STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

FILED
July 26, 2017
INDIANA UTILITY
REGULATORY COMMISSION

PETITION OF INDIANA MICHIGAN POWER COMPANY, AN INDIANA CORPORATION, FOR (1) AUTHORITY TO INCREASE ITS RATES AND CHARGES FOR ELECTRIC UTILITY SERVICE THROUGH A PHASE IN RATE ADJUSTMENT; (2) APPROVAL OF: REVISED DEPRECIATION RATES; ACCOUNTING RELIEF; INCLUSION IN BASIC RATES AND CHARGES OF QUALIFIED POLLUTION CONTROL PROPERTY, CLEAN ENERGY PROJECTS AND COST OF BRINGING I&M'S SYSTEM TO ITS PRESENT STATE OF EFFICIENCY; RATE ADJUSTMENT MECHANISM PROPOSALS; COST DEFERRALS; MAJOR STORM DAMAGE RESTORATION RESERVE AND DISTRIBUTION VEGETATION MANAGEMENT PROGRAM RESERVE; AND AMORTIZATIONS; AND (3) FOR APPROVAL OF NEW SCHEDULES OF RATES, RULES AND REGULATIONS.	)	**CAUSE NO.** 44967-NONE

SUBMISSION OF DIRECT TESTIMONY OF
THOMAS A. KRATT

Petitioner, Indiana Michigan Power Company (I&M), by counsel, respectfully submits the direct testimony and attachments of Thomas A. Kratt in this Cause.

Teresa Morton Nyhart (Atty. No. 14044-49)
Nicholas K. Kile (Atty. No. 15023-23)
Jeffrey M. Peabody (Atty No. 28000-53)
Barnes & Thornburg LLP
11 South Meridian Street
Indianapolis, Indiana 46204
Nyhart Phone: (317) 231-7716
Kile Phone: (317) 231-7768
Peabody Phone: (317) 231-6465
Fax: (317) 231-7433
Email: tnyhart@btlaw.com
nkile@btlaw.com
jpeabody@btlaw.com

Attorneys for Indiana Michigan Power Company

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing was served upon the following via electronic email, hand delivery or First Class, or United States Mail, postage prepaid this 26th day of July, 2017 to:

William I. Fine
Abby R. Gray
Indiana Office of Utility Consumer Counselor
Office of Utility Consumer Counselor
115 West Washington Street
Suite 1500 South
Indianapolis, Indiana 46204
infomgt@oucc.in.gov
wfine@oucc.in.gov
agray@oucc.in.gov

Jeffrey M. Peabody

Teresa Morton Nyhart (No. 14044-49)
Nicholas K. Kile (No. 15023-23)
Jeffrey M. Peabody (No. 28000-53)
BARNES & THORNBURG LLP
11 South Meridian Street
Indianapolis, Indiana 46204
Nyhart Phone: (317) 231-7716
Kile Phone: (317) 231-7768
Peabody Phone: (317) 231-6465

Attorneys for INDIANA MICHIGAN POWER COMPANY

I&M Exhibit: _____

INDIANA MICHIGAN POWER COMPANY

PRE-FILED VERIFIED DIRECT TESTIMONY

OF

THOMAS A. KRATT

INDEX

PRE-FILED DIRECT TESTIMONY OF THOMAS A. KRATT
ON BEHALF OF
INDIANA MICHIGAN POWER COMPANY

Q. Please state your name and business address.

A. My name is Thomas A. Kratt. My business address is Indiana Michigan Power Center, P.O. Box 60, Fort Wayne, Indiana 46801.

Q. By whom are you employed and in what capacity?

A. I am employed by Indiana Michigan Power Company (I&M or Company) as Vice President of Distribution Operations.

Q. Please describe your educational and professional background.

A. I received a Bachelor of Science degree in electronics engineering technology from the Ohio Institute of Technology in 1983. Prior to joining the Company, I spent five years as an engineer in the robotics industry. I joined I&M in 1986 as a design engineer for I&M's Cook Nuclear Plant, where I worked in various capacities for 13 years. In 2000, I joined I&M Distribution, where I eventually became the Manager of Distribution Systems for I&M's Michigan District. In 2010, I became the Manager of Distribution Dispatching for I&M, where I was responsible for the operation of the electrical distribution grid. In July 2013, I was named to my present position, where I am responsible for the safe, reliable, and efficient day-to-day operation of I&M's distribution system. In addition, I was a four year working member of the Nuclear Utility Group on Equipment Qualification, and a contributing member to the EPRI Cable Aging and Management white paper.

Q. What are your responsibilities as Vice President of Distribution Operations?

A. I am responsible for overseeing the planning, construction, operation, and maintenance of the distribution system. My duties include the safe and reliable delivery of service to our customers, the oversight and management of service extension to new customers, and the restoration of service when outages occur. My responsibilities also include overseeing I&M's distribution system, reliability programs, and vegetation management program. I report directly to I&M's President.

I. PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to provide an overview of the Company's distribution system planning and expenditures. Specifically, I will present the Company's Distribution Management Plan (Plan), a comprehensive, forward-looking capital and operations plan under which the Company is making significant investments to maintain and improve the reliability of its distribution system, to enhance public safety, and to modernize the distribution grid. I also discuss the metrics the Company uses to measure the reliability of its distribution system. To execute this Plan and the associated work involved with operating I&M's distribution system, I support the level of distribution operation and maintenance (O&M) expenses during the historical base period from January 1, 2016 through December 31, 2016, and the projected level of distribution O&M expenses during the forward-looking test period of January 1, 2018 through December 31, 2018

(Test Year). I also support forecasted distribution capital investment from January 1, 2017 through December 31, 2018 (Capital Forecast Period).

Q. Are you sponsoring any attachments in this proceeding?

A. I am sponsoring the following attachments:

- Attachment TAK-1: I&M's Distribution Management Plan (2017-2018)
- Attachment TAK-2: I&M's Distribution Management Plan Major Project Summary
- Attachment TAK-3: I&M Indiana Service Territory Map with Locations of Select Distribution Management Plan Programs and Projects

Q. Were the attachments that you are sponsoring prepared or assembled by you or under your direction?

A. Yes.

II. DISTRIBUTION SYSTEM CONDITIONS

Q. Please provide an overview of I&M's distribution system in Indiana.

A. I&M serves approximately 460,000 customers in eastern and central Indiana in a service area that covers approximately 3,200 square miles and includes 118 cities and communities and 24 counties. I&M's Indiana distribution system includes approximately 15,000 miles of distribution lines consisting of 12,100 miles of overhead line primarily supported on wood poles, and 3,000 miles of underground cable. As part of I&M's distribution system, I&M serves four cities within Indiana via underground networks, namely Fort Wayne, Muncie, Elkhart, and South Bend.

Q How would you generally characterize I&M's existing distribution asset base?

A. I&M's Indiana service territory is experiencing operating challenges related to vegetation and aging assets. In terms of vegetation, I&M is experiencing an increasing number of outages, particularly on distribution circuits that have narrow clearance zones. Outages attributed to I&M's aging distribution system are also a growing issue. Much of this system was built in the 1960s and 1970s, when I&M's territory experienced a growth phase, and a growing portion of assets are reaching the end of their expected design lives. Although age alone is not the determining factor for the failure of an asset, approaching or exceeding an asset's expected design life does correlate with increasing asset failure rates. This concern is compounded when multiple assets begin to reach the end of their design life in the same general time span, creating a "bow wave" effect in outages and corresponding recovery. Therefore, aging asset replacement is a growing concern when considering the capital investment and O&M necessary to support future reliability.

Q. Please provide examples of I&M's distribution aging assets in Indiana.

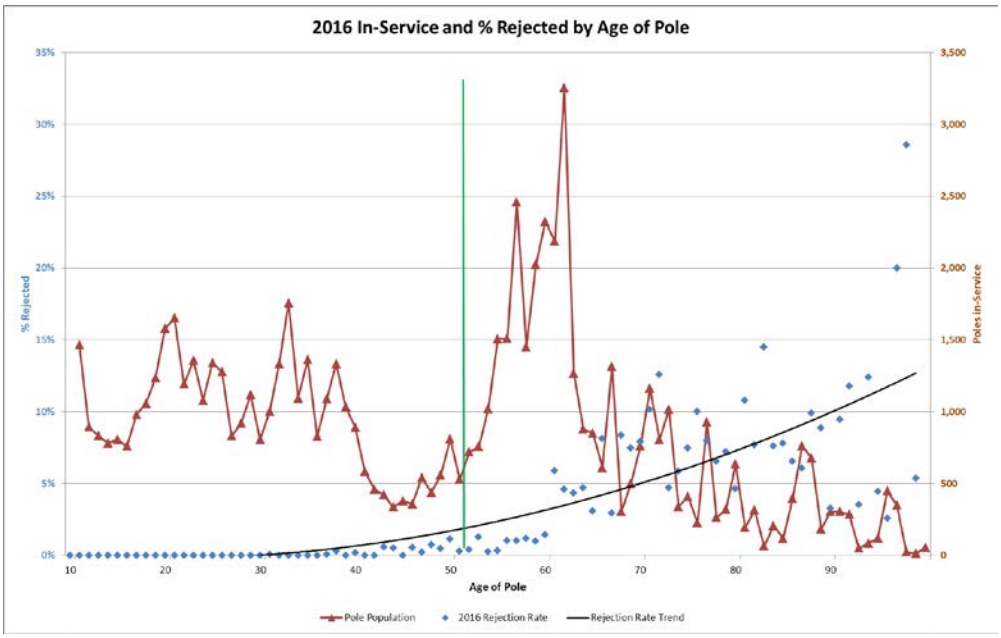
A. One example of aging assets focuses on underground residential distribution cable (URD). I&M has historically installed two types of URD cable: unjacketed and jacketed. Before the mid-1980s, URD cable used for most distribution applications in the United States was unjacketed, meaning the neutral conductor was exposed to earth. This factor, coupled with natural deterioration of the URD cable insulation, increases the likelihood of the URD cable failing and causing customer

interruptions. Beginning in the mid-1980s, I&M began installing jacketed cable, where the neutral is protected and therefore does not come into direct contact with earth. However, approximately 48 percent of I&M's URD cable is unjacketed and is in need of replacement.

Another example centers on the overhead conductor that has reached the end of its expected design life. For instance, the following most common types and sizes of conductor have been identified as obsolete: American wire gauge (AWG) size 4 Aluminum Conductor with Steel Reinforcement (4-AS), AWG size 6 Copper Conductor (6-CU), AWG size 4 Copper Conductor (4-CU), and AWG size 6 Copper Clad Steel and Copper Conductor (6A-CC). These examples of overhead conductor represent approximately 28 percent of I&M's total overhead conductor.

One final example is the population of wood distribution poles that continue to age. Of the approximately 355,000 distribution poles that I&M has in Indiana, the average age is 35 years in service, with over 15 percent in service for 60 years or more. As shown in Figure TAK-1, I&M's estimated population of deteriorated poles in its Indiana service territory is increasing as the pole plant continues to age. Recent inspections have found reject rates of approximately 6 percent.

Figure TAK-1
I&M Pole Age Distribution and Failure Rate
(Indiana)



Q. What conclusion do you draw from I&M's Indiana service territory characteristics?

A. Approximately 30 percent of I&M's overhead system has trees growing too close to the existing wires. These circumstances increase the likelihood of vegetation-caused customer outages. In fact, as I describe in detail later in my testimony, vegetation is a principal cause of outages in I&M's service territory.

Also, a large portion of I&M's Indiana distribution system is in need of replacement and modernization. As I&M's assets continue to age and move past their expected design lives, customer interruptions are expected to increase. The aging of assets has a direct relationship to the performance profile and recovery ability of the asset; the older an asset, the more difficult it is to restore the asset due to handling during restoration, available parts (for equipment), and the inherent safety risks (equipment past the end of its design life has a higher incidence of

catastrophic failure during operation). These factors, combined with the reliability expectations of customers and the obligation to operate its system safely, coincide to drive I&M towards a comprehensive asset renewal program.

In addition, costs associated with maintenance will correspondingly increase, limiting opportunities to incrementally improve the system. Some asset classes, such as poles and live-front padmount transformers, can also pose safety risks. As I also describe in more detail later, equipment failures are another principal cause of customer interruptions on I&M's distribution system.

III. RELIABILITY METRICS AND SYSTEM GOALS

Q. How does the Company measure the reliability of its distribution system?

A. I&M primarily uses the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI) to gauge service reliability. These indices are also in general use across the electric utility industry in the United States. SAIDI, SAIFI, and Customer Average Interruption Duration Index (CAIDI) (which is an additional metric I&M uses) are described in the Institute of Electrical and Electronics Engineers (IEEE) Standard 1366-2012 as follows:

- SAIDI indicates the total time the average customer is without service due to sustained interruptions during the specified period. It is the sum of customer minutes of interruption from each outage divided by the number of customers served.
- SAIFI indicates how often the average customer experiences a sustained interruption over a predefined period of time. It is the total number of customers interrupted divided by the total number of customers served.

- CAIDI represents the average time required to restore service. It is the sum of customer minutes of interruption (CMI) from each outage divided by the total number of customers interrupted.

These indices provide insight into how well I&M is minimizing service interruptions. Increasing values for these indices equates to worsening reliability performance, i.e. the amount of time a customer is without service, the number of customer interruptions, and the amount of time needed to restore service are increasing.

Q. Please summarize the Company's recent reliability performance in Indiana.

A. The Company strives to provide customers the best reliability it can with existing resources and system conditions. However, as I note throughout my testimony, the Company is facing ongoing challenges related to its distribution system, stemming from such items as vegetation and aging assets (our two primary drivers). These mounting distribution system issues will continue to impact reliability. It is for that reason that the Company has developed the Distribution Management Plan to make substantial investments in its distribution system to improve its reliability performance.

Figure TAK-2 provides the Company's reliability indices for the previous five years as submitted by the Company as part of its Electric Reliability Report to the Indiana Utility Regulatory Commission (Commission) in compliance with 170 IAC 4-1-23(e):

Figure TAK-2
I&M Reliability Indices 2012-2016
(Indiana)

	Excludes Major Event Days						All Conditions					
	SAIDI		SAIFI		CAIDI		SAIDI		SAIFI		CAIDI	
Year	Annual	5 Yr Avg	Annual	5 Yr Avg	Annual	5 Yr Avg	Annual	5 Yr Avg	Annual	5 Yr Avg	Annual	5 Yr Avg
2012	137	127	0.91	0.91	151	139	1071	601	1.39	1.21	773	450
2013	114	121	0.74	0.84	154	144	375	444	0.96	1.07	392	386
2014	128	129	0.77	0.83	165	156	306	480	0.96	1.08	318	423
2015	160	138	1.05	0.89	153	156	390	480	1.24	1.13	314	405
2016	153	138	0.95	0.88	161	157	255	479	1.06	1.12	241	407

Q. What are the primary causes of outages in I&M's Indiana service territory?

A. As shown on Figures TAK-3 and TAK-4 below, vegetation and equipment-related failures are the main causes of outages in I&M's Indiana service territory. Vegetation is a principal cause of outages and is responsible for 25 percent of SAIDI and approximately 18 percent of SAIFI during the past five years. Another principal cause is equipment-related failures, responsible for 22 percent of SAIDI and 24 percent of SAIFI.

Figure TAK-3
I&M's Principal Outage Causes as a Percentage of SAIDI
(Indiana)

Interruption Cause	2012	2013	2014	2015	2016	Average
Vegetation[1]	19.3%	29.9%	26.2%	24.1%	25.6%	25.0%
Equipment Failure	20.5%	22.0%	21.4%	23.2%	23.7%	22.2%
Station	26.3%	9.0%	13.6%	13.2%	8.8%	14.2%
Vehicle Accident	8.4%	12.5%	11.0%	13.2%	12.1%	11.5%
Transmission Line	7.0%	5.9%	6.8%	7.2%	6.6%	6.7%
Lightning	3.8%	3.8%	5.0%	2.5%	3.5%	3.7%
Scheduled	1.8%	2.4%	1.9%	4.1%	4.7%	3.0%
Animal	3.1%	3.0%	2.7%	1.8%	2.0%	2.5%
Other[2]	4.8%	8.1%	5.9%	5.0%	6.7%	6.1%
Unknown	4.9%	3.4%	5.4%	5.7%	6.3%	5.1%

Figure TAK-4
I&M's Principal Outage Causes as a Percentage of SAIFI
(Indiana)

Interruption Cause	2012	2013	2014	2015	2016	Average
Equipment Failure	21.8%	25.8%	22.0%	24.1%	27.0%	24.1%
Vegetation[1]	15.1%	19.7%	18.3%	16.6%	18.6%	17.7%
Station	28.1%	13.1%	16.6%	17.8%	10.2%	17.2%
Vehicle Accident	8.4%	13.9%	13.0%	14.2%	14.6%	12.8%
Transmission Line	4.8%	5.6%	6.5%	6.5%	5.0%	5.7%
Scheduled	4.3%	5.0%	4.2%	5.7%	6.6%	5.2%
Animal	5.9%	4.9%	5.2%	2.7%	3.4%	4.4%
Lightning	3.6%	2.8%	5.2%	2.7%	2.7%	3.4%
Unknown	5.1%	4.4%	5.2%	6.5%	6.2%	5.5%
Other[2]	3.0%	4.7%	3.8%	3.2%	5.5%	4.0%

[1] Vegetation includes both inside and outside of the rights-of-way (ROW), as well as vines.

[2] Other causes include contamination/flashover, customer equipment, fire, foreign object, other utility, overload, customer, and vandalism.

Figures TAK-3 and TAK-4 underscore that the two principal challenges facing I&M from a distribution reliability perspective are vegetation and aging equipment.

Q. What are the primary types of equipment that are failing?

A. The following are the primary types of equipment that are failing on I&M's Indiana distribution system:

- Porcelain Cutouts and Lightning Arresters
- Crossarms and Insulators
- Overhead Conductor
- Underground Conductor

Combined, these equipment types account for the majority of the equipment failures affecting customers on I&M's Indiana distribution system.

Q. What is the Company's main goal for its Indiana distribution system?

A. My number one priority as Vice President of Distribution Operations is to improve the customer experience by enhancing the reliability of the distribution system. I have personally engaged with customers and understand the impacts to our customers that outages impose. Outages cause considerable inconvenience and disruption to our residential customers when a vital component of modern life is interrupted. Outages also impose very real financial harm on commercial and industrial customers, who often must close their doors or halt production when outages occur. Accordingly, the Company's main goal for its Indiana distribution system is to address the reliability challenges the Company is facing and, through the Distribution Management Plan, to make a substantial improvement to its reliability metrics.

Q. Does the Company have any other goals for its Indiana distribution system?

A. In addition to improving reliability, I&M has created its Distribution Management Plan to address other goals directed at enhancing public and employee safety relative to daily operability. Each program that reduces the probability of asset failure also reduces the probability of a safety incident. The focus in this area is on reducing the probability and consequence of asset failures, thereby limiting potential exposure to the public. Similarly, some of our older assets present operability challenges to our employees. For example, replacement of live-front padmount transformers with dead-front units reduces exposure to live (i.e., electrified) equipment during repairs and maintenance. As I describe below, I&M's Distribution Management Plan optimizes safety both through system condition evaluations via inspections and through remediation efforts.

In addition to renewing the system by replacing aging and obsolete assets, I&M developed programs in its Plan to implement new technologies and system designs that provide better monitoring and remote operability of the energy delivery system. For example, the deployment of distribution line sensors will help I&M locate outages quicker and get crews to an approximate electric fault location faster to speed restoration. I discuss distribution line sensors, as well as other technologies that I&M will deploy as part of its Plan, later in my testimony.

IV. DISTRIBUTION MANAGEMENT PLAN

Q. Please summarize I&M's Distribution Management Plan.

A. I&M has developed a comprehensive Distribution Management Plan under which I&M is making substantial investments in its distribution system. The purpose of the Plan is to improve or maintain I&M's customer experience by improving reliability, addressing public safety, and modernizing the distribution grid.

Q. What is the timeline of the Distribution Management Plan?

A. I&M considers investments in its distribution system to be an ongoing process that I&M will continue to be working on for many years. My testimony presents the Distribution Management Plan for the two-year period 2017-2018, which is the period reflected in the Capital Forecast Period and the Test Year operating costs.

Q. How did the Company develop the programs included within its Distribution Management Plan?

A. I&M developed the Distribution Management Plan by focusing on several inputs to determine the programs and projects that were most needed and would bring the most value for I&M's customers. These inputs include:

- Evaluating circuit performance.
- Analyzing I&M distribution assets.
- Leveraging engineering analysis, combined with operations knowledge and experience.
- Allocating existing labor resources.
- Coordinating and aligning plans with I&M Transmission.

It is important to note that since safety is ingrained in I&M's culture and is of paramount importance for both customers and employees, it was integrated within each of the above inputs.

I&M's strategy includes analysis of historical asset performance over time to help predict future asset reliability. I&M's knowledge of asset performance and when assets are more prone to fail are tempered with district engineering knowledge and experience. Qualitatively, I&M field personnel know the problematic circuits within their regions, the areas that have the greatest frequency of outages, and what types of equipment are most responsible for outages. Although I&M's analysis may show that an asset is operating beyond its expected design life, local I&M personnel responsible for inspecting and maintaining these assets can use their experience to help decide whether an asset should be replaced.

Finally, since both Distribution and Transmission work in tandem as part of I&M's system, I&M has ensured coordination between these organizations to align both short and long-term system plans.

Q. What are the main categories of investments planned in the Distribution Management Plan?

A. The Distribution Management Plan involves five main categories of investments as shown on Figure TAK-5:

Figure TAK-5
I&M Distribution Management Plan Categories

Category	Description
1. Vegetation Management	The cornerstone of the Plan is a transition to a proactive, cycle-based vegetation management program.
2. Asset Renewal and Reliability	The Company has developed a suite of programs to replace aging infrastructure, improve reliability, and mitigate risk.
3. Major Projects	The Company has identified specific asset renewal and reliability projects that are needed to address capacity and contingency capacity constraints, improve outage recovery, replace or upgrade aging or obsolete station equipment, implement supervisory control and data acquisition (SCADA), and perform voltage conversions of select stations and distribution circuits.
4. Risk Mitigation	The Company will perform a series of inspection programs designed to identify potential hazards on the distribution system and promote public safety.
5. System Modernization	The Company has identified technologies that will help I&M monitor, protect, and improve the operation and reliability of its distribution system.

I discuss each of these categories below.

Q. Does I&M's Distribution Management Plan accommodate flexibility?

A. Yes. I&M's Plan was developed based on the best information and data available at this time. However, I&M's energy delivery system is dynamic, which creates a variety of reasons why I&M incorporates flexibility in implementing its Plan:

- Increased labor demand and specialized skills may cause resource constraints.
- Changing customer needs/expectations.

- Storms affecting I&M's service territory or requiring the assistance of I&M employees.
- Need to reprioritize projects.
- New or updated system and asset information.

Flexibility in implementing the Plan allows I&M to best manage the benefits of planned investment with their costs; with the primary objective of maintaining appropriate focus on those improvements that will most advance the customer experience.

Q. How does I&M monitor and evaluate the progress and costs of its Distribution Management Plan?

A. I&M monitors and evaluates Plan progress on a regular basis. As part of this process, I&M tracks estimated project costs versus the actual costs to-date. This process allows I&M to actively identify and evaluate significant variances to the work plan.

To ensure these activities are acted upon and adhered to properly, I&M has a Project Management Office providing oversight in all facets of the plan development, project initiation, execution, monitoring, and closing processes. Evaluation of progress, quality, adjustments, and costs are monitored through this group, allowing transparency and accountability regarding all the programs and projects identified as part of I&M's Plan.

A. Distribution Management Plan: Vegetation Management

Q. Please summarize the Company's planned vegetation management program.

A. Controlling interruptions to the safe and reliable delivery of power is fundamental to improving I&M's overall customer experience. A critical first step is to move away from a reactive approach toward managing vegetation (trees, brush, and vines) to a systematic, cycle-based manner. The initial four-year period involves two components: First, the Company will expand overhead conductor clearance zones, widening narrow zones and addressing issues such as trees affected by the Emerald Ash Borer (EAB) beetle, which has undermined the integrity of many ash trees in our service territory. Second, for clearance zones that are already sufficiently wide, the Company will perform remedial maintenance to restore overgrown clearance zones to their original width. Figure TAK-6 summarizes the Company's vegetation management work plan for this initial four-year period, beginning in 2018. After this initial four-year period (2018-2021), the Company will develop a work plan in which it will maintain all overhead lines on a four-year cycle, beginning in 2022. This first year, 2022, is also shown in Figure TAK-6:

Figure TAK-6
Summary of Vegetation Management Work Plan
(Indiana – Overhead Primary Line Miles)

Vegetation Management Work	2018	2019	2020	2021	2022
Clearance Zone Widening	652	802	630	176	0
Remedial Maintenance	2,173	1,561	1,694	2,028	2,510

Q. Please describe what clearance zones are and their condition in I&M's Indiana service territory.

A. A clearance zone is the space surrounding a distribution line that generally should be kept free of vegetation. Clearance zone widening is the expansion of this vegetation-free zone around a distribution circuit to a width greater than what has been established previously. When clearance zones are too narrow, vegetation can grow into the distribution circuit before I&M is able to trim the vegetation away from the circuit. Encroaching branches and trees close to the wires cause more frequent outages and damage when they break out in wind, heavy ice, or heavy snow loads. Maintaining a reasonable clearance above, beside, and below the lines minimizes the likelihood of customer interruptions due to the vegetation making contact with the distribution circuits. Historically, I&M has been able to widen the clearance zones only for select circuits.

Q. What are the drivers of the Company's vegetation management investment?

A. As I noted above, increasing challenges to I&M's distribution system have led to declining reliability for the Company. Chief among these challenges is vegetation, which is a principal cause of outages for the Company and accounts for 25 percent of SAIDI and almost 18 percent of SAIFI. Improving the Company's reliability performance must begin with vegetation management and transitioning to a cycle-based vegetation management program is the single greatest investment the Company can make to improve the Company's reliability performance for customers.

Q. How will the Company prioritize vegetation management work?

A. In the initial four-year period (2018-2021), the Company will prioritize vegetation management work based on an analysis of circuit performance and field personnel input. Evaluating circuit performance helps I&M to understand what issues are occurring, such as the major outage causes, as well as what efforts are needed to improve performance. Once the circuit performance list has been developed, it is then circulated to the field personnel that are responsible for and most familiar with the circuits in question. The field personnel utilize their knowledge of the circuits, as well as input from customers, to prioritize vegetation management work on the circuits. This methodology not only provides for flexibility, but also helps maximize the effect on reliability.

Q. What are the benefits of I&M's planned cycle-based vegetation management program?

A. The main benefit of the cycle-based vegetation management program is significantly reduced vegetation-related outages. Clearance zone widening and cycle-based vegetation management programs are widely acknowledged by the industry as the most effective way to reduce vegetation-related outages. I&M's own experience has shown that the four-year average of reliability improvements yields an average reduction in customer minutes of interruption by approximately 70 percent. Conversely, I&M's experience also shows that outages start to increase again after four years without performing vegetation management on a cleared circuit. For this reason, I&M's planned cycle-based vegetation management program is specifically designed to be on a four-year cycle.

As I noted earlier, outages cause significant costs and disruption to our customers. Customers depend on us to provide reliable electric service. The key benefits for the Company's customers stemming from shifting to a proactive, cycle-based vegetation management program include a positive impact on overall reliability and allowing the Company to restore service to customers more quickly after service interruptions.

Q. Are there any alternatives to the planned vegetation management program?

A. Practically, no. Although the Company has been doing its best to provide customers reliable service with its current performance-based approach to vegetation management, the effectiveness of that approach is limited, as shown by the increasing contribution of vegetation-related outages to SAIDI (as shown in Figure TAK-3). The only other alternative to reduce vegetation-related outages is to bury lines underground, but that is prohibitively expensive to accomplish on a service territory-wide basis. Transitioning to a cycle-based vegetation management program is the only viable means for the Company to reduce vegetation-related outages.

B. Distribution Management Plan: Asset Renewal and Reliability Programs

Q. Please summarize the Company's asset renewal and reliability programs reflected in the Capital Forecast Period and Test Year O&M.

A. The Company has developed a suite of programs designed to address aging infrastructure and reduce equipment-related outages. These include:

- Overhead Rebuild Program – This includes replacing line reclosers, sectionalizing circuits, rebuilding overhead lines, replacing crossarms,

establishing or bolstering circuit ties, and replacing porcelain cutouts and lightning arresters.

- Pole Replacement/Reinforcement Program – I&M will replace poles where necessary. Externally, poles may appear to be in good condition, but may have deteriorated internally and/or below the ground line to the point where they no longer are sufficiently strong enough to withstand horizontal loads produced by wind, or vertical loads caused by ice. I&M may also reinforce poles that are identified as reinforcement candidates. Field personnel will review identified reinforcement candidates and make the optimal choice between reinforcement and replacement.
- URD Cable and Live-Front Replacement Program – I&M will identify deteriorated and unjacketed cable in need of replacement and replace live-front padmount transformers.
- Underground Station Exit Cable Replacement Program – I&M will replace underground station exits. The underground station exit is a large underground cable(s) from the distribution breaker in the station to the line circuit served by the breaker. A failure on this critical portion of the circuit interrupts service to all customers served by that breaker.
- Distribution Feeder Breaker Replacement Program – I&M will replace distribution feeder breakers on a proactive basis. This will include the replacement of specific types of obsolete breakers.
- Underground (UG) Network Rebuild Program – I&M will replace and rebuild network secondary and primary components in the I&M South Bend, Elkhart,

Fort Wayne and Muncie networks. This program is complemented by the Network Monitoring program I discuss in the System Modernization section of my testimony.

Q. What are the drivers of the Company's asset renewal and reliability programs?

A. As I described above, a growing portion of I&M's distribution assets are reaching the end of their expected design lives. Although age alone is not the determining factor for the failure of an asset, approaching or exceeding an asset's expected design life does correlate with increasing asset failure rates. Therefore, aging asset replacement is a growing concern when considering the capital expenditures and O&M necessary to support future reliability. This concern is compounded when multiple assets begin to reach the end of their design life in the same general time span, creating a compounding effect on the number of outages and the length of time it takes to restore service after an outage.

In addition, as I discussed earlier in my testimony, older assets tend to be harder to recover or replace after a failure. For instance, it is often difficult to obtain available parts for aging equipment. Older assets also pose inherent safety risks – equipment that is operating after the end of its design life has a higher incidence of catastrophic failure during operation. These factors have coincided to lead I&M to develop a comprehensive set of asset renewal and reliability programs.

Q. What is the work scope and timing of the Company's planned asset renewal and reliability programs?

A. Figure TAK-7 summarizes the asset renewal and reliability program component of the Company's Plan over the 2017-2018 Capital Forecast Period:

Figure TAK-7
Summary of Asset Renewal and Reliability Work Plan
(Indiana)

Program	Units	2017	2018
Overhead Rebuild - Single Phase Line Rebuild	Miles	13.27	11.97
Overhead Rebuild - Three Phase Line Rebuild	Miles	9.54	12.71
Overhead Rebuild - Circuit Ties	Miles	9.26	7.39
Overhead Rebuild - Voltage Conversion	Miles	4.67	5.08
Overhead Rebuild - Sectionalizing	Units	6	7
Overhead Rebuild - Recloser Replacement	Units	118	138
Overhead Rebuild - Capacitor Replacement	Units	30	30
Overhead Rebuild - Porcelain Cutout & Lightning Arrester Replacement	Units	2,895	2,895
Overhead Rebuild - *Crossarm Replacement	Units	1,146	1,146
*Pole Replacement/Reinforcement	Units	2,727	2,727
URD Cable and Live-Front Replacement	Miles	12.10	13.48
Underground Station Exit Cable Replacement	Feet	3,055	3,062
Distribution Feeder Breaker Replacement	Units	32	37
UG Network Rebuild Program	Miles	24.5	4.3

*For crossarm and pole replacements/pole reinforcements, the number of units replaced may increase or decrease based on the outcome of the risk mitigation programs (i.e. pole inspections and overhead line inspections).

Although this presentation focuses on the first two years (2017-2018) of asset renewal and reliability work, these programs are ongoing and will continue on an annual basis beyond the two years highlighted in this proceeding. Attachment TAK-1 provides additional details related to I&M's asset renewal and reliability programs.

Q. How will the Company prioritize its asset renewal and reliability programs?

A. The Company takes several factors into consideration when prioritizing its asset renewal and reliability programs. This process includes analyzing the last three years of customer reliability data, with an emphasis on identifying customers who have experienced numerous and/or lengthy outages. Another input includes the findings from I&M's ongoing risk mitigation programs which identify problematic devices on the grid (such as porcelain cutouts and lightning arrestors), broken or damaged facilities (such as broken poles and crossarms), as well as overall facility condition (such as excessively sagging conductor, tree conditions, etc.). Finally, I&M considers industry information and analysis to assist in identification of generalized failure rates and obsolescence of equipment such as various overhead conductor types, URD cable types/materials, breakers, etc., which are reviewed when evaluating a preemptive approach for replacement and averted customer outages.

Q. What are the benefits of the asset renewal and reliability programs?

A. As with the vegetation management program, a principal benefit of the asset renewal programs is reduced outages and improved reliability. Additionally, some of these programs will also provide safety benefits, such as pole

replacements/reinforcements. The overhead rebuilds program will yield safety and reliability benefits. Specifically, overhead rebuilds enhance safety for both customers and I&M personnel, as replacing aged assets lowers the likelihood of downed lines or catastrophic failure of equipment that could pose potentially hazardous situations. Overhead rebuilds further enhance reliability because they will use more robust design specifications, such as poles (as discussed below), than previously used.

Replacing more poles proactively reduces the proportion of deteriorated poles, reduces the risk of a pole failing in the vicinity of customers or I&M personnel, and reduces the number of failed poles during a major event, thereby reducing restoration time and cost. Modern design standards are also more robust than historical standards.

Replacement of URD and live-front padmount transformers provides reliability and safety benefits. Specifically, the elimination of live-front equipment associated with underground replacement reduces the exposure to energized portions of the equipment during repairs or maintenance and therefore adds a layer of protection to I&M personnel's safety.

Replacement of underground station exits produces reliability benefits. The failure of underground station exits can have a significant impact on reliability due to the large number of customers affected and the potential difficulty in switching the load to other circuits.

Replacement of distribution feeder breakers produces reliability and safety benefits. Specifically, safety will be improved by reducing misoperations and

failures of the distribution feeder breakers, having the effect of reducing hazards on the system created by not properly clearing faults.

Replacement of older network cables targets improving both reliability and safety aspects. With network facilities having been installed over eight decades, the aging cables are increasingly at risk of failure, along with an increasing rate of customer outages. Similarly, the risk of an aged cable or equipment failure poses a degree of public and employee safety concern. Network improvements include circuit-focused programs that are aimed at upgrading the network cables, connectors, and splices. Simultaneously, upgrades to major network equipment, such as transformers, network protectors, and switches are also incorporated in this work.

Q. What are the costs of the asset renewal and reliability programs?

A. Figure TAK-8 provides the Company's projected capital expenditures for the asset renewal and reliability programs over the 2017-2018 Capital Forecast Period.

Figure TAK-8
Asset Renewal and Reliability Program Capital Expenditures
(Indiana – $000)

Program	2017	2018
Overhead Rebuild - Single Phase Line Rebuild	$1,522	$1,420
Overhead Rebuild - Three Phase Line Rebuild	$3,122	$4,332
Overhead Rebuild - Circuit Ties	$2,694	$2,188
Overhead Rebuild - Voltage Conversion	$1,656	$1,776
Overhead Rebuild - Sectionalizing	$372	$441
Overhead Rebuild - Recloser Replacement	$816	$979
Overhead Rebuild - Capacitor Replacement	$454	$467
Overhead Rebuild - Porcelain Cutout & Lightning Arrester Replacement	$980	$1,008
Overhead Rebuild - Crossarm Replacement	$823	$844
Pole Replacement/Reinforcement	$4,771	$5,069
URD Cable and Live-Front Replacement	$3,028	$3,509
Underground Station Exit Cable Replacement	$527	$545
Distribution Feeder Breaker Replacement	$4,607	$5,403
UG Network Rebuild Program	$28,257	$9,799
Totals	$53,630	$37,779

Q. Are there any alternatives to the asset renewal and reliability programs?

A. Yes, the Company could undertake a pure run-to-failure approach to its assets. However, this is impractical due to the trend of escalating asset failures as they continue to age absent any intentional renewal efforts. Similarly, this is an inappropriate option due to the increasing level of customer dissatisfaction that would likely occur if such an approach was implemented. Lastly, as assets age

and fail, there is a greater probability of public and Company employee exposure to safety risks. Therefore, the run-to-failure alternative is not viable. As I described above, the Company has analyzed outages and determined the primary outage causes, such as vegetation and equipment failures. As part of this analysis, I&M reviewed the specific equipment types that have caused the majority of the reliability issues that I&M has been experiencing in recent years. Based on the specificity of this analysis, I&M designed its Distribution Management Plan to address these causes and equipment types to optimize benefits over an extended period of time.

C. Distribution Management Plan: Major Projects

Q. Please summarize the Company's major projects reflected in the Capital Forecast Period and Test Year operating expenses, as well as the drivers for these projects.

A. Each year, I&M completes various distribution projects, termed "major projects," that are not included in the asset renewal and reliability programs or risk mitigation categories that I describe in my testimony. As stated earlier, these projects are necessary to address capacity and contingency capacity constraints (i.e., the ability to serve customers from another location, thereby reducing the length of an outage), to improve outage recovery, to replace or upgrade aging or obsolete station equipment, implement supervisory control and data acquisition (SCADA), and to perform voltage conversions of select stations and distribution circuits.

Q. What are the work scopes and timing of the Company's planned major projects?

A. The Company's planned major projects for 2017-2018 are detailed in Attachment TAK-2.

Q. How does the Company prioritize its planned major projects?

A. Several I&M groups, ranging from planning to engineering to the Distribution Dispatch Center, work in tandem to review I&M's distribution system in order to identify potential issues. I&M uses computer models, which take into consideration such items as load flows and overloads, to identify system constraints. Next, I&M reviews asset health information, which is mainly collected through field inspections, to help identify equipment conditions. Based on the system constraints and equipment conditions identified, I&M will determine which projects will help reduce the greatest number of CMI, which in turn helps create a project priority listing.

Q. What are the benefits of the planned major projects?

A. Completing the major projects helps improve the reliability of the system, improve the ability to serve increased load, as well as promote safety and help to modernize I&M's system by replacing or upgrading aging or obsolete station equipment. Attachment TAK-2 identifies the benefits for each specific major project that is part of I&M's Distribution Management Plan.

Q. What are the expected costs of the Company's major projects?

A. Figure TAK-9 provides the Company's projected expenditures for major projects over the Capital Forecast Period.

Figure TAK-9
Projected Major Project Capital Expenditures
(Indiana – $000)

Major Projects	2017	2018	In-Service Year
Three M Station	$1,418	$0	2017
Aviation Station	$5,529	$0	2017
Bixler Station	$770	$0	2017
County Line Station	$334	$0	2017
Dwenger Station	$4,052	$0	2017
Farmland Station	$206	$0	2017
Glenbrook Feeder #1 and #2	$413	$0	2017
Grabill Station	$949	$0	2017
Jones Creek Station	$643	$0	2017
Kenmore Station	$5,168	$0	2017
South Summitville Station	$781	$0	2017
Water Pollution Station	$1,410	$0	2017
Dunlap Station	$208	$590	2018
Elkhart Area Network Improvements	$3,954	$12,849	2018
Haymond Station	$0	$710	2018
Mackey Station	$1,694	$2,698	2018
Melita Station	$12,605	$1,295	2018
Milan Station	$1,292	$2,148	2018
North Portland Station	$2,257	$4,248	2018
Quinn/Vintage Stations	$0	$1,041	2018
Whitaker Station	$3,228	$4,664	2018
Totals	**$46,909**	**$30,245**	

Q. Are there any alternatives to the Company's major projects?

A. Yes, to a limited extent. Due to the nature of these projects, a thorough evaluation is performed to optimize the sizing, placement, design and related aspects in order to meet the current and projected future long-term need of these facilities. Through its planning process, I&M will evaluate alternatives for accomplishing each specific major project goal. For example, if I&M identifies a capacity contingency

constraint, the Company will evaluate the location of where to add capacity (i.e., which station), project costs, equipment types or upgrades, and different technology solutions in order to achieve the best solution based on the specific issue that needs to be addressed. Generally, the best solution provides the optimal targeted benefits while solving the issue in the most cost effective manner.

D. Distribution Management Plan: Risk Mitigation Programs

Q. Please summarize the Company's risk mitigation programs reflected in the Capital Forecast Period and Test Year operating costs.

A. The Company has developed the following risk mitigation programs to improve public safety:

- Pole inspections – I&M will inspect its distribution poles and replace or reinforce them when necessary in support of the Pole Replacement/Reinforcement Program I described earlier.
- URD equipment inspections – I&M will inspect the above ground equipment of the URD system (ex: pedestals, padmount transformers, and primary risers) for overall condition and to ensure enclosures are secure from public access.
- Overhead line inspections – I&M will inspect overhead facilities and equipment to evaluate overall condition and identify deteriorated or damaged facilities and equipment.
- Contact Voltage Inspections – I&M will inspect downtown underground network areas for contact voltage on any metallic equipment or structure to ensure public safety.

Q. What are the drivers and benefits of the Company's risk mitigation programs?

A. At its core, the risk mitigation programs are intended to identify and remediate assets that due to age, condition, or obsolete standards, presents a potential safety risk to either the public and/or employees. Additionally, the risk mitigation programs can identify reliability issues as well, which I&M can then proactively address prior to customer outages occurring. As I&M's system ages and the potential for asset failures increases, a targeted risk program is necessary to provide the greatest margin for public and employee safety.

As an example, I&M currently utilizes Automatic Meter Reading (AMR) in its Indiana service territory. Using this type of metering system requires less meter readers in the field. However, meter readers will typically monitor the health and condition of various I&M distribution assets as part of their normal duties. With fewer meter readers in the field to monitor asset health, the risk mitigation programs are needed to help ensure public safety. The results of the risk mitigation programs directly drive the asset renewal and reliability programs.

Q. What are the work scopes and timing of the Company's planned risk mitigation programs?

A. Figure TAK-10 summarizes the Company's work plan for its risk mitigation programs over the 2017-2018 period:

Figure TAK-10
Summary of Risk Mitigation Work Plan – Number of Inspections
(Indiana)

Program	Units	2017	2018
Pole Inspections	Poles	26,500	26,500
URD Equipment Inspections	Units	11,700	11,700
Overhead Line Inspections	Miles	2,455	2,455
Contact Voltage Inspections	Cities	4	4

Attachment TAK-1 provides additional details related to I&M's risk mitigation programs.

Q. How does the Company prioritize its risk mitigation programs?

A. I&M's risk mitigation programs are a systematic approach to help identify potential system issues. The overhead and underground inspection programs are designed to review 20 percent of these assets each year, such that the entire system is inspected within 5 years. The pole inspection program is designed to inspect the entire system on a 10-year cycle. The inspection results identify specific asset conditions, which are then used to prioritize the correlating asset renewal and reliability programs. This proactive approach helps identify issues that may otherwise go undetected and potentially cause customer interruptions and/or public safety issues.

Q. What are the expected costs of the risk mitigation programs?

A. Figure TAK-11 provides the Company's projected O&M expenditures for the risk mitigation programs over an initial two-year planning horizon (2017-2018).

Figure TAK-11
Projected Risk Mitigation Program O&M Expenditures
(Indiana – $000)

Risk Mitigation	2017	2018
Pole Inspections	$853	$878
URD Equipment Inspections	$84	$87
Overhead Line Inspections	$273	$281
Contact Voltage Inspections	$20	$20
Totals	$1,230	$1,266

Q. Are there any alternatives to the Company's risk mitigation programs?

A. There are no reasonable alternatives to the Company's risk mitigation programs. One of the overarching goals of the risk mitigation programs is to identify the potential public safety risks from assets exposed to the elements (wind, ice, etc.), conditions of the environment (trees, vehicle damage, vandalism, etc.) and related impacts typical of overhead and underground electric distribution facilities, including poles. The Company has identified the assets that pose the greatest risks, as well as the most effective methods to mitigate these risks via proactive inspections on a timely basis.

E. <u>Distribution Management Plan: System Modernization Projects</u>

Q. Please summarize the Company's system modernization projects reflected in the Capital Forecast Period and Test Year operating costs.

A. The Company's Plans include a series of system modernization projects that are designed to improve system reliability by increasing visibility into the system as well as help locate issues during an outage event. These projects include:

- Network Monitoring – I&M's underground Network Monitoring system is a state of the art monitoring system that integrates sensors, data concentrators and communication to provide real time data such as transformer oil temperature, oil pressure, and current and voltage readings to I&M's Distribution Dispatch Center. Water level within the vaults is also monitored. This enables engineers and operators to monitor the underground network system remotely and respond to alarms to address issues or concerns.
- Distribution Line Sensors – These devices help locate within an approximate distance where on the distribution system an outage has occurred. Having this information helps speed up the recovery process, as crews can be searching within a smaller area rather than the entire circuit to find the problem.

Q. What are the drivers of the Company's system modernization projects?

A. The Company's system modernization projects aim to improve system reliability, improve safety, and increase customer satisfaction by:

- Deploying network monitoring will provide visibility, data, and information to support the network that currently does not exist today. This monitoring system minimizes risk by enabling early detection of abnormalities as well as increasing situational awareness to operators.
- Deploying distribution line sensors to help locate faults within an approximate location. This helps reduce the time needed to search and locate problem areas for I&M crews who can then quickly resolve the issue.

Q. How does the Company prioritize its planned system modernization projects?

A. For Network Monitoring, the Company has already invested a significant amount in this effort. This system improvement was selected due to the sensitive nature of the network systems, their importance to serving our key commerce centers and the value that predictive indicators can provide in determining the current condition of such a vital part of our infrastructure.

For the other modernization applications, the Company uses a prioritization methodology that includes analysis of circuit performance, and a review of available technologies and their potential to reduce the length of customer outages. The Company performs analysis that begins by reviewing the last three years of customer reliability information, analyzing circuit configurations and available technologies to match potential problem areas with the right technology to minimize the amount of CMI, thus improving SAIDI.

Other factors that are considered in selection of projects include locations of distributed energy resources (DERs) and renewables, increased safety consideration by placing distribution line sensors in heavily wooded areas, and financial cost-benefit considerations.

Q. What are the benefits of the planned system modernization projects?

A. Network Monitoring allows I&M to perform protector switching operations remotely, permitting fewer crew entries into the vaults and reducing the risk of the required entries, particularly in the higher voltage networks. Additionally, the utility now has access to real time, steady-state, and emergency loading conditions in the network

for planning purposes. Line sensors will also assist in enabling shorter outage durations, and thereby improve the customer experience.

Q. What are the expected costs of the Company's system modernization projects?

A. The Company's projected capital expenditures for the Capital Forecast Period are shown in Figure TAK-12:

Figure TAK-12
Projected System Modernization Project Capital Expenditures
(Indiana – $000)

System Modernization	2017	2018
Network Monitoring	$7,623	$42
Distribution Line Sensors	$0	$847
Totals	**$7,623**	**$889**

Q. Are there any alternatives to the Company's system modernization projects?

A. There are no other technologies that currently have the capabilities offered by network monitoring, and distribution line sensors. However, there is another technology that the Company is aware of that would convey additional benefits: Advanced Metering Infrastructure (AMI). From an operational standpoint, AMI can provide improved safety for employees through reduced exposure to potential threats and hazards, real time information for system operation efficiency, and enhanced outage restoration ability due to real time system information.

As I have discussed throughout my testimony, I&M's first priority is to safely and reliably deliver electric power to its customers. The first step in that process is to improve the reliability of the distribution system through the Distribution Management Plan. Our plan incorporates the next steps in those areas, which aid

in the evaluation, designation, and ultimate restoration of outages on the system. Sequentially, it makes more sense to improve the overall system first, after which AMI implementation may be the next logical step.

V. DISTRIBUTION CAPITAL EXPENDITURES

Q. What is the projected capital period considered in this filing?

A. The projected period with respect to capital expenditures (Capital Forecast Period) is the time from January 1, 2017 through December 31, 2018. This twenty-four-month period commences after the conclusion of the historical base period and continues through the end of the Test Year. The expenditures supported in this testimony relate to the work plans developed by I&M to manage its system, including the Distribution Management Plan discussed above. This level of capital is included in the forecast presented by Company witness Lucas.

Q. How is the total amount of capital expenditures to be made in I&M's distribution system determined?

A. As Vice President of I&M Distribution Operations, I have responsibility for overseeing the development of the distribution work plan on an annual basis. I&M Distribution has reviewed its system in order to determine the level of work that needs to be completed, which includes I&M's Distribution Management Plan, in order to maintain the integrity of I&M's system and provide safe and reliable service. I&M's forecasting process is described in detail in the testimony of Company witness Lucas.

Q. Please describe the major categories of the distribution investments during the Capital Forecast Period.

A. Total distribution capital expenditures during the Capital Forecast Period are approximately $399.3 million (excluding Allowance for Funds Used During Construction (AFUDC)), as shown in Figure TAK-13 below.[3]

Figure TAK-13
I&M Distribution Capital Expenditures
($000 – Total Company – Excluding AFUDC)

Category	2017 Capital Expenditures	2018 Capital Expenditures	2017-2018 Total Capital Expenditures
Vegetation Management	$16,877	$17,418	$34,295
Asset Renewal and Reliability	$65,966	$49,050	$115,016
Major Projects	$82,008	$58,602	$140,610
System Modernization	$25,387	$17,097	$42,484
Customer Service, City and State Requirements, and Other	$32,166	$34,700	$66,866
Totals	**$222,404**	**$176,867**	**$399,271**

Capital expenditures related to vegetation management, asset renewal and reliability, major projects, and system modernization are described in connection with the Distribution Management Plan above. Capital expenditures for Customer Service, City and State Requirements, and Other relate to the installation of service to new residential and commercial customers, including the necessary transformers and meters, as well as outage restoration. These requirements are frequently associated with being located in or near public road rights-of-way (ROW), and often involve the relocation of distribution facilities to accommodate

[3] Figure DAL-1 of Company witness Lucas's testimony shows how AFUDC is added to capital expenditures.

projects such as road construction, water and sewer line installation, and sidewalk construction.

Q. What is the amount of the Company's distribution capital that will be placed in service during the Capital Forecast Period?

A. The Company forecasts that $450.5 million of distribution capital (including AFUDC) will be placed in service during the Capital Forecast Period, as shown on Figure TAK-14 below.[4] I am presenting these figures, as well as the total distribution capital expenditures shown in Figure 13, on a total Company basis. Company witness Stegall supports the Indiana jurisdictional allocation in this proceeding.

Figure TAK-14
I&M Distribution Additions to EPIS
($000 – Total Company – Including AFUDC)

Category	2017-2018 Additions to EPIS
Vegetation Management	$33,971
Asset Renewal and Reliability	$138,537
Major Projects	$160,269
System Modernization	$48,234
Customer Service, City and State Requirements, and Other	$69,508
Totals	**$450,519**

[4] Figure DAL-2 of Company witness Lucas's testimony shows how distribution additions to Electric Plant in Service (EPIS) are used to forecast total Company Plant in Service activity during the Capital Forecast Period.

Q. Are the Company's projected distribution capital expenditures during the Capital Forecast Period representative of the distribution expense necessary to provide safe and reliable service?

A. Yes, the projected distribution capital expenditures are representative of distribution service activities that are necessary to serve I&M's customer base.

Several factors affect the expenditure levels that are incurred by the Company on an ongoing basis. These include many of the same factors that also affect O&M. For example, as previously mentioned, I&M is experiencing an increasing failure rate of distribution equipment due to an aging infrastructure. In order to mitigate this trend, and to proactively replace distribution equipment that is at risk of failing, I&M needs to expend capital on its distribution system to maintain reliability. For this reason, I&M has developed its Distribution Management Plan. The projected level of expenditures represents the ongoing level necessary to provide safe and reliable service.

Q. Are the Company's projected distribution capital expenditures during the Capital Forecast Period reasonable and accurate?

A. Yes. The capital projects projected for the Capital Forecast Period represent planned distribution expenditures. Although I&M has the ability to prioritize capital dollars on an as-needed basis as circumstances warrant, the overall projected level of capital expenditures is reasonable and accurate.

VI. DISTRIBUTION OPERATIONS & MAINTENANCE EXPENSE

Q. What are you sponsoring related to distribution O&M expenses?

A. I am sponsoring I&M distribution overall work plans, which includes O&M expenses presented in my testimony. As further described by Company witness Lucas, I participate in the prioritization and allocation of I&M's O&M expenses based on work plan development.

Q. What are the historical base period and forward-looking Test Year levels of distribution O&M that you are supporting in this filing?

A. I am supporting historical base period distribution O&M expense of $67.7 million and Test Year O&M expense of $78.9 million. As with capital investments, I am presenting these O&M figures on a total Company basis. Company witness Stegall supports the Indiana jurisdictional allocation in this proceeding.

Q. What are the major areas of distribution O&M expense?

A. There are three main categories of distribution O&M expense:

- Ongoing O&M
- Vegetation Management
- Major Storms

The largest portion of distribution O&M expense is Ongoing O&M, which includes expenses such as labor, fringe benefits, fleet vehicles, insurance, consumable materials and chemicals, mandated fees, and other expenses. Additionally, Ongoing O&M includes amounts associated with the Distribution Management Plan, such as O&M related to inspections as part of I&M's risk mitigation programs as shown in Figure TAK-11.

Vegetation Management O&M expense relates to managing the vegetation management, such as clearing ROW, on I&M's distribution system. I describe the Company's vegetation management program in detail above in connection with the Distribution Management Plan.

Major Storm O&M expense relates to large storms that qualify as Major Storm events. I discuss Major Storm expense below.

Q. Please provide the historical base period and forward-looking Test Year distribution O&M expense by category.

A. Figure TAK-15 provides the historical base period and Test Year distribution O&M expense by category:

Figure TAK-15
I&M Distribution O&M Expenses
(Total Company – $000)

Distribution O&M Category	Historical Base (2016)	Test Year (2018)
Ongoing O&M	$45,335	$45,025
Vegetation Management	$17,111	$28,142
Major Storms	$5,225	$5,775
Total	**$67,671**	**$78,942**

Q. What is responsible for the increase in Vegetation Management O&M expenses between the historical base period and the Test Year?

A. The increase in Vegetation Management expenses reflects the Company's planned transition from a reactive, performance-based vegetation management program to a proactive, cycle-based vegetation management program. As supported by Company witness Stegall, the Indiana-jurisdictional vegetation management O&M for the Test Year is $18.191 million. Company witness

Williamson describes I&M's proposal to track and defer annual vegetation management expenditures above or below this baseline amount.

Q. Please show I&M's distribution O&M expenses since 2012.

A. Figure TAK-16 provides I&M's O&M expenses for the Historical Period and the previous four years.

Figure TAK-16
Historical Trend of I&M Distribution O&M Expenses
(Total Company – $000)

Year	I&M Distribution Expenses
2012	$54,053
2013	$55,467
2014	$64,522
2015	$56,683
2016	$67,671

Q. Please explain the Major Storm O&M category reflected in I&M's filing.

A. The term "major storm" is based on the methodology outlined in IEEE Standard 1366 - 2012, IEEE Guide for Electric Power Distribution Reliability Indices. The Commission approved a Major Storm Reserve for I&M based on its five-year average in Cause No. 44075. The reserve allows I&M to carry over costs associated with major storm restoration year to year, so I&M does not have to spend funds already allocated to other O&M projects to address major storms.

Q. Please provide an update on I&M's Major Storm expenses for the previous five years.

A. As shown in Figure TAK-17, I&M Indiana has experienced annual major storm costs of up to approximately $8.5 million in the last five calendar years. During this

period, storm costs have varied because storms are random and unpredictable events that can vary in size, significance, and impact, causing expenses to be volatile from one year to the next. For example, I&M's Indiana jurisdiction experienced a major storm on June 29, 2012, which had five days that qualified as major days based on the methodology outlined in IEEE Standard 1366 – 2012, and cost approximately $7.2 million in O&M expenses.

Figure TAK-17
I&M Major Storm Costs
(Indiana – $000)

Year	Major Storm Costs
2012	$8,537
2013	$5,393
2014	$3,300
2015	$4,601
2016	$1,199
Five-Year Ave.	***$4,606***

As shown in Figure TAK-17, the five-year average of major storm costs for I&M Indiana is over $0.5 million more than the $4,047,529 Distribution Major Storm Reserve amount approved by the Commission in Cause No. 44075. Company witness Williamson describes I&M's request to continue this baseline and the Major Storm Reserve because actual expense closely tracks to the previously approved baseline.

Q. What benefits does the Major Storm Reserve convey to I&M's customers?

A. Having the Major Storm Reserve helps I&M maintain the reliability of its distribution system. Use of a reserve allows I&M to recover the true costs of a major storm without the need to use other funds already allocated to other necessary

distribution O&M activities, such as reliability-related activities. Also, use of the Major Storm Reserve ensures that I&M customers only pay the true costs of a major storm – no more and no less.

Q. Is the Test Year level of distribution O&M expense reflected in the Company's filing representative of the distribution O&M expense necessary to provide ongoing safe and reliable service?

A. Yes, the forecasted Test Year level of O&M expense is representative of distribution service activities that are necessary to serve I&M's customer base and maintain the reliability of I&M's distribution system. The O&M expense in the Test Year is reasonable.

Q. Does this conclude your pre-filed verified direct testimony?

A. Yes.

VERIFICATION

I, Thomas A. Kratt, Vice President of Distribution Operations of Indiana Michigan Power, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information, and belief.

Date: 07.14.2017

Thomas A. Kratt

Indiana Michigan Power - Indiana 2017 Distribution Management Plan

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
Single Phase Line Rebuild	Asset Renewal/ Reliability	1	Cleveland / Memorial	Replace 4AS with 2AA beyond fuse at EL0165000131	0.91	Dist (mi)		
		2	Osolo / #4	Replace 4CU with 2AA from EL0146000016 to JO0147000191 and EL0146000017 to EL0147000135	0.25	Dist (mi)		
		3	East Side / Park Jeff	Replace 4CU with 2AA beyond fuse at JO0261001308	0.21	Dist (mi)		
		4	East Side / Park Jeff	Replace 4CU with 2AA beyond recloser at JO0261000012	0.57	Dist (mi)		
		5	Wallen / Windsor	Replace 6CU from AL301-547 to AL301-598 and 4CU from AL301-16 to AL301-238 with 2AA	0.54	Dist (mi)		
		6	Decatur / Root	Reconductor 6CU, 4ACSR, & 2ACSR with 2AA from AD183-317 to AD183-302	0.57	Dist (mi)		
		7	Saint Joe / East	Reconductor 4ACSR with 2AA from DK433-74 to DK435-54	1.55	Dist (mi)		
		8	Magley / Preble	Reconductor 6CU & 4ACSR with 2AA from AD166-48 to AD167-27 and 2ACSR with 2AA from AD166-112 to AD166-125	1.72	Dist (mi)		
		9	21st Street / Cowan	Replace 6A CC with 2AA from DE85D4-2 to DE86-223	0.91	Dist (mi)		
		10	Elwood / East	Replace 4AS, 8A CC and 4CU with 2 AA from MA26C-13 to MA18-48	0.84	Dist (mi)		
		11	Hummel Creek / South	Replace 4CU with 2AA from WA110-62 to WA110-117	1.00	Dist (mi)		
		12	Hummel Creek / South	Replace 4CU with 2AA from WA110-117 to WA102-32	1.00	Dist (mi)		
		13	Hogan / River Road	Replace 4 AS and 6A CC with 2AA from DE62-39 to DE72-14	1.00	Dist (mi)		
		14	Hogan / River Road	Replace 6A CC with 2AA from DE72-14 to DE72-75	1.50	Dist (mi)		
		15	North Portland / North	Replace 4CU with 2AA from JA28-50 to JA28-70	0.70	Dist (mi)		
							13.27	**$1,522,332**
Three Phase Line Rebuild	Asset Renewal/ Reliability	1	Elkhart Hydro / #2	Reconductor mixed 4CU and 2CU to 2AA from EL211-519 to EL210-1561	0.53	Dist (mi)		
		2	Elkhart Hydro / #1	Reconductor 4CU with 2AA from EL0190-1718 to EL190-194	0.63	Dist (mi)		
		3	Northland / #5	Reconductor mixed 4/0AA & 4AS with 566 AL, EL173-12 to EL131-22	1.08	Dist (mi)		
		4	Northland / #6	Reconductor mixed 4AS and 2AS with 2AA from EL191-360 to EL191-539	0.36	Dist (mi)		
		5	East Side / Park Jeff	Reconductor 4CU with 2AA beyond JO261-39	0.61	Dist (mi)		
		6	Jackson / Michigan Street	Reconductor 4CU with 556 AL from JO327-273 to JO305-72	0.34	Dist (mi)		
		7	St. Joe / West	Reconductor 4CU with 556AL from DK389-3 to DK387-55	1.10	Dist (mi)		
		8	South Berne / Geneva	Reconductor 4CU with 2AA from AD412-69 to AD413-68 and AD426-195 to 81 and 602 to 267	0.34	Dist (mi)		
		9	Magley / Preble	Reconductor mixed small CU with 2AA from AD193-5 to AD208-54	1.24	Dist (mi)		
		10	South Elwood / Excello	Replace 4CU & 2AA with 556AL MA26B1-22 to MA26B1-477	0.23	Dist (mi)		
		11	Winchester / Fountain Park	Replace problematic spacer cable RA51B4-191 to RA51B4-173	0.20	Dist (mi)		
		12	21st St / Walnut & Arcadia	Replace 1/0CU with 556AL DE76C2-69 to DE76C1-145	0.25	Dist (mi)		
		13	South Side / Commercial	Replace 4CU with 556AL GR49-108 to GR49-73	0.93	Dist (mi)		
		14	South Side / Commercial	Replace 2CU with 556AL GR49-71 to GR49C4-32	1.70	Dist (mi)		
							9.54	**$3,122,486**
Circuit Ties	Asset Renewal/ Reliability	1	Cleveland / Memorial	Relocate to road with 556AL from EL165-27 to EL187-377	0.53	Dist (mi)		
		2	Cleveland / Park Forrest	Reconductor with 556 AL from EL0102-16 to EL0102-79	0.51	Dist (mi)		
		3	Osolo / #4	Reconductor/Multiphase with 556 AL from EL0146000489 to EL0125000025 and from EL0146000112 to EL0146000091	0.83	Dist (mi)		
		4	Granger / #4	Reconductor with 556 AL from JO0146000034 to JO0147000013 and from JO0147000164 to JO0147000060	1.08	Dist (mi)		
		5	County Line / Tonkel to Clipper / Cedar	Reconductor with 556AL from DK465-105 to DK444-68.	1.10	Dist (mi)		
		6	Robison Park / Mallard to Grabill / Page	Reconductor with 556AL from AL222-14 to AL196-20	1.72	Dist (mi)		
		7	Hadley / Sutton to Hadley / Blake	Reconductor with 556AL from AL0442000214 to AL0442000339	0.42	Dist (mi)		
		8	Modoc/Modoc to Lynn/Lynn	Reconductor with 556AL from RA93-37 to RA105-28	1.10	Dist (mi)		
		9	Upland/North to Dooville/Farrville	Reconductor with 556AL from GR43-35 to GR43-2	1.07	Dist (mi)		
		10	Fairmount/Fowlerton to Gaston/Matthews	Reconductor with 556 AL from GR83D4-19 to GR94C3-4	0.90	Dist (mi)		
							9.26	**$2,693,854**
Voltage Conversion	Asset Renewal/ Reliability	1	Harrison / #2	Convert to 12 kV from EL0231000821 to EL0210000461	1.29	Dist (mi)		
		2	Decatur / Krick	Convert to 12kV (7 work orders)	3.04	Dist (mi)		
		3	Mock Avenue / Frank Foundaries	Convert to 12 kV from DE67B2-207 to DE77A1-140	0.34	Dist (mi)		
							4.67	**$1,656,382**
Sectionalizing	Asset Renewal/ Reliability		Swanson / #1	Review and modify sectionalizing on circuit	1	Each		
			Springville / New Buffalo	Review and modify sectionalizing on circuit	1	Each		
			Adams / Linn Grove	Review and modify sectionalizing on circuit	1	Each		
			Pettit / Sears	Review and modify sectionalizing on circuit	1	Each		
			Selma Parker / Parker	Review and modify sectionalizing on circuit	1	Each		
			Selma Parker / Wapahani	Review and modify sectionalizing on circuit	1	Each		
							6	**$372,383**
Recloser Replacement	Asset Renewal/ Reliability		New Carlisle / #1	LP0176000577 Replace 2-100 L	2	Each		
			Springville / Toll	LP0228000167 Replace 3-100 L	3	Each		
			Quinn / Lakeville	JO0415000007 Replace 1-100 V4H	1	Each		
			Quinn / Lakeville	JO0415000013 Replace 1-100 V4H	1	Each		
			Elcona / Country Club	EL0234000042 Replace 3-400 VXE15	3	Each		
			Swanson / #1	JO0165000170 Replace 3-185 DV	3	Each		
			Colfax / #1	JO0235001844 Replace 3-400 VXE15	3	Each		
			East Side / Ironwood	JO0306000992 Replace 3-400 VXE15	3	Each		
			German / #2	JO0185000056 Replace 3-200 V4L	3	Each		
			Ireland Road / #1	JO0373000074 Replace 3-400 VXE15	3	Each		
			Jackson Road / Lafayette	JO0326000588 Replace 3-400 VXE15	3	Each		
			Jackson Road / South	JO0371000339 Replace 1-200 V4L	1	Each		

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
			Jackson Road / South	JO0349000249 Replace 3-400 VXE15	3	Each		
			Beech Road / Dunn	EL0206000460 Replace 3-200 V4L	3	Each		
			Niles / Bertrand	JO0115000045 Replace 1-50 H	1	Each		
			Drewrys / Brookfield	JO0233000616 Replace 3-400 VXE15	3	Each		
			Drewrys / Portage	JO0234000085 Replace 3-400 VXE15	3	Each		
			East Side / Hastings	JO0261000787 Replace 3-400 VXE15	3	Each		
			East Side / Hastings	JO0261000800 Replace 3-400 VXE15	3	Each		
			Lincoln / Maysville	AL451-132 Replace 3-280 L	3	Each		
			21st Street / Cowan	DE86C1-277 Replace 3-280 L	3	Each		
			Alexandria / North	MA24-86 Replace 1-50 4H	1	Each		
			Alexandria / South	MA38C3-1 Replace 1-140 L	1	Each		
			Anchor Hocking / Island	RA52B1-11 Replace 1-140 L	1	Each		
			Anchor Hocking / Island	RA62C3-5 Replace 1-140 L	1	Each		
			Bethel / Village	DE65C3-59 Replace 2-100 L	2	Each		
			Elwood / Leisure	GR89-176 Replace 1-70 4H	1	Each		
			Elwood / Leisure	MA10-213 Replace 1-100 4H	1	Each		
			Elwood / Leisure	MA10-54 Replace 1-100 4H	1	Each		
			Elwood / Leisure	MA17-116 Replace 1-70 L	1	Each		
			Elwood / Leisure	MA17-53 Replace 3-200 V4L	1	Each		
			Elwood / Leisure	MA18-154 Replace 1-70 L	3	Each		
			Elwood / Leisure	MA26A1-230 Replace 1-140 L	1	Each		
			Elwood / Leisure	MA9-27 Replace 1-100 4H	1	Each		
			Elwood / Leisure	TI29-162 Replace 1-50 H	1	Each		
			Elwood / Leisure	TI29-65 Replace 1-50 H	1	Each		
			Elwood / Leisure	TI60-274 Replace 2-100 L	2	Each		
			Fairmount / Fowlerton	GR107-91 Replace 1-50 H	1	Each		
			Fairmount / Fowlerton	GR95-135 Replace 1-100 4H	1	Each		
			Fairmount / Fowlerton	GR96-133 Replace 1-100 L	1	Each		
			Gas City / Jonesboro	GR62B2-3 Replace 1-200 L	1	Each		
			Gas City / Jonesboro	GR73-23 Replace 1-100 L	1	Each		
			Hartford City / Central	BL32-198 Replace 1-140 L	1	Each		
			Hartford City / North	BL25-23 Replace 1-70 4H	1	Each		
			Linwood / Frankton	MA51-94 Replace 3-280 L	3	Each		
			McGalliard / Wheeling	DE56A2-214 Replace 1-200 L	1	Each		
			Mier / Sweetser	GR24-210 Replace 1-140 L	1	Each		
			Mier / Sweetser	GR24-46 Replace 1-100 L	1	Each		
			Miller Av / North	GR38C1-3 Replace 3-280 L	3	Each		
			Montpelier / Montpelier	BL5A4-15 Replace 3-280 L	3	Each		
			Montpelier / Roll	BL1-97 Replace 1-100 4H	1	Each		
			Montpelier / Roll	BL4-7 Replace 1-140 L	1	Each		
			Montpelier / Roll	WE74-95 Replace 1-50 H	1	Each		
			Montpelier / Roll	WE84-57 Replace 1-70 4H	1	Each		
			Peacock / Summitville	MA13-20 Replace 1-70 4H	1	Each		
			Peacock / Summitville	MA15-203 Replace 1-140 L	1	Each		
			Pennville / Pennville	WE81C4-18 Replace 1-50 H	1	Each		
			Pennville / Pennville	WE91-171 Replace 1-70 4H	1	Each		
			Pipe Creek / Cole	GR57-133 Replace 1-50 4H	1	Each		
			Rose Hill / Rose Hill	MA52-206 Replace 1-100 L	1	Each		
			Selma Parker / Wapahani	DE69C4-456 Replace 1-100 L	1	Each		
			South Elwood / Country Club	HA9-147 Replace 1-70 4H	1	Each		
			South Elwood / Country Club	MA42-1 Replace 1-100 4H	1	Each		
			South Elwood / Country Club	TI68-2 Replace 1-70 4H	1	Each		
			South Elwood / Country Club	TI69-172 Replace 1-100 4H	1	Each		
			South Elwood / Country Club	TI70-147 Replace 1-100 4H	1	Each		
			South Elwood / Dundee	MA34-404 Replace 3-280 L	3	Each		
			Tillotson / Westwood	DE55C2-24 Replace 1-200 L	1	Each		
			Van Buren / Landess	GR30-114 Replace 1-50 H	1	Each		
			Dooville / Farrville	GR32-129 Replace 1-70 4H	1	Each		
			Wabash / North	BL23-131 Replace 1-70 L	1	Each		
			Wesdel / Farmington	DE44 - 212 Replace 1-140 L	1	Each		
			Wesdel / Harrison	DE32-85 Replace 1-70 4H	1	Each		
							118	**$816,384**
Capacitor Replacement	Asset Renewal/ Reliability		Beech Road / Dunn	EL0206000107 Replace 900 KVAR Switched	1	Each		
			Elkhart Hydro / #1	EL0190000036 Replace 900 KVAR Switched	1	Each		
			Elkhart Hydro / #2	EL0232000396 Replace 900 KVAR Switched	1	Each		
			Northwest / #3	EL0209000439 Replace 900 KVAR Switched	1	Each		
			East Side / #2	JO0328000826 Replace 900 KVAR Fixed	1	Each		
			German / #2	JO0186000054 Replace 900 KVAR Fixed	1	Each		
			Gravel Pit / #2	JO0344000045 Replace 900 KVAR Switched	1	Each		
			Gravel Pit / #2	JO0366000104 Replace 900 KVAR Switched	1	Each		
			Ireland Road / #3	JO0372000008 Replace 900 KVAR Switched	1	Each		
			Lydick / Country Club	JO0278000080 Replace 900 KVAR Switched	1	Each		
			Hamilton / Hamilton	ST0430000011 Replace 900 KVAR Switched	1	Each		
			Ligonier / Gerber Street	NO0175000197 Replace 900 KVAR Switched	1	Each		
			Berne / Parr	AD0356000414 Replace 900 KVAR Switched	1	Each		

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
			Ossian / Baker	WE0137000295 Replace 450 KVAR Switched	1	Each		
			Anthony / Wabash	AL0478000479 Replace 450 KVAR Switched	1	Each		
			Colony Bay / Colony	AL0472000413 Replace 900 KVAR Switched	1	Each		
			Fulton / Bloomingdale	AL0446001432 Replace 450 KVAR Switched	1	Each		
			Hillcrest / Southtown #2	AL0594000234 Replace 900 KVAR Switched	1	Each		
			Pettit / Sears	AL0506001156 Replace 900 KVAR Switched	1	Each		
			Trier / Walden	AL0393000945 Replace 900 KVAR Switched	1	Each		
			Montpelier / East	BL0005C20204 Replace 450 KVAR Fixed	1	Each		
			Hummel Creek / South	GR0028B30293 Replace 450 KVAR Switched	1	Each		
			Marion Plant / East	GR0039C10026 Replace 900 KVAR Switched	1	Each		
			South Elwood - Excello	MA0026B20023 Replace 450 KVAR Switched	1	Each		
			Hartford City / South	BL0031A20223 Replace 900 KVAR Switched	1	Each		
			Royerton / Eden Church	DE0037000393 Replace 450 KVAR Switched	1	Each		
			Bethel / Brook	DE0055C40543 Replace 450 KVAR Switched	1	Each		
			Utica / Industrial	DE0076A10289 Replace 900 KVAR Switched	1	Each		
			Bluff Point / Ridgeville	RA0006B10126 Replace 450 KVAR Switched	1	Each		
			Farmland / Bears	RA0068000124 Replace 450 KVAR Switched	1	Each		
							30	**$453,958**
Porcelain Cutout & Arrester Replacement	Asset Renewal/ Reliability		Various	Replace porcelain cutouts and arresters	2,895	Each	**2,895**	**$979,962**
Crossarm Replacement	Asset Renewal/ Reliability		Various	Replace deteriorated crossarms and insulators identified from the overhead inspection program	1,146	Each	**1,146**	**$822,819**
Pole Replacement/Reinforcement	Asset Renewal/ Reliability		Various	Replace/Reinforce deteriorated poles identified from the pole inspection program	2,727	Each	**2,727**	**$4,770,697**
URD Cable and Live Front Transformer Replacement	Asset Renewal/ Reliability	1	Swanson / #1	Swanson Dr	0.83	Dist (mi)		
		2	German / #2	JO0186000352	0.04	Dist (mi)		
		3	Capital Ave / Current	JO0215000218	0.34	Dist (mi)		
		4	Darden / Lilac	JO0162000427	0.44	Dist (mi)		
		5	Granger / #5	JO0166000402	0.21	Dist (mi)		
		6	South Bend / #1	JO0213000820	0.10	Dist (mi)		
		7	South Bend / #1	JO0213000818	0.12	Dist (mi)		
		8	South Bend / #1	JO0213000817	0.11	Dist (mi)		
		9	Gravel Pit / #2	JO0411000118	0.13	Dist (mi)		
		10	Hillcrest / Warfield	AL564-788 to AL564-789 & AL 564-1125 to AL564-1107	1.03	Dist (mi)		
		11	Colony Bay / Colony	AL472-403 to AL472-356	0.75	Dist (mi)		
		12	Glenbrook / Speedway	AL360-383 to AL360-883	0.04	Dist (mi)		
		13	Hillcrest / Southtown #2	AL593-109 to AL593-164	0.04	Dist (mi)		
		14	State Street / Trier	AL421-784 to AL421-808	0.02	Dist (mi)		
		15	State Street / Trier	AL421-296 to AL421-886	0.02	Dist (mi)		
		16	State / Brentwood	AL422-648 to AL422-649	0.34	Dist (mi)		
		17	State / Brentwood	AL422-322 to AL422-320	0.36	Dist (mi)		
		18	Reed / Parker	AL335-924 to AL335-925	0.37	Dist (mi)		
		19	Reed / Brookside	AL334-300 to AL334-304	0.09	Dist (mi)		
		20	Reed - Brookside	AL334-344 to& AL334-369	0.24	Dist (mi)		
		21	Wesdel / Farmington	DE45B4-22 to DE45B4-86	0.31	Dist (mi)		
		22	Alexandria / North	MA31C4-40 to MA31C4-42	0.24	Dist (mi)		
		23	Marion Plant / North	GR39C3-115 to GR39C3-150	0.17	Dist (mi)		
		24	Cross Street / West	MA72A1-56 to MA72A1-77	0.48	Dist (mi)		
		25	South Elwood / Country Club	MA26A1-122 to MA26A1-239	0.34	Dist (mi)		
		26	Lantern Park / Petty	DE55B4-80 to DE55B2-79	0.28	Dist (mi)		
		27	South Elwood / Dundee	MA26D2-75 to MA26D2-87	0.23	Dist (mi)		
		28	Elwood / Leisure	MA26A1-122 to MA26A1-239	0.34	Dist (mi)		
		29	South Elwood / Country Club	MA33A3-87 to MA33A3-89	0.13	Dist (mi)		
		30	Lantern Park / Petty	DE55B2-197 to DE55B4-80	0.66	Dist (mi)		
		31	Hummel Creek / South	GR28B1-292 to GR28B1-174	0.30	Dist (mi)		
		32	Northwest / #2-12 kV	EI0188000110 to EL0188000736	0.34	Dist (mi)		
		33	South Bend / #1 -12 kV	JO0212000633	0.09	Dist (mi)		
		34	South Bend / #1 -12 kV	JO0212000634	0.09	Dist (mi)		
		35	South Bend / #1 -12 kV	JO0212000636	0.06	Dist (mi)		
		36	Swanson / #1-34.5 kV	JO0214100269 to JO0214100271	0.28	Dist (mi)		
		37	Industrial Park - Summit	AL360-1379 to AL360-1381	0.40	Dist (mi)		
		38	Industrial Park - Summit	AL360-1369 to AL360-1009	0.62	Dist (mi)		
		39	Lincoln / Maysville	AL421-710 to AL421-713	0.15	Dist (mi)		
		40	Lincoln / Maysville	AL420-695 to AL420-694	0.18	Dist (mi)		
		41	Lincoln / Maysville	AL420-693 to AL420-685	0.22	Dist (mi)		
		42	Lincoln / Maysville	AL0480000997	0.04	Dist (mi)		
		43	Waynedale / Avalon	AL591-316 & AL591-315	0.51	Dist (mi)		
		44	Spring Street / Tower	AL445-65 to AL445-401	0.02	Dist (mi)		
	Asset Renewal/ Safety		German / #2	JO0186000352 Replace Live Front Transformer	1	Each		
			Capital Avenue / Penn	JO0242000286 Replace Live Front Transformer	1	Each		
			Countryside / Jimtown	EL0270000141 Replace Live Front Transformer	1	Each		
			Lusher Avenue / #2	EL0252000796 Replace Live Front Transformer	1	Each		
			Lusher Avenue / #2	EL0252000833 Replace Live Front Transformer	1	Each		
			Darden Road / Lilac	JO0161000311 Replace Live Front Transformer	1	Each		

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
			Drewrys / Brookfield	JO0209000664 Replace Live Front Transformer	1	Each		
			Capital Ave / Current	JO0215000218 Replace Live Front Transformer	1	Each		
			Darden / Lilac	JO0162000427 Replace Live Front Transformer	1	Each		
			Granger / #5	JO0166000402 Replace Live Front Transformer	1	Each		
			South Bend / #1	JO0213000820 Replace Live Front Transformer	1	Each		
			South Bend / #1	JO0213000818 Replace Live Front Transformer	1	Each		
			South Bend / #1	JO0213000817 Replace Live Front Transformer	1	Each		
			Gravel Pit / #2	JO0411000118 Replace Live Front Transformer	1	Each		
			Silver Lake / Rolling Prairie	LP0235000362 Replace Live Front Transformer	1	Each		
			Silver Lake / Rolling Prairie	LP0235000370 Replace Live Front Transformer	1	Each		
			Drewrys / Wilber	JO0210000733 Replace Live Front Transformer	1	Each		
			State / Brentwood	AL0422000468, AL0422000472, AL0422000475, AL0422000476, AL0422000477 Replace Live Front Transformers	5	Each		
			State / Brentwood	AL0422000531, AL0422000536, AL0422000538 Replace Live Front Transformers	3	Each		
			Reed / Parker	AL0334000307 Replace Live Front Transformer	1	Each		
			Reed / Brookside	AL0334000293 Replace Live Front Transformer	1	Each		
			Reed / Brookside	AL0334000352, AL0334000353, AL0334000664 Replace Live Front Transformers	3	Each		
			Cross Street / West	MA72A1-57 Replace Live Front Transformer	1	Each		
			Cross Street / West	MA72A1-62 Replace Live Front Transformer	1	Each		
			Cross Street / West	MA72A1-64 Replace Live Front Transformer	1	Each		
			Alexandria / South	MA38C2-109 Replace Live Front Transformer	1	Each		
			Alexandria / South	MA38C2-107 Replace Live Front Transformer	1	Each		
			Elwood / Leisure	MA26A1-173 Replace Live Front Transformer	1	Each		
			Elwood / Leisure	MA26A1-169 Replace Live Front Transformer	1	Each		
			Elwood / Leisure	MA26A1-185 Replace Live Front Transformer	1	Each		
			Deer Creek / East	GR51A3-26 Replace Live Front Transformer	1	Each		
			Deer Creek / East	GR51A3-29 Replace Live Front Transformer	1	Each		
			Deer Creek / East	GR51A3-32 Replace Live Front Transformer	1	Each		
			Deer Creek / East	GR51A3-58 Replace Live Front Transformer	1	Each		
			Linwood / Linwood	MA54D1-106 Replace Live Front Transformer	1	Each		
			Linwood / Linwood	MA54D1-54 Replace Live Front Transformer	1	Each		
			Linwood / Linwood	MA54D1-98 Replace Live Front Transformer	1	Each		
			Alex / South	MA38B3-6 Replace Live Front Transformer	1	Each		
			West End / North	GR27D4-303 Replace Live Front Transformer	1	Each		
			Elwood / East	MA26C-153 Replace Live Front Transformer	1	Each		
			Deer Creek / North	GR50B1-333 Replace Live Front Transformer	1	Each		
			Industrial Park - Summit	AL0331000218, AL0331000229, AL0331000262, AL0331000266 Replace Live Front Transformers	4	Each		
			Industrial Park - Summit	AL0331000249 & AL0331000252 Replace Live Front Transformers	2	Each		
			Lincoln / Maysville	AL0421000788, AL0421000790, AL0421000792 Replace Live Front Transformers	3	Each		
			Lincoln / Maysville	AL0420000750 Replace Live Front Transformer	1	Each		
			Lincoln / Maysville	AL0420000736, AL0420000738, AL0420000740,AL0420000742, AL0420000744 Replace Live Front Transformers	5	Each		
			Lincoln / Maysville	AL0480000999 Replace Live Front Transformer	1	Each		
			Waynedale / Avalon	AL0591000332 Replace Live Front Transformer	1	Each		
			South Bend / #1 -12 kV	JO0212000633 Replace Live Front Transformer	1	Each		
			South Bend / #1 -12 kV	JO0212000634 Replace Live Front Transformer	1	Each		
			South Bend / #1 -12 kV	JO0212000636 Replace Live Front Transformer	1	Each		
							12.10	**$3,028,246**
Underground Station Exit Cable Replacement	Asset Renewal/ Reliability	1	Northland / #3	Replace with 1000 MCM AL	295	Dist (ft)		
		2	West Side / #3	Replace with 1000 MCM AL	850	Dist (ft)		
		3	Ossian / Lafever	Replace with 1000 MCM AL	80	Dist (ft)		
		4	Berne / Swiss	Replace with 1000 MCM AL	130	Dist (ft)		
		5	Industrial Park / Wells	Replace with 1000 MCM AL	445	Dist (ft)		
		6	Haymond / Riverside	Replace with 1000 MCM AL	1,255	Dist (ft)		
							3,055	**$526,830**
Distribution Feeder Breaker Replacement	Asset Renewal/ Reliability		Deer Creek / Alternate VA Hospital	Replace obsolete PR feeder breaker	1	Each		
			Blaine Street / Heekin Park	Replace obsolete PR feeder breaker	1	Each		
			Winchester / Fountain Park	Replace obsolete PR feeder breaker	1	Each		
			Winchester / Overmyer	Replace obsolete PR feeder breaker	1	Each		
			Upland / South	Replace obsolete PR feeder breaker	1	Each		
			Upland / North	Replace obsolete PR feeder breaker	1	Each		
			Grant / North	Replace obsolete PR feeder breaker	1	Each		
			Grant / Sweetser	Replace obsolete PR feeder breaker	1	Each		
			Mayfield / Selma	Replace obsolete PR feeder breaker	1	Each		
			Mayfield / Springwater	Replace obsolete PR feeder breaker	1	Each		
			Jay / Redkey	Replace obsolete WE feeder breaker	1	Each		
			Jay / Mill Grove	Replace obsolete WE feeder breaker	1	Each		
			Hartford City / North	Replace obsolete PR feeder breaker	1	Each		
			Parnell / University	Replace obsolete PR feeder breaker	1	Each		
			Parnell / Coliseum	Replace obsolete PR feeder breaker	1	Each		
			Parnell / Northcrest	Replace obsolete PR feeder breaker	1	Each		
			Mckinley / Hale	Replace obsolete PR feeder breaker	1	Each		
			Albion / Albion City	Replace obsolete PR feeder breaker	1	Each		
			Industrial Park / Wells	Replace obsolete PR feeder breaker	1	Each		

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
			Industrial Park / Summit	Replace obsolete PR feeder breaker	1	Each		
			Industrial Park / Production	Replace obsolete PR feeder breaker	1	Each		
			Ferguson / Brookwood	Replace obsolete PRV feeder breaker	1	Each		
			South Decatur / Gage	Replace obsolete PR feeder breaker	1	Each		
			South Decatur / Tyndall	Replace obsolete PR feeder breaker	1	Each		
			Cleveland / Memorial	Replace obsolete WE feeder breaker	1	Each		
			Cleveland / Park Forest	Replace obsolete WE feeder breaker	1	Each		
			Cleveland / Discovery	Replace obsolete ESV feeder breaker	1	Each		
			Ireland Road / #3	Replace obsolete VWE feeder breaker	1	Each		
			Ireland Road / #4	Replace obsolete PR feeder breaker	1	Each		
			Conant / #1	Replace obsolete PR feeder breaker	1	Each		
			Conant / #3	Replace obsolete PR feeder breaker	1	Each		
			West Side / #3	Replace obsolete PRM feeder breaker	1	Each		
							32	**$4,606,835**
UG Network Rebuild	Asset Renewal/Reliability		Various	Replace and rebuild network secondary and primary components in South Bend, Elkhart, Fort Wayne and Muncie	24.5	Dist (mi)	**24.5**	**$28,256,586**
Major Projects	Capacity	1	Three M Station	Add bus and feeder to serve existing customer's increased load				**$1,417,719**
	Reliability	2	Aviation Station	Construct new station with 3 feeders				**$5,528,783**
	Reliability	3	Bixler Station	Add new bay and two feeder breakers				**$769,921**
	Reliability	4	County Line Station	Add new feeder breaker, station exit and construct feeder				**$334,379**
	Capacity	5	Dwenger Station	Construct new station with one feeder breaker and station exit				**$4,051,946**
	Reliability	6	Farmland Station	Add new feeder breaker, station exit and construct feeder				**$205,598**
	Reliability	7	Glenbrook Feeder #1 and #2	Upgrade underground cable and equipment to two underground feeder				**$412,710**
	Reliability	8	Grabill Station	Add new feeder breaker and station exit				**$948,911**
	Reliability	9	Jones Creek Station	Add new feeder breaker and station exit				**$642,774**
	Reliability/Capacity	10	Kenmore Station	Construct new station to replace obsolete station. Construct six feeders				**$5,167,626**
	Reliability	11	South Summitville Station	Add two new feeder breakers, station exits and construct feeders				**$780,593**
	Reliability	12	Water Pollution Station	Upgrade transformer				**$1,409,811**
Risk Mitigation	Reliability /Safety		Pole Inspection	Comprehensive pole inspection and treatment	26,500	Each	**26,500**	**$853,000**
			Underground Distribution Inspection	Inspect above ground structures (padmounts, enclosures, pedestals, etc.)	11,700	Each	**11,700**	**$84,000**
			Overhead Line Inspection	Inspect overhead distribution lines	2,455	Dist (mi)	**2,455**	**$273,000**
			Contact Voltage Inspection	Inspect downtown network areas	4	Cities	**4**	**$20,000**
Network Monitoring	System Modernization		Various	Install a monitoring and control system on four electric network systems				**$7,622,998**

Indiana Michigan Power - Indiana 2018 Distribution Management Plan

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
Single Phase Line Rebuild	Asset Renewal/ Reliability	1	Countryside / Homestead	Replace 4AS & 4Cu with 2AA beyond fuse at EL0274000127	0.80	Dist (mi)		
		2	Darden / East	Replace 4AS with 2AA beyond fuse at JO0163000080	0.18	Dist (mi)		
		3	East Side / Wilson	Replace 4Cu with 2AA beyond fuse at JO0236000777	0.64	Dist (mi)		
		4	Swanson / #1	Reconductor 4AS to 2AA beyond JO189-79	0.20	Dist (mi)		
		5	Darden / Lilac	Reconductor 4AS & 4Cu to 2AA beyond JO0162000114	0.15	Dist (mi)		
		6	Darden / Douglas	Reconductor 4Cu to 2AA beyond JO0187000179	0.32	Dist (mi)		
		7	Granger / #6	Reconductor 6Cu to 2AA from JO0120000012 to JO0120000009 and JO0120000006 to JO0120000001	0.23	Dist (mi)		
		8	Studebaker / Lark	Reconductor single phase to 2 AA, beyond JO283-699	0.15	Dist (mi)		
		9	Swanson / #1	Reconductor 4AS to 2 AA, beyond JO189-157	0.34	Dist (mi)		
		10	Colony Bay / Getz	Reconductor 4Cu & 6Cu to 2AA from AL473-453 to AL473-222	0.48	Dist (mi)		
		11	Reed / Stellhorn	Reconductor 4Cu to 2AA from AL364-703 to AL364-171	0.34	Dist (mi)		
		12	Summit / Salomon	Reconductor 4AS & 6AS to 2AA from AL301-498 to AL301-406	0.41	Dist (mi)		
		13	Wallen / Windsor	Reconductor 4Cu & 6Cu to 2AA from AL301-549 to AL301-503	0.63	Dist (mi)		
		14	Wallen / Windsor	Reconductor 2AS & 6AS to 2AA from AL301-286 to AL301-197	0.75	Dist (mi)		
		15	Colony Bay / Iverness	Reconductor 5Cu to 2AA from AL470-49 to AL470-76	0.74	Dist (mi)		
		16	Hacienda / Arlington	Reconductor 6ACC to 1/0AA from AL365-304 to AL336-85 and 6ACC to 2AA from AL336.99 to AL337-46	1.15	Dist (mi)		
		17	Winchester / Saratoga	Rebuild 4AS to 2AA from RA49-3 to RA60-10	1.23	Dist (mi)		
		18	Mier / Swayzee	Rebuild 4AS to 2AA from GR23-143 to GR34-1	1.01	Dist (mi)		
		19	Daleville / Daleville	Rebuild 6ACC to 2AA from DE81-21 to DE72-87	1.19	Dist (mi)		
		20	Linwood / Frankton	Rebuild 4CU to 2AA from MA41-12 to MA49-30	1.03	Dist (mi)		
							11.97	**$1,419,810**
Three Phase Line Rebuild	Asset Renewal/ Reliability	1	Beech / Dunn 12 kV	Reconductor 4Cu with 2AA from JO0244000094 to JO0267000032	1.50	Dist (mi)		
		2	Northland / #5 -12 kV	Reconductor/Multiphase mixed 4/0AA & 4AS with 556AL from EL0131000022 to EL0132000034	2.35	Dist (mi)		
		3	Hamilton / Hamilton	Reconductor 4AS & 2AS to 2AA from ST431-286 to DK140-3	2.82	Dist (mi)		
		4	Mulldon Mill / Hoagland	Replace 6Cu with 2AA from AL628-20 to AL627-53	2.00	Dist (mi)		
		5	Farmland / Wildcat	Rebuild 4Cu to 556AL from RA47D1-49 to RA36D2-10	1.03	Dist (mi)		
		6	Mier - Sweetser	Rebuild 4Cu to 556AL from GR25D2-31 to GR25-43	0.83	Dist (mi)		
		7	Hogan / Cammack	Rebuild 4AS & 4Cu to 2AA from DE64C3-425 to DE54D3-10	0.90	Dist (mi)		
		8	Fairmount / Fowlerton	Rebuild 4Cu to 556AL from GR95-79 to GR96-133	1.28	Dist (mi)		
							12.71	**$4,332,388**
Circuit Ties	Asset Renewal/ Reliability	1	Lydick / Town to Pine / Landmark	Reconductor with 556AL from JO0180-374 to JO0156-59	1.29	Dist (mi)		
		2	Kankakee / Olive	Reconductor/Multiphase with 556AL from JO0302000009 to JO0324000005	0.70	Dist (mi)		
		3	Gravel Pit / #1	Reconductor/Multiphase with 556AL from JO0323000045 to JO0324000005	0.87	Dist (mi)		
		4	Reed / Parker	Reconductor with 556AL from AL364-622 to AL364-697	0.71	Dist (mi)		
		5	Reed / Brookside to Robison Park / Dupont	Reconductor with 556AL from AL305-53 to AL306-179	0.32	Dist (mi)		
		6	Harlan / Notestine to Woodburn / Milan	Reconductor with 556AL from AL256-160 to AL316-28	1.83	Dist (mi)		
		7	Anchor Hocking / Island to Winchester / Saratoga	Replace 1/0CU with 556AL from RA51B1-68 to RA51A4-24	0.60	Dist (mi)		
		8	Mier / Sweetser to Grant / Sweetser	Replace 1/0CU with 556AL from GR25-240 to GR25D2-61	1.07	Dist (mi)		
							7.39	**$2,187,958**
Voltage Conversion	Asset Renewal/ Reliability	1	Harrison / #2-4 kV	Convert 4 kV to 12 kV from EL0210000530 to EL0210000524	1.00	Dist (mi)		
		2	Harrison / #2-4 kV	Convert 4 kV to 12 kV from EL0210000083 to EL0210002173	0.91	Dist (mi)		
		3	Jobes / South	Convert 4 kV to 12 kV from DE66D1-468 to DE66D4-3	2.55	Dist (mi)		
		4	Jobes / South	Convert 4 kV to 12 kV from DE66B3-9 to DE66B4-395	0.62	Dist (mi)		
							5.08	**$1,775,638**
Sectionalizing	Asset Renewal/ Reliability		Kankakee / Sample	Review and modify sectionalizing on circuit	1	Each		
			Granger / #4	Review and modify sectionalizing on circuit	1	Each		
			St. Joe / Newville	Review and modify sectionalizing on circuit	1	Each		
			Adams / Vera Cruz	Review and modify sectionalizing on circuit	1	Each		
			S. Summitville / Goblins	Review and modify sectionalizing on circuit	1	Each		
			S. Summitville / Cleveland	Review and modify sectionalizing on circuit	1	Each		
			North Portland / Fairgrounds	Review and modify sectionalizing on circuit	1	Each		
							7	**$440,965**
Recloser Replacement	Asset Renewal/ Reliability		Cleveland / Park Forest	EL0144000144 Replace 3-400 VXE15	3	Each		
			Cleveland / Park Forest	EL0143000178 Replace 3-400 VXE15	3	Each		
			Conant / #3	EL0212000165 Replace 3-400 VXE15	3	Each		
			Conant / #3	EL0212000885 Replace 3-400 VXE15	3	Each		
			Conant / #3	EL0212000886 Replace 3-400 VXE15	3	Each		
			Countryside / Homestead	EL0318000033 Replace 2-140 V4L	2	Each		
			Osolo / #2	EL0170000048 Replace 3-400 VXE15	3	Each		
			Osolo / #2	EL0169000027 Replace 3-400 VXE15	3	Each		
			Darden Road / Douglas	JO0211000110 Replace 3-200 V4L	3	Each		
			Darden Road / Lilac	JO0162000037 Replace 1-100 V4L	1	Each		
			Drewrys / Brookfield	JO0233000238 Replace 3-200 V4L	3	Each		

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
			East Side / Adams	JO0284001868 Replace 3-400 VXE15	3	Each		
			Colfax #3	JO0259000585 Replace 3-400 VXE15	3	Each		
			South Bend / #3	JO0237000196 Replace 3-400 VXE15	3	Each		
			East Side / Ironwood	JO0306000697 Replace 3-400 VXE15	3	Each		
			Lydick / Town	JO0228000050 Replace 3-400 VXE15	3	Each		
			Lydick / Town	JO0204000081 Replace 3-400 VXE15	3	Each		
			Pine / Blackthorn	JO0159000152 Replace 3-400 VXE15	3	Each		
			Pine / Blackthorn	JO0159000164 Replace 3-400 VXE15	3	Each		
			Countryside / Homestead	EL0318000298 Replace 3-140 V4L	3	Each		
			Colony Bay / Getz	AL0501000472 Replace 1-560-VWE	1	Each		
			Alexandria / Orestes	MA0028D30025 Replace 2-100-V4L	2	Each		
			Alexandria / Orestes	MA0036000172 Replace 1-100-V4H	1	Each		
			Bethel / Brook	DE0055C40050 Replace 3-200-V4L	3	Each		
			Bethel / Brook	DE0056B10171 Replace 3-200-V4L	3	Each		
			Cross Street / Chesterfield	MA0072B40002 Replace 1-100-V4L	1	Each		
			Cross Street / Chesterfield	MA0072D20035 Replace 1-140-V4L	1	Each		
			Deer Creek / East	GR0051A40021 Replace 3-140-V4L	3	Each		
			Deer Creek / East	GR0052000386 Replace 1-140-V4L	1	Each		
			Elwood / East	MA0026A20045 Replace 3-280-V4L	3	Each		
			Elwood / East	MA0026A20097 Replace 1-280-V4L	1	Each		
			Elwood / Leisure	MA0002000074 Replace 1-70-V4H	1	Each		
			Elwood / Leisure	MA0003000105 Replace 1-70-V4H	1	Each		
			Elwood / Leisure	MA0009000059 Replace 1-70-V4H	1	Each		
			Elwood / Leisure	MA0010000231 Replace 3-140-V4L	3	Each		
			Elwood / Leisure	MA0011000047 Replace 1-70-V4H	1	Each		
			Elwood / Leisure	TI0030000027 Replace 1-70-V4H	1	Each		
			Fairmount / Fowlerton	GR0096D10012 Replace 1-70-V4H	1	Each		
			Fairmount / West Eighth St.	GR0091000086 Replace 3-100-V4H	3	Each		
			Gaston / Matthews	DE0003000021 Replace 3-140-V4L	3	Each		
			Gaston / Matthews	GR0109A30044 Replace 3-140-V4L	3	Each		
			Grant / Sweetser	GR0038A10015 Replace 3-280-V4L	3	Each		
			Linwood / Linwood	MA0053000189 Replace 1-100-V4H	1	Each		
			McClure / East Commercial	GR0039A40028 Replace 3-280-V4L	3	Each		
			Mier / Swayzee	GR0034000202 Replace 3-400-VXE	3	Each		
			Mississinewa / Raceway	GR0063000414 Replace 3-200-V4L	3	Each		
			Montpelier / East	BL0013000029 Replace 1-70-V4H	1	Each		
			Montpelier / East	JA0001000001 Replace 1-100-V4H	1	Each		
			Montpelier / East	WE0089000071 Replace 1-70-V4H	1	Each		
			Montpelier / East	WE0090000078 Replace 1-70-V4H	1	Each		
			Montpelier / Roll	BL0003000025 Replace 1-100-V4H	1	Each		
			North Portland / North	JA0029000002 Replace 1-100-V4H	1	Each		
			Pennville / Pennville	JA0002000054 Replace 3-100-V4H	3	Each		
			Royerton / Riggin Road	DE0057A10013 Replace 3-140-V4L	3	Each		
			Sharon Road / Desoto	DE0049B10006 Replace 1-100-V4H	1	Each		
			South Elwood / Dundee	MA0035000223 Replace 3-280-V4L	3	Each		
			South Elwood / Excello	MA0026B20006 Replace 3-280-V4L	3	Each		
			South Elwood / Excello	MA0026B20180 Replace 3-280-V4L	3	Each		
			South Side / Commercial	GR0049000040 Replace 3-140-V4L	3	Each		
			South Side / Commercial	GR0049C40577 Replace 3-200-V4L	3	Each		
			Van Buren / Landess	GR0019000182 Replace 1-70-V4H	1	Each		
			Dooville / Farrville	GR0043000080 Replace 1-70-V4H	1	Each		
							138	**$978,549**
Capacitor Replacement	Asset Renewal/ Reliability		Concord / #4	EL0251000813 Replace 900 KVAR Switched	1	Each		
			County Road 4 / Airport	EL0146000223 Replace 450 KVAR Switched	1	Each		
			Lusher / #2	EL0231000331 Replace 900 KVAR Switched	1	Each		
			Northland / #3	EL0171000200 Replace 900 KVAR Switched	1	Each		
			Whitaker / #1	JO0292000412 Replace 900 KVAR Switched	1	Each		
			Drewrys / Diamond	JO0234000649 Replace 900 KVAR Switched	1	Each		
			Granger / #1	JO0122000103 Replace 900 KVAR Switched	1	Each		
			Ireland Road / #2	JO0328000026 Replace 900 KVAR Switched	1	Each		
			Jackson Road / Michigan St	JO0327000714 Replace 900 KVAR Switched	1	Each		
			Pine / Landmark	JO0158000158 Replace 900 KVAR Switched	1	Each		
			Butler / City	DK0265000076 Replace 900 KVAR Switched	1	Each		
			Butler / West	DK0263000060 Replace 450 KVAR Switched	1	Each		
			Berne / Swiss	AD0357000043 Replace 900 KVAR Switched	1	Each		
			Decatur / Root	AD0168000058 Replace 900 KVAR Switched	1	Each		
			Wayne Trace / Stinson	AL0566000092 Replace 900 KVAR Switched	1	Each		
			Waynedale / Avalon	AL0562000272 Replace 900 KVAR Switched	1	Each		
			Ferguson / Baer Field	AL0619000121 Replace 900 KVAR Switched	1	Each		
			Industrial Park / Centennial	AL0387000403 Replace 900 KVAR Switched	1	Each		
			Robison Park / Auburn Road	AL0303000595 Replace 900 KVAR Switched	1	Each		
			Harlan / Springfield	AL0229000192 Replace 450 KVAR Switched	1	Each		

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
			Alexandria / North	MA0030B10021 Replace 450 KVAR Switched	1	Each		
			Deer Creek / East	GR0041000112 Replace 450 KVAR Switched	1	Each		
			Elwood / Leisure	MA0025A20045 Replace 450 KVAR Switched	1	Each		
			Mier / Sweetser	GR0014000101 Replace 450 KVAR Switched	1	Each		
			Blaine / Luick	DE0077A20077 Replace 900 KVAR Switched	1	Each		
			Jay / Millgrove	JA0068B10153 Replace 450 KVAR Switched	1	Each		
			Lantern Park / Petty	DE0055B40005 Replace 900 KVAR Switched	1	Each		
			Utica / Ross	DE0076A30004 Replace 900 KVAR Switched	1	Each		
			Albany / Albany	RA0001C20056 Replace 450 KVAR Switched	1	Each		
			Lynn / Lynn	RA0096D20089 Replace 900 KVAR Switched	1	Each		
							30	**$466,506**
Porcelain Cutout & Arrester Replacement	Asset Renewal/ Reliability		Various	Replace porcelain cutouts and arresters	2,895	Each	**2,895**	**$1,008,481**
Crossarm Replacement	Asset Renewal/ Reliability		Various	Replace deteriorated crossarms and insulators identified from the overhead inspection program	1,146	Each	**1,146**	**$844,197**
Pole Replacement/Reinforcement	Asset Renewal/ Reliability		Various	Replace/Reinforce deteriorated poles identified from the pole inspection program	2,727	Each	**2,727**	**$5,069,467**
URD Cable and Live Front Transformer Replacement	Asset Renewal/ Reliability	1	South Side / Wildcat	JO0306000775	2.07	Dist (mi)		
		2	Conant / #2	EL0212000590	0.04	Dist (mi)		
		3	Conant / #2	EL0213000643	0.04	Dist (mi)		
		4	Concord / #2	EL0252000855	0.20	Dist (mi)		
		5	Dunlap / #3	EL0297000484	0.18	Dist (mi)		
		6	Elkhart Hydro / #1	EL0210001862	0.05	Dist (mi)		
		7	Elkhart Hydro / #2	EL0210001856	0.04	Dist (mi)		
		8	Lusher Avenue / #1	EL0232001271	0.05	Dist (mi)		
		9	Darden Road / East	JO0163000972	0.07	Dist (mi)		
		10	Darden Road / East	JO0163001022	0.14	Dist (mi)		
		11	Ireland Road / #3	JO0327000587	0.22	Dist (mi)		
		12	Swanson / #1	JO0164000524	0.10	Dist (mi)		
		13	Swanson / #1	JO0164000526	0.32	Dist (mi)		
		14	Woods Road / North	AL162-198 to AL162-273	0.78	Dist (mi)		
		15	Woods Road / North	AL135-51 to AL135-54	0.14	Dist (mi)		
		16	Waynedale / Smith	AL59-676 to AL59-677	0.30	Dist (mi)		
		17	Waynedale / Avalon	AL591-314 to AL591-313	0.30	Dist (mi)		
		18	Waynedale / Avalon	AL591-315 to AL591-315	0.51	Dist (mi)		
		19	Waynedale / Avalon	AL59-494 to AL59-315	0.59	Dist (mi)		
		20	Waynedale / Ridge	AL59-586 to AL59-585	0.25	Dist (mi)		
		21	Wayne Trace / Paulding	AL566-537 to AL566-536	0.33	Dist (mi)		
		22	Wayne Trace / Paulding	AL508-322 to AL508-364	0.29	Dist (mi)		
		23	Illinois Road / Scott	AL469-110 to AL469-199	0.76	Dist (mi)		
		24	Spy Run / Centlivre	AL418-19 to AL418-2117	0.27	Dist (mi)		
		25	Waynedale / Smith	AL561-832 to AL561-837	0.28	Dist (mi)		
		26	West End / North	GR28B1-292 to GR28B1-250	0.29	Dist (mi)		
		27	Deer Creek / East	GR51A1-41 to GR51A3-58	0.23	Dist (mi)		
		28	WesDel / Farmington	DE45B4-25 to DE55A3-34	0.33	Dist (mi)		
		29	Randolph / Chestnut	RA55C1-226 to RA55C1-277	0.36	Dist (mi)		
		30	Wabash / Gilkey	BL24B2-53 to BL24B2-422	0.03	Dist (mi)		
		31	Mier / Sweetser	GR26B2-8 to GR26B2-22	0.05	Dist (mi)		
		32	Elwood / Leisure	MA26A1-198 to MA26-379	0.06	Dist (mi)		
		33	Marion Plant / North	GR39C3-132 to GR39C3-207	0.05	Dist (mi)		
		34	Cross Street / West	MA64-389 to MA64-385	0.07	Dist (mi)		
		35	Tillotson / Jackson	DE65A4-24 to DE65A4-275	0.04	Dist (mi)		
		36	Gas City / Jonesboro	GR61-755 to GR61-755	0.04	Dist (mi)		
		37	Lantern Park / Nebo	DE54C2-64 to DE54C2-49	0.07	Dist (mi)		
		38	Hogan / River Road	DE63D2-364 to DE63D2-365	0.47	Dist (mi)		
		39	Farmland - Wildcat	RA36D2-13 to RA36D2-76	0.34	Dist (mi)		
		40	Lantern Park - Petty	DE55B4-37 to DE55B4-38	0.43	Dist (mi)		
		41	Hogan - Morrison Road	DE64D3-1053 to DE64D3-1046	0.06	Dist (mi)		
		42	Lusher Avenue / No 2	EL0253000846	0.07	Dist (mi)		
		43	Osolo / #1	EL0147000411	0.04	Dist (mi)		
		44	Osolo / #1	EL0147000412	0.09	Dist (mi)		
		45	Osolo / #1	EL0147000436	0.10	Dist (mi)		
		46	Osolo / #3	EL0169000283	0.08	Dist (mi)		
		47	Swanson / #1-34.5 Kv	JO0165000261, JO0165000510 and JO0165000378	0.98	Dist (mi)		
		48	Waynedale / Ideal	AL590-147 to AL590-7	0.21	Dist (mi)		
		49	Colony Bay / Colony	AL500-83 to AL472-368	0.55	Dist (mi)		
		50	Churubusco / Blue Lake	WH166-810 to WH166-308	0.10	Dist (mi)		
	Asset Renewal/ Safety		Conant / #2	EL0212000590 Replace Live Front Transformer	1	Each		
			Conant / #2	EL0213000643 Replace Live Front Transformer	1	Each		
			Concord / #2	EL0252000855 Replace Live Front Transformer	1	Each		
			Dunlap / #3	EL0297000484 Replace Live Front Transformer	1	Each		

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
			Elkhart Hydro / #1	EL0210001862 Replace Live Front Transformer	1	Each		
			Elkhart Hydro / #2	EL0210001856 Replace Live Front Transformer	1	Each		
			Lusher Avenue / #1	EL0232001271 Replace Live Front Transformer	1	Each		
			Darden Road / East	JO0163000972 Replace Live Front Transformer	1	Each		
			Darden Road / East	JO0163001022 Replace Live Front Transformer	1	Each		
			Ireland Road / #3	JO0327000587 Replace Live Front Transformer	1	Each		
			Swanson / #1	JO0164000524 Replace Live Front Transformer	1	Each		
			Swanson / #1	JO0164000526 Replace Live Front Transformer	1	Each		
			Woods Road / North	AL0162000203 & AL0162000207 Replace Live Front Transformers	2	Each		
			Woods Road / North	AL0135000078 & AL0135000080 Replace Live Front Transformers	2	Each		
			Waynedale / Smith	AL0590000667, AL0590000669 & AL0590000670 Replace Live Front Transformers	3	Each		
			Waynedale / Avalon	AL0591000326 Replace Live Front Transformer	1	Each		
			Waynedale / Avalon	AL0591000332 Replace Live Front Transformer	1	Each		
			Waynedale / Avalon	AL0590000496, AL0590000498, AL0590000514, & AL0590000525 Replace Live Front Transformers	4	Each		
			Waynedale / Ridge	AL0590000591, AL0590000594, & AL0590000596 Replace Live Front Tr	3	Each		
			Wayne Trace / Paulding	AL0566000516, & AL0566000564 Replace Live Front Transformers	2	Each		
			Wayne Trace / Paulding	AL0508000373, & AL05508000376 Replace Live Front Transformers	2	Each		
			Illinois Road / Scott	AL0469000144, AL0469000116, AL0469000119, AL0469000181, AL0469	5	Each		
			Spy Run / Centlivre	AL0418001236 Replace Live Front Transformer	1	Each		
			Waynedale / Smith	AL0561000833 & AL05900000570 Replace Live Front Transformers	2	Each		
			Hogan / Cammack	DE64A-1192 Replace Live Front Transformer	1	Each		
			Bluff Point / Ridgeville	RA7-101 Replace Live Front Transformer	1	Each		
			Hummel Creek / West	GR16A1-30 Replace Live Front Transformer	1	Each		
			West End / South	GR38D1-227 Replace Live Front Transformer	1	Each		
			Peacock / Summitville	GR105C2-26 Replace Live Front Transformer	1	Each		
			South Elwood / Dundee	MA28-332 Replace Live Front Transformer	1	Each		
			Cross Street / Moonville	MA63A4-42 Replace Live Front Transformer	1	Each		
			Wabash / Gilkey	BL24B2-422 Replace Live Front Transformer	1	Each		
			Mier / Sweetser	GR26B2-22 Replace Live Front Transformer	1	Each		
			Elwood / Leisure	MA26-379 Replace Live Front Transformer	1	Each		
			Marion Plant / North	GR39C3-207 Replace Live Front Transformer	1	Each		
			Cross Street / West	MA64-385 Replace Live Front Transformer	1	Each		
			Tillotson / Jackson	DE65A4-275 Replace Live Front Transformer	1	Each		
			Gas City / Jonesboro	GR61-755 Replace Live Front Transformer	1	Each		
			Lantern Park / Nebo	DE54C2-49 Replace Live Front Transformer	1	Each		
			Hogan / River Road	DE63D2-372 Replace Live Front Transformer	1	Each		
			Waynedale / Ideal	AL0590000490 Replace Live Front Transformer	1	Each		
			Colony Bay / Colony	AL0472000471 & AL04720000369 Replace Live Front Transformers	2	Each		
			Churubusco / Blue Lake	WH0166000811 Replace Live Front Transformer	1	Each		
			Lusher Avenue / #2	EL0253000846 Replace Live Front Transformer	1	Each		
			Osolo / #1	EL0147000411 Replace Live Front Transformer	1	Each		
			Osolo / #1	EL0147000412 Replace Live Front Transformer	1	Each		
			Osolo / #1	EL0147000436 Replace Live Front Transformer	1	Each		
			Osolo / #3	EL0169000283 Replace Live Front Transformer	1	Each		
							13.48	**$3,508,543**
Underground Station Exit Cable Replacement	Asset Renewal/ Reliability	1	German / #4	Replace with 1000 MCM AL	450	Dist (ft)		
		2	German / #5	Replace with 1000 MCM AL	430	Dist (ft)		
		3	Concord / #5	Replace with 1000 MCM AL	470	Dist (ft)		
		4	Colony Bay / Inverness	Replace with 1000 MCM AL	1,027	Dist (ft)		
		5	Trier / Walden	Replace with 1000 MCM AL	250	Dist (ft)		
		6	McGalliard /West	Replace with 1000 MCM AL	435	Dist (ft)		
							3,062	**$545,101**
Distribution Feeder Breaker Replacement	Asset Renewal/ Reliability		Arnold Hogan / River Road	Replace obsolete WE feeder breaker	1	Each		
			Arnold Hogan / Cammack	Replace obsolete WE feeder breaker	1	Each		
			Arnold Hogan / Brindle Road	Replace obsolete WE feeder breaker	1	Each		
			Arnold Hogan / Morrison Road	Replace obsolete WE feeder breaker	1	Each		
			Wabash Avenue / Gilkey	Replace obsolete WE feeder breaker	1	Each		
			Wabash Avenue / North	Replace obsolete WE feeder breaker	1	Each		
			South Elwood / Country Club	Replace obsolete WE feeder breaker	1	Each		
			South Elwood / Excello	Replace obsolete WE feeder breaker	1	Each		
			Randolph / Chestnut	Replace obsolete PRM feeder breaker	1	Each		
			Randolph / Jackson Pike	Replace obsolete PRM feeder breaker	1	Each		
			Van Buren / Landess	Replace obsolete PR feeder breaker	1	Each		
			Van Buren / Van Buren	Replace obsolete PR feeder breaker	1	Each		
			Mcgalliard Road / Chateau	Replace obsolete PRM feeder breaker	1	Each		
			Mcgalliard Road / Mall	Replace obsolete PRM feeder breaker	1	Each		
			Twenty First Street / Arcadia	Replace obsolete PRM feeder breaker	1	Each		
			Twenty First Street / Hackley	Replace obsolete PR feeder breaker	1	Each		
			Elmridge / Hines Road	Replace obsolete FK-14.4-250 feeder breaker	1	Each		
			Kingsland / Uniondale	Replace obsolete PR feeder breaker	1	Each		

Program	Category	Map Reference Number	Station/Circuit	Description	Units	UOM	Program Total	Est Capital Cost
			Kingsland / Tocsin	Replace obsolete PR feeder breaker	1	Each		
			Hamilton / Hamilton	Replace obsolete PR feeder breaker	1	Each		
			North Kendallville / Publix	Replace obsolete PR feeder breaker	1	Each		
			Industrial Park / Progress	Replace obsolete PR feeder breaker	1	Each		
			Industrial Park / Harris	Replace obsolete PR feeder breaker	1	Each		
			Mckinley / Taylor	Replace obsolete ESV feeder breaker	1	Each		
			Mckinley / Phenie	Replace obsolete ESV feeder breaker	1	Each		
			Mckinley / Engle	Replace obsolete ESV feeder breaker	1	Each		
			Harper / Minich	Replace obsolete ESV feeder breaker	1	Each		
			Swanson / Fdr #1	Replace obsolete CXE feeder breaker	1	Each		
			Swanson / Fdr #2	Replace obsolete CXE feeder breaker	1	Each		
			Dunlap / Fdr #1	Replace obsolete PRM feeder breaker	1	Each		
			Dunlap / Fdr #2	Replace obsolete PR feeder breaker	1	Each		
			Dunlap / Fdr #3	Replace obsolete PR feeder breaker	1	Each		
			Dunlap / Fdr #4	Replace obsolete VWE feeder breaker	1	Each		
			Concord / Fdr #3	Replace obsolete PR feeder breaker	1	Each		
			Concord / Fdr #4	Replace obsolete ES feeder breaker	1	Each		
			Granger / Fdr #1	Replace obsolete PR-SEL feeder breaker	1	Each		
			Granger / Fdr #2	Replace obsolete PR-SEL feeder breaker	1	Each		
							37	**$5,403,236**
UG Network Rebuild	Asset Renewal/Reliability		Various	Replace and rebuild network secondary and primary components in South Bend, Elkhart, Fort Wayne and Muncie	4.3	Dist (mi)	**4.3**	**$9,798,562**
Major Projects	Reliability	1	Dunlap Station	Add new feeder breaker and station exit				**$797,762**
	Asset Renewal/Reliability	2	Elkhart Area Network Improvemer	Rebuild three stations and construct feeders				**$16,803,221**
	Reliability	3	Haymond Station	Add a second bus, two bus tie breakers, two new network feeder breakers and station exits				**$710,222**
	Asset Renewal/Reliability	4	Mackey Station	Construct new station to replace obsolete station. Construct five feeders				**$4,392,863**
	Asset Renewal/Reliability	5	Melita Station	Construct new station with six network feeders				**$13,899,887**
	Asset Renewal/Reliability	6	Milan Station	Construct new station to replace obsolete station. Construct two feeders				**$3,440,190**
	Asset Renewal/Reliability	7	North Portland Station	Construct new station to replace obsolete station. Construct six feeders				**$6,505,540**
	Asset Renewal/Reliability	8	Quinn/Vintage stations	Convert one station and convert/relocate another station				**$1,040,890**
	Asset Renewal/Reliability	9	Whitaker Station	Rebuild obsolete station and add three feeders				**$7,892,661**
Risk Mitigation	Reliability /Safety		Pole Inspection	Comprehensive pole inspection and treatment	26,500	Each	**26,500**	**$878,000**
			Underground Distribution Inspection	Inspect above ground structures (padmounts, enclosures, pedestals, etc.)	11,700	Each	**11,700**	**$87,000**
			Overhead Line Inspection	Inspect overhead distribution lines	2,455	Dist (mi)	**2,455**	**$281,000**
			Contact Voltage Inspection	Inspect downtown network areas	4	Cities	**4**	**$20,000**
Network Monitoring	System Modernization		Various	Install a monitoring and control system on four electric network systems				**$41,855**
Distribution Line Sensors	System Modernization		Granger Station	Install Distribution Line Sensors	45	Each	**45**	**$847,297**

Muncie Area – Three M Station

Project Description:

- Expand the existing 69/4 kV Three M Station to include a second 4 kV feed to New Indy Hartford City LLC, necessary due to proposed customer load increases. Add a second 4 kV bus, 4 kV feeder breaker, and line regulators.
- ISD: 2017; 1 year project timeline

Justification / Need for the Project:

New Indy Hartford City LLC has notified I&M Customer Services of their intent to increase their demand in three steps. The third step results in a projected overload of the existing line regulators on the Visy Paper 4 kV feeder. Installing a second feed to this customer resolves the overload, and provides additional flexibility during maintenance and outage conditions. This project also expands the station footprint to allow for two mobiles transformers to be installed without setting a temporary fence and ground grid. Two mobiles are required due to the high load current at 4 kV and size of available mobile transformers. The following are drivers for the project:

- Customer load increase resulting in overloading line regulators.

Distribution Line Component:

- Install a 300 foot underground exit consisting of 3-1000 MCM AL EPR cable

Benefits of the Project:

- In addition to mitigating the equipment overload, expanding the station footprint will facilitate mobile transformer installations when required and set the station up for future development when required.

Fort Wayne Area – Aviation Station

Project Description:

- Build a new 138/12 kV station, called Aviation, to provide capacity for a new 8 MVA customer (BAE Systems).
- Install a new 138/12 kV, 20 MVA transformer.
- Install three 12 kV distribution circuit breakers and exits.
- Install station Supervisory Control and Data Acquisition (SCADA).
- Replace two 12 kV distribution circuit breakers at Waynedale Station.
- Install 138 kV high side circuit switcher at Waynedale Station.
- ISD: 2017; 3 year project timeline.

Justification / Need for the Project:

Construction of Aviation Station is due to concerns of capacity, reliability and the expectation for load growth. The following are the drivers for this project:

- Waynedale forecasted station load was 85% of capability in 2015, with the BAE systems block load.
- Waynedale – Ridge circuit was forecasted to be 11.2 MVA, or 92% of the circuit's original 12.1 MVA design limit in 2015. This circuit is also the alternate feed to the Fort Wayne International Airport which when transferred would further load the circuit to 98% or capacity.
- Increased reliability with remote supervisory control and load monitioring.

Distribution Line Component:

Reconfigure and extend two existing distribution circuits to create three new 12 kV circuits.

- Install three new underground distribution exits from Aviation Station each 120 feet in length using 3-1000 MCM AL & 1-4/0 CU cable.
- Build approximately 1.1 mile of new 3-phase overhead line with 3-556 AL & 1-4/0 AA conductor.
- Reconfigure existing circuitry of Waynedale Station by switching to create 3 new distribution circuits from Aviation Station.

Benefits of the Project:

- The construction of Aviation Station relieves loading in this capacity constrained area near the Ft Wayne International Airport.
- Relieves reliability concerns of aged equipment and improves the ability for contingency transfers.

- The replacement of the two aged 12 kV circuit breakrs eliminates a safety issue for station personel working in the area.
- Construction of a standard modern station will allow for connection of a mobile backup transformer for increased reliability for outage and planned maintenance events.
- The available space on site makes it possible to install a second transformer for greater reliability and ability to serve increasing demand.
- SCADA capabilities allow enhanced monitoring, additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.

Avilla Area – Bixler Station

Project Description:

- Construct new distribution bay with two new feeder breakers and a bus tie breaker at Bixler Station.
- Install a new drop in control module.
- Upgrade existing station Supervisory Control and Data Acquisition (SCADA).
- ISD: 2017; 2 year project timeline.

Justification / Need for the Project:

The addition of two new distribution feeder breakers are needed due to concerns of reliability. The following are drivers for the project:

- The current circuit configuration provides limited opportunities for load transfers to adjacent circuits. As load continues to grow operational flexibility will decrease further.
- In the event of a circuit exit or breaker failure, 10 MVA of load is at risk of not being served until repairs could be made or a mobile transformer could be placed in service.
- SCADA equipment is obsolete and has intermittent service.

Benefits of the Project:

- The location has transmission and distribution infrastructure in place and represents a cost-effective option.
- The load on Bixler Station becomes fully recoverable in the event of a circuit breaker or exit failure.
- Increased reliability and operational flexibility.
- SCADA capabilities allow enhanced monitoring, additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.
- The improvements made will allow for the addition of a second 138/12 kV transformer in the future for greater reliability and ability to serve an increasing load.

Fort Wayne Area – Dwenger

Project Description:

- Construct Dwenger Station.
- Install a 34.5/12 kV, 9.375 MVA transformer.
- Install a 34.5 kV phase over phase switch with motor operated disconnect switch sectionalizing capability on both sides of the switch.
- Install single 12 kV Distribution feeder with 12 kV metering to serve the customer.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD: 2017; 1 year project timeline.

Justification / Need for the Project:

The construction of Dwenger Station is due to capacity constraints. The following are the drivers for the project:

- The City of Fort Wayne is undertaking a tunnel boring project that is expected to last a total of four to five years. This includes two years of actual boring activity (peak load) followed by two to three years of finishing work (reduced load). The city has projected a peak load of approximately 4 MVA and have asked for a 12.47 kV delivery voltage.
- The Water Pollution Station cannot meet the requirements of the peak load and voltage for the city project, therefore a 34.5/12 kV station will be constructed and will tie into the existing line west of the water pollution station.

Distribution Line Component:

With the construction of the station, a 12 kV delivery point will need to be established.

- Install 150 feet of 3-556 AL & 1-4/0 AA overhead line.
- Install 15 feet of 3-1000 MCM AL 15 kV underground cable to a padmounted metering cabinet.

Benefits of the Project:

- The capacity addition at Dwenger Station relieves loading constraints.
- SCADA capabilities allow enhanced monitoring, additional switching, and remote sectionalizing abilities reducing overall outage identification and restoration time.

Fort Wayne Area – Glenbrook Feeders Underground Rehabilitation

Project Description:

- Replace aging electrical supply assets on the Glenbrook feeders to avoid further service interruptions.
- Relocate equipment located within customer premises.
- Provide infrastructure that will operate reliably and can be maintained more efficiently.
- ISD: 2017; 2 year project timeline.

Justification / Need for the Project:

A major renovation and replacement of aged distribution facilities serving the Glenbrook #1 & #2 feeders will improve service reliability.

- Operational flexibility and safety will be enhanced by moving equipment out of confined spaces.
- Built in 1966, Glenbrook Square completed major expansions in 1976 and 1981. Much of the electrical distribution equipment serving the mall is original vintage.
- A series of outages during the 2015 Christmas shopping season brought attention to the aging distribution infrastructure.

Distribution Line Component:

Convert existing select-feed distribution system to a loop-feed system:

- Install five PSE-9 pad mount switchgear (manual type)
- Install two PME-11 pad mount switchgear (auto-transfer type)
- Replace two vault transformers and switchgear with two pad-mount transformers
- Retire one 8-bay live-front auto-transfer switchgear in Central Plant vault
- Install approximately 2,100 feet of 3-500 CU 15 KV primary cable.
- Install approximately 5,800 feet of 3-1/0 AL 15 KV primary cable
- Install approximately 4,100 feet of 3-2 AL 15 KV 3 Ph. cable in two primary loop systems
- Retire approximately 7,200 feet of 3 phase primary cable of various sizes

Benefits of the Project:

- Installation of automatic transfer switchgear will reduce the interruption duration for customers in the event of certain line faults by automatically switching to an alternate source.
- Installation of manual switchgear improves sectionalizing allowing for a greater degree of reliability.
- The replacement of aged cable reduces the probability of failures resulting in outages.

Muncie Area – Kenmore Station

Project Description:

- Replace the existing 34 kV Tillotson Station with a modern Gas Insulated Station (GIS), 34/12 kV station at Kenmore Station.
- Install 2 – 34/12 kV 25 MVA, LTC transformers with 6 distribution feeders.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD: 2017; 4 year project timeline

Justification / Need for the Project:

Tillotson Station 34/12 kV 20 MVA transformer is loaded to 78% of capacity. Property was acquired just south of the existing station, but due to the sensitive nature of the location, i.e. Gateway to Muncie, Ball State University main entrance, and nearby neighborhood; a conventional station was determined to be impractical. The following are drivers for the project:

- Tillotson station is surrounded by a wall, and the small station footprint prevents rebuild at the existing location.
- The Tillotson 34/12 kV transformer performance was degrading due to over-heating, moisture, and gassing. The transformer subsequently failed and has been replaced, but additional operability and load transfer capability are desired.

Distribution Line Component:

- Establish six new station exits, three of which integrate the existing three circuits.
- Install three extensive 12 kV underground duct lines to fully integrate the stations' capacity relieving loading on adjacent stations.
- Transfer load from Bethel and Utica Stations to Kenmore Station.

Benefits of the Project:

- The Kenmore project collaboratively relieves capacity and reliability concerns of Distribution assets.
- Cooperates with the city of Muncie, Ball State University, and local neighborhood to minimize visual impact on the area.
- Replaces an aged station transformer and associated equipment.
- The capacity addition provides distribution load transfers from Bethel and Utica Stations to Kenmore Station and improves operability.
- Eliminates the need for a mobile transformer during a transformer outage in the Tillotson load area.

Fort Wayne Area – Water Pollution Station

Project Description:

- Replace one of the two 34/4 kV transformers which provides service to the City of Fort Wayne's Water Pollution Control Plant at Water Pollution Station with a 69-34/4 kV, 7 MVA LTC transformer.
- ISD: 2017; 1 year project

Justification / Need for the Project:

- Water Pollution Station Transformer 2 is early 1950's vintage and is nearing end-of-life.
- The City of Fort Wayne has experienced high voltage issues at the Water Pollution Control Plant in the past due to the unregulated 4 kV delivery.
- As the load on the 34 kV sub-transmission system serving this station is gradually shifted to 69 kV and 138 kV sources, issues of high voltage can be expected to persist on this unregulated service

Benefits of the Project:

- Proactively replacing Transformer 2 with an upgraded unit can help improve reliability and improve power quality by reducing the risk of equipment failure.
- Transformer 1 was recently upgraded to provide service at a regulated voltage. Upgrading Transformer 2 will result in a fully regulated voltage supply to the City of Fort Wayne which is not currently offered with the existing transformer arrangement.

South Bend/Elkhart Area – Elkhart Area Network Improvements

Project Description:

- Rebuild the existing Elkhart area network from 2-34.5 kV and 2-4 kV feeders from Elkhart Hydro Station into a new network, only station at Harrison Street with 4-13.8 kV feeders.
- Convert Harrison Street Station from 34.5 to 69 kV operation and transfer existing distribution to Lusher Ave to create a new modern 69/13.8 kV four feeder underground network station.
- Convert Lusher Ave Station from 34.5 to 69 kV operation and double its capacity by installing 2-20 MVA transformers and 6-12 kV feeders.
- Rebuild Elkhart Hydro Station from 34.5/12/4 kV into a modern 69/34.5/12 kV station with new 20 MVA non-LTC transformer and 3-12 kV feeders, one of which is new.
- Install station Supervisory Control and Data Acquisition (SCADA) at Harrison Street, Elkhart Hydro, and Lusher Ave Stations.
- ISD: 2018; 3 year project timeline.

Justification / Need for the Project:

The rebuild of Elkhart area network is due to concerns of reliability. The following are the drivers for this project:

- The entire 34.5 kV subtransmission system in central Elkhart is comprised of equipment that is 40-70 years old and requires costly maintenance or replacement facilities.
- Harrison Street Station is located much closer to the Elkhart underground distribution network service area, but is not currently an acceptable network source because it is the last 34.5/4 kV station supplying a single 4 kV overhead distribution circuit with no backup in South Bend and Elkhart area. In addition, Harrison Street Station is radially supplied by a single 1.5 mile long 34.5 kV line via 2-way without automatic sectionalizing capability.
- The Elkhart Hydro Station is comprised of 4 kV equipment that was installed in the 1920's and is obsolete and has clearance issues that require complete outages for station personnel to access.
- The four existing network feeders share nearly a mile of common manhole/duct line that includes a single bridge crossing that can create outages to the entire system for a single contingency issue.
- Lusher Ave Station 34.5/69 kV conversion is necessary for Harrison Street Station and will address significant issues; including unsafe 34.5 kV bus clearances inside the station, aging 34.5/12 kV LTC xfmr, deteriorated wood pole structures within the station, two aging 1950's vintage 34.5 kV CB's, and 34.5 kV underground exit cables at the end of life.
- Increase reliability with remote supervisory control and load monitoring.

Distribution Line Component:

Elkhart Hydro will relocate the existing distribution exits and add one new 12 kV feeder exit. All three feeders will be overhead with 3-556 AL & 1-4/0 AA conductor. This is estimated to be a total of 0.7 miles.
The Lusher Ave component will relocate the existing three 12 kV feeders and add three new feeders. These will have 4 underground 3-1000 MCM AL & 1-4/0 CU EPR and 2 overhead with 3-556 AL & 1-4/0 AA conductors. The distance is estimated to be 0.25 miles of underground and 1 mile of overhead. Install 4-12kV primary exits from Harrison Street Station consisting of 3-1000 MCM AL EPR & 4/0 CU to supply underground network.

Benefits of the Project:

- The relocation of Elkhart area network to Harrison Street Station and conversion to 69kV supply relieves reliability concerns of aged 34.5 kV equipment that has parts unavailable until custom units can be made and reduces the length of the network feeders.
- Modernizing into a 69 kV system eliminates ongoing equipment outages and brings the area in phase with the adjacent 138 kV stations.
- The added capacity at Lusher Ave Station relieves loading on adjacent stations and improves the ability to serve an increasing load.
- The load served by Lusher Ave becomes fully recoverable.
- The added capacity and feeder at Elkhart Hydro replaces an aged station transformer that has scored high on the asset renewal metric and improves reliability.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.

Muncie Area – Haymond Station

Project Description:

- Rebuild the existing 12 kV network system at Haymond Station to include a second network bus, two bus tie breakers, underground bus conductor, and two additional network feeder breakers.
- ISD: 2018; 1 year project timeline

Justification / Need for the Project:

The Muncie downtown network is sourced from Haymond Station via two underground network feeders. These feeders occupy common manholes and ducts. Similar configurations have resulted in catastrophic failures and long outages in numerous communities. I&M is undergoing a project to reconfigure the network source in Muncie, but has recognized another single contingency outage which could result in a long duration outage. Adding another 12 kV network bus with two additional feeders will eliminate this situation. The following are drivers for the project:

- A single contingency failure could result in an extended outage to the downtown Muncie network, including the central business district, area banks, and local government offices.
- I&M commitment to improve underground network reliability.

Distribution Network Component:

- Installation of the two additional underground network feeders, including station exits, is included in the ongoing network remediation project.

Benefits of the Project:

- The Haymond network project collaboratively eliminates a contingency outage situation and sets up the station for future conversion to 69 kV and dual sourcing the network.

South Bend/Elkhart Area – Mackey Station

Project Description:

- Rebuild the existing Northwest 34.5/12 kV Station which provides 12 kV service to I&M customers into a modern 69/34.5/12 kV station to be called Mackey.
- The 69 kV upgraded station will add two 69/34.5/12 kV, 20 MVA non-LTC transformers with 12 kV bus regulation
- Relocate the existing five 12 kV feeders to the new distribution bay.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD: 2018; 2 year project timeline

Justification / Need for the Project:

The rebuild of Northwest Station is due to concerns of reliability and expectation for load growth. The following are the drivers for the new station:

- Northwest Station was built in 1950's, and most of the station equipment is obsolete. It has maintenance issues that the extend outages due to replacement parts that are no longer available.
- Northwest Station is located in a capacity constrained area which limits the opportunities for load transfers during emergency situations.
- Due to the age and condition of the existing 34.5 kV subtransmission system it is being rebuilt to with 69 kV in the near future.
- This project replaces 2–47 year old 34.5/12 kV transformers, 1-20 MVA and 1-10.5 MVA that have maintenance issues with 2-69/34.5/12 kV, 20 MVA units .
- Increase reliability with remote supervisory control and load monitioring.

Distribution Line Component:

The five existing distribution exits will need to be relocated when the station is rebuilt. Two of the feeders will need to be relocated with the subtransmission entrance relocations.

- Increase reliability with remote supervisory control and load monitioring.
- There are five overhead exits totaling 870 feet and will be 3-556 AL & 1-4/0 AA Conductor.
- The 12 kV line relocations needed will be overhead and include line extensions to create new circuits totaling approximately 1.6 Miles of 3-556 AL & 1-4/0 AA.

Benefits of the Project:

- The upgrades at Northwest Station relieve reliability concerns of aged and obsolete equipment and improve the ability to serve increasing load.
- The load served by Northwest Station becomes fully recoverable.

- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.

Fort Wayne Area – Melita Station

Project Description:

- Build a new 69 kV sourced Network and Distribution station called Melita near the existing Webster Station.
- Install 3 – 69/12 kV 30 MVA, LTC transformers with six network feeders.
- Reconfigure and extend the Network system to integrate the new station to serve the downtown Fort Wayne underground network.
- Install 2 – 69/12 kV 25 MVA, non- LTC transformers, two sets of 12 kV bus regulators, and five distribution feeders.
- Convert Pettit Station to 69 kV operation (Served from the Hillcrest - Melita line).
- Install station Supervisory Control and Data Acquisition (SCADA).
- Upgrade relaying scheme at Hadley Station.
- Retire Webster Station.
- Retire Three Rivers Station underground network facilities.
- ISD: 2018; 3 year project timeline.

Justification / Need for the Project:

Melita Station is being constructed to replace the Webster and Three Rivers feeds to the downtown Fort Wayne network system. The current dual station configuration results in uneven reactive and real power flows through the network, resulting in excessive network protector operations. Additionally, the network transformers and equipment are reaching the end of their useful life. The following are drivers for the project:

- Need to reconfigure Network sourcing to a single station.
- Aging and undersized equipment at Webster Station.
- Webster station was built in the 1910's and has equipment manufactured during that time still in-service.

Distribution and Network Line Components:

- Establish 6-225 foot network station exits, and extend the existing network feeders a combined 12,850 feet to terminate in Melita Station.
- Establish 5 – 200 foot distribution feeder exits, and reconfigure the existing three Webster circuits into five, incorporating load transfers from adjacent stations to improve reliability and system reliability.
- Rebuild approximately 1,600 feet of existing distribution with 3-556 AL & 4/0 AA conductors.

Benefits of the Project:

- The Melita project improves Network capacity and reliability concerns due to dual sourcing.
- Network alternative supply is readily available, energized and on-site for immediate service for the downtown central business area.
- Replaces aged station transformers, breakers and station equipment.
- Improves Distribution reliability and operational flexibility.
- Provide remote load monitoring and control capabilities.

Fort Wayne Area – Milan Station

Project Description:

- Replace the existing Woodburn 69/12 kV Station with a new modern 138/12 kV station at the existing Milan Station.
- Replace the station transformer with a 20 MVA unit at Milan Station.
- Replace the 69 kV ground switch with a circuit switcher.
- Replace obsolete metal clad switch gear with a modern 12 kV bay and circuit breakers.
- Relocate the existing feeder and add a second 12 kV feeder to the new site.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD: 2018; 2 year project timeline.

Justification / Need for the Project:

Woodburn Station rebuild is due to concerns of reliability and space constraints on the existing site. The following are the drivers for this project:

- The radial Harlan-Woodburn 69 kV line is in deteriorated condition and is poor performing.
- The obsolete metal-clad switchgear at Woodburn Station is experiencing an increasing number of failures and repair parts are no longer available.
- Provides increased reliability with remote supervisory control and load monitoring.

Distribution Line Component:

Relocate the one existing feeder and add a second feeder to Milan Station location.

- Install two new overhead distribution exits from Milan Station each 120 feet in length using 3-556 AL & 1-4/0 AA conductor.
- Approximately 500 feet of existing distribution line to the south of Milan Station will be rebuilt and reconfigured for the new feeder exits.

Benefits of the Project:

- Consolidation of transmission and distribution facilities at one location will allow for the retirement of the Harlan-Woodburn 69 kV line which in need of rebuild.
- Relieves reliability concerns of aged equipment and improves the ability for contingency transfers.
- The replacement of the obsolete metal clad 12 kV switch gear eliminates a safety issue for station personnel working in the area.
- Construction of a standard modern station will allow for connection of a mobile backup transformer for increased reliability for outage and planned maintenance events.

- SCADA capabilities allow enhanced monitoring, additional switching and remote sectionalizing abilities which reduce overall outage identification and restoration time.

Portland Area – North Portland Station

Project Description:

- Replace the existing 69/12 kV, 20 MVA, North Portland three feeder station with a modern 69/12kV station with 2 – 20 MVA transformers, 12 kV bus regulation and 6-12 kV distribution feeders on company owned property adjacent to the existing station.
- Install a 69 kV line circuit breaker toward Berne.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD: 2018; 2 year project timeline.

Justification / Need for the Project:

An upgrade to the North Portland Station is needed due to area capacity constraints, in addition to reliability, operability and modernization. The following are drivers for the project:

- The Portland area transformers are loaded to 98% of capacity. This limits the opportunities for load transfers during emergency and planned contingency situations.
- The North Portland Station was constructed in 1964. No remote monitoring or control is available.
- The 69/12 kV North Portland transformer has been loaded in the 98% range for multiple years and is nearing its end of life.

Distribution Line Component:

- Establish six new station exits including 2 which will be underbuilt on the 69 kV entrances.
- Install 2-450 foot and 2-200 foot station exits consisting of 3-1000 MCM AL 15 kV & 4/0 CU cable
- Reconfigure the exiting three feeders into six.
- Transfer load from Portland Station to North Portland Station.

Benefits of the Project:

- The North Portland project relieves capacity and reliability concerns of an aged station transformer and associated equipment.
- The capacity addition provides load transfers to the Portland Station which is also loaded near 98% of capacity.
- Eliminates the need for a mobile transformer during a transformer outage in the Portland load area. (Planned or Emergency).

South Bend/Elkhart Area – Quinn and Vintage Station Improvements

Project Description:

- Convert the Quinn Station to 69 kV operation. Install a 69 kV circuit switcher and 69/12 kV, 12.5 MVA non-LTC transformer. Reconductor the two existing feeders, 4.5 miles towards Jackson Rd Station and 2.7 miles towards Vintage station.
- Convert and relocate the Lapaz Station into a new modern 69 kV station, called Vintage Station. Install a 69/12 kV, 12.5 MVA non-LTC transformer with 12 kV bus regulation and 2-12 kV feeders, one new. Reconductor the feeders, 2.4 miles towards Quinn Station and 0.5 miles towards Marshall Station.
- Install station Supervisory Control and Data Acquisition (SCADA) at Quinn and Vintage stations.
- ISD: 2018; 1 year project timeline.

Justification / Need for the Project:

The Quinn/Vintage project is due to concerns of reliability. The following are the drivers for this project:

- The Lapaz Station is a 1950's vintage station with equipment beyond its life expectancy. It is a space constrained site and will need to be relocated to accommodate the 34.5/69 kV conversion.
- The Quinn Station will need to be converted to 69 kV operation.
- The entire 10.1 miles of distribution line reconductoring is to increase reliability by reducing circuit exposure and improve circuit transfer capabilities.
- Increase reliability with remote supervisory control and load monitoring.

Distribution Line Component:

- Quinn Station: Reconductor the two existing feeders, 4.5 miles towards Jackson Rd station and 2.7 miles towards Vintage Station with overhead 3-556 AL & 1-4/0AA conductor.
- Vintage Station: Reconductor the feeders, 2.4 miles towards Quinn Station and 0.5 miles towards Marshall Station with overhead 3-556AL & 1-4/0AA conductor.

Benefits of the Project:

- The project also provides capacity to switch the source to Quinn and Vintage Stations relieving concerns of 11 MVA of load at risk.
- The conversion to 69 kV modernizes the area to be in phase with surrounding stations.
- Quinn Station upgrades the high side ground switch with a circuit switcher.
- Vintage Station will be a new modern 69/12 kV station reducing outage concerns with the 1950's vintage station equipment at Lapaz Station.

- The feeder addition at Vintage Station improves reliability by reducing customer exposure and increased transfer options by providing another field tie.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.

South Bend/Elkhart Area – Whitaker Station

Project Description:

- Rebuild the existing Whitaker 69/12 kV Station which provides 12 kV service to I&M customers into a modern 69/34.5/12 kV station.
- The new station will add two new 69/34.5/12kV, 20 MVA transformers.
- Three new 12 kV feeders and line extensions will be added for a total of six distribution feeders.
- Install station Supervisory Control and Data Acquisition (SCADA).
- ISD: 2018; 2 year project timeline.

Justification / Need for the Project:

The rebuild of Whitaker Station is due to concerns of reliability and expectation for load growth. The following are the drivers for a new station:

- Whitaker Station was built in 1950's and the station equipment is beyond its life expectancy. It has maintenance issues with parts no longer available.
- This is a capacity constrained area which limits the opportunities for load transfers during emergency situations and would leave 8 MVA of load unrecoverable until repairs could be made.
- Increase reliability with remote supervisory control and load monitoring.

Distribution Line Component:

The three existing distribution exits will need to be relocated when the station is rebuilt. Three new exits and line extensions will need to be built.

- There are three underground exits totaling 900 feet and will be 3-1000 MCM AL & 1-4/0 CU EPR cable.
- Three exits will be overhead and include line extensions to create new circuits totaling 4.8 Miles of 3-556 AL& 1-4/0 AA.

Benefits of the Project:

- The replacement of Whitaker Station relieves reliability concerns of aged equipment that has parts unavailable.
- The added capacity at Whitaker Station relieves loading on adjacent stations and improves the ability to serve an increasing load.
- The load served by Whitaker Station becomes fully recoverable.
- SCADA capabilities allow enhanced monitoring and additional switching and sectionalizing abilities done remotely, reducing overall outage identification and restoration time.

Fort Wayne, Muncie, South Bend/Elkhart – Feeder Additions

Project Description:

Add Circuit Breaker and 12 KV distribution feeder to the following stations:

- County Line ISD: 2017, 1 year project timeline
  - 1-12 kV Circuit Breaker
  - Undergound Exit Span (350 feett)
  - 0.4 Miles of existing distribution circuit rebuild

- Dunlap ISD: 2018, 2 year project timeline
  - 1-12 kV Circuit Breaker
  - Undergound Exit Span (400 feet)
  - 2.65 Miles of distribution circuit

- Grabill ISD: 2017, 1 year project timeline
  - 1-12 kV Circuit Breaker
  - Undergound Exit Span (350 feet)
  - 4.6 Miles of existing distribution circuit rebuild

- Farmland ISD: 2017, 1 year project timeline
  - 1-12 kV Circuit Breaker
  - Undergound Exit Span (1,000 feet)

- Jones Creek ISD: 2017, 1 year project timeline
  - 1-12 kV Circuit Breaker
  - Undergound Exit Span (150 feet)

- South Summitville ISD: 2017, 1 year project timeline
  - 2-12 kV Circuit Breaker
  - Two Underground Exit spans (750 feet)
  - 5.4 Miles of existing distribution circuit rebuild

Justification / Need for the Project:

The feeder addition projects are needed due to reliability and expectations for growth. The following are drivers for the new circuits:

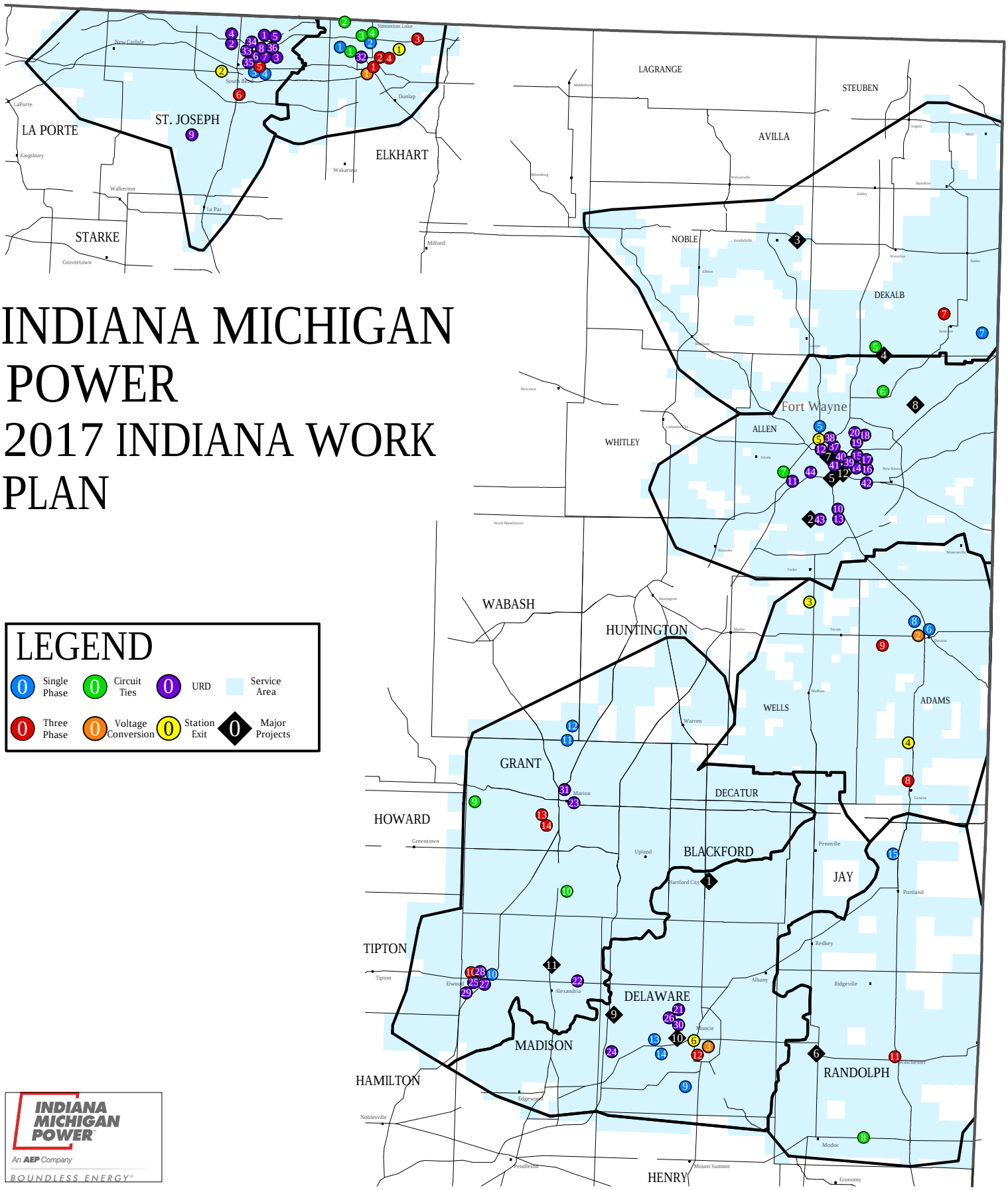
- This is a reliability constrained area with limited opportunities for load transfers durning emergency situations.
- The feeder additions will help improve area reliability and operational flexibility.
- The existing stations have transformer capacity and the feeder addition will facilitate the operability of this capacity.

Distribution Line Component:

- Each feeder addition will have a new exit span and line extension to meet existing facilities as noted above in project description.

Benefits of the Project:

- The project will increase reliability with additional circuit ties for contingency switching.
- The additional circuit provides capacity for anticipated load growth.
- The feeder addition will utilize excess transformer capacity.

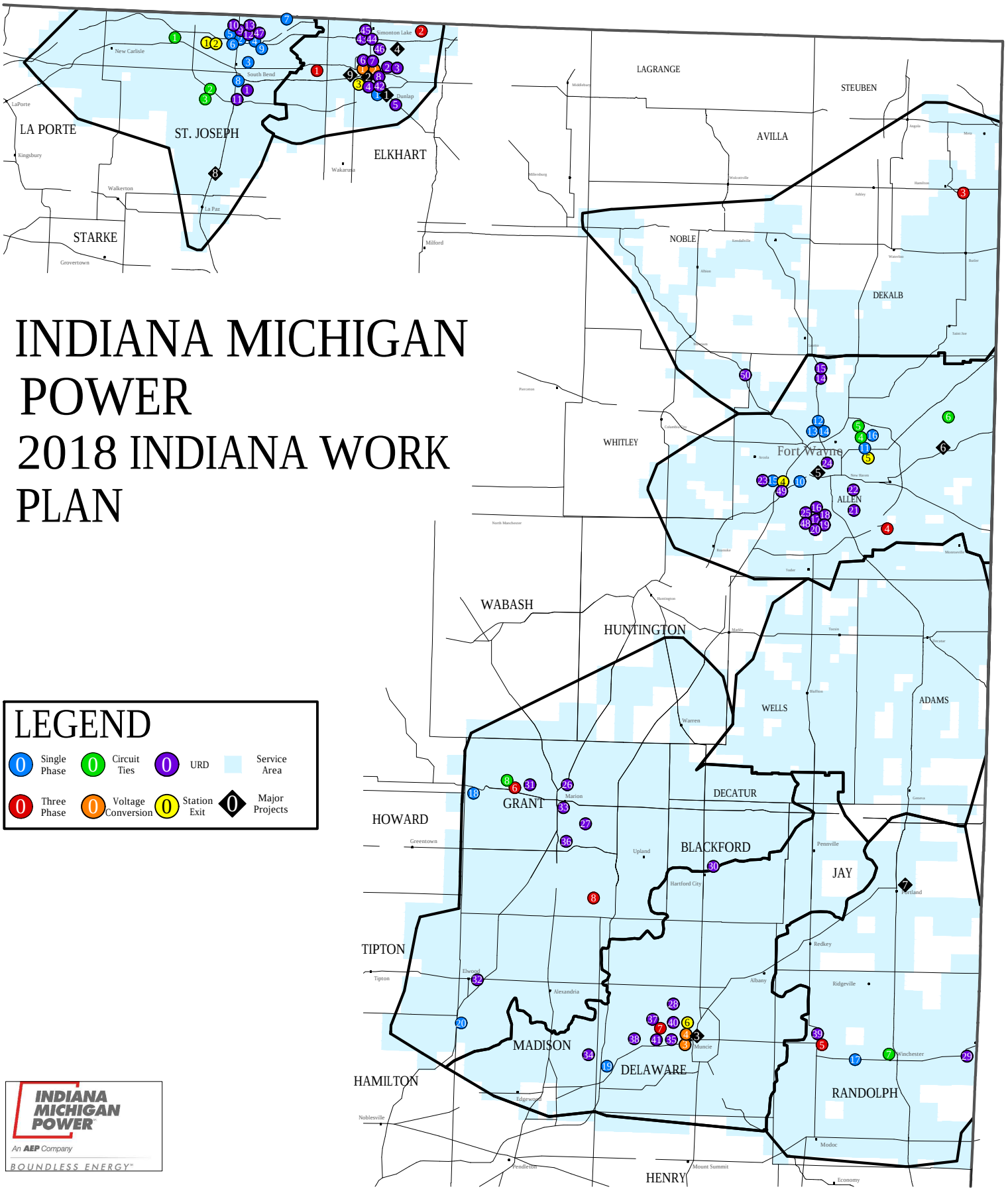


INDIANA MICHIGAN POWER
2017 INDIANA WORK PLAN

LEGEND

0	Single Phase	0	Circuit Ties	0	URD		Service Area
0	Three Phase	0	Voltage Conversion	0	Station Exit	0	Major Projects

INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY™



INDIANA MICHIGAN POWER
2018 INDIANA WORK PLAN

INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY