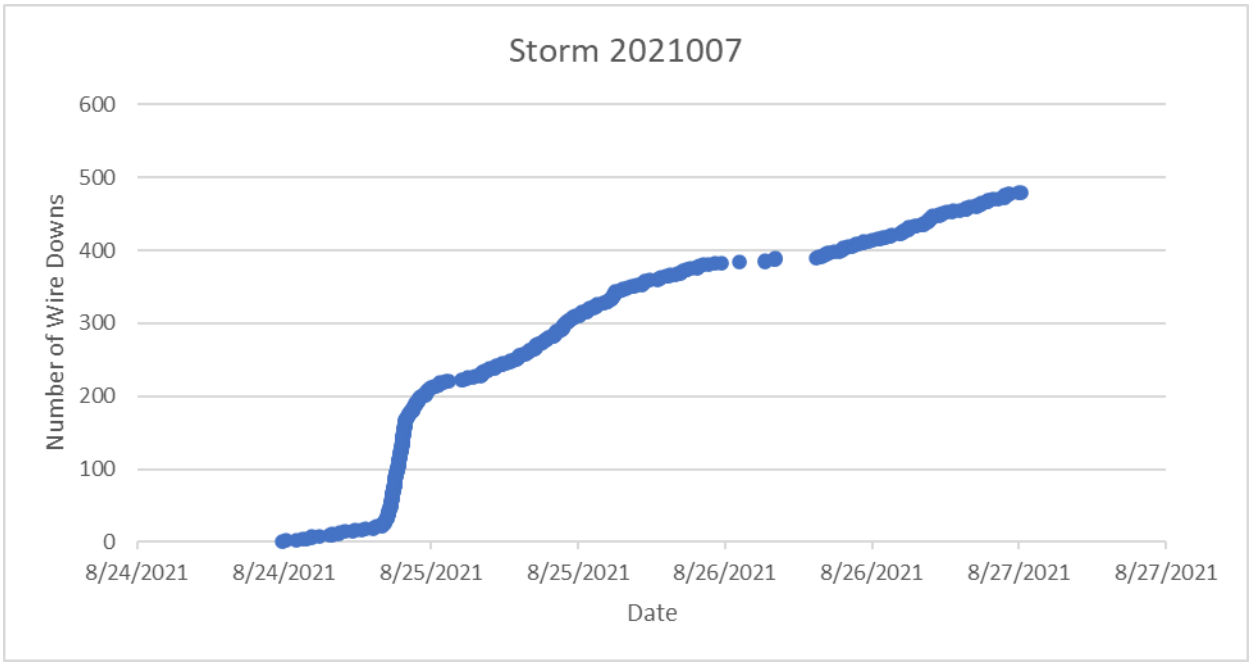


Figure 7 – Incoming Wire Downs, Storm 2021010

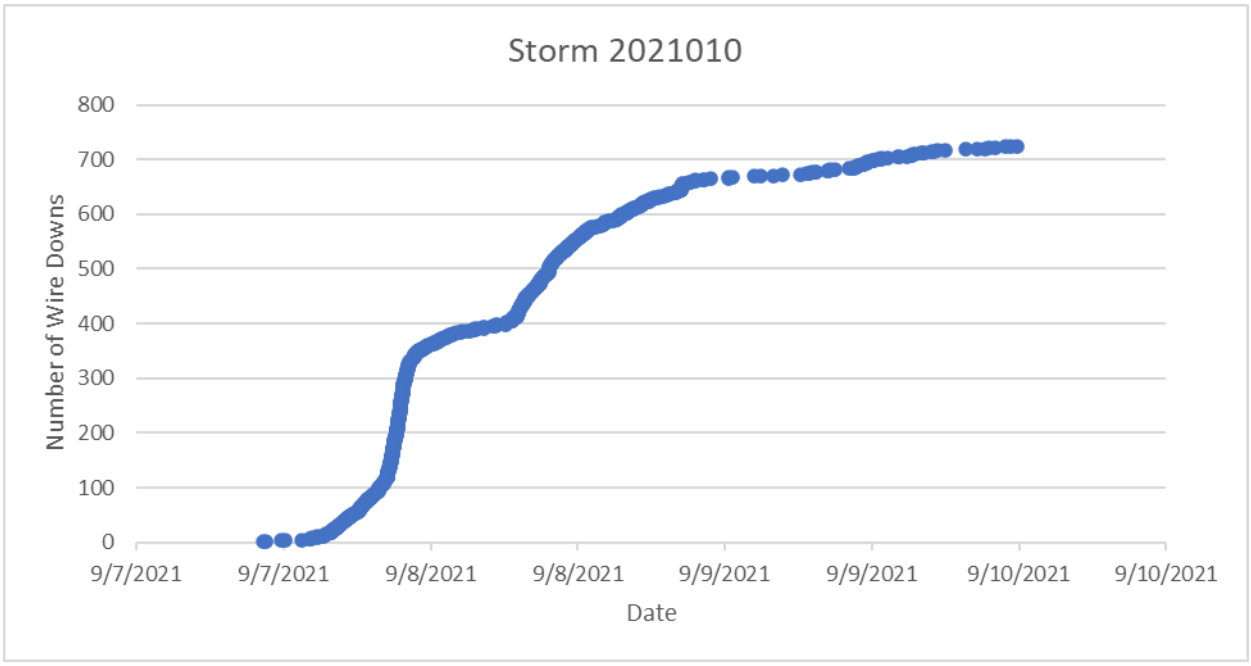


Figure 8 – Incoming Wire Downs, Storm 2021012

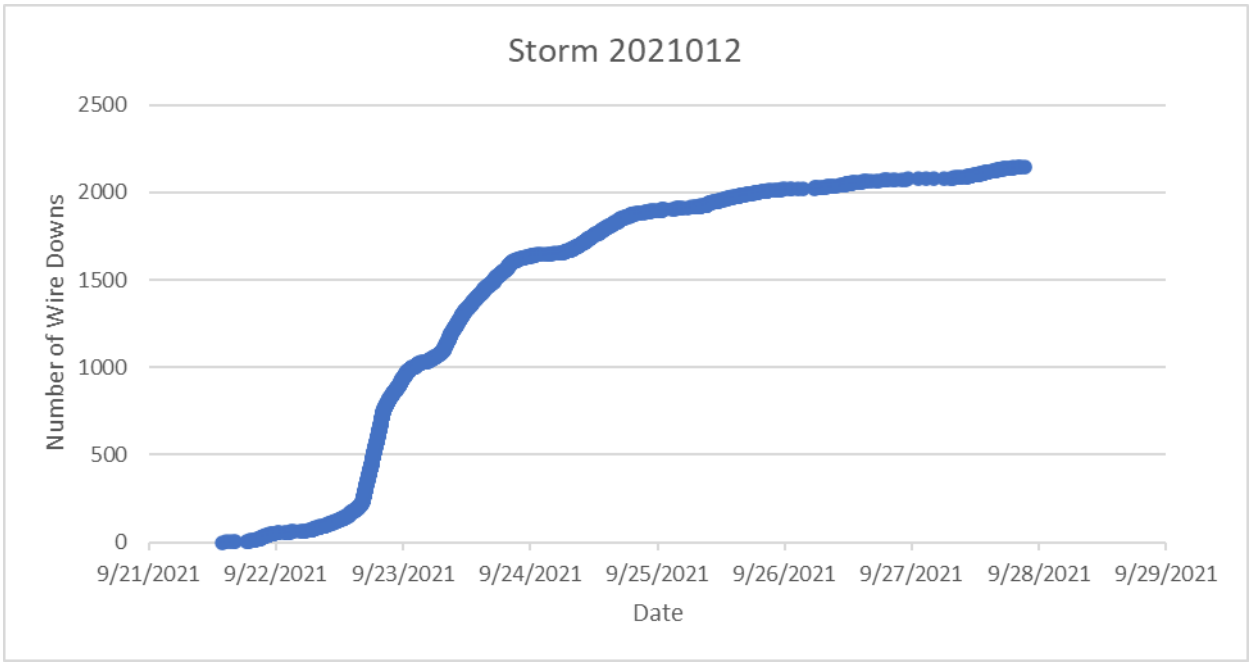
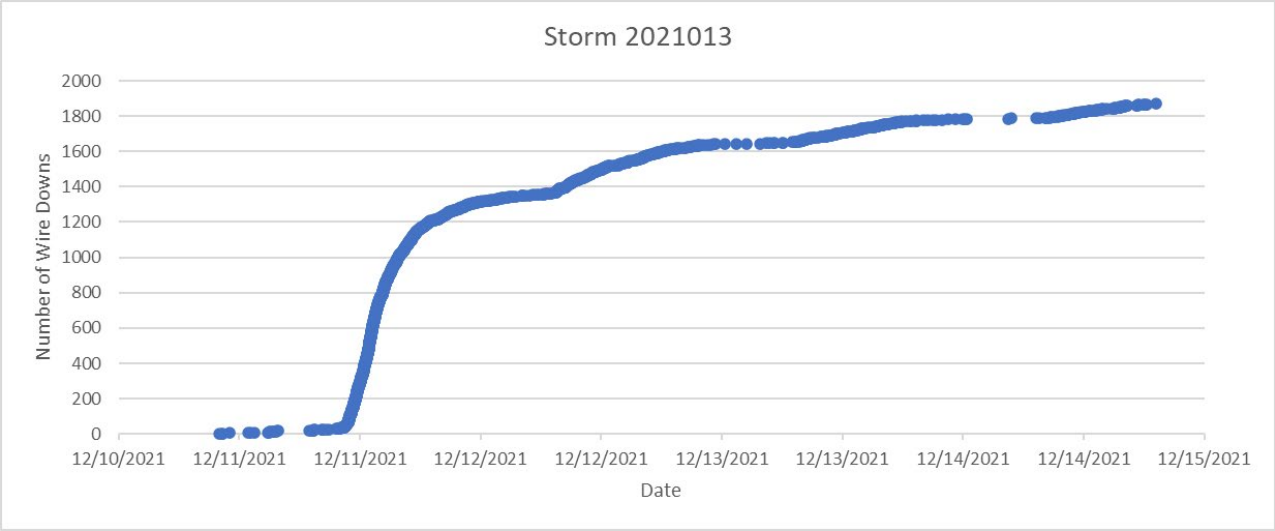


Figure 9 – Incoming Wire Downs, Storm 2021013



Average and median arrival times and deployed wire down teams are shown in Table 3 below.

Table 3 – Average Arrival Times, Number of Wire Down Teams

Storm #	Number of Wire Downs	Average Arrival Time (min)	Expected Average Arrival Time (min) (based on 2019/2020)	Median Arrival Time (min)	Expected Median Arrival Time (min) (based on 2019/2020)	Number of Wire Down Teams
2021001	782	106	111	61	55	283
2021002	1443	95	168	49	72	379
2021003	1650	232	186	78	78	418
2021005	1392	377	164	95	70	340
2021006	5915	780	583	371	298	710
2021007	481	178	86	60	49	222
2021010	725	199	107	76	54	273
2021012	2146	370	229	116	94	460
2021013	1870	304	205	189	85	459

6-d. The findings and conclusions of the audit process to validate the quality of securing downed wires as described in DTE Electric's September 7, 2018 report;

Any defects found in the field are processed through the Emergency Preparedness and Response team for remediation. Each case is analyzed for root cause; once the cause is determined any necessary coaching/disciplinary action takes place. Given the push for additional resources to address downed wires, the number of auditors in 2022 will increase.

Wire Down Audit Checklist

Auditor Name _____

Date _____

Address _____

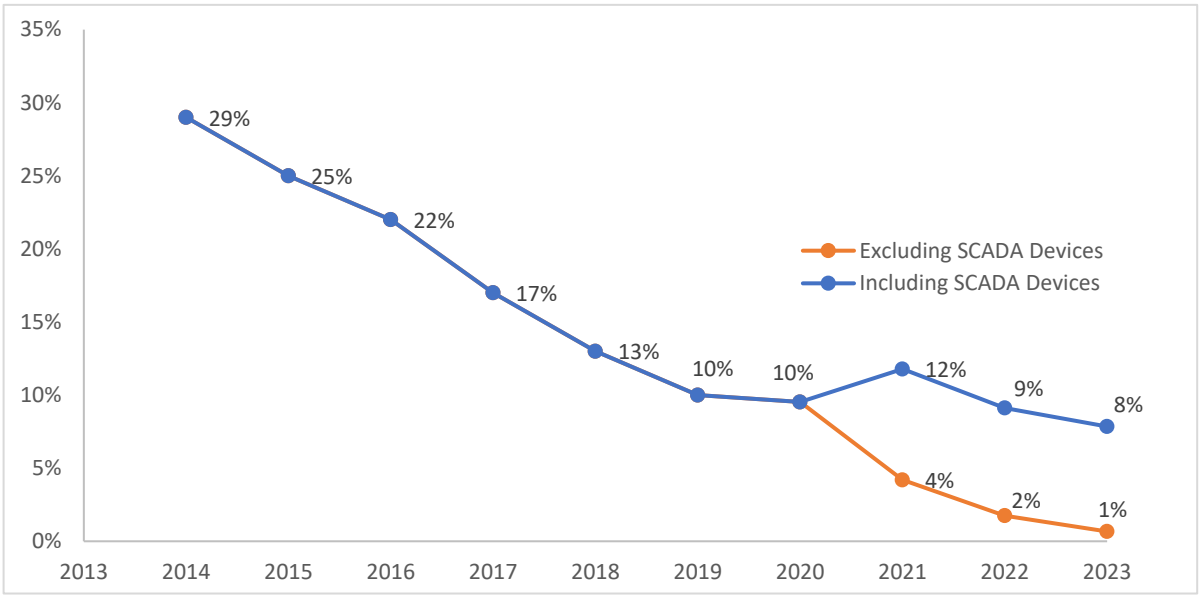
Is Follow Up Required? _____

Satisfactory (S)	Improvement Opportunity (IO)	Not Applicable (NA)	
			Is the barrier tape located 20 feet from the electrical hazard?
			Is tape tied off to anything metal?
			Is the entire area taped off?
			Is there evidence of an employee passing through a metal gate?
			Are the door hangers properly hung?
			Are the door hangers properly filled out?
			Are neighbors properly notified?
			Are lanes of traffic properly closed off?
			Are flares properly activated?
			Are flashers properly activated?

6-e. Estimated target backlog percentage and other progress toward reducing the company's distribution maintenance backlog; and

DTE Electric has continued to improve its maintenance backlog of critical assets from 29% in 2014 to under 12% at year-end 2021. DTE defines critical assets as those that have the potential to impact the largest number of customers and include the following asset classes: distribution breakers, regulators, single tap substations, distribution SCADA devices and primary switch cabinets. It is currently projected that the distribution breaker backlog will be eliminated by the end of 2022, while the primary switch cabinet and regulator backlogs will be eliminated by the end of 2024. The largest contributor to the overall backlog is SCADA devices. Due to issues identified during failure analysis, SCADA devices had their maintenance cycle cut in half from eight years to four years resulting in an immediate and significant backlog. Excluding distribution SCADA devices, the maintenance backlog for all other critical assets at year-end 2020 was 4%. It is projected to be below 2% at year-end 2022 and to be below 1% at year-end 2023.

Figure 9 – Reduction in Preventive Maintenance Backlog for Critical Assets



Assets are prioritized for inspection based on their health assessments, and asset maintenance is generally performed to adhere to pre-determined, time-based maintenance cycles. However, these time-based cycles may be altered based on several other considerations, which would technically render them off-cycle, but are not a deviation from best practices (such as condition-based predictive maintenance programs discussed below). Assets may have maintenance intentionally

deferred/canceled due to planned work in the near-term where the assets will be decommissioned or replaced. Conversely, assets may have maintenance activities completed ahead of cycle based on other criteria (e.g., breakers are inspected after a pre-specified number of fault operations, regardless of the time since last inspection). When this happens, another asset's maintenance may need to be deferred to allow resources and required shutdowns to be rescheduled, as per normal industry practices.

Additionally, some assets have maintenance activities deviate from time-based cycles based on results from the Company's Predictive Maintenance program. The Predictive Maintenance program uses condition-based assessments to determine if maintenance should be pulled ahead or safely deferred from time-based cycles. For instance, regulators and single tap substations are both on cycle with Predictive Maintenance inspections and therefore are considered up to date on maintenance although they may not be on-cycle with time-based maintenance. As more condition-based Predictive Maintenance is conducted, there could be more deviations from time-based maintenance cycles. This condition-based maintenance technology is a well-accepted practice throughout the industry.

In addition to the time-based maintenance and condition-based predictive maintenance, substation operators perform monthly visual inspections on all DTE Electric substations to identify and address potentially emerging problems. Any identified issues are scheduled for additional maintenance or remediation. The monthly substation visual inspections are performed for all major power equipment, the building, the fences, and the environmental systems to ensure safe and reliable operations.

In summary, the backlog is not simply a result of delay, but a calculated and monitored schedule shift for particular assets. DTE Electric has been on a steady pace to reduce its maintenance backlog. One of the greatest challenges in reducing the preventive maintenance backlog is the level of required system redundancy needed to allow the equipment to be isolated and safely de-energized for maintenance activities without interrupting customers. Considerations to de-energize are a significant factor in the development and execution of DTE Electric's plan to reduce the maintenance backlog. DTE Electric maintains that the existing maintenance program including the backlog reduction plan best serves the Company's customers while minimizing the risk of forced outages.

6-f. Proof of concept pilot findings to address accessibility and reliability issues related to rear-lot overhead construction as discussed in the September 7 report and in response to the Staff's #5 recommendation to the company.

DTE Electric is evaluating multiple alternatives to 4.8 kV rear lot overhead construction in the City of Detroit. Each alternative has feasibility and constructability challenges associated with community acceptance, rights-of-way, and other existing infrastructure (sewer, gas, etc.). The following table compares key benefits and considerations for various alternatives to rear lot overhead construction.

Table 5 - Comparison of Alternatives to 4.8 kV Rear Overhead Construction

Rebuild Method	Description	Key Benefits	Key Considerations
1. Overhead Rear Lot	Install poles, overhead wires, and equipment in alleys, vacated alleys or rear lots	• Easy connection to existing meter boxes • Away from foot traffic	• Not truck accessible – climb required for tree trim, • maintenance, and restorations • Maintenance tree trim required Pole and Pole Top Maintenance (PTM) required
2. Underground Rear Lot	Install underground padmount transformers, pedestals, cable and conduit etc. in alleys, vacated alleys or rear lots	• No exposure to downed wires • Easy connection to existing meter boxes • No need for maintenance tree trim • No need for Pole and Pole Top Maintenance • (PTM) No need for 4.8 kV Hardening	• Encroached fence lines and obstacles in alleys make • underground construction difficult Difficulty in obtaining permits & customer approvals • Damage to landscape • Installation cost is significantly higher than overhead Installation
3. Underground Front Lot	Install underground padmount transformers, pedestals, cable and conduit etc. in front lots adjacent to the road and reroute service wire to meter box in rear lot	• No exposure to downed wires • No need for maintenance tree trim • No need for Pole and PTM • No need for 4.8 kV Hardening	• Damage to customer property (driveways, landscape, • etc.) • Interference with existing utilities (sewer, gas, water, • etc.) Difficulty in obtaining easements, permits and community approvals Difficulty in connecting to existing meter boxes • Installation cost is significantly higher than overhead installation
4. Overhead Front Lot	Install poles, overhead wires, and equipment in front lots adjacent to the road and reroute service wire to meter box in rear lot	• Improved truck access • Reduced tree interference (typically front lots • have less tree density) Reduced cost in maintenance tree trim • Reduced cost in Pole and PTM • Reduced cost in 4.8kV Hardening	• Aesthetically not appealing • Damage to customer landscape • Interference with existing utilities (sewer, gas, water, etc.) • Difficulty in obtaining easements, permits and community approvals • Difficulty in connecting to existing meter boxes • Maintenance tree trim required • Higher foot traffic in vicinity of overhead wires
5. Primary De-conductoring	Remove primary wires in sparsely populated areas and reconductor secondary wires where necessary	• Reduced exposure to downed primary wires • Improved truck access • Reduced cost in maintenance tree trim • Reduced cost in Pole and PTM • Reduced cost in 4.8 kV Hardening • Radial secondary results in easier to locate and isolate trouble	• Potential low voltage issues for end customers • Rebuild required if the area repopulates

Proof of Concept Pilots

DTE Electric has three proof of concept pilots in progress. The first pilot is to replace 4.8 kV rear lot overhead on circuit Appoline 1346 with a rear lot looped Underground Residential Distribution (URD) system (Alternate #2 in Table 5). The second pilot is primary de-conductoring on two circuits: Wayburn 2136 and Grant 1598 (Alternate #5 in Table 5). These two alternatives were chosen to be piloted first because they are considered most viable in terms of executability and engineering attributes for neighborhoods of different occupancy rates. The third pilot is to relocate overhead rear-lot assets to front-lot URD on a portion of Fairmount DC 1593 (Alternative #3 in Table 5). The final alternative, #4 may be considered in future pilots.

Pilot 1: Appoline 1346 Conversion to Underground Rear Lot (Alternative #2)

To ensure an executable and successful pilot, Appoline 1346 in northwest Detroit was chosen based on consideration of the occupancy rate, potential community and customer approval challenges, and access to rear lot meter boxes. The pilot affects approximately 60 residential customers on two city blocks. The scope of the pilot project includes the installation of a looped URD system with approximately 1,300 feet of primary, six transformers, and underground services to residences. Once functional, the overhead infrastructure will be removed, including eleven wood poles, three transformers, #6 primary conductor, secondary conductor, and overhead services.

Preliminary field visits and design were undertaken in the first quarter of 2019. In July 2019, a letter was sent to affected customers to inform them that DTE Electric will be working in the area. There exist encroachments of customers' fences and structures in the vacated alleys that require customer approvals before construction work can take place. The underground work will include trenching and boring and siting the pad mount transformers. Customers' meter boxes will have to be modified or replaced to accommodate underground service. Construction of the cable poles was completed in late 2019 and the URD loop construction was completed in the first quarter of 2020. The remaining work is the installation and connection of the underground service to the residences. This requires direct interaction with each customer, which was delayed in 2020 due to restrictions stemming from the COVID-19 pandemic. As of the end of 2021, approximately half of the customers have been transferred to the URD loop. Obtaining the required customer approvals to perform the work needed on their properties remains a challenge. The Company is going door to

door to meet with customers to obtain these approvals. After completion of the pilot, based on lessons learned and costs, an evaluation will be made as to the feasibility and economics of additional opportunities to convert rear-lot overhead to underground.

Figure 10 - Appoline 1346 Pilot: Fence and Structure Encroachment in Right-Of-Way

Figure 11 - Appoline 1346 Pilot: Two City Blocks for Rear-Lot OH to UG Conversion
Yellow Lines – Primary Conductors
Red Lines – Secondary Conductors
Green Lines – Edge of Right-of-Way

Pilot 1: Appoline 1346 Update / Lessons Learned to-date

The Appoline Pilot has reached its final stage and efforts to obtain approval from and connect the remaining customers are underway. Through this stage of the project there are key lessons learned:

1) The area required more clean-up than initially estimated (clearing brush/trees, general rubbish, etc.)
2) It is challenging to make direct contact with customers

In order to install the transformers and prepare the site for the installation of the URD loop the area needed to be cleared of debris. During this processes DTE Electric observed a higher level of tree and brush than expected, along with several fence and a few garages in the previous alley right of way, and in addition they were required to remove more garbage, including medical waste such as needles. This process slowed the project slightly and will be considered if a full-scale undergrounding project is going to be implemented.

Perhaps the biggest challenge faced during this project was contacting the customers to obtain approvals. DTE Electric began the process by sending out mailings, twice, for which no responses were acquired out of the 61 customers contacted. Following the mailings, DTE Electric utilized door hangers, again trying the approach twice. From the door hangers DTE Electric received two approvals. Currently, DTE Electric is going door to door to meet with the customers face-to-face and contacting property owners when the premise is a rental property. This process is still ongoing but has received the best results to date. DTE Electric has received approval to perform the necessary work to connect them to the new URD loop from 43 of the 61 customers.

Pilot 2: Primary De-conductoring (Alternative #5)

In certain urban areas, neighborhoods have become increasingly less occupied; there are situations where on a city block only a fraction of the residences are inhabited and many are uninhabitable. For instance, the infrastructure in the City of Detroit was established to serve the peak population of approximately 1.8 million in the 1950s. With the population now at approximately 670,000, there are many unoccupied properties and underutilized and aging assets.

Figure 12: Unoccupied areas in the DTE's Caniff Service Center Area

(east side of the Detroit Metropolitan area)
The blackened areas represent unoccupied properties

In these sparsely populated areas, primary de-conductoring may be an option. Primary de-conductoring involves the removal of small sized primary wire and arc circuit wire as well as overhead transformers and pole tops, and reconductoring secondary wires where necessary. The amount of infrastructure removal is dependent upon the sparsity and location of customers in the neighborhood while maintaining adequate voltage on the secondary (in absence of the primary) and jumpering points for contingencies. Two circuits were selected for the pilot: Wayburn 2136 and Grant 1598. Combined, the two circuits serve 1,300 customers and have 19 miles overhead primary, or 68 customers per overhead mile of primary – sparse for an urban neighborhood.

High level conceptual design and scope of work have been completed for both circuits. The combined scope includes the removal of 40,000 feet of primary, removal of 120 rear lot overhead transformers, installation of 60 truck accessible transformers, and reconductoring 20,000 feet of secondary. After completion of the pilot, based on lessons learned and costs, an evaluation will be made as to the feasibility and economics of additional opportunities for primary de-conductoring.

Figure 12 - Primary/Secondary Lines and Properties on Wayburn 2136
Yellow Lines – Primary Conductors
Red Lines – Secondary Conductors
Green Lines – Edge of Right-of-Way

Pilot 2: Primary De-conductoring Update / Lessons Learned

At this time one of the two de-conductoring projects has been completed. Wayburn 1236 was completed ahead schedule in 2020 utilizing available extra crews to complete the planned scope. In addition, the lower population density resulted in limited issues on the electrical system.

Grant 1598 is still under construction and has seen some additional challenges. The population density is higher on Grant than on Wayburn, which has caused some voltage issues when de-conductoring. Construction on Grant is underway and the scope of work is expected to be complete in August 2022.

Through these two projects DTE Electric has learned a couple of lessons, primarily that removing some sections of primary has caused voltage issues on the circuits. As such, some primary has been left in place to maintain proper voltage. DTE Electric also learned that the less dense the population is in an area the easier and more effective the de-conductoring project is.

Pilot 3: Rear-lot to Front Lot URD Pilot (Alternative #5)

A third pilot was developed as part of the 2021 DGP and the impacts of scenario planning, which considered a future with a higher intensity and frequency of severe weather. Customer outages caused by storm in the summer of 2021 support the identified impacts of that scenario. This pilot project has chosen Fairmount DC 1593 in East Detroit. The circuit currently serves a well populated neighborhood with overhead rear-lot laterals. The customers on this circuit have experienced a higher than average number of down wires per mile, even after tree trim has been completed, so an additional solution is needed. The scope of the project will be to convert the current rear-lot overhead laterals to front-lot URD using the lessons learned from Appolline and benchmarking. This pilot, along with an overall life cycle cost model that is being developed, will allow the company to create and refine criteria for which situations warrant moving overhead laterals underground.

The scope of the project is to install approximately 3.3 miles of URD, 77 pad-mounted transformers, 260 pedestals, and underground residential services. Additionally, 2.5 miles of rear-lot overhead lines will be removed from the circuit. The new infrastructure will be constructed to support future conversion to a higher voltage as well.

This pilot is still in the design phase, with construction expected to start in the Fall of 2022 and continue throughout 2023.

Conclusion

On January 11, 2019, DTE Electric and the Staff entered into a settlement agreement focused on safety and reliability. That settlement agreement included a requirement that DTE Electric file an annual report regarding items #6a-f. This document meets that requirement and demonstrates DTE Electric's continued commitment to operating and maintaining a safe and reliable electrical distribution system.