

Electrical Engineering & Line Department Report



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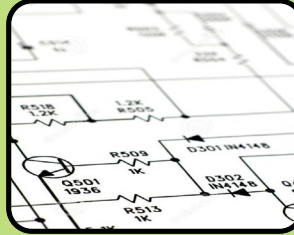
Presentation Agenda



Outage
Types



Major
Events



Reliability
Indices



Monthly
Report



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Outage Types

- **Momentary**

- One or more power interruptions that are 5 minutes or less

- **Unplanned**

- Unintentional loss of power to customers

- **Planned**

- If an outage can be deferred, it is “planned”

- **Major Event**

- “(A)n event that exceeds reasonable design and or operational limits of the electric power system.”



Major Events



One Large Event

- Many Meters
- Long Duration



Many Events, One Day

- Heavy Winds
- Various Feeders



Extreme Type of Event

- Flood
- Wildfire
- Zombie Apocalypse



Reliability Indices

$$\text{SAIDI} = \left(\frac{\text{All minutes every customer experienced an unplanned outage}}{\text{All TID customers}} \right) / \text{Year}$$

System Average Interruption Duration Index

- Average duration of an unplanned outage on the system
- The Index is given in “minutes-per-year”

Customer Average Interruption Duration Index

- Average restoration time for an interrupted customer
- The Index is given in “minutes-per-year”

$$\text{CAIDI} = \left(\frac{\text{All minutes every customer experienced an unplanned outage}}{\text{All customers that experienced an unplanned outage}} \right) / \text{Year}$$

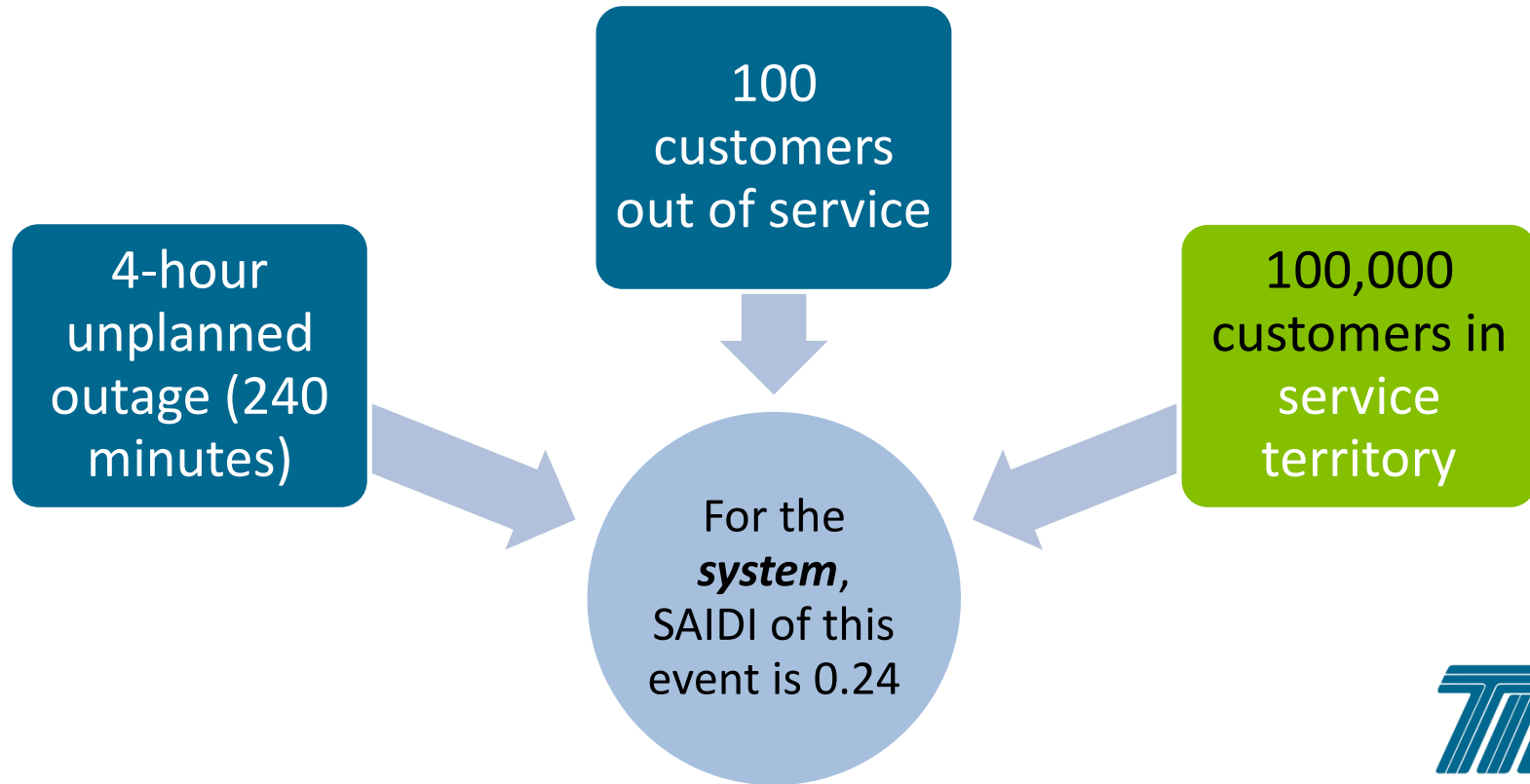
$$\text{MAIFI} = \left(\frac{\text{All customers that experienced a momentary outage}}{\text{All TID customers}} \right) / \text{Year}$$

Momentary Average Interruption Frequency Index

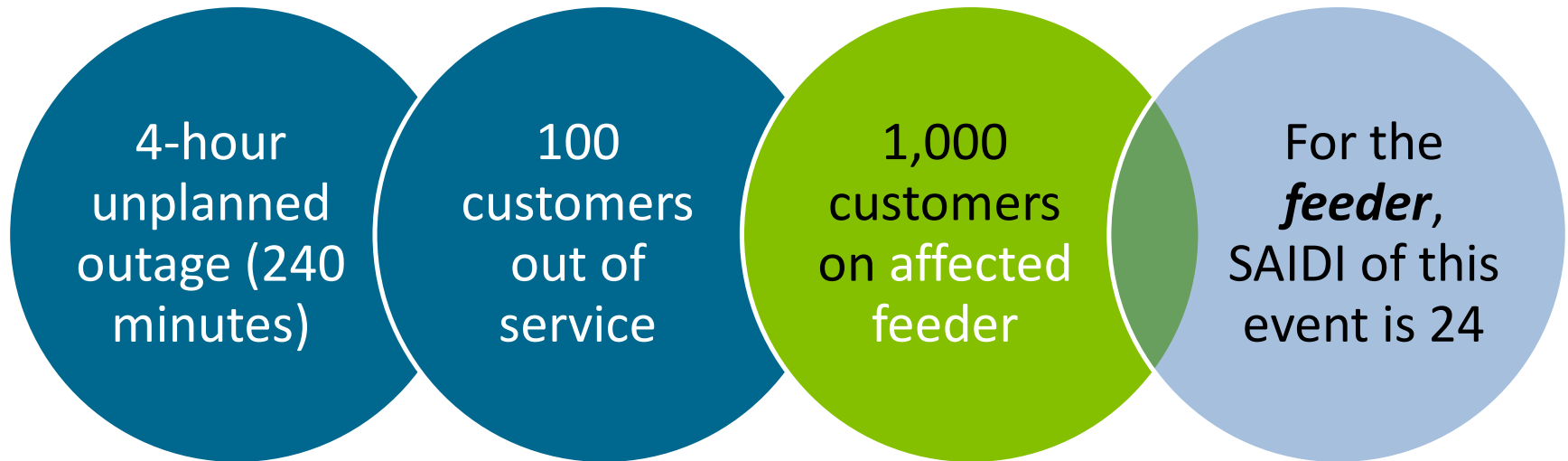
- How often momentary outages occur on average
- The Index is given in “momentary-outages-per-year”



Service Territory SAIDI Example



Single Feeder SAIDI Example



“How SAIDI accumulates” Example

Three separate
identical outages,
same *system*

$$(240 * 100) + \\ (240 * 100) + \\ (240 * 100) = 72,000$$

$$72,000 / 100,000 = \\ 0.72 = 0.24 + 0.24 \\ + 0.24$$



Two outages, same SAIDI

Many customers,
short time

1,000 customers
for 30 minutes

Annual SAIDI of
system with 100K
customers = 0.3

Few customers,
long time

10 customers for
3000 minutes

Annual SAIDI of
system with 100K
customers = 0.3

10 customers for
50 hrs = 1,000
for 30 min.



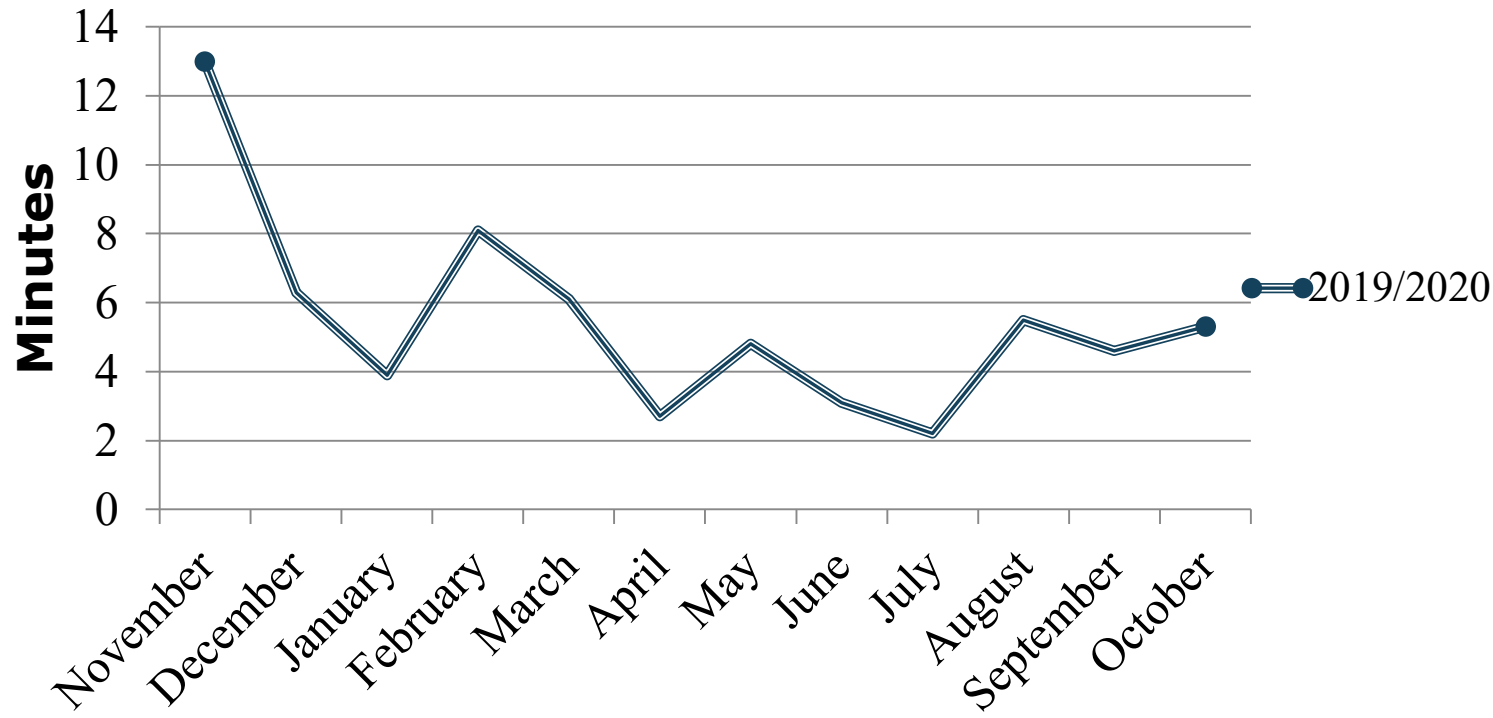
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Monthly Report Introduction

- Provides “at-a-glance” reliability performance
- Indicates relative performance trends
- Reports four reliability data items:
 - Monthly SAIDI trend
 - Cumulative annual SAIDI trend
 - Monthly CAIDI trend
 - Monthly MAIFI trend

Monthly SAIDI

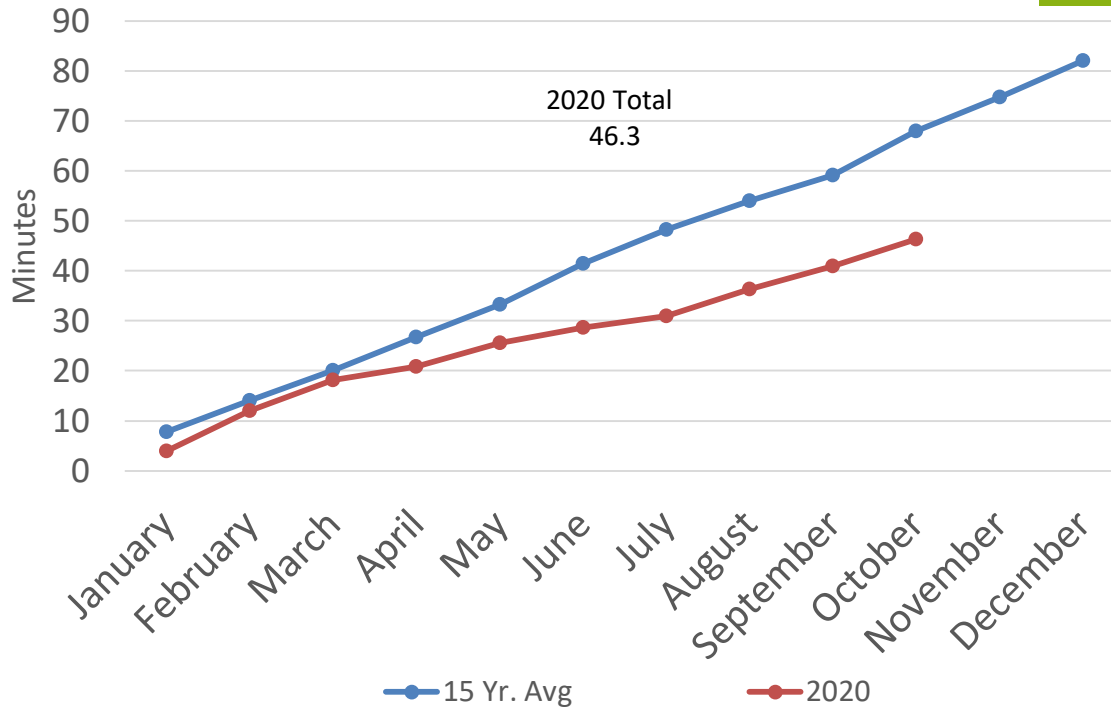
$$\text{SAIDI} = \left(\frac{\text{All minutes every customer experienced an unplanned outage}}{\text{All TID customers}} \right) / \text{Month}$$



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Year to Date SAIDI

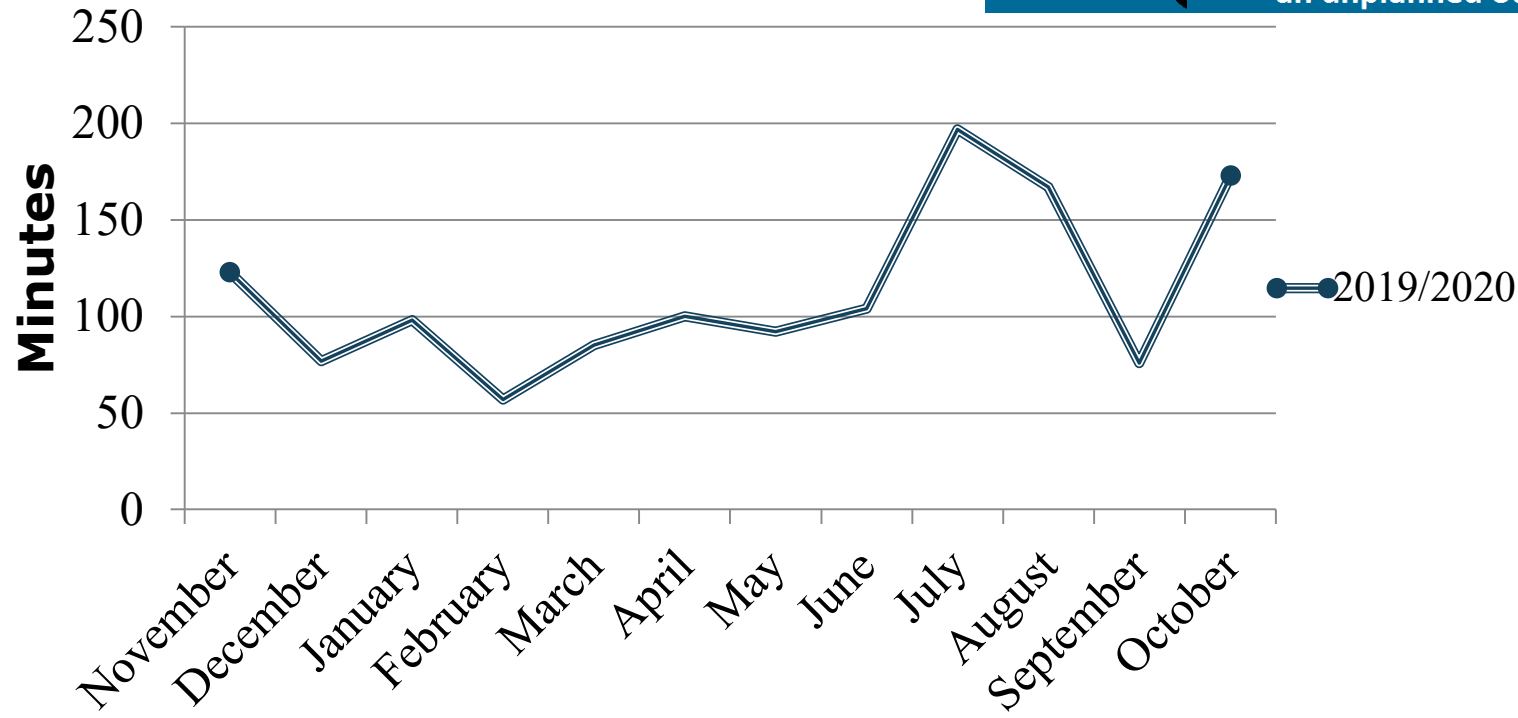
$$\text{SAIDI} = \left(\frac{\text{All minutes every customer experienced an unplanned outage}}{\text{All TID customers}} \right) / \text{Year}$$



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Monthly CAIDI

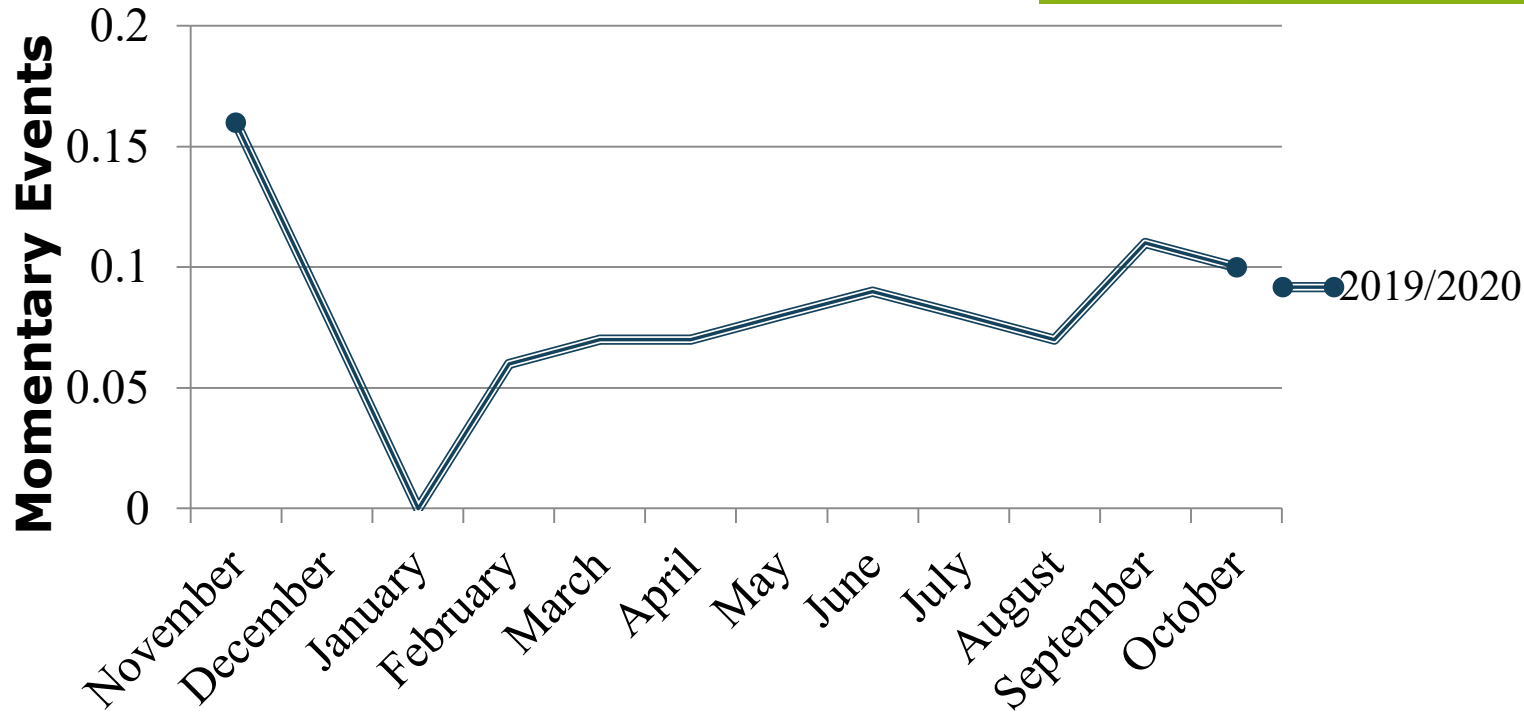
$$\text{CAIDI} = \left(\frac{\text{All minutes every customer experienced an unplanned outage}}{\text{All customers that experienced an unplanned outage}} \right) / \text{Month}$$



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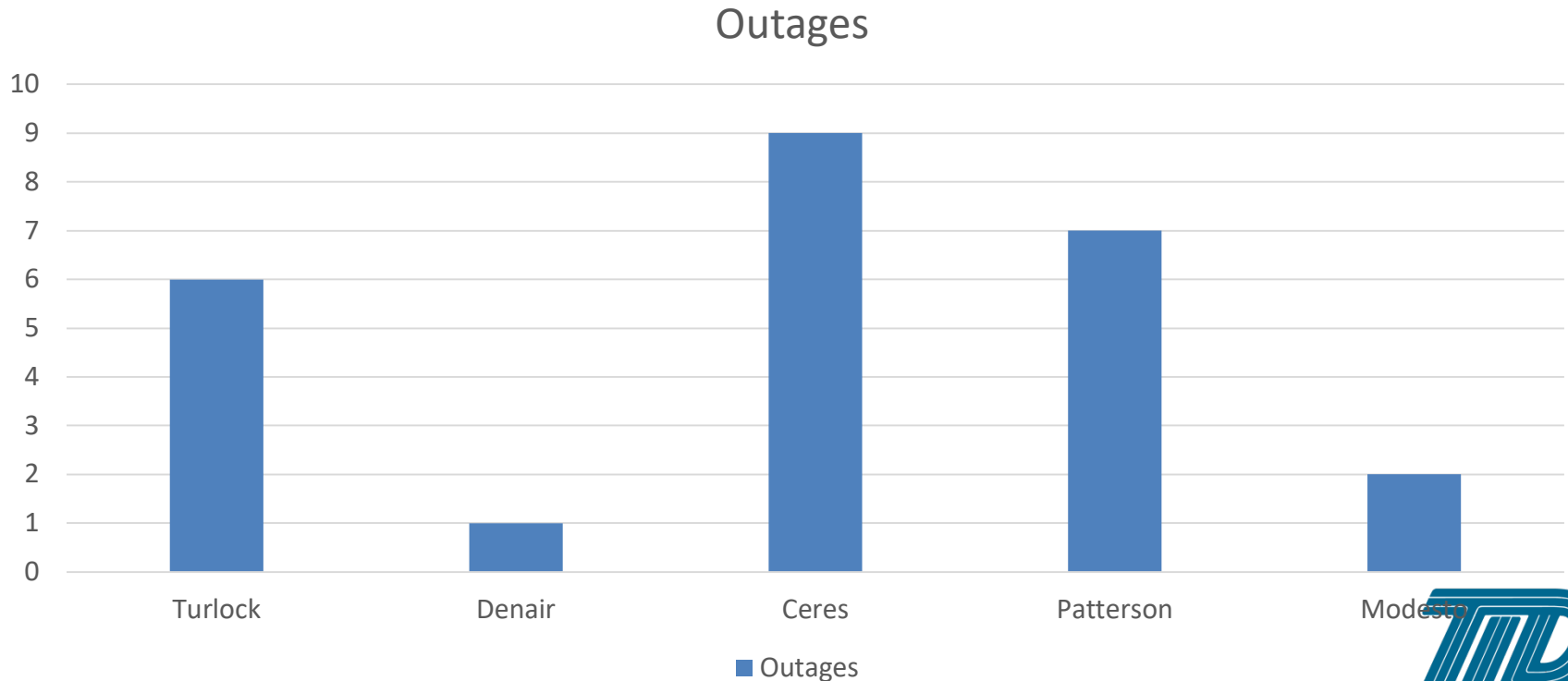
Monthly MAIFI

$$\text{MAIFI} = \left(\frac{\text{All customers that experienced a momentary outage}}{\text{All TID customers}} \right) / \text{Month}$$

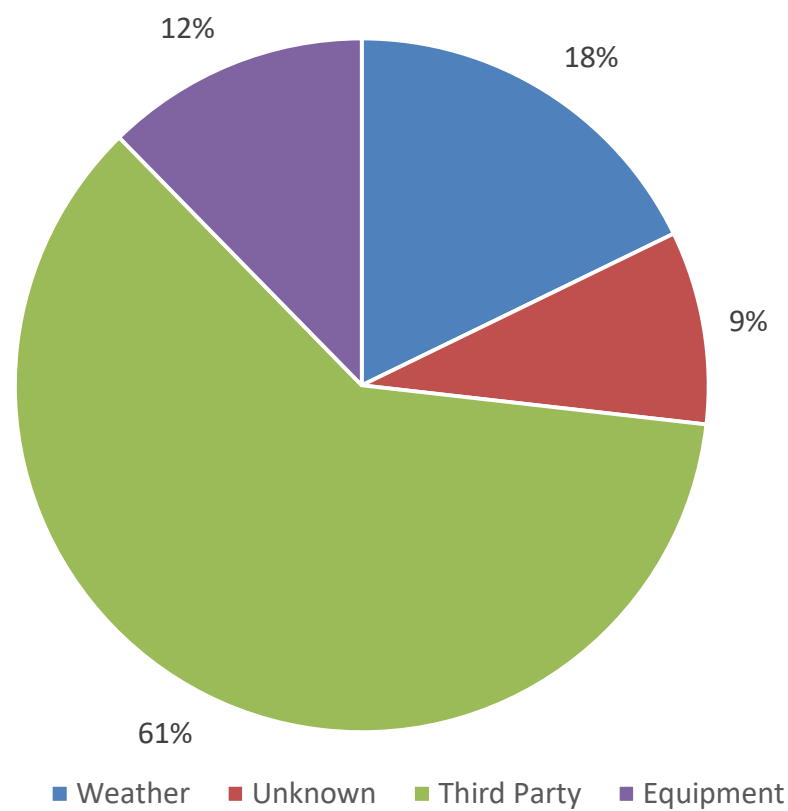


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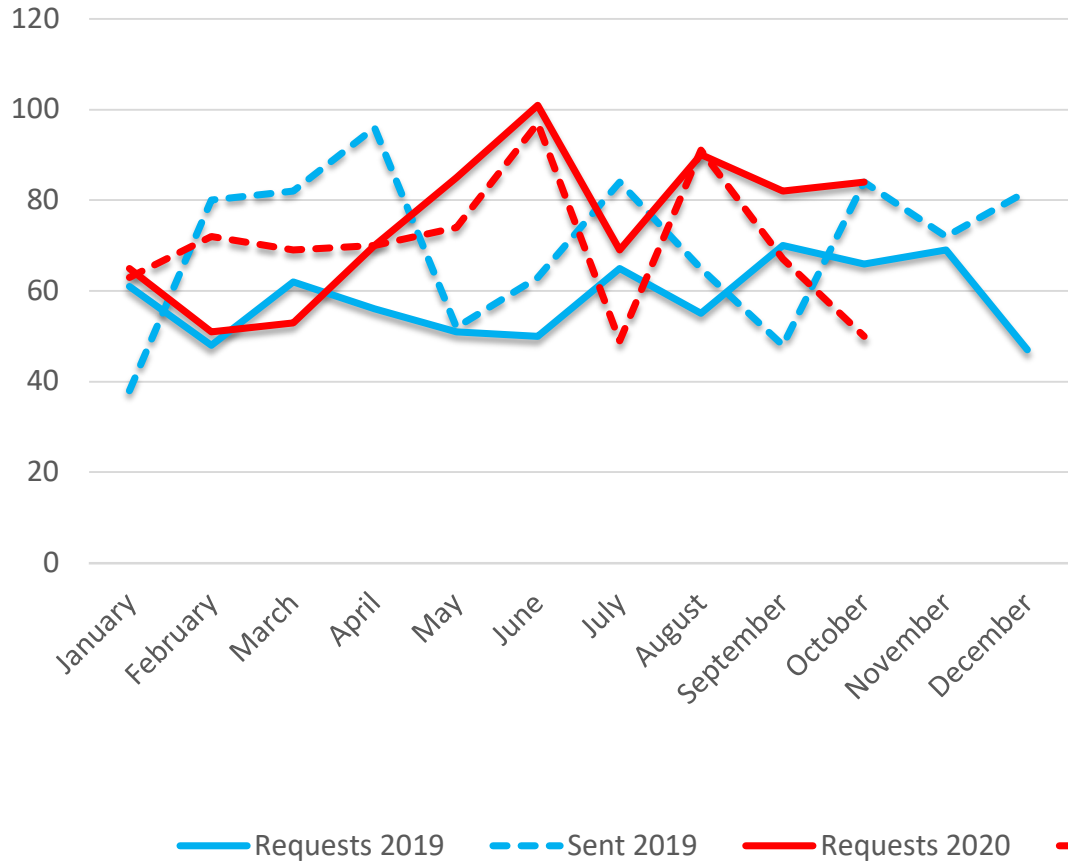
October Outages Locations



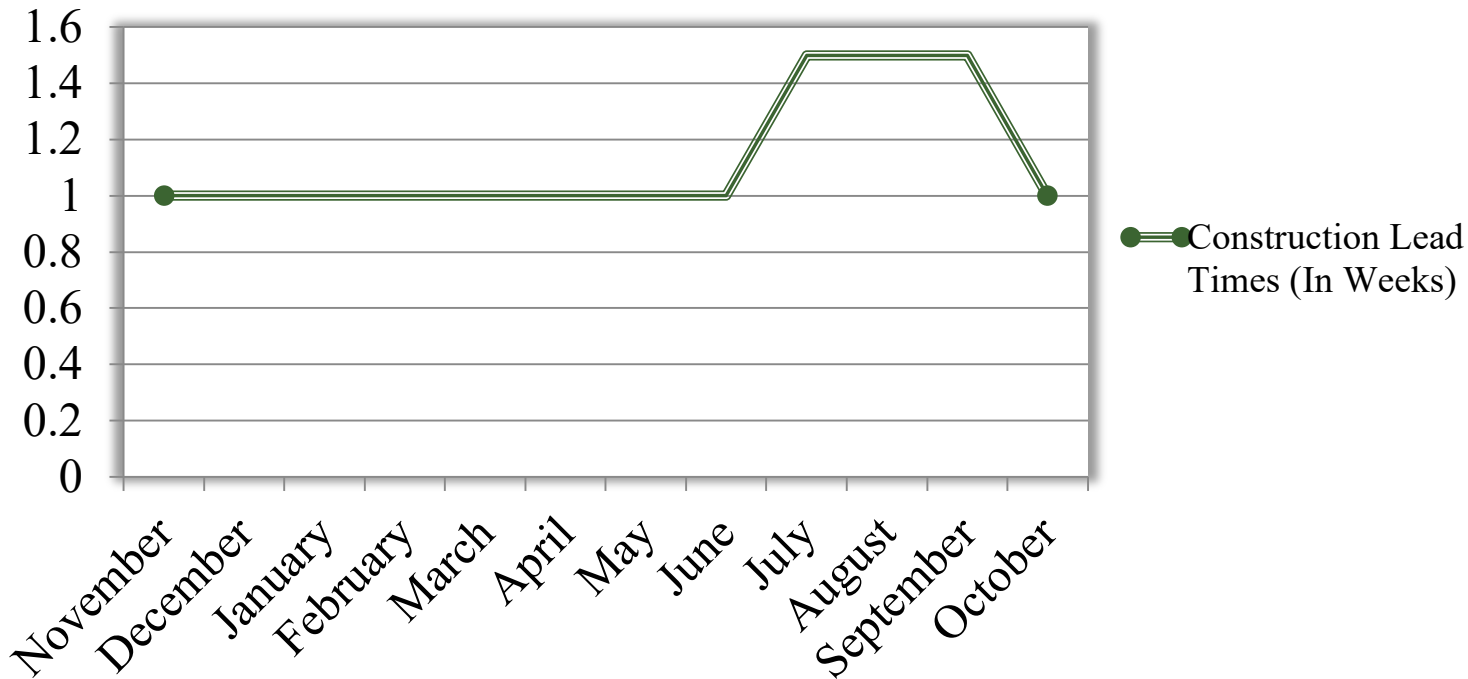
October Outage Contributors



2018/2019 Engineering Design

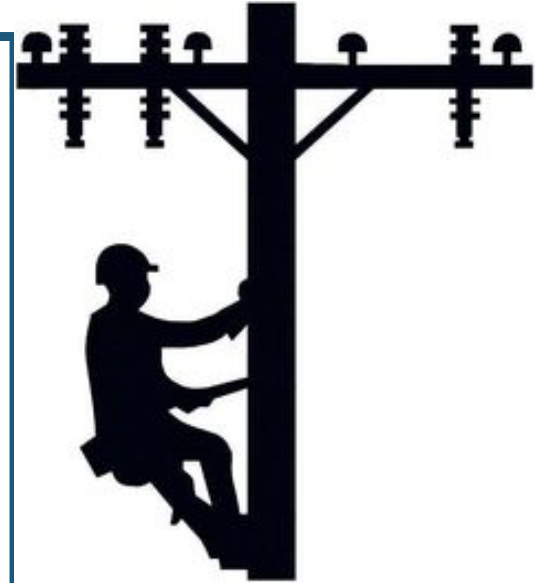


Line Department Customer Workflow Management

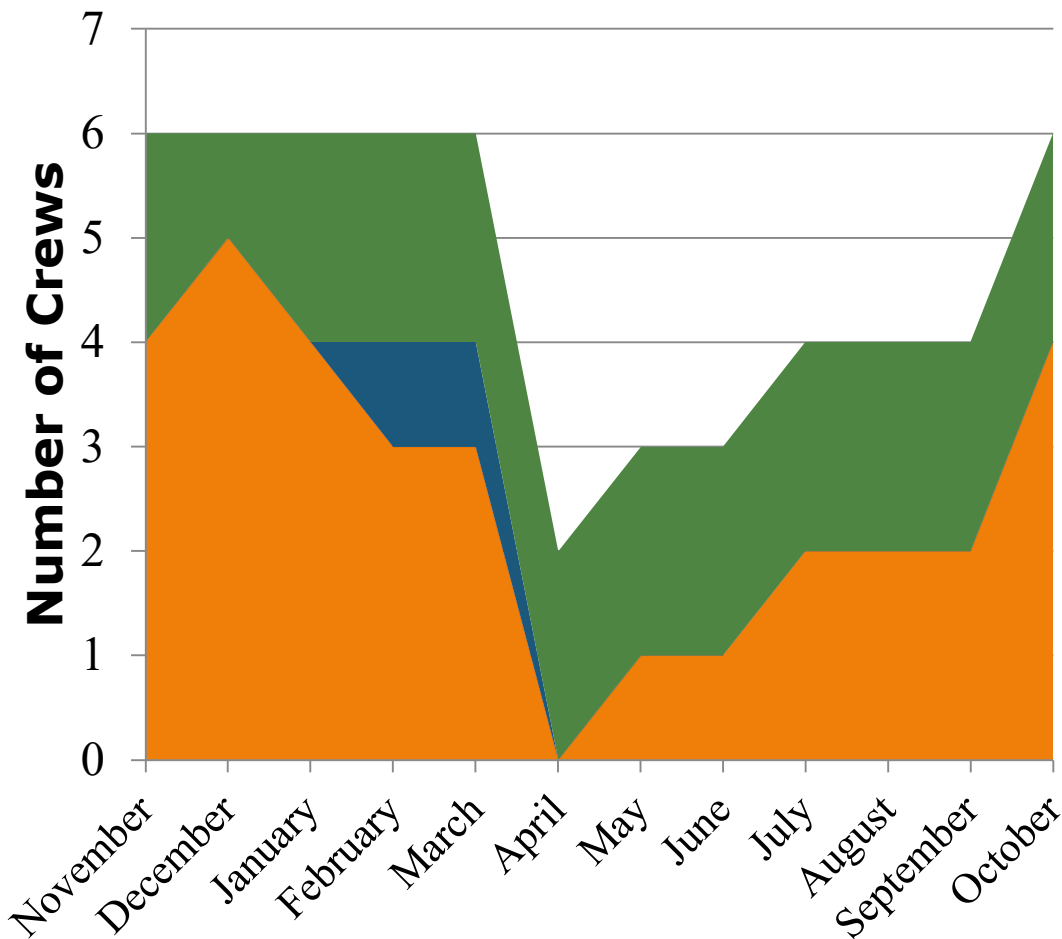


October Crew Structure

- 4 - 5 Person Crew
- 2 – 4 Person Crew



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- Customer Work
- Maintenance
- UG Maint. Program
- Capital

2019/2020



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