Public Utility District No. 1 of Benton County

2022 Five Year Plan of Service

2023 through 2027

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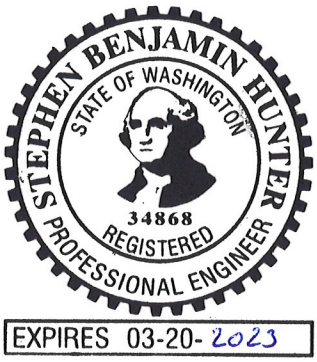

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Commission Date: August 23, 2022

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Executive Summary

The Five Year Plan of Service (Plan) supports the District's mission to provide a reliable and efficient electrical system. In accordance with Administrative Directive No. 24, the Plan is completed bi-annually. The primary purpose of the Plan is to identify and prioritize system improvement projects that are required during the upcoming five year period so the electrical system will continue to provide satisfactory service under projected peak loading during both normal and outage contingency conditions.

The Plan process involves analyzing the system performance at peak loading, identifying deficiencies, planning for customer growth, and recommending projects to support the structured development of the electrical system over the next five years. From this analysis, projects are recommended to ensure compliance with system performance criteria, such as service voltage and equipment loading limits. Projects are also recommended based on specific knowledge of future development, system reliability improvements and outage contingency improvements. The recommended project list, including cost estimates, is the final output of the Plan and is an important input to the District's capital requirements planning.

The majority of recommendations identified by the 2022 Plan are focused on projects to upgrade existing substation facilities, and to improve the distribution facilities on the edges of the system, in the areas of Red Mountain, Badger Canyon, and East Kennewick. The following table summarizes the annual project costs by project type.

Table 1 – Total Project Cost by Type ($K by Year)

Project Type	2023	2024	2025	2026	2027	2023-2027 Total
New/Upgraded Substations	**-**	**-**	**-**	**-**	**-**	**$2,771**
Edison Street (Kennewick)	-	-	-	-	2771	-
Metalclad Switchgear Rep.	**1056**	**-**	**1069**	**-**	**-**	**$2,125**
Misc. Substation Upgrades	1144	629	446	595	267	**$3,081**
Distribution Improvements	**2248**	**1215**	**1348**	**1215**	**1406**	**$7,432**
Cable Replacement	1500	1500	1500	1500	1500	**$7,500**
Plan Total	**$5,948**	**$3,344**	**$4,363**	**$3,310**	**$5,944**	**$22,909**

Projects identified in the first two years of the plan (2023-2025) are typically required by existing loading or contingency conditions or imminent customer projects that are well along in development. Projects in the last three years (2025, 2026, and 2027) are either less certain or less critical at this time or are delayed due to logistical factors, such as needing to complete other projects first. Project timing may also be dependent on continued load growth or tentative customer projects as anticipated at this time. Faster than anticipated growth may accelerate plans for projects and slower growth may allow for deferral.

The system performance has been studied and overall system planning has been considered to develop the list of projects. The recommended projects will help ensure reliable and efficient service to our customers. Following Commission approval of the Plan, the project estimates will be incorporated into the District's financial planning process. Further detail of the substation and distribution projects is provided below.

The substation project costs are listed in further detail in Table 2 below.

Table 2 – Substation Project Costs ($K by Year)

Project Type	2023	2024	2025	2026	2027	2023-2027 Total
Power Xfmr Protection	-	250	250	394	102	$997
15 kV Breaker Upgrades	1263	55	1069	-	-	$2,387
River Station Upgrades	75	75	75	75	75	$375
New Substations	-	-	-	-	2771	$2,771
Regulator Replacement	612	-	-	-	-	$612
Misc. Equip. Upgrades	67	25	25	47	25	$189
Misc. SCADA Upgrades	183	224	95	80	65	$647
Plan Total	**$2,200**	**$629**	**$1,515**	**$595**	**$3,038**	**$7,977**

The primary focus for substation upgrade projects is to mitigate the risk associated with a major equipment failure. The District should continue to invest in equipment, such as circuit switchers and protective relaying to minimize the risk of power transformer failures. The installation of differential relay protection provides high speed system protection. Traditional high side fusing will open during faults, though not always fast enough to prevent internal equipment damage. The differential protection also ensures that all three phases operate, preventing single phasing of the substation unit. The Plan also provides upgrade recommendations for aging 15 kV feeder breakers and metalclad switchgear. These upgrades incorporate newer technology that allows for less required maintenance, enhanced SCADA integration, and a reduced risk of failure. An additional benefit is increasing crew safety through the installation of remote racking equipment and controls that allow operating personnel to be located at a safe distance from direct hazard zones during system switching or maintenance activities.

System improvements and contingency support for the Red Mountain and East Kennewick areas are a major focus of the 2022 Plan. The recent construction of Orchard View Bay 2 and Southridge Substation puts the District in good position to meet the near and medium term forecasted load growth in the Vista Field and Southridge areas as well as providing additional outage contingency support. Badger Canyon is becoming more constrained during contingency support as development continues. While the construction of Badger Canyon substation is beyond the timeline of the 2022 Plan this capacity expansion will be required in the medium to long term if growth continues. The District needs to identify and acquire property in the Badger Canyon area and move forward with an interconnection request with BPA.

The District already has property for a future substation that will be constructed to support Vista Field re-development long term. The site referred to as the Edison Street Substation has been included in an already submitted BPA transmission interconnection application. Construction is tentatively planned for 2027 but will depend on actual development of loads in Vista Field.

The District has property for a future substation that will be constructed to support the middle to western end of the Southridge/Bob Olson Pkwy. area and the Christenson Rd UGA area. Construction is currently planned beyond the timeline of the 2022 Plan but this may accelerate if a commercial “anchor tenant” begins development.
The Plan also contains projects targeted for the large agricultural irrigation substations ("River Stations") in the southern portion of the county. These substations and circuits were not specifically studied as part of this Plan, instead they were developed as a result of the Horse Heaven Hills Transmission Study and a follow up study, the Transmission Reliability Improvement Project (TRIP). The projects are listed in the Plan to provide a complete picture of all substation projects. These upgrades include connecting the river stations to the fiber network.

The Plan recommends the completion of certain distribution system projects which are summarized in Table 3 below.

Table 3 – Distribution Project Costs ($K by Year)

Project Type	2023	2024	2025	2026	2027	2023-2027 Total
Kennewick West	-	-	413	471	232	$1,116
Kennewick East	1223	723	935	743	845	$4,470
Benton City & Prosser	915	492	-	-	329	$1,736
Voltage Optimization	110	-	-	-	-	$110
Cable Replacement	1500	1500	1500	1500	1500	$7,500
Plan Total	**$3,748**	**$2,715**	**$2,848**	**$2,715**	**$2,906**	**$14,932**

Since the last Plan was completed in 2020, the District has continued to see residential growth, primarily in areas such as Badger Canyon, Hansen Park, Southridge, Vista Field, and the eastern COK UGA/Finley area. Commercial growth has continued as well, especially in the Southridge area, which is anchored by Trios Hospital campus. Projects have been recommended, especially in the first two years, to improve system performance in response to this growth and to ensure continued reliability throughout the system. The majority of the distribution projects are related to improving outage contingency support and feeder planning. Projects have been recommended to improve outage support in the Red Mountain, East Kennewick, and West Kennewick areas. The projects are designed to maximize the District’s investments in Benton City, Phillips Substation Bay 4, Sunset Road, and Zephyr Heights Substations by constructing new feeders, reconductoring tie lines, and adding additional line switches.

Ongoing for the 2022 Plan is a focus on completing voltage optimization (VO) projects to support energy conservation efforts. VO is a type of distribution system energy efficiency project that qualifies as a conservation measure under the Washington State Energy Independence Act (Initiative I-937) and is also being promoted by the Bonneville Power Administration. VO projects include upgrades to the District's distribution system in conjunction with optimizing the operating voltage of main feeder circuits depending on the current loading level. By optimizing voltages, the minimum amount of electrical energy is consumed while still meeting industry standards for minimum voltages. Construction for the District's first project was started in 2021 with re-phasing and service drop cleanup efforts. The next phase, installing and operating the capacitor banks, is planned for construction in 2023 for the Kennewick Substation Bay 1 feeders. If the project is deemed successful, it is targeted to review and potentially complete voltage optimization projects every two years, consistent with our conservation planning and completion of the Five Year Plan of Service.

The District's high-voltage underground cable replacement program continues to target segments that have experienced two or more faults and cable meeting certain age and design criteria. In June of 2017, the District decided to eliminate cable rejuvenation as a means of extending underground cable life. Engineering staff analyzed bids received for cable rejuvenation and compared them to costs associated with recent cable replacement projects completed by a District contractor. This analysis indicated that cable replacement using modern boring technology allows difficult to access cables to be replaced economically with new cable in conduit with an expected life of 40 years versus the 25 year warranty offered by the cable rejuvenation contractor. In addition, the District has been experiencing failures of rejuvenated cable well before the 25 year warranty. Cable rejuvenation will only delay ultimate replacement of cables which will likely need to occur within the 40 year life of a new cable. The Plan recommends an annual budget of $1.5 million for materials and contractor labor to complete cable replacement efforts through the next five year period. This level of expenditure is needed in order to stay on track with plans to replace more than 30 circuit miles of cable over the next 10 years.

Purpose

The primary purpose of the Five Year Plan of Service (Plan) is to study the electrical distribution system's ability to provide satisfactory service under projected peak load and outage contingency conditions. The study identifies and prioritizes system improvement projects that are required during the upcoming five year period.

The plan is updated every two years in accordance with Administrative Directive No. 24. The last plan was completed in 2020 and the next plan will be completed in 2024. The plan is reviewed annually to ensure growth is occurring as expected and to ensure planned projects are budgeted and scheduled appropriately.

System Overview

This section is provided first to clarify the terminology used throughout the report and to establish the context of the study. The distribution facilities referred to in the Plan consist of substations and their medium voltage feeders.

District substations have power transformers that convert 115 kV transmission system voltages to 12.47 kV distribution system voltages. The power transformers are typically rated between 20 and 28 MVA. Substations may have one, two, or three power transformers. Associated with each power transformer is a load tap changer or a voltage regulator that provides voltage regulation to the distribution feeders. Substation power transformers and their associated equipment are often referred to as bays or banks (e.g. Bay 1, Bay 2, etc.) and are identified this way in the study. Each power transformer typically serves three or four feeders.

Feeders are individual circuits that originate in the substation and distribute load carrying capacity to the distribution system at 12.47 kV. A feeder begins with a circuit breaker or recloser, located within the substation, downstream of the power transformer and voltage regulator. Feeders are often referred to by alpha numeric names consisting of a three letter abbreviation of the substation's name, a dash "-", and a pre-assigned feeder number (e.g. ANG-1, ANG-2, GUM-4, KEN-9, etc.). The feeders are identified this way in the study.

"Getaway" conductors connect the substation feeder breaker/recloser to the distribution system. Most getaway circuits are underground, but there are some overhead installations on the system. Main underground feeder lines typically consist of 15 kV, XLP or EPR insulated, 750 or 1000 kcmil cable. The standard for new main underground feeder lines is triplex, 15 kV, 175 mil EPR insulated, 1000 kcmil cable. Main overhead feeder lines typically consist of 3/0 AWG ACSR, 4/0 AWG ACSR, 336.4 kcmil AAC/ACSR or 556 kcmil AAC bare overhead conductor. The standard for new main overhead lines is typically 336.4 kcmil AAC or 556 kcmil AAC conductors.

Introduction

This introductory section is intended to provide a brief overview of the Five Year Plan of Service (Plan) process from start to finish. The body of the report includes details of each step of the planning process under the respective heading, starting with a review of the study area and concluding with the project recommendations. For even greater detail, the report often refers to tables, graphs, maps, etc. located in the appendices.

The substations and medium voltage distribution systems that serve the Kennewick, Prosser, and Benton City urban areas within the County are the primary focus. The study does not address the Horse Heaven Hills system, dedicated industrial customers, or small isolated areas within the District where electrical loads are added infrequently.

The Plan process begins with the collection of historical peak loading data for each substation bay and feeder. The feeder peak loads are then adjusted to the planning temperature. The temperature adjusted feeder peaks represent the base year loads to which five years of forecasted load growth is added.

The load growth forecast begins with a review of the most recent Retail Energy Load Forecast and a forecast of the total system peak. The total system growth is then allocated to feeders in the study area. The allocation process involves identifying potential customer growth, such as residential developments and commercial projects, and assigning the future load growth to individual feeders on the distribution system.

After the annual feeder growth has been determined, the feeder peaks are forecasted for the next five years. A manual review is completed to identify feeders that may exceed planning ratings. In addition, the total bay loading is reviewed to ensure that the total of the feeder peak loads does not exceed the bay ratings. Following the manual review, the feeder peaks are input into the District's load flow analysis software and the performance of each feeder is checked against District criteria.

System improvement projects are recommended to correct the problems found by the manual review of the peak load data and the load flow analysis criteria violations. Projects may also be recommended based on specific knowledge of future development, system reliability improvements or outage contingency improvements. The recommended project list, including cost estimates, is the final output of the Plan and is an important input to the District's capital requirements planning.

Study Area

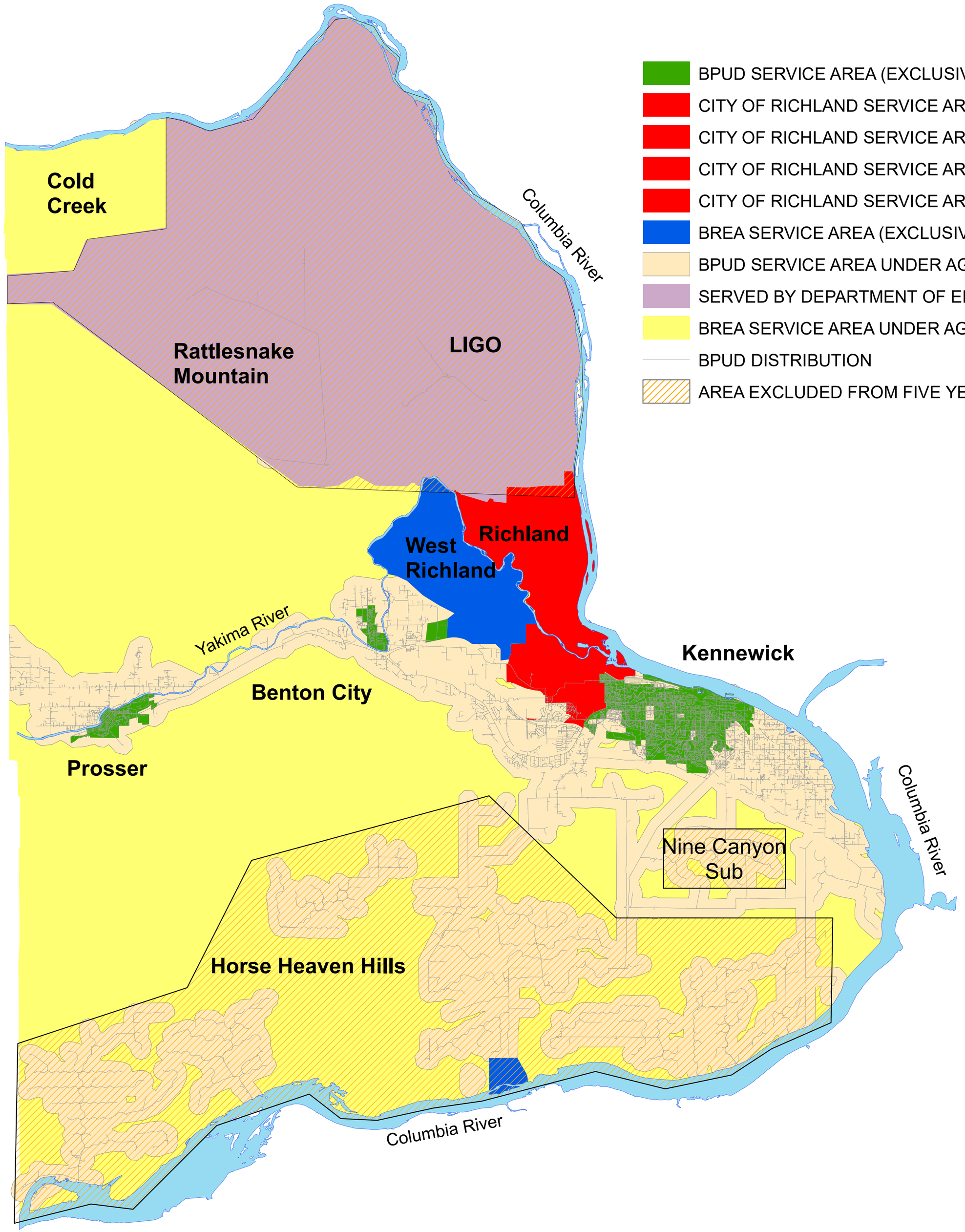
The study area includes the substations and distribution systems in Kennewick, Benton City, and Prosser. The following District substations are associated with each study area:

Study Area	*Substation Names*
• Kennewick West	Angus, Highlands, Leslie Road, Orchard View, Reata, Southridge, Vista
• Kennewick East	Ely, Gum Street, Hedges, Kennewick, Phillips Bay 4, Zephyr Heights
• Benton City	Benton City, Sunset Road
• Prosser	Prosser, Riverfront
• Cold Creek Area	Cold Creek

The Plan study area does not include all of the District's electrical system or all of the District's service territory. Load growth or reductions in certain areas is sporadic and is not included with our general system growth. These areas are studied separately, on a case by case basis or as changes in load occur. The areas not included in the Plan analysis are:

- 115 kV River/Irrigation Transmission System – Refer to Elcon Associates study:
  - July 2016 study, "Transmission System Study"
  - April 2014 study, "South County Transmission Reliability Improvement Project (TRIP)".
- River/Irrigation distribution system
  - The River system is studied in the Large Irrigator Plan of Service. This study is performed annually to identify system deficiencies on the River system and to work with the Large Irrigators for load growth planning.
- Agrium (Chevron and Phillips Bay 1, 2, & 3 Substations)
- LIGO and Rattlesnake Mountain service areas (DOE)

Refer to the Study Area map on the following page for an overview of the study area and the excluded areas.



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2022 Five Year Plan Study Area

DRAWN BY	smitht
DATE	6/1/2022
SCALE	N.T.S.
MAP NO.	
DRAWING NAME	STUDY AREA

BENTON P.U.D

Historical Peaks

The peak data collected for this study period includes winter 2020/2021, winter 2021/2022 and the summers of 2020 & 2021. Except where otherwise identified, the historical peaks are non-coincidental peaks, meaning that each bay or feeder may have peaked at a different time or even a different day from the system peak and from other bay or feeder peaks.

Winter and summer peak loads are reviewed in the study. Typically winter loading is the limiting condition for most of our urban distribution system due to the large amount of residential electric appliances and space heating. A few generally commercial areas have summer loading that provides the most severe loading condition. Of the District's 90 feeders, only 14 were identified as summer peaking. This is in line with the District's historical average of summer peaking feeders due.

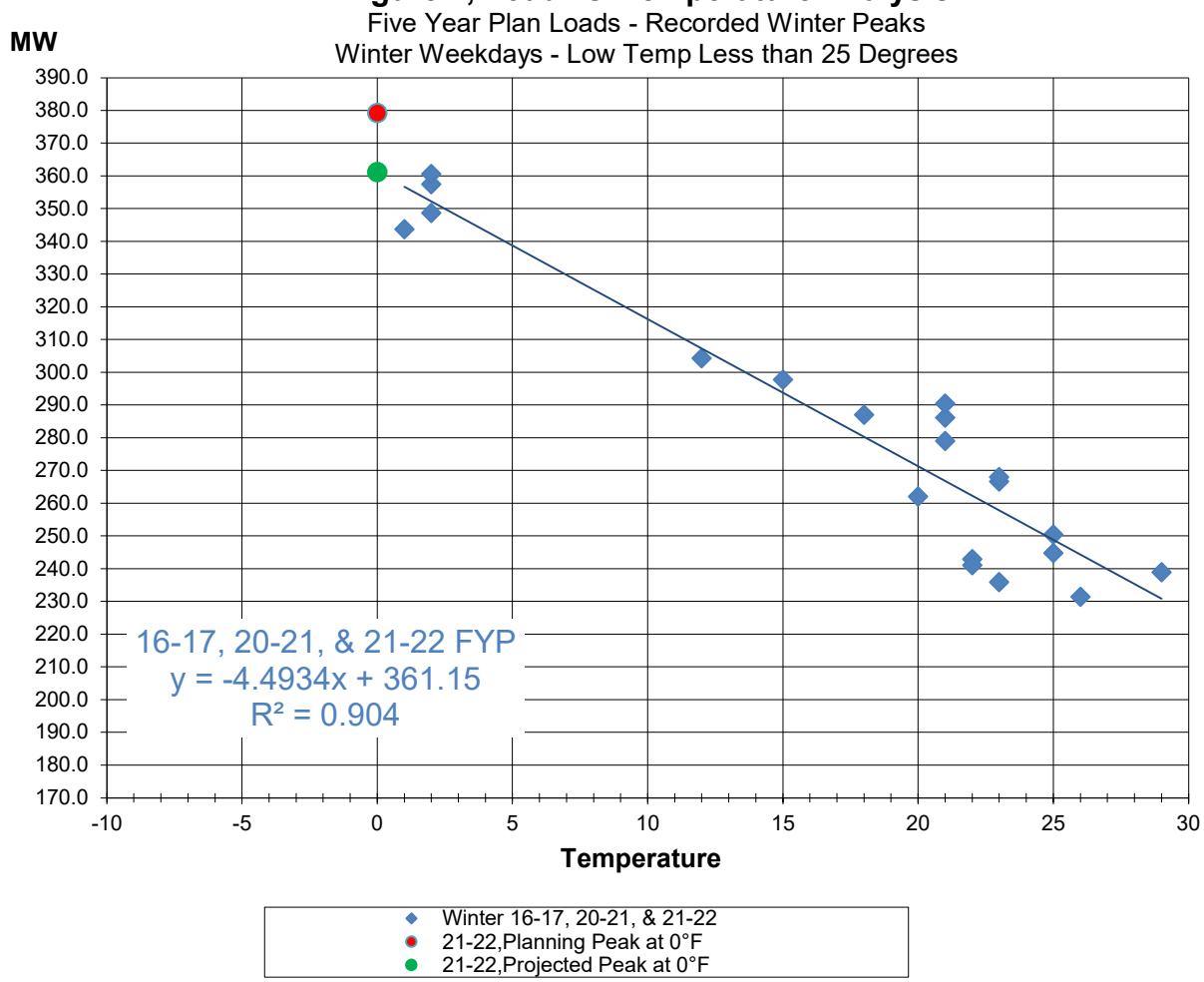
The feeder peaks are recorded by the District's Supervisory Control and Data Acquisition (SCADA) system. Refer to Appendix B, Tables B1-B6 for the detailed feeder peaks. The substation bay peaks are recorded by Bonneville Power Administration (BPA) meters located within District substations. This data was collected from BPA's meter data management website (MDMR). Refer to Appendix C, Tables C1-C6 for the detailed substation bay peaks.

System Peak Forecast

The Plan uses a model of our electrical system and corresponding peak loads during extreme weather conditions. The planning temperature is 0°F for winter and 104°F for summer. When winter temperatures have been mild (above 0°F) or summer temperatures have been mild (below 102°F) or high (above 106°F), a trend line, see Figures 1 & 2 below, are required to estimate the load at 0°F and 104°F. These trend lines are created by plotting several peak load points for the last two winters and summers and assumes a linear load vs. temperature relationship. The trend line is used to estimate what the load would be for a temperature of 0°F and 104°F. Traditionally, the trend line peak estimates are increased by 5% to develop a conservative planning peak for the system and to account for the variability of the trend line estimate.

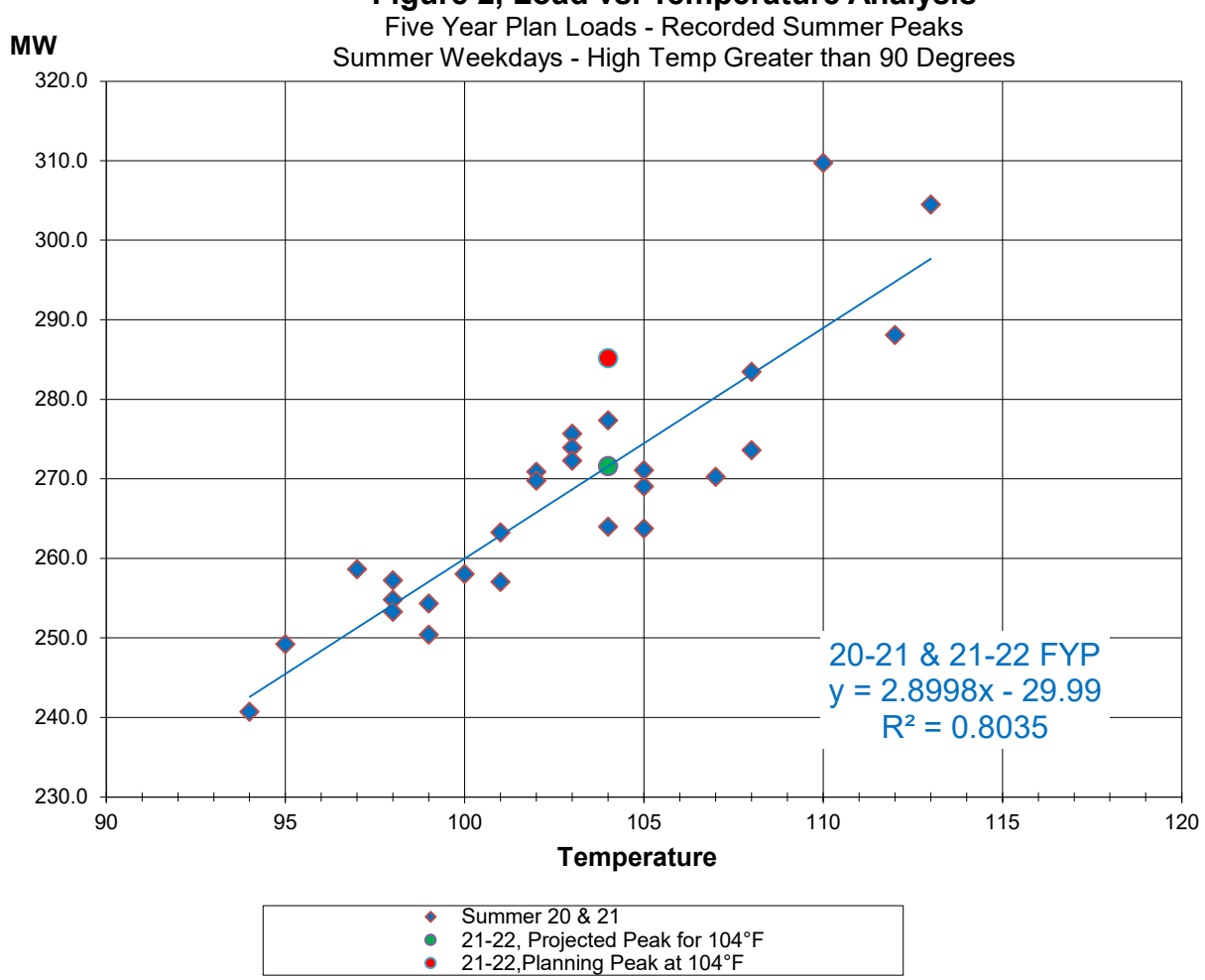
For the 2022 Plan, the loading for winter 2021/2022 was used as winter 2020/2021 had milder temperatures. The total system peak of 318.8 MW was at a temperature of 17°F, with the Plan portion of the system peaking at 318.8 MW. The previous winter (2020/2021) system peak was 302.7 MW at a temperature of 18°F, with the Plan portion of the system peaking at 252.8 MW. While the most recent winter data included data points near 0°F, there were no sustained cold periods to generate a significant winter peak. Peak data from winter 16-17 was included to generate a better statistical model. This resulted in setting the 0°F temperature corrected planning peak at 379.2 MW for the Plan portion of the system. The ratio of the planning peak to the actual peak (379.2/318.8) results in a 1.18 temperature correction factor, which was applied to the feeder peaks.

Figure 1, Load vs. Temperature Analysis



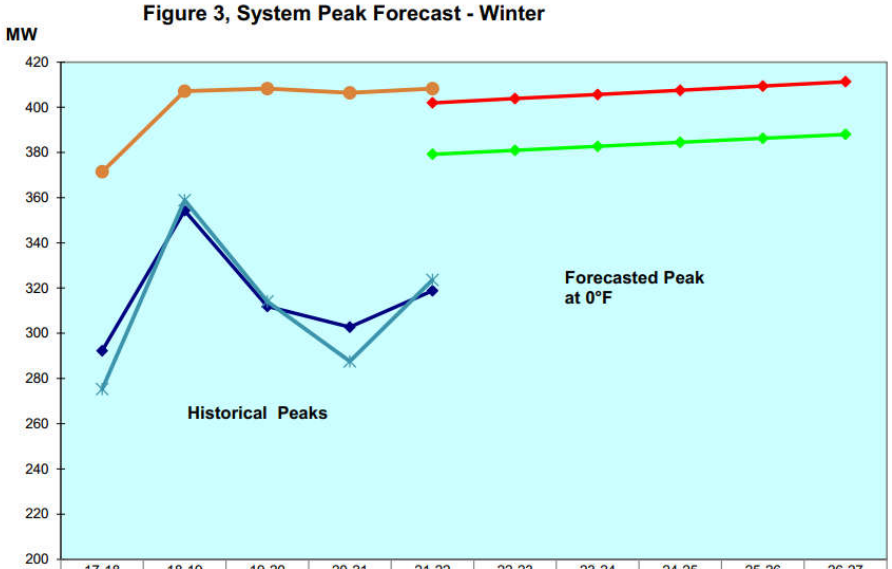
The previous summer (2021) generated a total system peak of 489.6 MW at a temperature of 110°F with the Plan portion of the system peaking at 309.7 MW and occurred on June 29th in hour 18. The previous summer (2020) system peak was 437 MW at a temperature of 108°F, with the Plan portion of the system at peaking at 283.4 MW. Due to the very high ambient temperatures this peak was not ideal and required a temperature correction. This resulted in setting the 104°F temperature corrected planning peak at 285.2 MW for the Plan portion of the system. The ratio of the planning peak to the actual peak (285.2/309.7) results in a 0.92 temperature correction factor, which was applied to the feeder peaks.

Figure 2, Load vs. Temperature Analysis



The system peak is forecasted over the next five years so that the total system load growth can be allocated to individual feeders. The system peak forecast uses an annual growth rate of 0.46% for each of the five years. The methodology for the Retail Energy Load Forecast generates only a single growth rating, instead of low, medium, and high growth rates. A high growth rate over the 2023 to 2027 time period was determined by averaging the difference between the medium and high growth rates over the 2015-2018 time period. This high forecast percentage growth rate was selected over the medium growth rate percentage as this is more in line with the historical medium growth rate that has been used over the past few planning cycles for the Plan portion of the system. The rate selected defines the load growth to be allocated to 5YP feeders (2. MW/year winter, 1.487 MW/year summer). This load growth compares well with the customer growth potential.

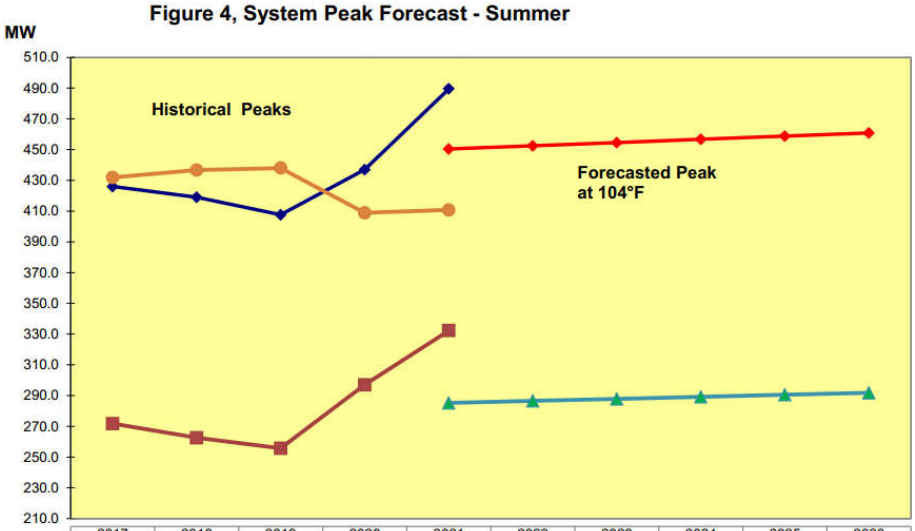
Figure 3, System Peak Forecast - Winter



	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27
System - Actual Peak	292.3	354.3	311.9	302.7	318.8					
System - Historical Forecast	371.5	407.1	408.3	406.4	408.3					
System - 2022 Forecast					402.0	403.8	405.7	407.5	409.4	411.3
POS Loads - Actual Peak	275.3	358.9	314.1	287.6	323.6					
POS Loads - 2022 Forecast					379.2	380.9	382.7	384.5	386.2	388.0
Temperature (°F)	18	1	24	18	17	0	0	0	0	0

Figure 2: Historical and Projected Winter Peak.

Figure 4, System Peak Forecast - Summer



	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
System - Actual Peak	426.0	419.0	407.7	437.0	489.6					
System - Historical Forecast	431.9	436.8	438.0	408.9	410.8					
System - 2022 Forecast					450.4	452.5	454.6	456.7	458.8	460.9
POS Loads - Actual Peak	271.7	262.5	255.7	297.0	332.3					
POS Loads - 2022 Forecast					285.2	286.5	287.8	289.2	290.5	291.8
Temperature (°F)	104	102	87	108	110	104	104	104	104	104

Figure 3: Historical and Projected Summer Peak.

Customer Growth

The District's Retail Energy Load Forecast attempts to forecast the amount of growth expected. The Plan is also concerned about the amount of growth, but is more focused

on determining the location of the proposed load growth so it can be allocated to distribution feeders and substation bays.

During preparation of the Plan, several areas of customer growth potential were examined for their possible impact on the electrical system. An overview of the major areas is provided in Appendix D. Some of these projects are difficult to forecast with regards to expected load and timing, but they could have a significant impact on the distribution system. The progress of each project is continually being monitored.

In addition to the overview of major growth areas, a more detailed list of customer projects has been developed. The customer projects that are currently known to the District's Engineering department are listed in Appendix D, Table D1. Refer to the system maps, also in Appendix D, for the locations of these projects. The main purpose of Table D1 is to determine the potential load growth that should be assigned to an individual feeder. Some of the projects are under construction; others are in the planning phase. In many cases, the projects are done in phases, with one phase under construction and future phases planned. Some of these projects may not materialize and other unforeseen projects may be initiated and completed in the next five years.

For reference purposes, Appendix D, Table D2 is included with the Plan to provide a snapshot of the customer count by rate schedule for each feeder.

Feeder Growth

Feeder load growth is derived by assigning a percentage of the expected annual system growth to individual feeders. The projected system peak annual load growth of 1.76 MW was diversified by a coincidence factor of 90% and allocated to the feeder level with a 98% power factor. The coincidence factor of 90% increases (1.76 MW / 0.90) the amount of annual load growth to be assigned to the feeders because the total of the feeder non-coincidental peaks would be greater than the system peak. The resulting annual total feeder load increase for the study was 2.0 MVA for winter and 1.487 MVA for summer. This total annual load growth must be allocated amongst the District's 90 feeders included in the study area.

Load growth on the electrical system is non-uniform by nature. The proposed customer growth shown in Table D1 along with staff knowledge of recent load growth is used to allocate a percentage of the total system growth to individual feeders. To determine the percentage allocated to individual feeders, the estimated load growth for each feeder was divided by the total load growth on the system. A general estimate of 4 kVA for a residential unit, 2 kVA for an apartment, and 50 kVA for a general commercial unit was used in these calculations. Estimated loading for new specific commercial services is adjusted based on the best information available to the District at the time of the Plan. Residential and Commercial load growth is assumed across a five year period to allow for development. In the case of Electrical Intensive Loads (EILs) the buildout schedule is modified to align with what the District has experienced with established customers. Larger residential growth areas were given a diversity factor due to the low probability of

all the houses being occupied in the near future. Each 1.0% assigned to a feeder equals 2.0 kVA of load growth per year in winter and 14.87 kVA of growth in summer. Refer to Table B1 and B2 to determine the percent of system load growth assigned to each feeder.

Feeder Peak Forecast

The feeder historical peaks, temperature adjusted peaks, growth percentages and feeder projected peaks are summarized for winter and summer in Appendix B, Tables B1 and B2 respectively.

Generally, the District's feeders have a winter rating of approximately 12,000 kVA. The planning rating of each feeder is 8,000 kVA, which leaves a reserve capacity of 4,000 kVA per feeder. The reserve capacity is equal to one-half the load that would be served by any adjacent feeder. Therefore, in the event of a feeder outage, the feeder's load can be transferred to any two adjacent feeders. District practice is to begin making plans to reduce load on feeders that are projected to reach the 8,000 kVA planning rating. Feeders exceeding 8,000 kVA are highlighted in red in Tables B1 and B2.

There is only one distribution feeder that exceeds the 8,000 kVA maximum winter planning rating during the next five years. Reata feeder RTA-2 continues to see significant residential growth mostly attributed to winter heating load. Projects to provide short to medium term feeder support to the RTA-2 utilizing RTA-1 are anticipated to be completed by fall 2022. Long term growth will require additional system capacity to be provided to the area.

Bay Peak Forecast

The bay/bank historical peaks, projected peaks, rating, and percentage loading are summarized for winter and summer in Appendix C, Tables C1 and C2 respectively. The bay projected peaks are the summation of the feeder non-coincidental projected peaks, multiplied by a calculated coincidence factor, to provide a bank loading estimate used to flag any issues.

The District begins planning for corrective action when the projected peak load of substation power transformers or regulators exceeds 90% of the equipment's normal rating. Each substation bay and feeder was reviewed to update normal and emergency capabilities during winter and summer loading conditions. A summary of each substation's capability is included in Appendix F.

Prosser Bay 2 is the only substation bay that exceeds the 90% bay normal loading criteria. In addition to District feeders PSR-4, PSR-5, and PSR-6, Prosser Bay 2 also energizes several Benton REA (BREA) feeders. The BREA feeders accounted for 44% and 48% of the overall bay loading respectively during the planning cycle peak winter and summer loads. The BREA load has peaked as high as 57% of the overall bay loading during summer loads in past planning cycles. The District has engaged with BREA to evaluate

equipment replacement to increase capacity or BREA load reduction options to relieve the loading condition at Prosser Bay 2. BREA is currently slated to energize their Huard substation north of Prosser Fall 2022. BREA is also in the design process for installing their own power transformer in their laydown yard directly adjacent to Prosser substation. This project is currently scheduled for energization in spring 2023 and would remove the BREA from Prosser bay 2.

Projects and/or switching have been completed over previous planning cycles to relieve the loading on bays that previously exceeded 90% normal loading criteria.

System Performance Criteria

Voltage Criteria

The District has developed criteria per ANSI Std. C84.1 for the distribution system to ensure that customers receive reliable service. System voltage criteria, on a 120 volt base, are listed below:

- During normal system operation, with a 124 volt bus voltage, the system shall be designed to limit the maximum voltage to 126 and the voltage drop on the primary distribution lines to less than seven volts, corresponding to a minimum primary voltage level of 117 volts. This allows for a three volt drop through the distribution transformer and customer secondary for a minimum service voltage of 114V at the customer's meter. (ANSI Std. C84.1 Voltage Range A)

- During outage contingency operation, with a 124 volt bus voltage, the system shall be designed to limit the maximum voltage to 127 and the voltage drop on the primary distribution lines to less than ten volts, corresponding to a minimum primary voltage level of 114 volts. This allows for a four volt drop through the distribution transformer and customer secondary for a minimum service voltage of 110V at the customer's meter. (ANSI Std. C84.1 Voltage Range B)

Equipment Loading Criteria

In addition to the system performance criteria, the District has developed criteria for equipment loading. Equipment has been assigned summer and winter normal and emergency ratings to limit operating temperatures to below levels that would damage or accelerate aging of the equipment.

The District begins planning for corrective action when the loading and/or the projected load exceeds 90% of the equipment's rating. High feeder loading can also create the need for substation facilities, as there are physical constraints that often limit the District's ability to extend or install new feeders.

The temperature and ampacity ratings of the major electrical components are listed in Appendix E.

Distribution Efficiency Criteria

The District has traditionally been concerned about distribution efficiency; however, there is an increasing focus on the conservation savings potential associated with distribution efficiency, which will require much greater scrutiny of system performance to achieve the savings potential. The District is currently working with Bonneville Power Administration (BPA) to evaluate and possibly implement Voltage Optimization for conservation credit toward I-937 compliance. The target criteria to qualify for this credit are outlined in BPA's Simplified Voltage Optimization (VO) Measurement and Verification Protocol. These criteria will be implemented as the District implements Voltage Optimization:

- Feeder-Source Power Factor Minimum (one hour) > 96%
- Feeder-Source Power Factor Average (annual) > 98%
- Feeder-Source Unbalance < 15%
- Feeder-Source Neutral Current < 40A
- Voltage Control Zone Maximum Adjusted Voltage Drop < 3.3%
- Secondary Maximum Allowed Voltage Drop < 4.0%
- Maximum Voltage Drop Variance between multiple Feeders < 2V
- Primary Line Minimum Hourly Voltage > [114V + 1/2 bandwidth + secondary maximum allowable voltage drop]
- Primary Line Maximum Hourly Voltage < [126V - 1/2 bandwidth]

Reliability Criteria

Outage information is logged into the District's Outage Management System (OMS). Every outage that occurs has an associated cause, region, number of customers affected and number of customer minutes out. This data is examined quarterly at the feeder level to determine the worst performing feeders. Feeders are ranked in order out over a two year rolling window. The feeders SAIFI (system average interruption frequency), SAIDI (system average interruption duration), and CAIDI (customer average interruption duration) values are ranked and those rankings averaged to identify the 10 worst performing. The 10 worst feeders generally have SAIFI and SAIDI ratings that are at least double the District’s set goals. Identification of the worst performing circuits using reliability indices is an industry best practice consistent with APPA’s Reliable Public Power Provider (RP3) recommendations. These 10 feeders were examined for outage trends to see what improvements could be made to decrease the numbers of customers out or the customer minutes out and increase their reliability.

The largest incidents for each of these 10 feeders were examined to see if improvements could be made to prevent similar outages in the future. It was discovered that some large outages could have been reduced in scale if the feeder was better sectionalized by installing fuses on lateral taps and through installation of mid-line reclosers. Fusing previously un-fused laterals limits the exposure to the main line from faults that occur on these laterals. The addition of mid-line reclosers limits the exposure to the feeder breaker

for main line faults that occur further out from the substation on the main line. The installation of additional line switches allows for more precise fault sectionalizing. All of these actions will decrease both the SAIFI and SAIDI rating for that particular feeder over time.

Load Flow Analysis

The District utilizes electric system modeling and analysis software as an integral part of the Plan study. The two pieces of software are MilSoft Utility Solutions' WindMil and LightTable. The WindMil model includes the conductors and equipment on the primary distribution system, except for the distribution transformers. System performance criteria, equipment ratings and other system options are configured to reflect District standards.

The primary input to the WindMil model is the projected feeder peaks. Once the feeder peaks are loaded, the total peak load is allocated to the feeder's line sections and a load flow analysis is ran to evaluate loading and voltage levels on the feeder. Lines can be switched to simulate system performance during outage contingency operation. The effect of system improvement projects, such as regulator bank installations or reconductor projects can be evaluated.

In accordance with the system performance criteria, WindMil was configured to flag any line sections where the voltage was less than 117 volts during normal peak operation and less than 114 volts during outage contingency operation. In addition, equipment that exceeded the allowable loading criteria was also flagged. Note: Substation equipment is not included in the model and is evaluated manually.

Contingency Switching Plan

The 2022 Plan included an additional effort to update the District's outage switching plan, which was last updated by the 2020 Plan. WindMil was used to evaluate outage switching scenarios and bank loading utilizing base loads in the winter and summer models.

The District has been and remains dedicated to constructing and maintaining a robust grid that allows for system recovery should any one bay in the study area (Kennewick, Benton City, and Prosser) be removed from service. This N-1 contingency planning was performed for both the peak summer and winter conditions. For stations that have multiple bays, it was assumed that the remaining bay(s) remained energized. In a typical case this would require the peak loads from 3-4 feeders to be served by other in-service feeders. The 2020 Plan determined that there were 5 cases in which all feeders of a bay could not be picked up in the event of a bay outage. In the 2022 plan, 5 cases were identified that require the use of the District's mobile substation. These are Philips Bay 4 (summer), Riverfront (winter and summer), and Sunset Road (winter and summer). Projects have been identified to correct these issues.

Project Recommendations

The primary output of the Plan is the project recommendations. Refer to Appendix A, Table A1 (Distribution Projects) and Table A2 (Substation Projects) for the recommended project lists and associated project cost estimates. Also refer to Appendix A for detailed project descriptions, overall area maps and detailed maps for the distribution projects.

The project list generated by the Plan is a significant input to the District's capital planning process. Typically, projects identified in the first two years are required by existing loading conditions or imminent customer projects that are well along in development. Projects identified in the third through fifth years are usually dependent on continued load growth or tentative customer projects. Faster than anticipated growth may accelerate plans for projects and slower growth may allow the District to defer projects. Projects over $100,000 will come before Commission again for job approval per District policies.

FAC-002 Coordination of Plans for New Facilities

The District complies with the requirements of NERC standard FAC-002, Coordination of Plans for New Facilities when planning for the construction of recommended projects. Specifically, all District projects involving the integration of generation and/or transmission facilities will be planned and coordinated in cooperation with the Bonneville Power Administration (BPA).

When requested by BPA, the District will provide information and assistance to support any system studies recommended by BPA to evaluate the reliability impacts of the new facilities and their connections on the BPA transmission system. Assessments may include steady-state, short-circuit, and dynamic studies as necessary to evaluate system performance in accordance with applicable reliability standards. When applicable the District will include copies of report summaries and/or cross-references to BPA studies in our five year plan of service study report to provide evidence of proper project planning and coordination.

It is BPA's responsibility to ensure compliance with NERC Reliability Standards and applicable regional, sub-regional, power pool, and BPA planning criteria and facility connection requirements.

At this time, the District has the following Line Load Interconnection Requests (LLIR) submitted to BPA and is working with BPA to perform the related studies:

#L0506 – Weber Canyon to Prosser, Feasibility Study, BPUD Contract #22-21-64

Additionally, COR is planning a new substation in the Dallas Rd. area. COR previously built the transmission line extension from near Reata substation to the proposed Dallas Rd. substation site and are currently finishing the BPA interconnection process for final tie in. The District has partnered with COR on this transmission line and plans to extend

it from COR's proposed Dallas Rd. substation to the existing transmission line feeding Sunset Road substation that is currently served from BPA's Red Mountain substation. This will alleviate a long standing reliability concern as Leslie Rd. & Reata substations are currently energized via a single source on a radial transmission line from BPA Badger Mountain switchyard and Sunset Road is currently energized from a single source radial transmission line from BPA Red Mountain switchyard. It is the District's preference to have loop feed capability at a substation where practicable.

While partnering with COR on Dallas Rd. (similar to Leslie Rd.) is being considered, it would be more advantageous to pursue acquisition of substation property in Badger Canyon to place the additional capacity adjacent to the load it would be serving. Necessary feeder upgrades would be less extensive, more cost effective, have less line exposure from a reliability standpoint, and load balancing between new and existing feeders would be more easily accomplished. Continuing to coordinate with BPA on the future Weber to Badger line may yield an opportunity to locate the substation along the path, minimizing the required transmission

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Appendix A

Projects

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Table A1 – Distribution Projects

POS# (WO#)	Feeder, Project Description	Qty. (1000')	Cost Estimate ($K)		
			Mat.	Lab.	Total
2023					
2	Misc. feeder, underground cable replacement, and getaway upgrades – Contract Labor	n/a	300	1200.0	1500.0
11	GUM-4, HED-3, recond. 3/0, Bowles Rd. (POS 2010)	10.8	210.0	142.6	352.6
12	GUM-4, recond. #4, S. Oak St. (POS 2010)	5.3	236.3	116.3	352.6
13	GUM-4, recond. #4, Game Farm Rd. (POS 2010)	10.5	181.2	336.3	517.5
58	BEC-3, new feeder to east, tie to SSR-1 (POS 2012)	16.13	465.6	449.4	915.0
83	Voltage Optimization – Kennewick Feeders	n/a	85	25.0	110.0
	2023 Total		**$1,478.1**	**$2,269.6**	**$3,747.7**

POS# (WO#)	Feeder, Project Description	Qty. (1000')	Cost Estimate ($K)		
			Mat.	Lab.	Total
2024					
2	Misc. feeder, underground cable replacement, and getaway upgrades – Contract Labor	n/a	300	1,200	1500
36a	SSR-3, relocate and reconductor (POS 2010)	9	109.8	42.8	152.6
36b	SSR-3, relocate and reconductor (POS 2010)	9	118.9	220.5	339.4
20	HED-4, recond. 3/0, Perkins Rd. (POS 2010)	16.1	250.0	201.0	451.0
21	HED-4, recond. #6 CU along Bernath Rd. and new tie to GUM-4. (POS 2010)	8	226.2	319.9	546.1
81	PHI-8, new feeder, recond. Cochran Rd. (POS 2014)	7.8	213.7	300.9	514.6
102	HED-4 Get-away Reconductor (POS 2018)	0.25	70.3	42.9	113.2
	2024 Total		**$1,288.9**	**$2,328.0**	**$3,616.9**

POS# (WO#)	Feeder, Project Description	Qty. (1000')	Cost Estimate ($K)		
			Mat.	Lab.	Total
2025					
2	Misc. feeder, underground cable replacement, and getaway upgrades – Contract Labor	n/a	300	1,200	1500
15	HIG-4, recond. 3/0, W. 10th Ave. (POS 2010)	3.2	152.2	157.9	310.1
41	ZEH-4, new OH tie to GUM-4 at Game Farm (POS 2010)	8	183.8	138.2	322.0
54	ZEH-3, recond. 1/0 for GUM-3 load transfer (POS 2012)	3.8	126.1	125.9	252.0
105	KEN-9, recond 3/0 on Washington St (POS 2018)	4.5	134.2	227.1	361.3
122	ANG-3, recond. 3/0, Clearewater (POS 2022)	1.5	67.7	35.3	103.0
	2025 Total		**$964.0**	**$1,884.4**	**$2,848.4**

POS# (WO#)	Feeder, Project Description	Qty. (1000')	Cost Estimate ($K)		
			Mat.	Lab.	Total
2026					
2	Misc. feeder, underground cable replacement, and getaway upgrades – Contract Labor	n/a	300	1,200	1500
14	GUM-4, new OH tie HED-3, Game Farm to Terrill Rd. (POS 2010)	3.2	125.5	142.9	268.4
38	V1 to V6, UG feeder tie across W. Quinault Ave. (POS 2010)	1.2	164.0	64.6	228.6
39	ZEH-1, new OH line and UG tie with STH-3 (POS 2010)	5.1	134.6	173.6	308.2
56	ELY-8, recond. 3/0, near Ely St. (POS 2012)	1.5	86.8	79.8	166.6
120	ANG-4, recond. 3/0 Clearwater. (POS 2022)	2.3	54.2	106.8	161.0
121	HLS-7, recond. 4/0 Clearwater. (POS 2022)	1.5	12.0	69.7	81.7
	2026 Total		**$877.1**	**$1,837.4**	**$2,714.5**

POS# (WO#)	Feeder, Project Description	Qty. (1000')	Cost Estimate ($K)		
			Mat.	Lab.	Total
2027					
2	Misc. feeder, underground cable replacement, and getaway upgrades – Contract Labor	n/a	300	1,200	1500
19	HED-3, recond. #4, Terril Rd. (POS 2010)	7	123.0	171.1	294.1
22	KEN-8, convert OH to UG across fairgrounds (POS 2010)	2	162.5	46.6	209.1
79	RTA-2, recond. Badger Rd., L766A to L80R (POS 2014)	5.3	88.8	71.8	160.6
95	HED-2, recond #266.8, Finley Rd (POS 2016)	4.5	166.3	139.8	306.1
116	LES-1, Country Meadows alt. feed. (POS 2020)	1.4	37.5	33.8	71.3
113	ELY-2 recond. Garfield St L138A to 82912-3405 (POS 2018)	0.5	8.8	27.3	36.1
119	PSR-3 reconductor (POS 2020)	1.9	204.8	124.2	329.0
	2027 Total		**$1,091.7**	**$1,814.6**	**$2,906.3**

2023 - 2027 Total	**$5,699.8**	**$10,134.0**	**$15,833.8**

Distribution Project Descriptions

 # 00 – Misc. feeders, future system improvements. This project is intended to account for system improvement projects that are not specifically identified in the current Five Year Plan, but that may become necessary in the future years. This project may be used as a placeholder in the third through fifth years.

 # 02 – Misc. feeders, underground cable replacement, and getaway upgrades. This project is intended to account for the annual system wide replacement of aging underground cable. The District started an injection program in 2014. In 2017, the two companies offering injection service merged. Subsequent cost increases have now put the cost of injecting cable on par with outright replacement. Replacement is preferred as it is a 40 year fix (injection is a 20-25 year fix), and it provide a conduit which allows for much easier replacement in the future. The focus remains areas of the system still utilizing direct buried, high molecular weight (HMW) polyethylene insulated cables, which the District refers to on our maps as "ALCN" cable. It is anticipated that there are about 400 segments of this cable that will be addressed in 2019, addressing the majority of the at risk cable and leaving only small pockets of ALCN to be addressed in future years. These cable replacement efforts will continue, replacing segments that cannot be injected, or replacing cable that is already in conduit. In addition, the District has been systematically planning projects to upgrade our aging underground feeder getaway cables and upgrades to our underground getaway vault systems so that no more than two feeders share a vault. By redesigning our getaway vault system in conjunction with the cable replacements we will improve the reliability and operation of the system for the long term. Substations with getaway cable and vault systems that do not meet the newer practices are Vista Substation (XLP Cable & Vaults), Prosser Substation (XLP Cable), and Riverfront Substation (XLP Cable). Prioritization will consider sensitivity of the system to failures of the cables in question, age of the cable, characteristic evaluation (i.e. ampacity (size), neutral integrity, number of past failures), and economic analysis.

 # 11 – GUM-4 (Gum Street), HED-3 (Hedges), reconductor 3/0 ACSR line along Bowles Rd. from S. Oak St. east to Haney Rd. Feeder GUM-4 can be used to pick up a portion of HED-3 during Hedges Substation outages. Currently, GUM-4 can only support a portion of HED-3. There are low voltage problems for HED-3 customers over a large area. Therefore, customers downstream of recloser L159R on Nine Canyon Rd. would need to remain out of service. Upgrading the 3/0 ACSR would alleviate the low voltage problems. This project, combined with Project #10 (S. Oak St. reconductor), will allow feeder GUM-4 to pick up 100% of HED-3. Because this tie line is normally lightly loaded, 336.4 AAC is recommended as the economic conductor for this upgrade.

 # 12 – GUM-4 (Gum Street), reconductor #4 ACSR line along S. Oak St. from Bowles Rd. south to Game Farm Rd. Feeder GUM-4's 1000 kcmil cable is potentially overloaded when GUM-4 is picking up 100% of HED-3 (Hedges). Feeder GUM-3 can provide only minor load transfer capability. To offload GUM-4 during Hedges outages and to better utilize the exiting investment of Zephyr Heights Substation, this project is

recommended to facilitate load transfer between GUM-4 and ZEH-4. This project, combined with Project #41 (ZEH-4 to GUM-4 feeder tie) and #13 (Game Farm Rd. reconductor), provides load transfer capability from GUM-4 to ZEH-4 and a future main feeder route for permanent load transfer to feeder ZEH-4. Existing load south of Bowles Rd. could be transferred from feeder GUM-4 to feeder ZEH-4. According to Operations, this section of line has a history of trouble, including conductor burn down, that further justifies the upgrade. Coupled with the improvements in Project #10, line switches will be installed on this project to allow the portion of GUM-4 south of Bowles Rd (but upline of L1244R) to be transferred to GUM-3 during Hedges outages until Project #41 is completed. A line switch shall be installed just before the tee on Game Farm road to facilitate Project #41. As part of design the location of L51V will be evaluated to see if a more beneficial location can be found due to the larger conductor and communication issues the regulators are having as their current location are in a gully. Because this line is normally lightly loaded and in the future will primarily be a tie between GUM-4 and ZEH-4, 336.4 AAC is recommended as the economic conductor for this upgrade.

 # 13 – GUM-4 (Gum Street), reconductor #4 ACSR line along Game Farm Rd.
This project, combined with Projects #41 (ZEH-4 to GUM-4 feeder tie) and #12 (S. Oak St. reconductor), provides load transfer capability from GUM-4 to ZEH-4 and a future main feeder route for permanent load transfer to feeder ZEH-4. Existing load south of Bowles Rd. could be transferred from feeder GUM-4 to feeder ZEH-4. In addition, extending feeder ZEH-4 to the east will facilitate a future tie to Hedges feeder HED-3. This project, combined with Project #12 (S. Oak St. reconductor) and Project #14 (GUM-4 to HED-3 feeder tie), supports the load transfer capability desired for GUM-4 to ZEH-4 and from HED-3 to ZEH-4. These load transfers are needed to improve Hedges Substation outage support, but may also be considered for permanent load transfer. In the future this line will be a main feeder route for ZEH-4, however, the loading will still be relatively low and therefore 336.4 AAC is recommended as the economic conductor for this upgrade.

 # 14 –GUM-4 (Gum Street) to HED-3 (Hedges), new overhead feeder tie line from Game Farm Rd. south to Terrill Rd. Hedges feeder HED-2 currently has limited options for load transfer. During Hedges substation outages, 100% of HED-1 and HED-2 are transferred to Phillips Bay 4 feeder PHI-7, which overloads the 1000 kcmil cable on PHI-7. Hedges feeder HED-2 needs additional load transfer options. This project, combined with the project #19 (Terrill Rd. reconductor), will allow a route for feeder ZEH-4 (via existing GUM-4) to tie with HED-3 and HED-2. With ZEH-4 picking up HED-2 load, it would reduce loading on PHI-7 during Hedges Substation outages. Maximizing the HED-2 load transfer to ZEH-4 also improves the outage situation for HED-4 load northeast of Hedges substation, which could then be picked up by PHI-7 or by creating a new tie with HED-3 so that GUM-1 could pick up more of HED-4. In addition to outage support, this project, combined with the other ZEH-4 projects, enables the possibility for permanent load transfer from HED-3 to feeder ZEH-4, reducing the relatively high Hedges transformer bank loading. Because this line will normally be lightly loaded, 336.4 AAC is recommended as the economic conductor for this upgrade.

 # 15 – HLS-4 (Highlands), reconductor 3/0 ACSR line along W. 10th Ave. from S. Edison St. east to S. Union St. ANG-2 support from HLS-4 is limited by the 3/0 ACSR overhead line on W. 10th Ave., which could be severely overloaded if existing switching was used. Upgrading this section of line will remove a potential weak point in the system, increase reliability by replacing an aging circuit and provide a more economical conductor size for HLS-4 loading during normal configuration. It should be noted that feeder HLS-4 overhead line to the east (from S. Union St. east to L98A near S. Morain St.) has already been upgraded to 556.5 AAC. Because this will be a main feed normally carrying high load, 556.5 AAC is recommended as the economic conductor for this upgrade. This project will move feeder HLS-4 on W. 10th Ave. closer to 100% upgraded, but additional 3/0 ACSR remains on HLS-4 east of Morain St.

 # 19 – HED-3 (Hedges), reconductor #4 ACSR line along Nine Canyon Rd. from Game Farm Rd. south to Terril Rd. and then west along Terril Rd. Hedges feeder HED-2 currently has limited options for load transfer. During Hedges substation outages, a significant portion of Hedges load is transferred to Chevron feeder C2. Hedges feeder HED-2 needs additional load transfer options. This project, combined with the GUM-4 to HED-3 tie, will allow a route for feeder ZEH-4 (via existing GUM-4) to tie with HED-3 and HED-2. This upgrade is required to ensure adequate voltage. With ZEH-4 picking up HED-2 load, it would reduce loading on C2 during Hedges Substation outages. It also enables the potential to create a new tie between HED-3 and HED-4 so that GUM-4 could pick up more of HED-4. In addition to outage support, this project, combined with the other ZEH-4 projects, enables the possibility for permanent load transfer from HED-3 to feeder ZEH-4, reducing the relatively high Hedges transformer bank loading. Because this line will normally be lightly loaded, 336.4 AAC is recommended as the economic conductor for this upgrade.

 # 20 – HED-4 (Hedges), reconductor 3/0 ACSR line along E. 19th Ave., S. Yew St., and Perkins Rd. from S. Oak St. east to Haney Rd. The primary need for this project is to improve outage support for Hedges feeder HED-4. For Hedges Substation outages, feeder GUM-1 is the primary support feeder for HED-4, but GUM-1 cannot provide adequate voltage when picking up 100% of HED-4. There are severe voltage problems for HED-4 customers. Customers downstream of L947A, near Perkins & Haney, would need to remain out of service for adequate voltage to other HED-4 customers. This project, combined with the GUM-1 reconductor and the GUM-4 to HED-4 tie and reconductor, will allow feeder GUM-1 to pick up 100% of feeder HED-4 with adequate voltage to nearly all HED-4 customers. A switch should be added north of Perkins Rd. on Haney Rd. This switch would be opened during HED-4 outages when picked up by GUM-1. Because this is primarily a tie line and is normally lightly loaded, 336.4 AAC is recommended as the economic conductor for this upgrade.

 # 21 – HED-4 (Hedges), reconductor #6 CU along Bernath Rd. from Haney Rd. west to S. Yew St. and new feeder tie to GUM-4 (Gum Street). This project is needed to improve outage support for Hedges feeder HED-4. For Hedges Substation outages, feeder GUM-1 is the primary support feeder for HED-4, but GUM-1 cannot provide adequate voltage when picking up 100% of HED-4. There are severe voltage problems

for HED-4 customers. Customers downstream of L947A, near Perkins & Haney, would need to remain out of service for adequate voltage to other HED-4 customers. This project, combined with the GUM-1 and GUM-4 reconductor and the Perkins Rd. HED-4 reconductor, will allow feeder GUM-1 to pick up 100% of feeder HED-4 with adequate voltage to nearly all HED-4 customers. Feeder GUM-4 and HED-4 currently coexist near S. Yew St. & Bernath St., but are not electrically connected. Fiber does span approximately 320 feet from one circuit to the other with a fiber only pole in the middle. Adding a feeder tie at this location will greatly improve the ability for GUM-1 to support HED-4 customers to the east. The GUM-4 line is a main feeder route at this location and the 3/0 ACSR is recommended for upgrade in a separate project. Feeder HED-4 at this location is not a main feeder route and is currently only three phase #6 CU and some #4. Upgrading this line to main feeder conductor from this location east to Haney Rd. will provide significantly better voltage support when GUM-1 is picking up HED-4 customers. Feeder HED-4 has no other feeder ties on its northern half. Completing this feeder route upgrade along Bernath Rd. will allow for a future feeder tie from feeder KEN-8 on the north. Because this is primarily a tie line and is normally lightly loaded, 336.4 AAC is recommended as the economic conductor for this upgrade. A 167kVA regulator will be required at 83009-4901 for voltage support during a Hedges bay outage.

 # 22 – KEN-8 (Kennewick), convert overhead to underground across fairgrounds
This project recommends converting the 3/0 ACSR overhead line that goes across the county fairgrounds to a 1000 kcmil underground circuit with increased capacity. This will improve the outage transfer capability from KEN-8 to GUM-1 or GUM-4.

 # 36 – SSR-3 (Sunset Road), relocate and reconductor 1/0 CU line along E. Jacobs Rd./I-82 from Sunset Rd. Substation east to I-182. The primary purpose of this project is to improve the ability of Reata feeder RTA-4 to pick up a larger portion of Sunset Road feeder SSR-3 during outages and provide better support as load continues to grow in the Red Mountain area. Due to updates to the proposed routing the western portion of this project shall be completed concurrently with the planned transmission project to connect Sunset Road to City of Richland's Dallas Road substation site. The eastern portion will be completed the following year. Growing irrigation load has caused voltage exceptions to emerge near the east end of this portion of feeder. This project will install 556.4 conductor from near the western I-82 crossing to a location near the eastern UG I-82 crossing. The existing line will be left in place and operated as a radial tap line, and subsequent smaller projects will be proposed to DNR to move the loads currently fed from the existing line to the new line along Jacobs Rd. This project will also install a 250kVA regulator bank at the eastern end of the project to help support voltage during Reata outages. As this project will be completed across two budget years it is being denoted as "36a" and "36b" in the tables and on the project maps.

#38 – V1 to V6 (Vista), underground feeder tie south across W. Quinault Ave. In conjunction with the Vista feeder underground getaway upgrades, it is desirable to get a second feeder into the Columbia Center Mall from the south. Currently, only feeder V1

serves the mall with three taps (west, center, east) feeder from north to south. Only the western feed has a loop (V1 to V6). The center and east taps have no loops. This project would utilize existing feeder V6 to add a tie to feeder V1 from the south. Currently, the existing feeder is V7. The preference would be to utilize feeder V6 as the tie because it is lightly loaded. This will require the installation of a switch cabinet along W. Quinault Ave. to move the normal open point between V6 and V7 so that V6 can feed to the north. There is an existing conduit across W. Quinault Ave. that makes this project even more viable. Additional study is required to determine if other upgrades are required for this tie to support Columbia Center, but this project is the first step.

 # 39 – ZEH-1 (Zephyr Heights), new overhead line from Canyon Lakes west to Hwy 395 and underground feeder tie with STH-3 (Southridge). This project would extend an overhead line from Zephyr Heights feeder ZEH-1 in the area near the Heights at Canyon Lakes (South Hill) development, west towards the Southridge area to make an underground tie with Southridge Feeder STH-3 on the east side of Hwy 395. The likely route for the overhead line from east to west would be within the Bonneville Power Administration's (BPA) existing transmission line right-of-way. Extending feeder ZEH-1 will provide additional outage support to the Southridge area and for ZEH-1. Because this is primarily a tie line and would normally be lightly loaded, 336.4 AAC is recommended as the economic conductor for this upgrade.

 # 41 – ZEH-4 (Zephyr Heights) to GUM-4 (Gum Street), new feeder and overhead line from Zephyr Substation east to Game Farm Rd. Feeder GUM-4's 1000 kcmil cable is potentially overloaded when GUM-4 is picking up 100% of HED-3 (Hedges). Feeder GUM-3 can provide only minor load transfer capability. To offload GUM-4 during Hedges outages and to better utilize the exiting investment of Zephyr Heights Substation, this project is recommended to facilitate load transfer between GUM-4 and ZEH-4. This project, combined with the S. Oak St. and Game Farm Rd. reconductor projects, provides load transfer capability from GUM-4 to ZEH-4 and a future main feeder route for permanent load transfer to feeder ZEH-4. Existing load south of Bowles Rd. could be transferred from feeder GUM-4 to feeder ZEH-4. In addition, extending ZEH-4 to the east will facilitate outage support to other Hedges feeders (HED-2, HED-3). The proposed route is to double circuit with ZEH-3 south of the substation to SR-397, then follow the road until intercepting GUM-3, then double circuit north to Game Farm Road.

#54 – ZEH-3, Reconductor 1/0 Cu OH from just outside Zephyr Heights Substation to tie switch L998A for GUM-3 to ZEH-3 load transfer. Feeder GUM-4's 1000kcmil cable is potentially overloaded when GUM-4 is picking up 100% of HED-3 (Hedges). In order to reduce loading on GUM-4 this project in conjunction with the GUM-3. Getaway rearrangement to pick up GUM-4 load will allow for more support from Gum feeders to the east to tie to Hedges circuits and improve options during outage contingency switching.

#56 – ELY-8 (Ely), Reconductor 3/0 ACSR OH from S. Ely St. East to S. Conway St. along W. 15th Ave. and from W.15th Ave. north along S. Conway St. to an existing

riser. During HIG-4, HIG-2 (Highlands), KEN-2 (Kennewick), and ANG-2 (Angus) outages, ELY-8 is limited by 7 spans of 3/0 ACSR OH conductor. Reconductoring this portion of line would allow better utilization of ELY-8 during these outages. The majority of ELY-8's load is down stream of this section of 3/0. The ideal conductor would be to stay consistent with 336.4 AAC as is installed in the adjacent area.

#58 – BEC-3, New Benton City Feeder east along Transmission ROW across Yakima River. This project will install a new feeder tie with northern portions of SSR-1 (Sunset Rd). This project will allow better support for Sunset Rd outages now that Benton City Substation has been upgraded and can support a 3rd feeder. KID has installed two large pumping stations in the Red mountain area on the east side of the Yakima River which have encouraged further agricultural development. 336.4 AAC is recommended as the economic conductor for this project. A minimum of one 333kVA regulator installations will be required for voltage support during switching contingencies as the proposed distance covers several miles. The installation of a switch at 92709-0002 is the recommended location to split SSR-1 to accommodate outage contingency switching.

#79 – Reconductor #4 Badger Rd from L766A to L80R. This reconductor makes it possible for Orchard View feeder ORV-3 to feed loads in the Ridge at Reata West area of Badger Canyon during a Reata Outage. Currently there are voltage issues in the Country Meadows area when ORV-3 is used to pick up load on this portion of RTA-2. This project coincides with previously completed projects #80 (reconductor L80R to Spirit Ln), #57 (reconductor SSR-3 Badger Rd to L767A), #59 (reconductor Badger Rd L767A to L25A), and #60 (reconductor L25A to L70R). The ideal conductor would be to stay consistent with 336.4 AAC as has been called out in the previous projects. Once the final location of Badger Canyon substation is determined this project should be wrapped into the associated feeder reconstruction efforts.

#81 – New Phillips Feeder PHI-8, Reconductor Cochran Rd. from Finley Rd to SR-397 - This project along with a new Phillips Substation PHI-8 feeder will allow the District to more fully utilize the investment made in Phillips Bay 4, and reduce the District's dependency on Chevron Substation which is primarily used to feed the District's lone industrial customer Nutrien. The use of Chevron Substation for Hedges outages is not ideal since Nutrien has large equipment that when started can introduce large voltage drops on the distribution system when used for contingency switching. This project will install a new feeder getaway from Phillips substation to the north and connect with the reconductored Line on Cochran Rd. The 80T fuses at 83022-5901 will need to be replaced with a line switch or a hard tap. In addition a line switch will be required along Finley road between Pole 83022-5906 and the flying tap just north of 83027-9907. This project will also allow more load to be picked up at the east end of HED-4 without exposing customers to the infrequent yet large voltage variations they would experience while being fed from Chevron Substation via CHE-2. The ideal conductor would be to stay consistent with 336.4 AAC as is installed in the adjacent area. This project may require a regulator installation as well, additional study will be required.

#83 – Voltage Optimization (VO) - An initiative is underway to implement voltage optimization as a qualifying distribution efficiency conservation measure to assist in meeting our I-937 targets. The District has been working with Bonneville Power Administration and their technical service provider in the study phase of the District's first voltage optimization project. While all 9 feeders at Kennewick Substation are targeted for VO, Bay 1 (K1, K2, K3) have been targeted for this first project. An initial study has been performed by a third party consultant working for Bonneville Power Administration (BPA), and the benefits of voltage optimization are outlined in "Distribution System Efficiency and Voltage Optimization Scoping Study - Benton County PUD" dated March 7th, 2014. The District has completed the one year data collection phase, and is currently evaluating implementation options with BPA. Necessary system improvements (re-phasing and reconductoring) were completed in 2021/2022 and initial implementation of Voltage Optimization on K1-K3. The District is planning to repeat similar projects in the future.

#95 – HED-2 (Hedges), Reconductor 266.8 ACSR from Hedges Substation to Finley Rd along Perkins Rd and from Perkins Rd to Bowles Rd along Finley Rd. During PHI-6, PHI-7 (Phillips Bay 4) outages, HED-2 is limited by the 266.8 ACSR feeder get-away. Reconductoring this portion of line would allow better utilization of HED-2 during these outages. This project coincides with completed projects #93 (new switch on Piert Rd) and #94 (new switch on Game Farm Rd). The ideal conductor would be to stay consistent with 336.4 AAC as the remaining main line portion of HED-2 is currently 336.4 AAC. Project #102 provides provisions to underground a portion of the get-away to mitigate the single point of failure on the existing three circuit get-away structure. While not specifically part of this project, it should be considered to align this reconductoring with reconductoring of the transmission line overbuild.

 # 100 – Southridge Feeder Support. This project is intended as a placeholder to account for system improvements with sudden growth in the Southridge area that are not specifically identified in the current Five Year Plan. The District has not been notified to date of any large “anchor” tenants associated with COK’s Bob Olsen Parkway road extension project. However the District anticipates future growth in the Southridge/South Thompson Hill area to correlate with the completion of the project. Additionally the COK UGA is expanding south of I-82 along the Christensen road area and is anticipated to be zoned commercial, similar to Brinkley Rd. Long term support for this projected growth will be accomplished through extension of feeders ORV-1, ORV-7, ORV-8, and the construction of Ridgeline Substation. Prior to these projects, existing feeders must be utilized to support growth in the near term. Currently Highlands HIG-1, and HIG-5, Orchard View ORV-3, and Southridge STH-4 feeders are in the vicinity. Existing facilities in the area will potentially require upgrading and additional feeder ties will need to be constructed. The specific location of these ties and which feeder is most optimal is dependent on where the load growth occurs. Due to the unknown nature of the future loads, budgeting for this project would be accomplished through a budget amendment.

 # 101 – Rural Feeder Reliability and Sectionalizing - In the 2016 Plan three rural feeders were selected for reliability improvements through additional sectionalizing. The District's performance measures, which include outage indices that measure outage customer count and outage duration, were used to select these feeders. Due to their nature the number of customers on rural feeders tends to be lower, but outage times tend to be longer due to the generally more difficult line patrol conditions. This project is intended to account for reliability & sectionalizing improvements on one or two rural feeders a year. This project would use the District's reliability metrics to select which feeders, but the initial focus is anticipated to be the Benton City, Gum, Hedges, Prosser, and Sunset Road feeders.

 # 102 – HED-4 (Hedges), Get-away Reconductor. The 3/0 overhead get-away conductor for HED-4 exceeded 90% of the conductor rating during winter peak conditions in 2016-2017 as identified in the 2018 Plan. Additionally feeders HED-2, HED-3, & HED-4 all exit the station via the get-away same overhead structure. This puts an increased reliability risk resulting in de-energizing three of the four Hedges feeders through a single car-pole accident, pole fire, etc. While a direct overhead replacement with 336.4 AAC is possible, it is desirable to minimize the risk of a large outage associated with a single incident. For this reason it is recommended to replace the overhead get-away for HED-4 with a 1000 kcmil underground one. It is additionally recommended that provisions (additional conduit) be put into place to accommodate replacing the get-away for HED-2 when the reconductor described in project #95 occurs to further reduce the single cause outage exposure on Hedges substation.

 # 105 – KEN-9 (Kennewick), reconductor 3/0 ACSR line along Washington St. from W. 11th Ave. south to W. 16th Ave. GUM-1 support from KEN-9 is limited by the 3/0 ACSR overhead line on Washington St., which is over 90% loaded when existing switching is used. Upgrading this section of line will remove a potential weak point in the system, increase reliability by replacing an aging circuit and provide a more economical conductor size for KEN-9 loading during normal configuration. The ideal conductor would be to stay consistent with 336.4 AAC as the remaining main line portion of KEN-9 upline is currently 336.4 AAC. This project will move feeder KEN-9 on Washington St. closer to 100% upgraded, but additional 3/0 ACSR remains on KEN-9 between W. 16th Ave and 27th Ave.

 # 113 – ELY-2 (Ely) reconductor 3/0 on Garfield St from L138A south to 82912-3405. ELY-2 support from KEN-5 is limited by the 3/0 ACSR overhead line on Garfield St., which is over 90% loaded when existing switching is used. Upgrading this section of line will remove a potential weak point in the system, increase reliability by replacing an aging circuit and provide a more economical conductor size for ELY-2 loading during normal configuration. The ideal conductor would be to stay consistent with 336.4 AAC as the remaining main line portion of ELY-2 upline is currently 336.4 AAC.

 # 116 – RTA-2 Country Meadows Additional Feed. The main portion of the Country Meadows development is a large single-phase tap that has a history of nuisance trips during heavy winter loading conditions. Routing of additional conduit through the

established neighborhood would be difficult and costly due to the amount of landscaping and asphalt repair required. The District previously routed in a feed from the west as part of a subdivision development in the area. This solves the near-term normal condition loading issue but still leaves the area vulnerable during abnormal outage switching conditions due to cold load pickup and both sources being on RTA-2. Assuming the District can secure the necessary easement and the canal crossing permit the proposed route would be:

From pole 82821-6102 route overhead south across the irrigation canal. Follow the canal to the west. Transition to underground and move south to tie into the existing conductors at 82820-5901. Due to the possibility of backfeeding during outage support the minimum underground conductor size is 1/0 EPRJ. This allows for the use of Leslie Road feeder LES-1 for some limited switching during local outages.

 # 117 – SSR-1 offload to SSR-3. With the build out of SSR-4 and subsequent splitting of SSR-3, SSR-3 now has available capacity to accommodate a load shift from SSR-1. While SSR-1 is not overly heavily loaded, it covers a relatively large geographic area that slows patrol times during feeder outages. Furthermore load in Benton City is growing limiting available switching capacity. Load east of L1430A will be moved to SSR-3. With the previous installation of L1410A and L1500A and the installation of additional fault indicators, this load shift will reduce crew patrol times during outages and allow for more flexible switching options and set up the area for the build out of feeder BEC-3.

 # 119 – PSR-3 (Prosser), reconductor of 4/0 XLPJ to 1000 kcmil, #2 STRBC to 336.4 AAC. During a summer Prosser Bay 1 outage Riverfront has limited switching options, resulting in an overload of Prosser Bay 2 during switching. Reconductoring the #4/0 XLP from switch L595A to Pole 82402-2804 with 1000 kcmil, and the #2 STRBC from Pole 2402-2804 to Pole 2402-4907 with 336.4 AAC would allow additional load to be transferred to Riverfront and prevent an overload at Prosser Bay 2. 336.4 AAC was selected as the ideal conductor to stay consistent with the other feeder mainlines in the Prosser area.

 # 120 – ANG-4 (Angus) reconductor 3/0 ACSR on Clearwater Ave from L311A east to 82903-9902. ANG-7 support from ANG-4 is limited by the 3/0 ACSR overhead line on Clearwater Ave., which is loaded to 98.3% of its emergency rating when existing switching is used. Upgrading this section of line will remove a potential weak point in the system, increase reliability by replacing an aging circuit and provide a more economical conductor size for ANG-4 loading during normal configuration. The ideal conductor would be to stay consistent with 336.4 AAC as the remaining main line portion of ANG-4 downline is currently 336.4 AAC.

 # 121 – HLS-7 (Highlands) reconductor 4/0 ACSR on Clearwater Ave from 82904-9303 west to 82904-9002. HLS-3 support from HLS-7 is limited by the 4/0 ACSR overhead line on Clearwater Ave., which is loaded to 97% if ORV-5 is not utilized. Upgrading this section of line will remove a potential weak point in the system, increase

reliability by replacing an aging circuit, simplify switching requirements in the area, and provide a more economical conductor size for HLS-7 loading during normal configuration. The ideal conductor would be to stay consistent with 336.4 AAC as the remaining main line portion of HLS-7 upline & downline is currently 336.4 AAC.

 # 122 – ANG-3 (Angus) reconductor 3/0 ACSR on Clearwater Ave from L314A west to 82903-9002. Ongoing growth in the Vista Field area has limited ANG-9 support from VIS-4 and no longer allows a full transfer from ANG-9 to VIS-4 during summer peaks. Alternate switching to move part of ANG-9 load onto ANG-3 to prevent a VIS-4 get-away overload condition results in the 3/0 ACSR on ANG-3 to be loaded to 90.33% of its emergency rating. Upgrading this lime will remove a potential weak point in the system, increase reliability by replacing an aging circuit and provide a more economical conductor size for ANG-3 loading during normal configuration. The ideal conductor would be to stay consistent with 336.4 AAC as the downline main line portions of ANG-3 is currently 336.4 AAC.

 # 123 – Badger Canyon Feeder Redevelopment. While installation of these feeders is beyond the timeline of the 2022 Plan, this project is intended as a placeholder to account for system improvements to the existing distribution feeder layout associated with the buildout of Badger Canyon substation. Once the final location for Badger Canyon substation is established proposed feeder routing will be determined and noted to coordinate with continued development in the area. It is currently anticipated that one feeder would route along the tap on RTA-2 that feeds L80R, one would head west and tie to SSR-4, and two would double circuit to the east to tie into RTA-3 and LES-1.

Table A2 – Substation Projects

POS#	Substation, Project Description	Cost Estimate ($K)		
		Mat.	Lab.	Total
2023				
S10	Misc. Sub -Aux. Equip., Relays/Controls	15	10	25.0
S39	Misc. Sub. SCADA Equip., RTUs/Comms	20	30	50.0
S42	Vista Bay 1 Metalclad Replacement	839.3	216.8	1056.1
S42	Vista Bay 1 SCADA Upgrades	25.2	15.1	40.3
S41	Prosser Bay 2 Regulator Replacement	573.8	38.0	611.8
S39	Prosser Bay 2 SCADA Upgrades	7.0	8.0	15.0
S43	Hedges Regulator Swap	7.0	35.0	42.0
S28	Angus Bay 3 Breaker Upgrades	158.8	47.9	206.7
S39	Angus Bay 3 SCADA Upgrades	7.0	8.2	15.2
S39	Highlands Sub SCADA Upgrades – 2032 Replacement	36.5	26.4	62.9
S33	Prosser Bay 2 Offload or Capacity Exp.	TBD	TBD	TBD
2023 Total		**$1,690**	**$435**	**$2,125**

POS#	Substation, Project Description	Cost Estimate ($K)		
		Mat.	Lab.	Total
2024				
S10	Misc. Sub -Aux. Equip., Relays/Controls	15	10	25.0
S39	Misc. Sub. SCADA Equip., RTUs/Comms	20	30	50.0
S46	Hedges Oil Breaker & Battery Bank Replacement	39.9	15.1	55.0
S39	Hedges Substation SCADA Upgrade	21.0	15.0	36.0
S05	Prosser Bay 1 Circuit Switcher Addition	168.0	82.4	250.4
S39	Prosser Bay 1 SCADA Upgrades	64.4	38.3	102.7
S39	Zephyr Heights Sub SCADA Upgrades – 2032 Replacement	9.5	25.5	35.0
2024 Total		**$338**	**$216**	**$554**

POS#	Substation, Project Description	Cost Estimate ($K)		
		Mat.	Lab.	Total
2025				
S10	Misc. Sub -Aux. Equip., Relays/Controls	15	10	25.0
S39	Misc. Sub. SCADA Equip., RTUs/Comms	20	30	50.0
S05	Prosser Bay 2 Circuit Switcher Addition	168.0	82.4	250.4
S39	Prosser Bay 2 SCADA Upgrades	18.5	11.4	29.9
S44	Vista Bay 2 Metalclad Replacement	839.3	230.0	1069.3
S44	Vista Bay 2 SCADA Upgrades	7.0	8.2	15.2
2025 Total		**$1,068**	**$372**	**$1,440**

POS#	Substation, Project Description	Cost Estimate ($K)		
		Mat.	Lab.	Total
2026				
S10	Misc. Sub -Aux. Equip., Relays/Controls	15	10	25.0
S39	Misc. Sub. SCADA Equip., RTUs/Comms	20	30	50.0
S10	Bay & Feeder Relay Upgrades – Riverfront	120.2	154.4	274.6
S37	Riverfront Battery Bank Replacement	13.9	7.6	21.5
S10	Sunset Rd Bay Relays Upgrade	59.3	60.6	119.9
S39	Sunset Rd SCADA Upgrades	18.5	11.1	29.6
2026 Total		**$247**	**$274**	**$521**

POS#	Substation, Project Description	Cost Estimate ($K)		
		Mat.	Lab.	Total
2027				
S10	Misc. Sub -Aux. Equip., Relays/Controls	15	10	25.0
S39	Misc. Sub. SCADA Equip., RTUs/Comms	20	30	50.0
S10	Angus Bay 2 Bay Relay Upgrade	42.0	60.0	102.0
S39	Angus Bay 2 SCADA Upgrades	7.0	8.0	15.0
S34	Edison St. Substation	2240.0	530.5	2770.5
2027 Total		**$2,324**	**$638**	**$2,962**

2021 - 2025 Total	**$5,666.1**	**$1,935.9**	**$7,602.0**

Substation Project Descriptions

#S05 – Circuit Switcher Additions (replace high side transformer fusing). These projects will increase protection of the power transformers by allowing additional differential protection and gang operated switching during substation bay faults. Currently some substations utilize fusing on the high side of the power transformer for protection of faults occurring on some piece of equipment included in the bay (i.e. Power Transformer, LTC/Voltage Reg, PT's, CT's, and Busing). Replacing the fusing with a Circuit Switcher will allow the District to monitor the bay as a unit via additional relaying, and allow for the complete, automatic isolation of a bay if problems are detected. This will also eliminate single phase conditions that can occur with high side fusing applications. Priority is driven by system impact, and level of additional work required. Projects may also be "bundled" with other co-located substation projects in order to minimize future project related outages and abnormal switching. The addition of circuit switchers will include transformer protection relay packages to include Overcurrent and Differential Protection.

- Prosser 1 & 2
- Hedges

#S10 – Misc. Substation Auxiliary equipment (Relays/Controls). This project category includes various minor equipment upgrades.

#S28 – 15 kV Breaker Replacement/Upgrade. These projects are necessary to ensure equipment that has, reached its end of life and are difficult to find parts for, are replace with more modern breaker technologies. These projects would generally include relay upgrades to microprocessor based protective relaying at the same time.
Priority (in order):

- Angus - mostly control switch issues, one bay has newer so less priority. Bay 2 has become a higher priority as we have had trip coil failures and maintenance is becoming more difficult.

#S31 – Hedges Substation Overhaul. Currently the Hedges Bay consists of high side fusing, a non-LTC power transformer, a low side main bus breaker, and a standalone three phase regulator. The previous oil treatment on DN43 drastically improved oil testing results and no abnormal degradation is being found on routine Doble testing. Coupled with the improvements to the bus breaker and the 125VDC to 48VDC battery bank conversion described in project #S46 (scheduled for 2024), this project will most likely be scheduled to coincide with the planned replacement of DN43, which is beyond the scope of the 2022 FYP.

This project will install a new circuit switcher and transformer protection package, and power transformer. The age and health of the freestanding regulator will dictate if the power transformer needs to be an LTC or non-LTC style. Additional scope includes evaluating the existing ground grid to determine if improvements are required. These

upgrades to Hedges substation will bring the station on par with rest of the District's substation fleet.

#S33 – Prosser Bay 2 – REA Offload or Capacity Expansion. Currently the District supplies several Benton REA (BREA) feeders from Prosser Bay 2. During the last planning cycle the 20 MVA power transformer was loaded to 110% of nameplate during the winter and 96% of nameplate during the summer, with BREA accounting for 46% and 57% of those loads respectively. With the District's winter planning criteria allows a non-LTC power transformer to operate at 136% of nameplate, this loading limit is only 90% during the summer. The available options to reduce loading are to replace the existing 20 MVA unit with a 25 MVA one or work with BREA to have them reduce their dependency on Prosser Bay 2. The District initiated a conversation with BREA in July 2018 to notify them of the loading condition. BREA is currently planning on energizing Huard substation north of Prosser in fall 2022 and this will reduce some of the loading on Prosser Bay 2. Concurrently BREA is working on a design to install their own power transformer at Prosser Substation to remove their loads from Prosser Bay 2.

#S34 – Edison St Substation. This station will consist of a Circuit Switcher, 25MVA LTC transformer, and a four breaker metalclad/control house assembly. The District has already submitted an interconnection request with BPA, informing them of our intent to build. The Port of Kennewick has generated a master growth plan for the Vista Field area and this substation will provide needed support to the area as development occurs. Additionally, this substation will provide outage support to Angus feeder ANG-9, Highlands feeder HIG-3, and Vista feeders VIS-3 and VIS-4. Current feeder routes have been determined and infrastructure has been installed on Metaline Drive. Timing for the construction of this substation remains as a 5th year project in the 2022 FYP as it is heavily dependent on the Port of Kennewick coming through with the development they have been speaking of. Construction timing will be reevaluated in the 2024 FYP based on actual realized development by the Port of Kenneiwck.

#S37 – Battery Bank Replacements. These projects will replace the aging Direct Current (DC) infrastructure at the substations which provide critical backup power in the event of an AC power outage. The battery banks provide power for protective devices to issue tripping commands to circuit switchers, breakers, and reclosers. They also provide the necessary power requirements for opening said devices. The District is replacing battery banks on a 15 year cycle due to the critical nature of the load they support.

#S38 – Animal Fence Installations. These projects will install 4 foot tall electric fences around equipment that can be easily scaled by squirrels or other small animals. The animals are deterred by the electric fence that provides a small amount of negative reinforcement to avoid significant outages or equipment damage.

#S39 – Misc. Substation SCADA Equipment (RTUs/Communication). This project category includes upgrading RTU's and communications equipment. Also includes installation of fiber to substations that are currently on the radio network.

- Angus – SCADA upgrade to be aligned with scheduled Breaker replacements at bay 1, bay 2, and bay 3
- Hedges – SCADA upgrade to be aligned with scheduled substation upgrade.
- Highlands – Replace SEL-2032 with RTAC
- Zephyr Heights – Replace SEL-2032 with RTAC
- Prosser – SCADA upgrades to be aligned with scheduled bay 1 and bay 2 circuit switcher installations.

#S40 – Prosser Bay 1 Regulator Upgrade. The regulator at Prosser Bay 1 was built in 1968 and routine testing results are starting to show signs of deterioration. This project will replace the existing 2000 kVA unit with a 2667kVA unit similar to Reata substation. This size upgrade will accommodate the eventual replacement of the power transformer at Prosser Bay 1 with a standard 25 MVA unit.

#S41 – Prosser Bay 2 Regulator Upgrade. The regulator at Prosser Bay 2 was built in 1968 and routine testing results are starting to show signs of deterioration. This project will replace the existing 2000 kVA unit with a 2667kVA unit similar to Reata substation. This size upgrade will accommodate the eventual replacement of the power transformer at Prosser Bay 2 with a standard 25 MVA unit.

#S42 – Vista Bay 1 Metalclad Switchgear Replacement. The metalclad switchgear at Vista Bay 1 was installed in 1968 and has reached the end of its operational life. While the original breakers were replaced in 2003, a controls only upgrade was not considered as the internal bus insulation is aging and the District has experienced insulation failure problems on other units of the same vintage. This replacement will have (4) magnetically actuated, vacuum breaker positions as well as modern microprocessor relay controls. SCADA RTU improvements will be made concurrently during the replacement.

#S43 – Hedges Regulator Swap-out. The District's spare three phase, freestanding, substation regulator (DN 165) has never been put into service. This project will put DN 165 into service at Hedges substation and move the in-service DN 10 to be the District spare. DN 10 was chosen as dielectrically it tests well, but internal mechanical linkage maintenance costs of constant day to day operation are increasing. It is a good unit to use as a short term spare while purchasing a replacement in the event of a unit failure.

#S44 – Vista Bay 2 Metalclad Switchgear Replacement. The metalclad switchgear at Vista Bay 2 was installed in approximately 1979 and has reached the end of its operational life. While the original breakers were replaced in 2012, a controls only upgrade was not considered as the internal bus insulation has previously experienced a tracking failure. While this failure was repaired, more failures will occur over time until one of them is catastrophic. This replacement will have (4) magnetically actuated, vacuum breaker positions as well as modern microprocessor relay controls. SCADA RTU improvements will be made concurrently during the replacement.

#S44 – Ridgeline Substation. This station will consist of a Circuit Switcher, 25MVA LTC transformer, and a four breaker metalclad/control house assembly. The District previously purchased property for the future Ridgeline Substation in the Bob Olson Parkway area. Currently Highlands HLS-1 and HLS-5, Orchard View ORV-3, and Southridge STH-4 feeders are in the vicinity for near term growth. Medium term support for this projected growth is expected to be accomplished through the extension of feeders ORV-1, ORV-7, and ORV-8 and associated line upgrades as load requests come in. COK recently received approval to modify their urban growth plan to extend the UGA boundary south of I-82 into the Christensen Rd. area. It is expected that this area will be commercially zoned. Southridge STH-2 will provide medium term support to the area as heavy development is anticipated to be limited until COK's planned I-82/Center Parkway interchange is completed, which per COK's published 2022-2027 traffic plan is beyond the scope of the 2022 FYP.

Ridgeline substation will be necessary to support the long term growth in these areas. The District has not yet submitted a formal interconnection request with BPA. The District should start this process and work with BPA to prepare the existing 115kV line for a future interconnection to avoid the coordination issues that arose during the construction of Southridge Substation.

#S45 – Badger Canyon Substation. This station will consist of a Circuit Switcher, 25MVA LTC transformer, and a four breaker metalclad/control house assembly. The District can currently switch out Reata substation during N-1 contingency conditions with the anticipated load growth cycle of the 2022 FYP, however that only covers the buildout of existing subdivisions or known proposed developments. While this moves Badger Canyon substation beyond the scope of the 2022 FYP, taking the load density (all electric) in the subdivision portions of Badger Canyon and applying it to remaining farmland/field areas results in the need for additional capacity in the Badger Canyon area in the medium (6-10 yr) term. The necessary installation year will be reevaluated in the 2024 FYP.

The District is just beginning to identify possible available property locations for Badger Canyon substation. The ideal location is near L80R which provides an ideal crossroads of existing lines to support the feeder buildout associated with substation development. While such routing will be re-evaluated in the 2024 FYP, it is anticipated that one feeder would route up the tap that feeds L80R, one would head west and tie to SSR-4, and two would double circuit to the east to tie into RTA-3 and LES-1.

The District should continue to partner with BPA on the future Weber – Badger Switchyard transmission line to ensure consideration for a substation connection is maintained and submit an interconnection request as soon as practicable.

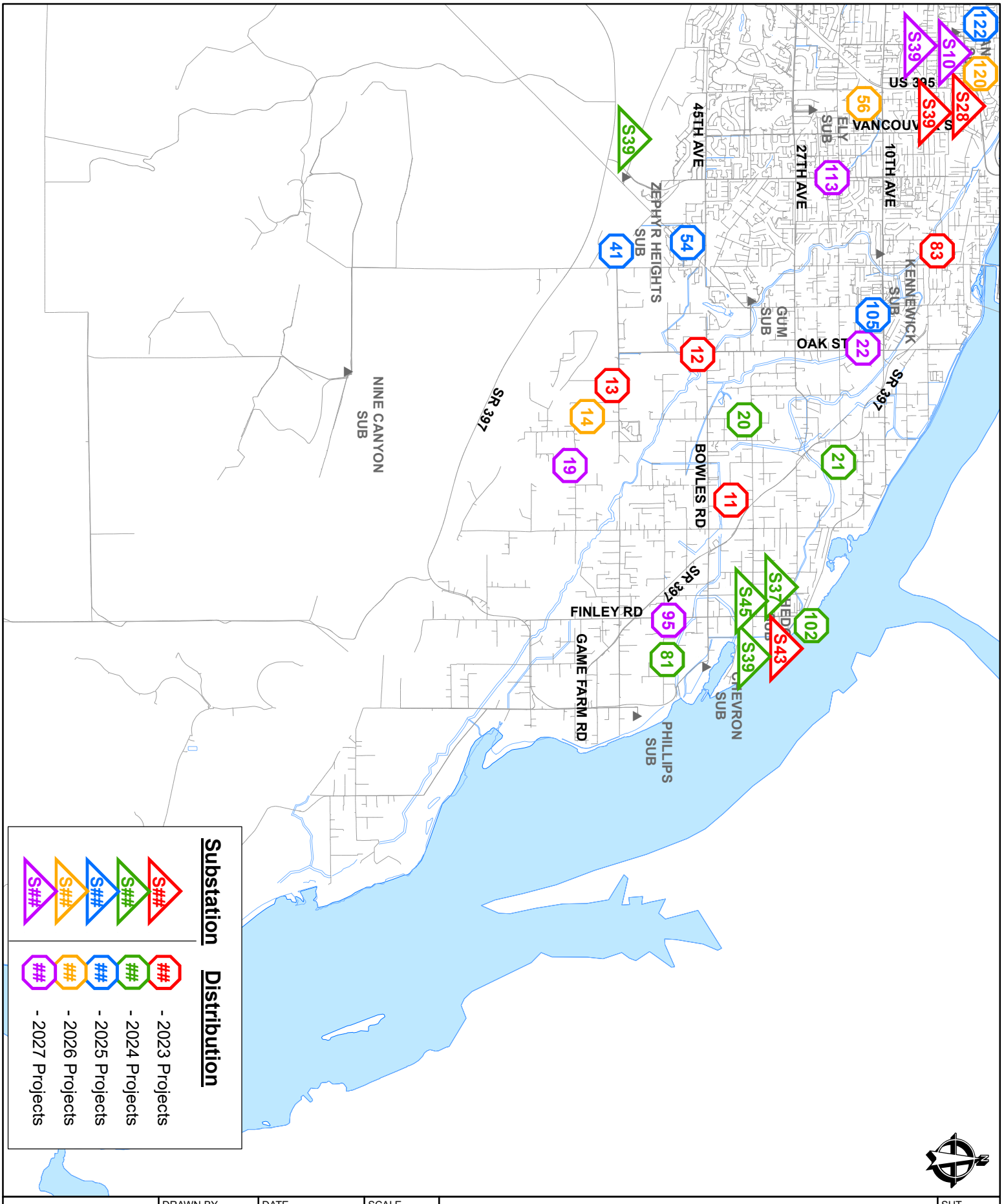
Partnering with the City of Richland on their Dallas Rd. substation has been considered; but placing a substation bay at this location would limit feeder routes and make it extremely difficult to get feeder capacity to where it needs to be. Additionally it would

create another partially islanded substation on the edge of the system that would be difficult to maintain service during N-1 contingencies.

#S46 – Hedges Bus Breaker and Battery Bank Replacement. During the rebuild of Benton City substation in 2018, the District reclaimed a 15kV ABB R-Mag vacuum breaker as a spare for the Hedges oil circuit breaker. The existing 15kV substation bus protection circuit breaker at Hedges substation was manufactured in 1950 and has reached the end of its service life. In addition to replacing the breaker, the existing electromechanical controls are also scheduled to be replaced with an SEL-751.

Additionally Hedges is the last of the District's urban substations with a 125VDC battery bank. This project replaces this bank with a 48VDC one and includes the necessary control component upgrades for the remaining equipment to operate at 48VDC (power supplies, voltage converters, etc.).

The District previously retrofitted SEL-351R controls on the existing feeder reclosers. The SEL-351R was utilized due to the 125VDC battery bank being present.. As part of this project the SEL-351R units will be returned to inventory and replaced with the District's standard SEL-651R2 units, which will accept a direct 48VDC connection from the battery bank.



BENTON P·U·D

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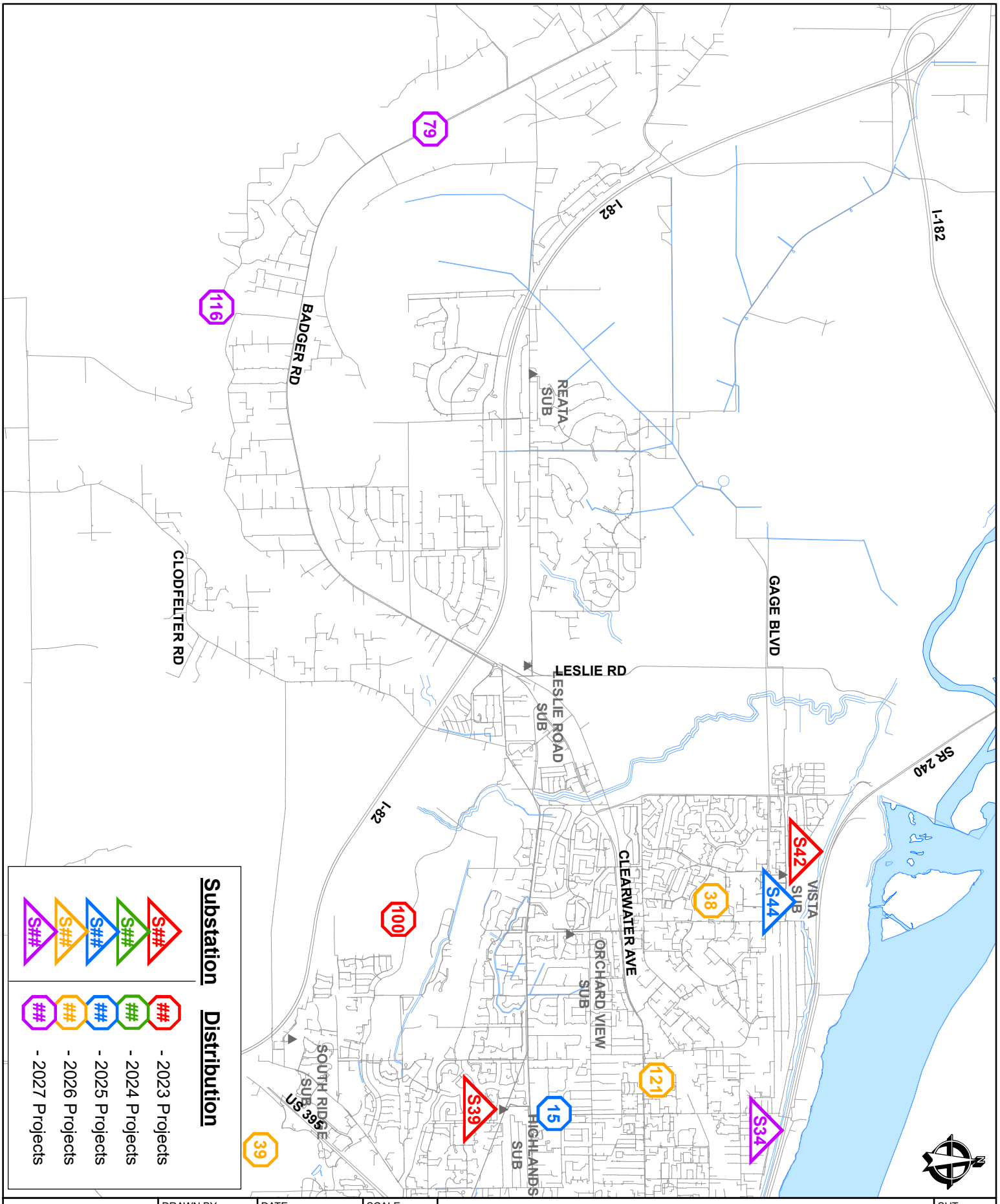
2022 Five Year Plan
Kennewick East Projects

SHT.
1 of 1



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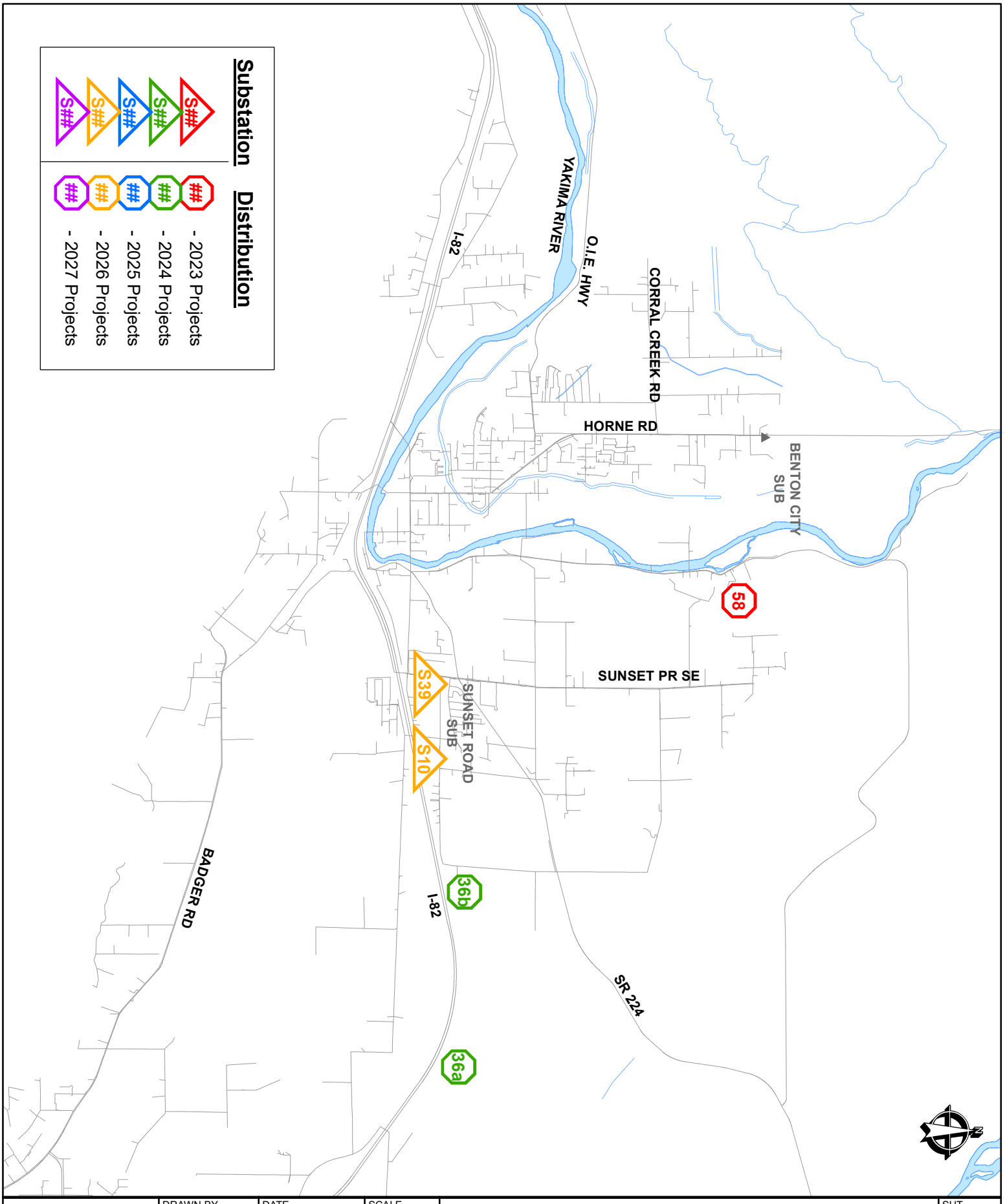
	MAP NO.		
	DRAWING NAME: KP-1		

2022 Five Year Plan
Kennewick West Projects

SHT. 1 of 1



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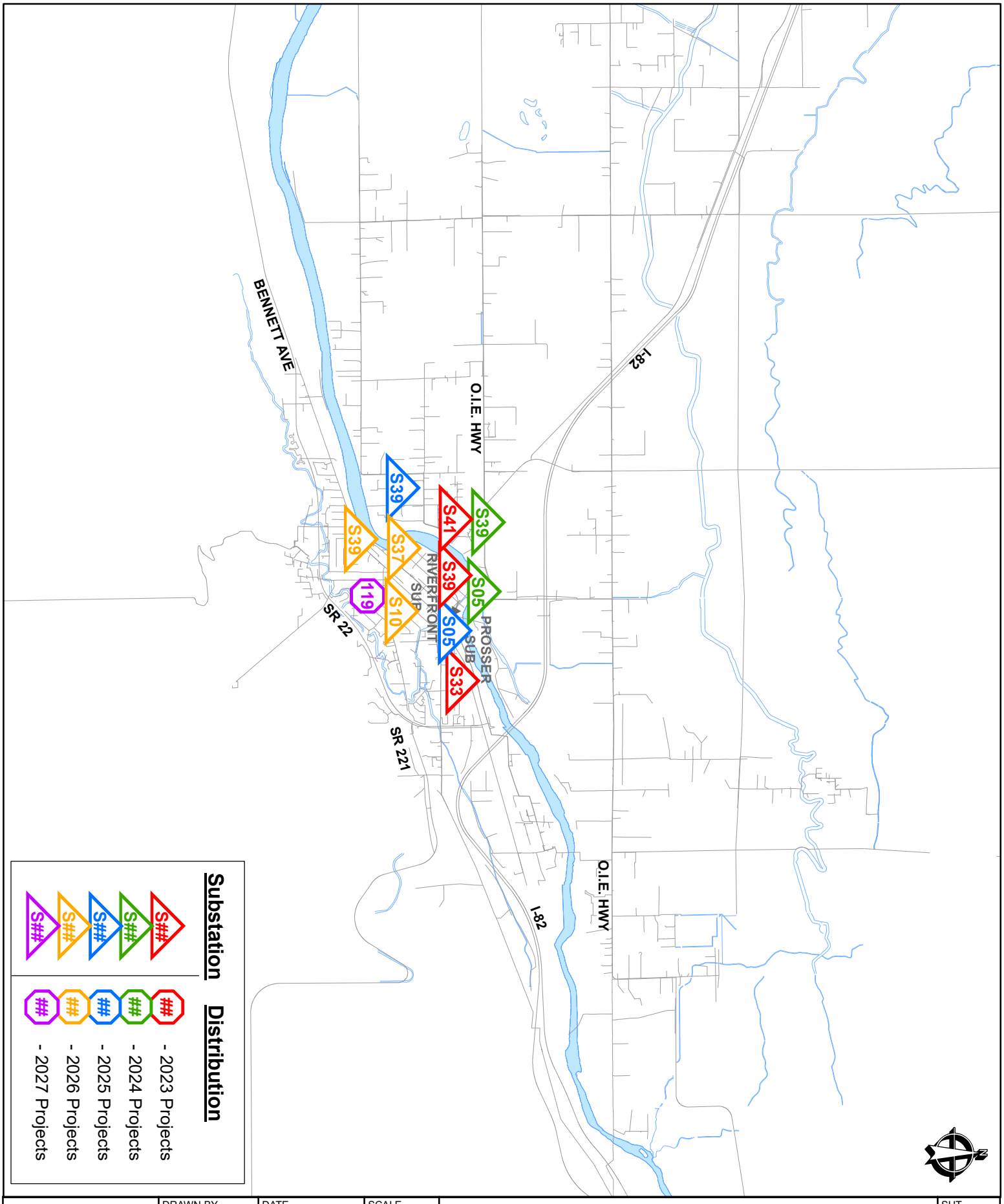
	MAP NO.		
	DRAWING NAME: BP-1		

2022 Five Year Plan
Benton City Projects

SHT. 1 of 1



BENTON P·U·D

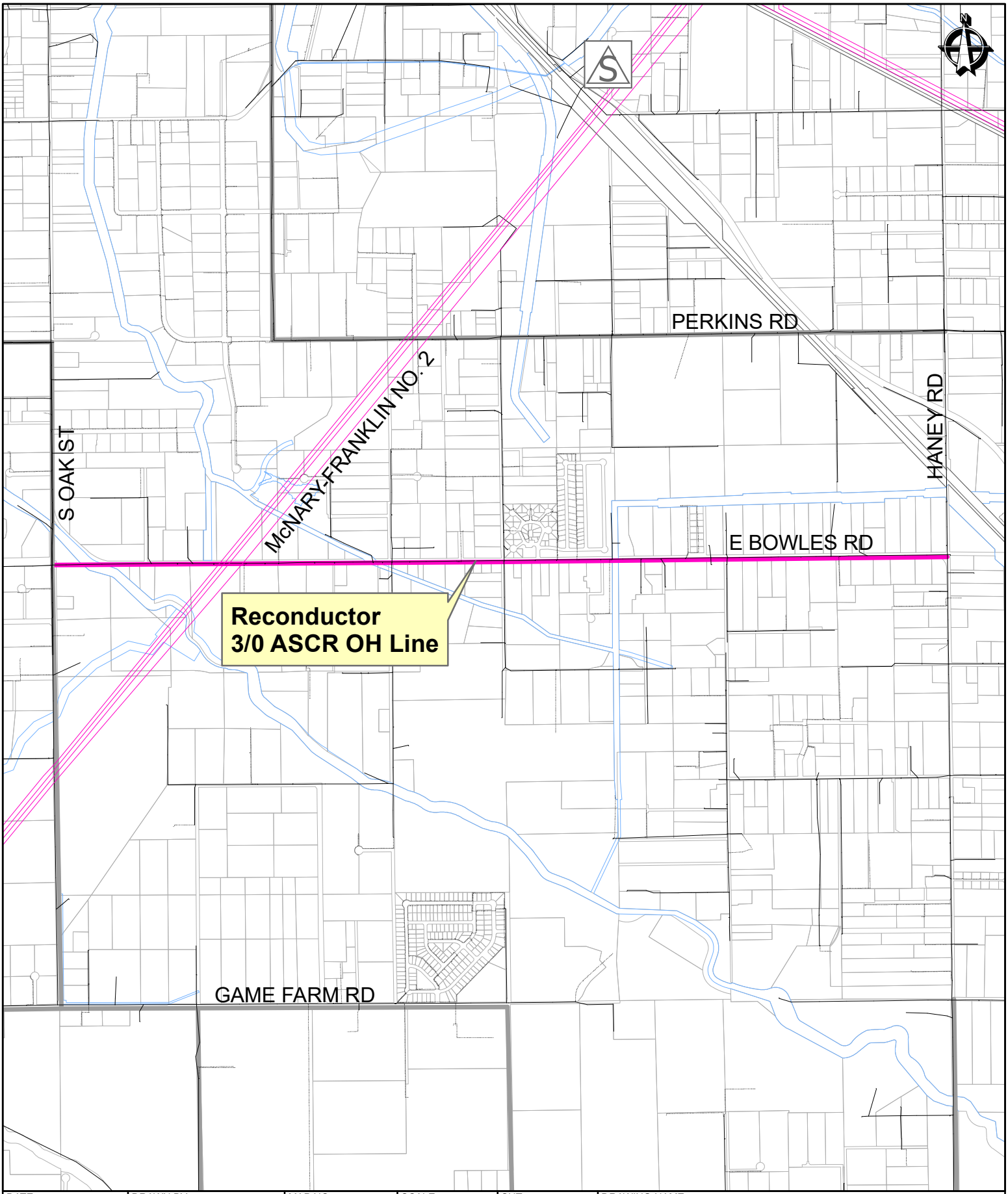
DRAWN BY	DATE	SCALE
haneym	8/2/2022	N.T.S.

MAP NO.

DRAWING NAME
PP-1

2022 Five Year Plan
Prosser Projects

SHT.
1 of 1



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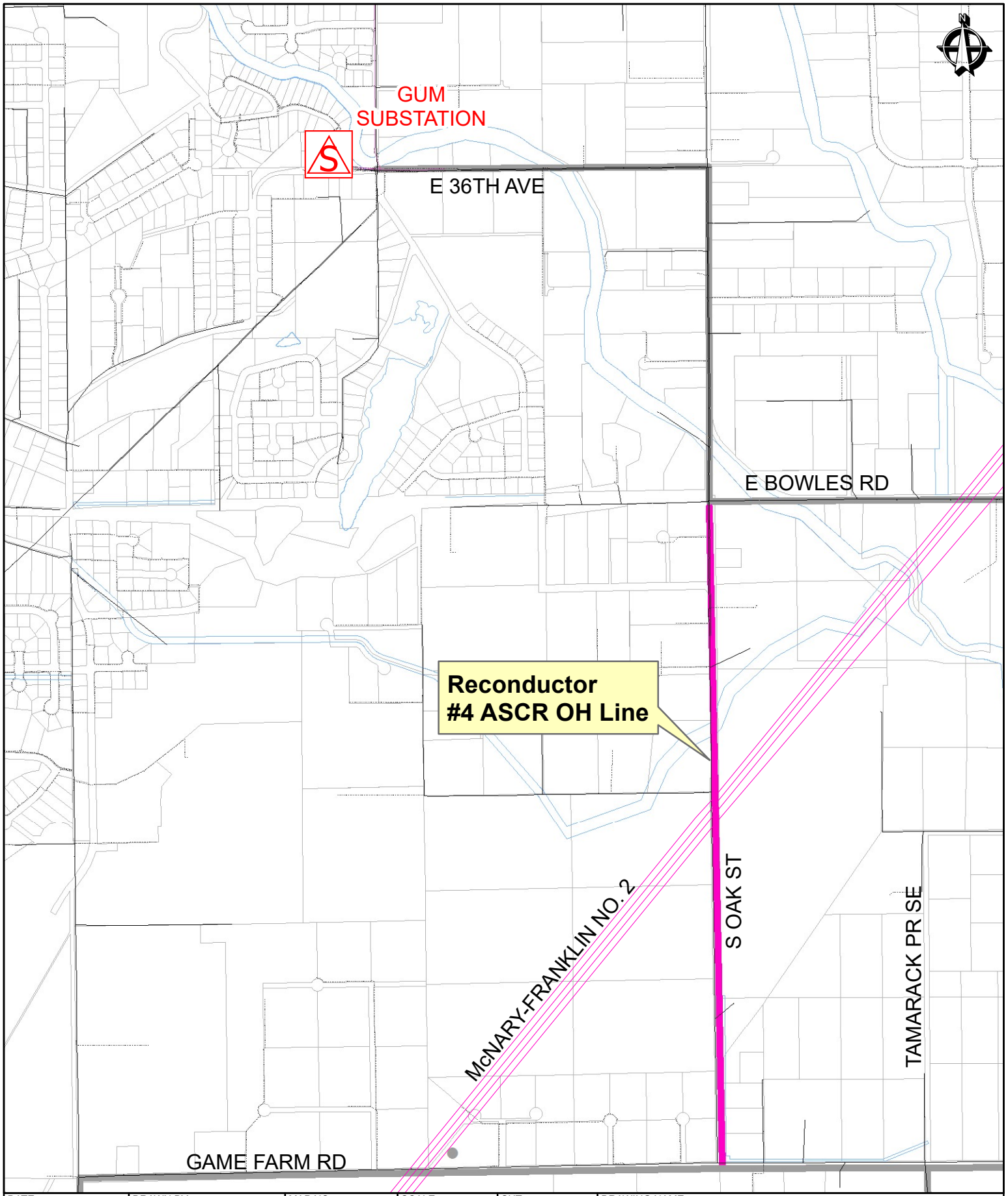
6/1/2022	smitht	83020	N.T.S.	1 of 1	Project 11

BENTON P·U·D

2022 Five Year Plan
GUM-4 (GUM STREET) & HED-3 (HEDGES)
Reconductor



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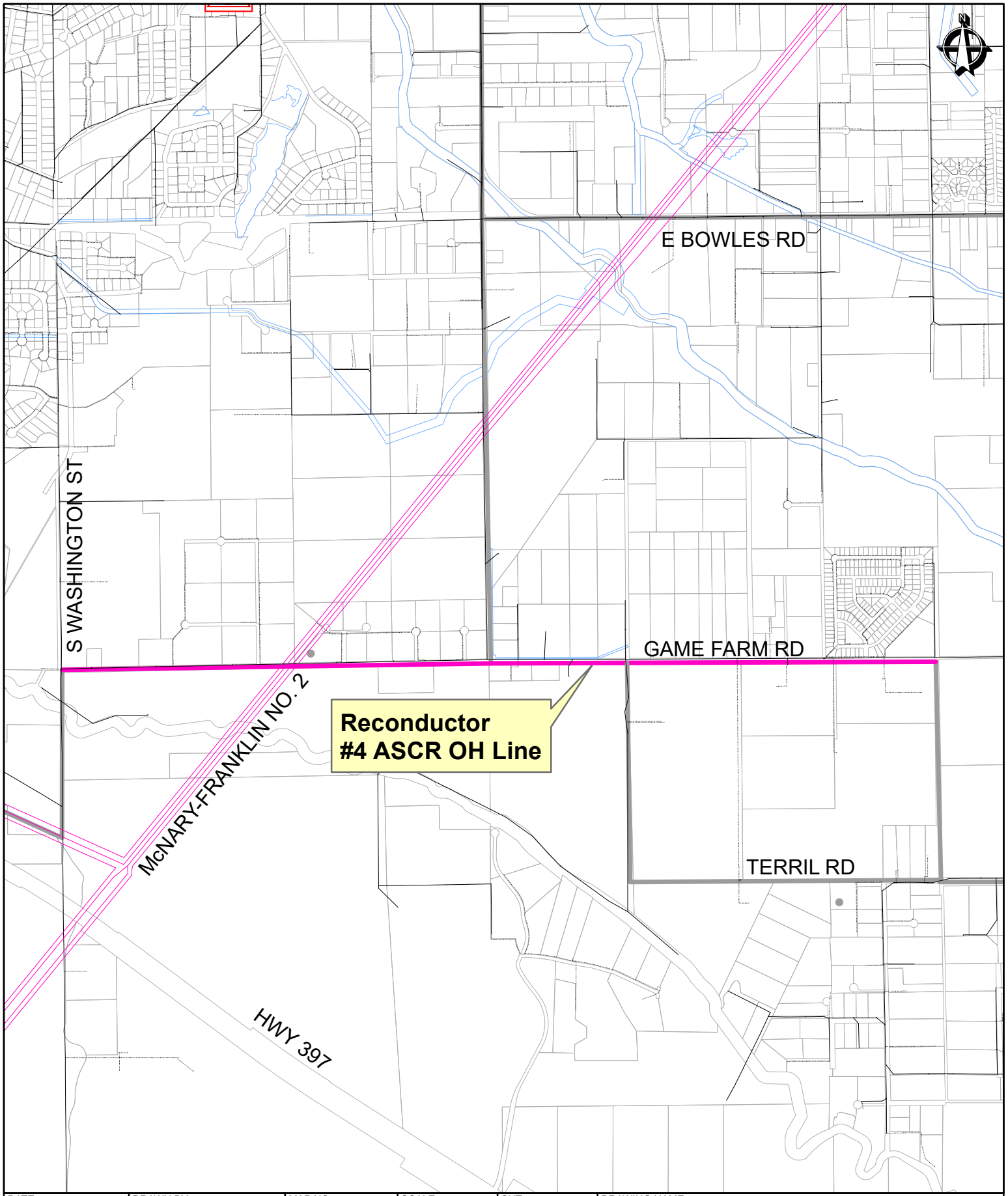
6/1/2022	smitht	83019	N.T.S.	1 of 1	Project 12

BENTON P·U·D

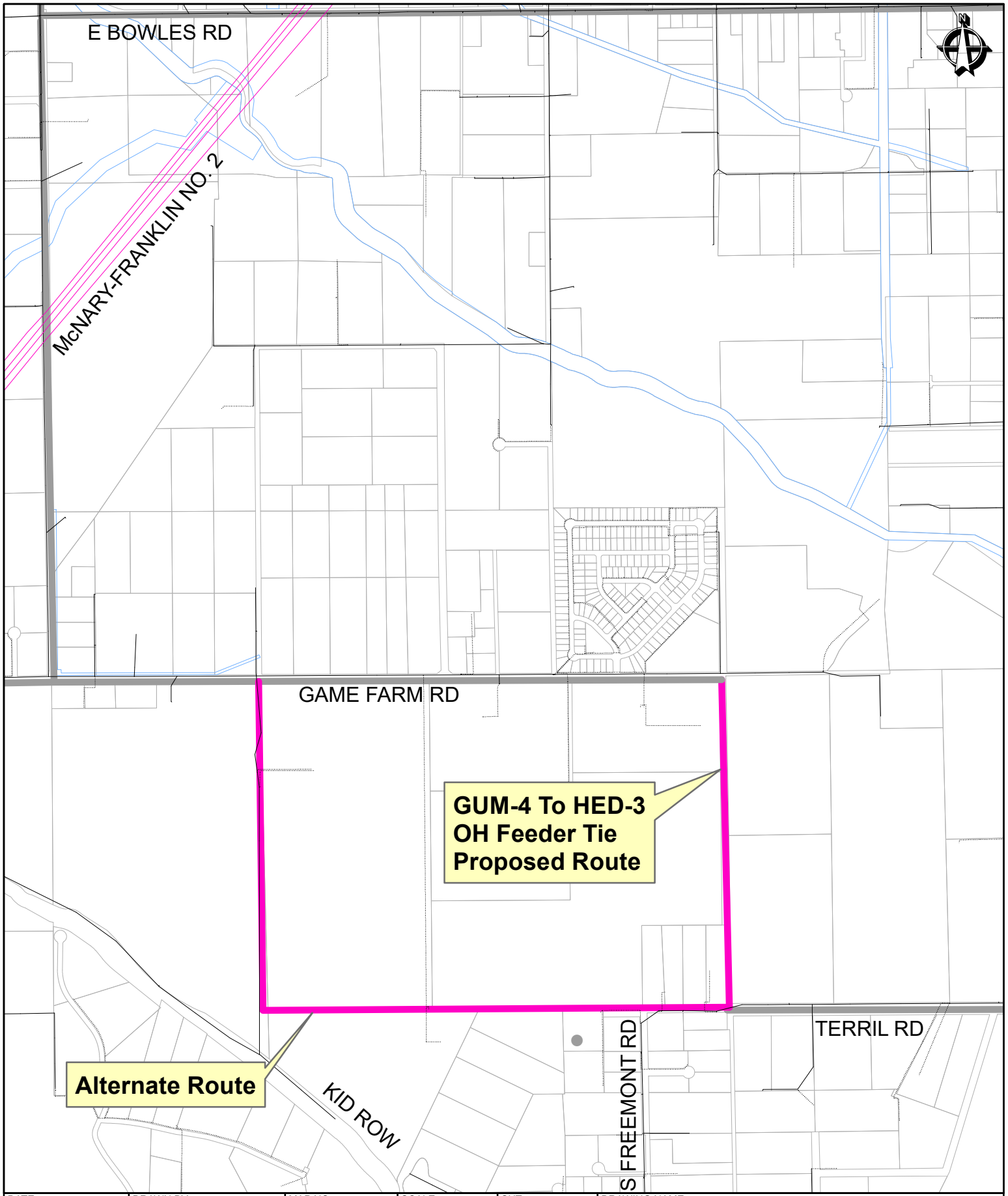
2022 Five Year Plan
GUM-4 (GUM STREET)
Reconductor



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	83019	N.T.S.	1 of 1	Project 13

BENTON P·U·D

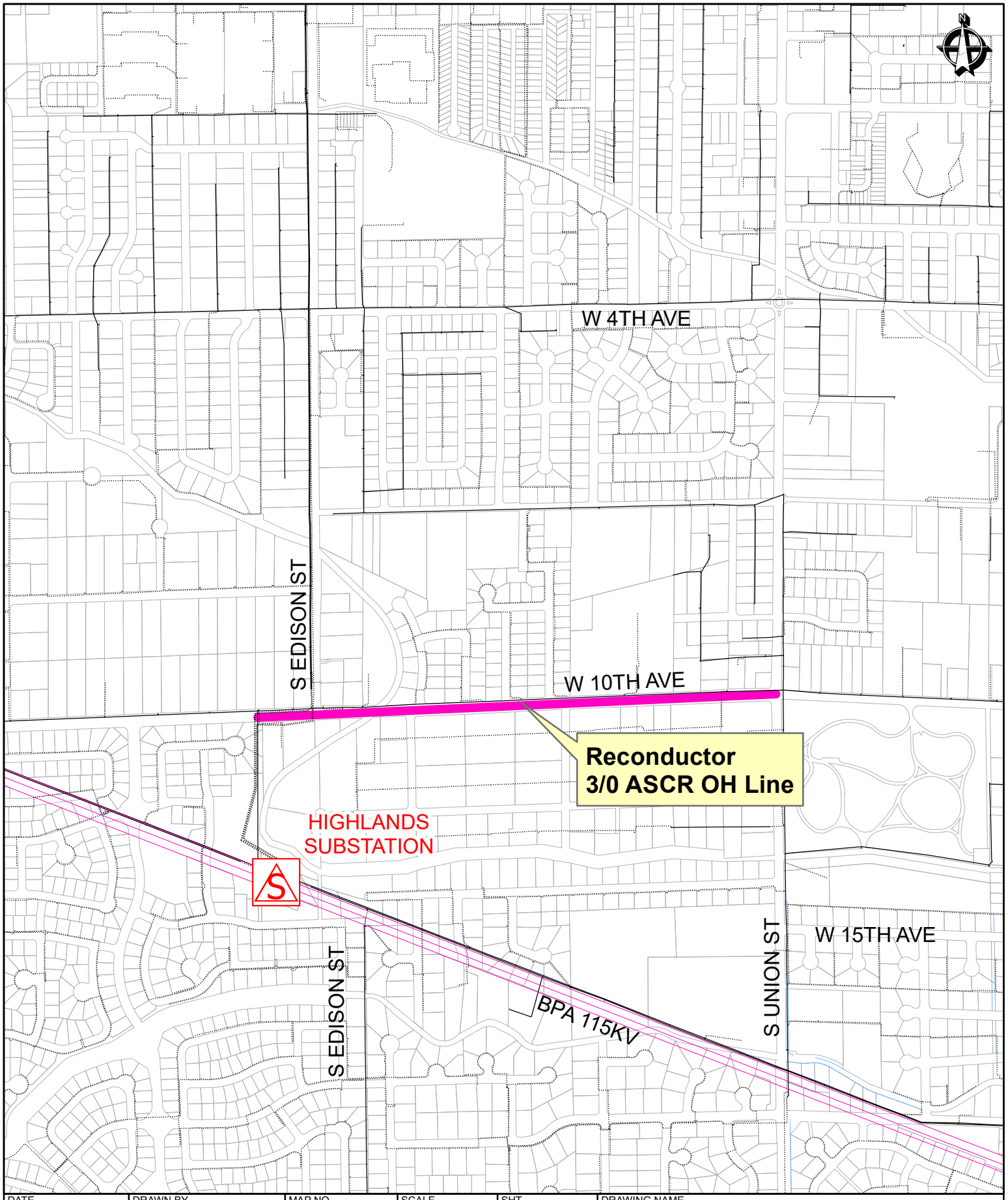
2022 Five Year Plan
GUM-4 (GUM STREET)
Reconductor



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	83029	N.T.S.	1 of 1	Project 14

BENTON P·U·D

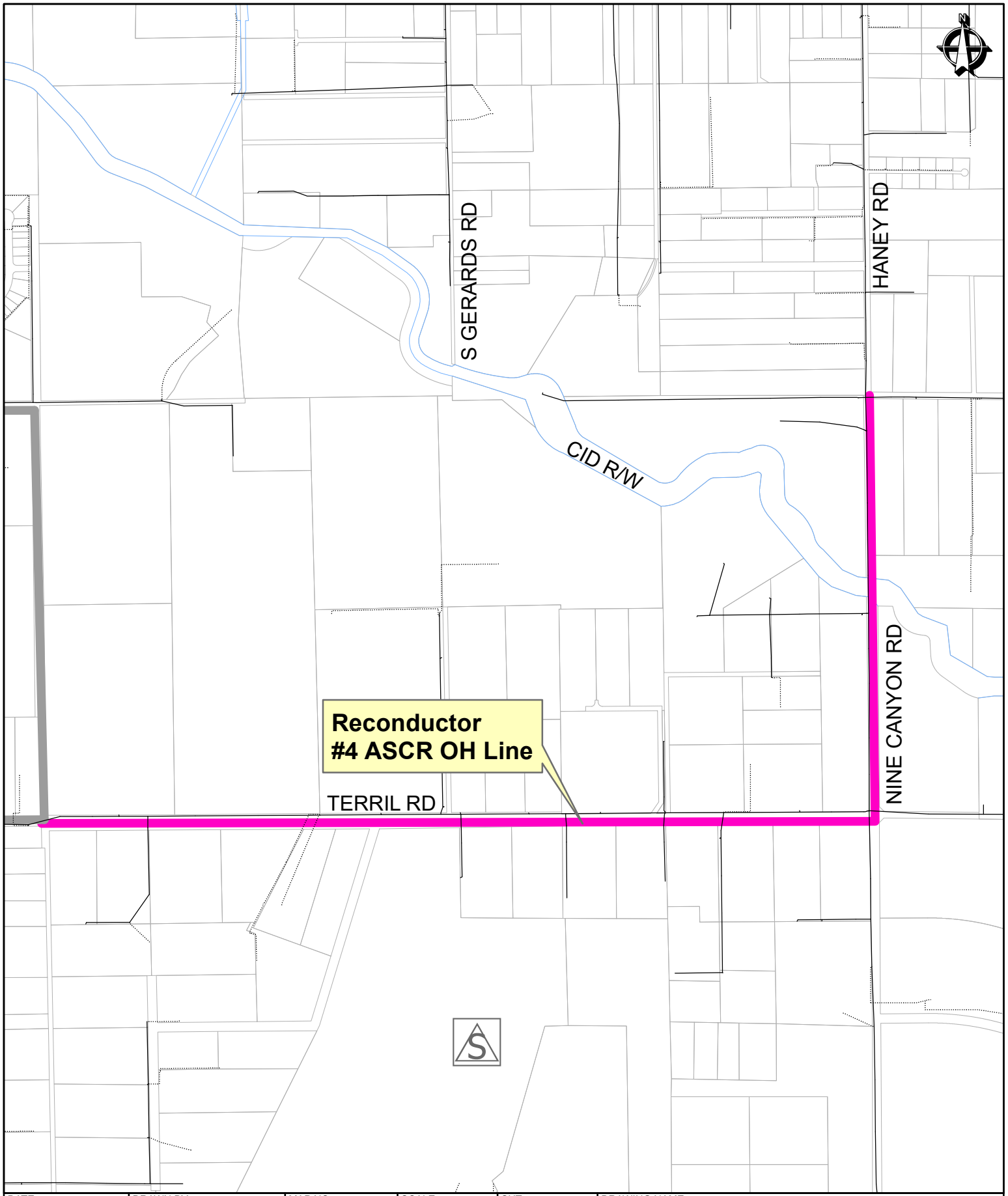
2022 Five Year Plan
GUM-4 (GUM STREET) & HED-3 (HEDGES)
Feeder Tie



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
7/27/2022	stiversc	82909	N.T.S.	1 of 1	Project 15

BENTON P·U·D

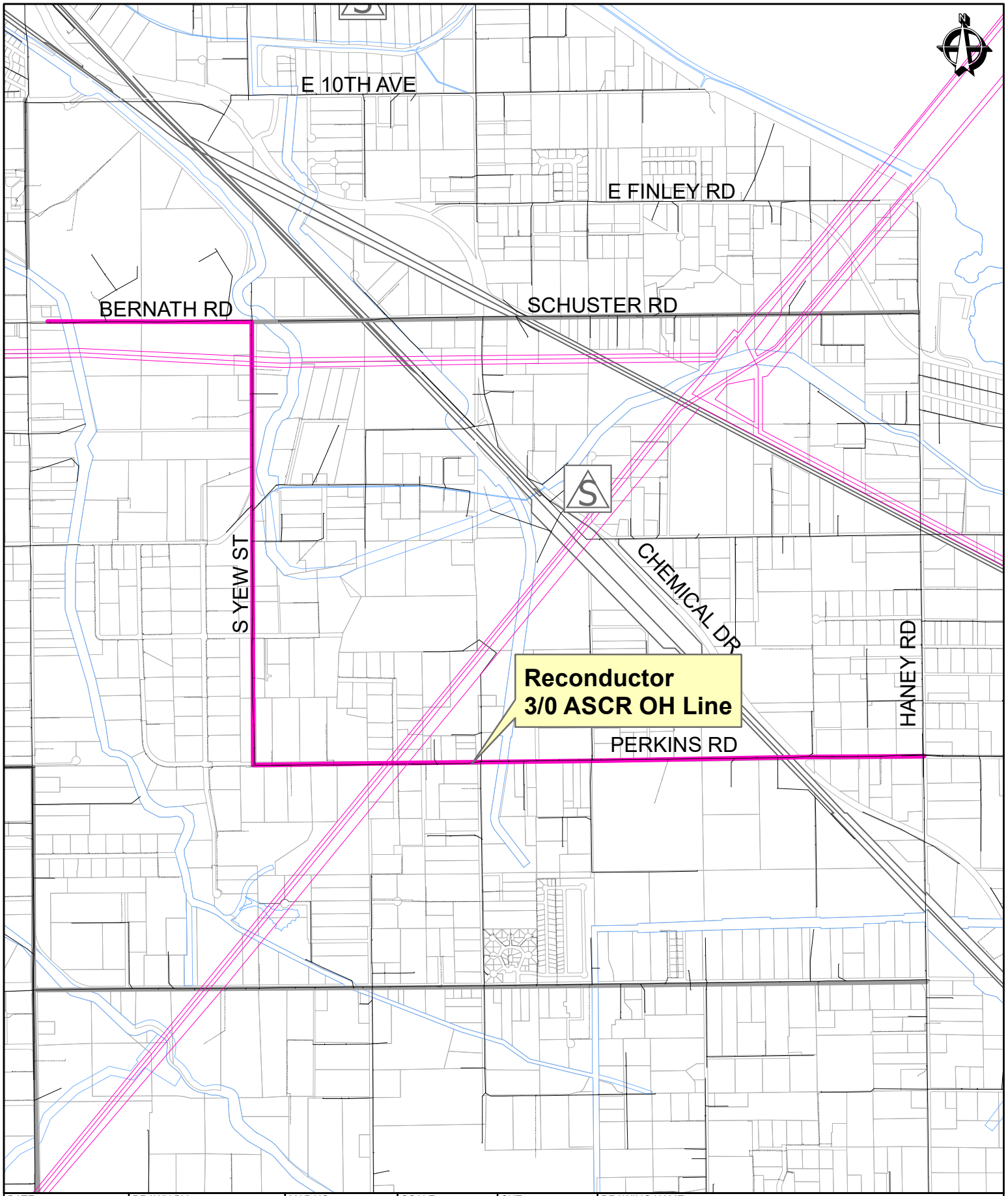
2022 Five Year Plan
HLS-4 (HIGHLANDS)
Reconductor



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	83028	N.T.S.	1 of 1	Project 19

BENTON P·U·D

2022 Five Year Plan
HED-3 (HEDGES)
Reconductor



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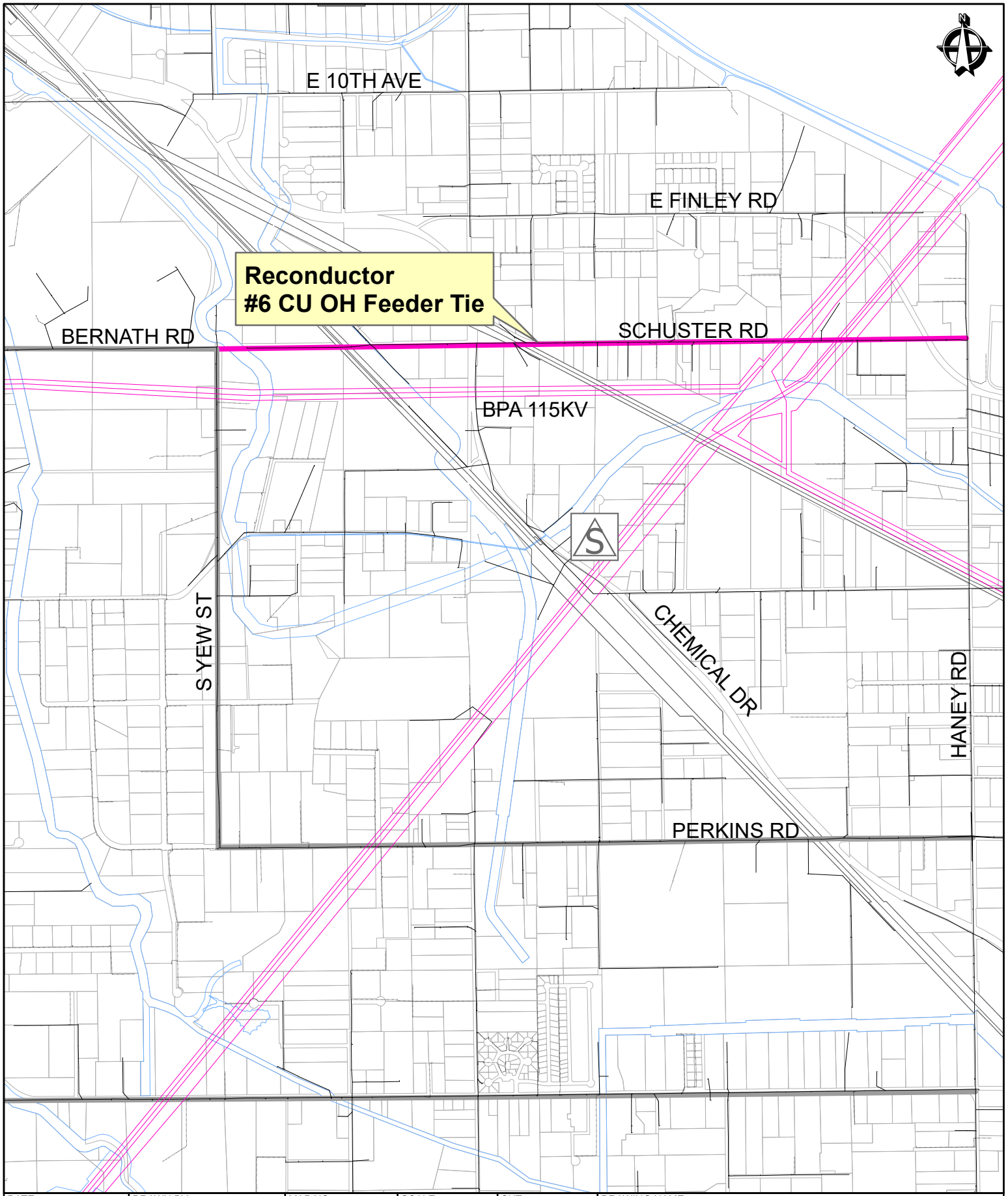
BENTON P·U·D

2022 Five Year Plan
HED-4 (HEDGES)
Reconductor



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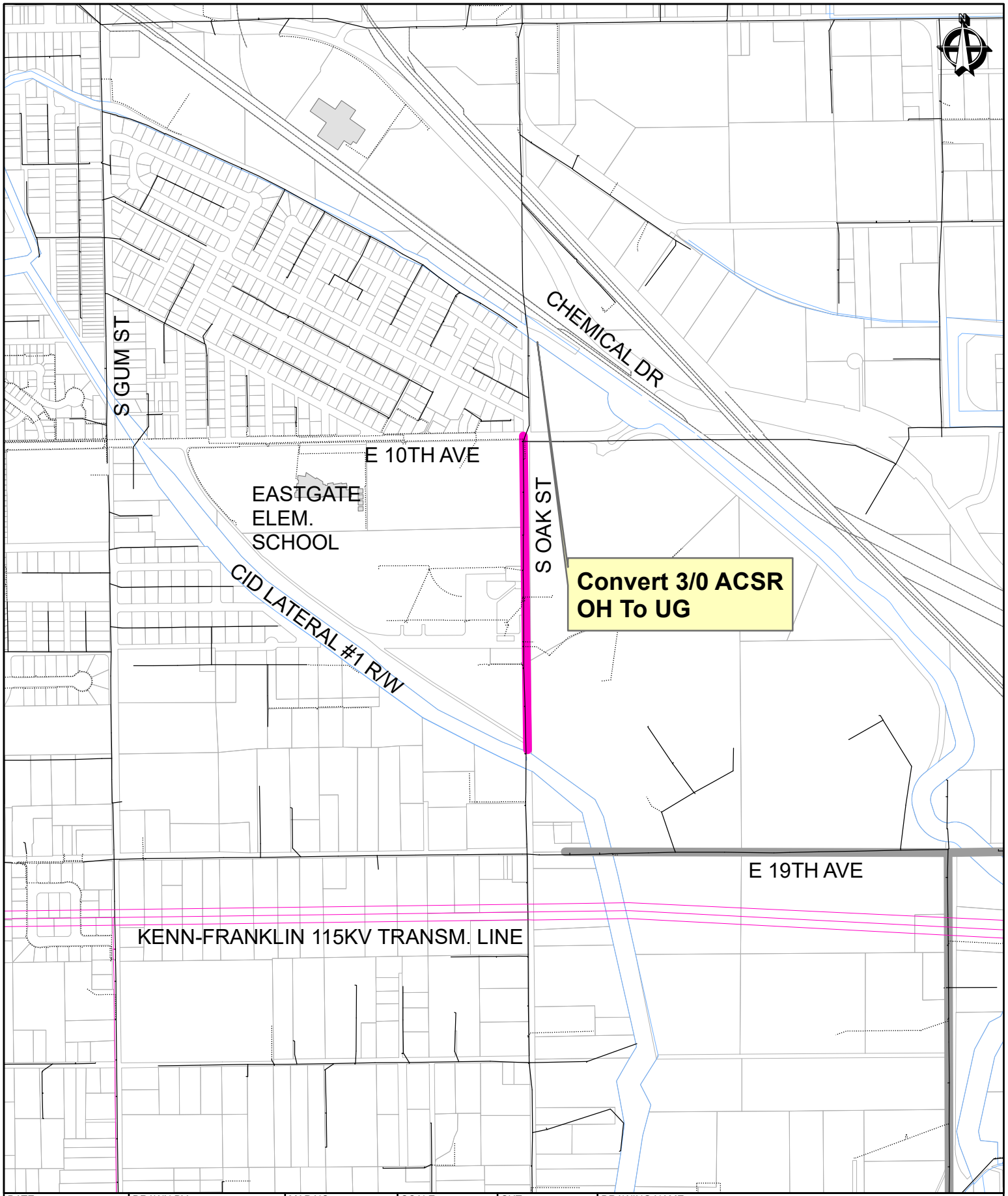
6/1/2022	smitht	83009	N.T.S.	1 of 1	Project 21

BENTON P·U·D

2022 Five Year Plan
HED-4 (HEDGES)
Reconductor



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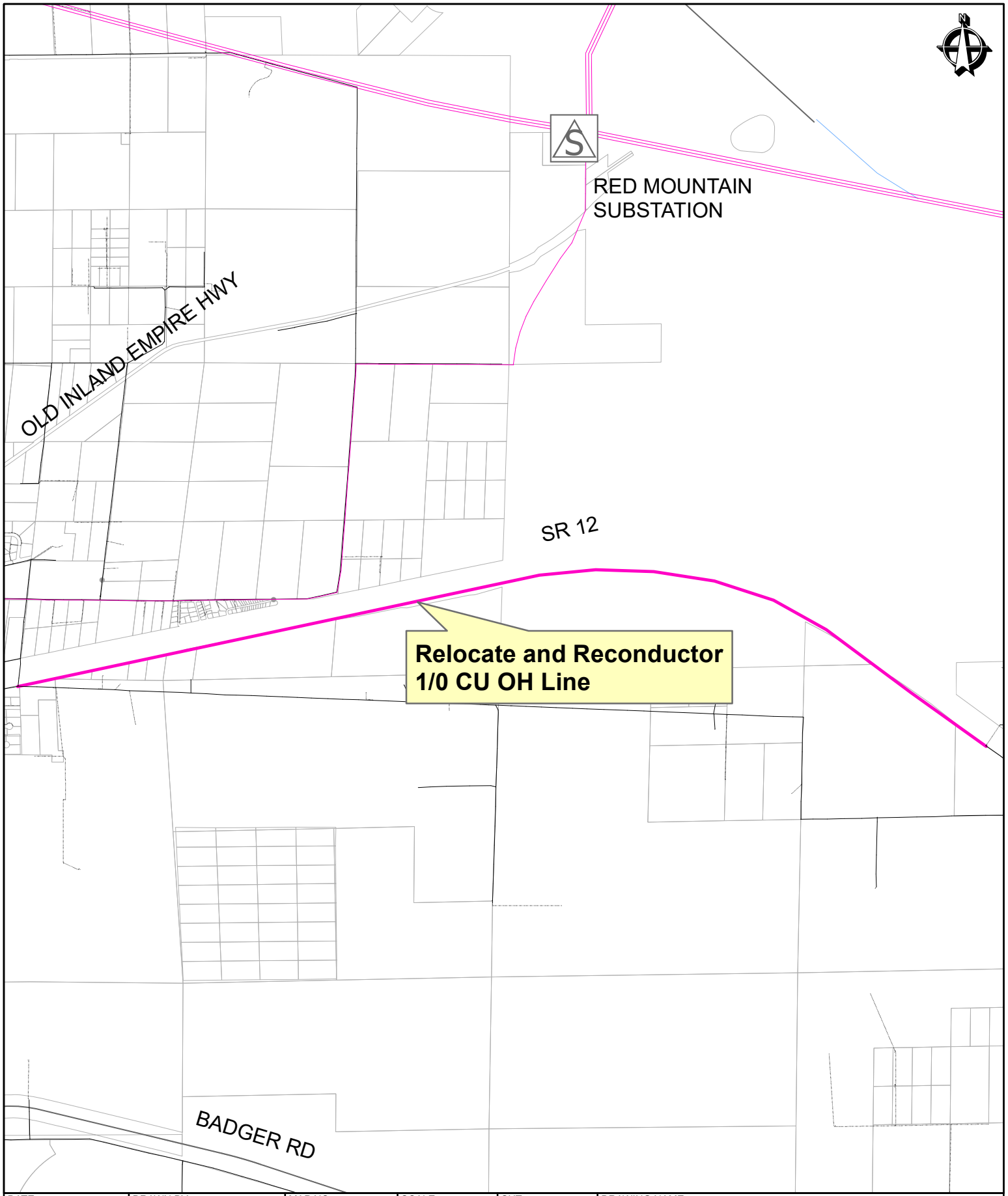
6/1/2022	smitht	83007	N.T.S.	1 of 1	Project 22

BENTON P·U·D

2022 Five Year Plan
KEN-8 (KENNEWICK)
OH to UG Conversion



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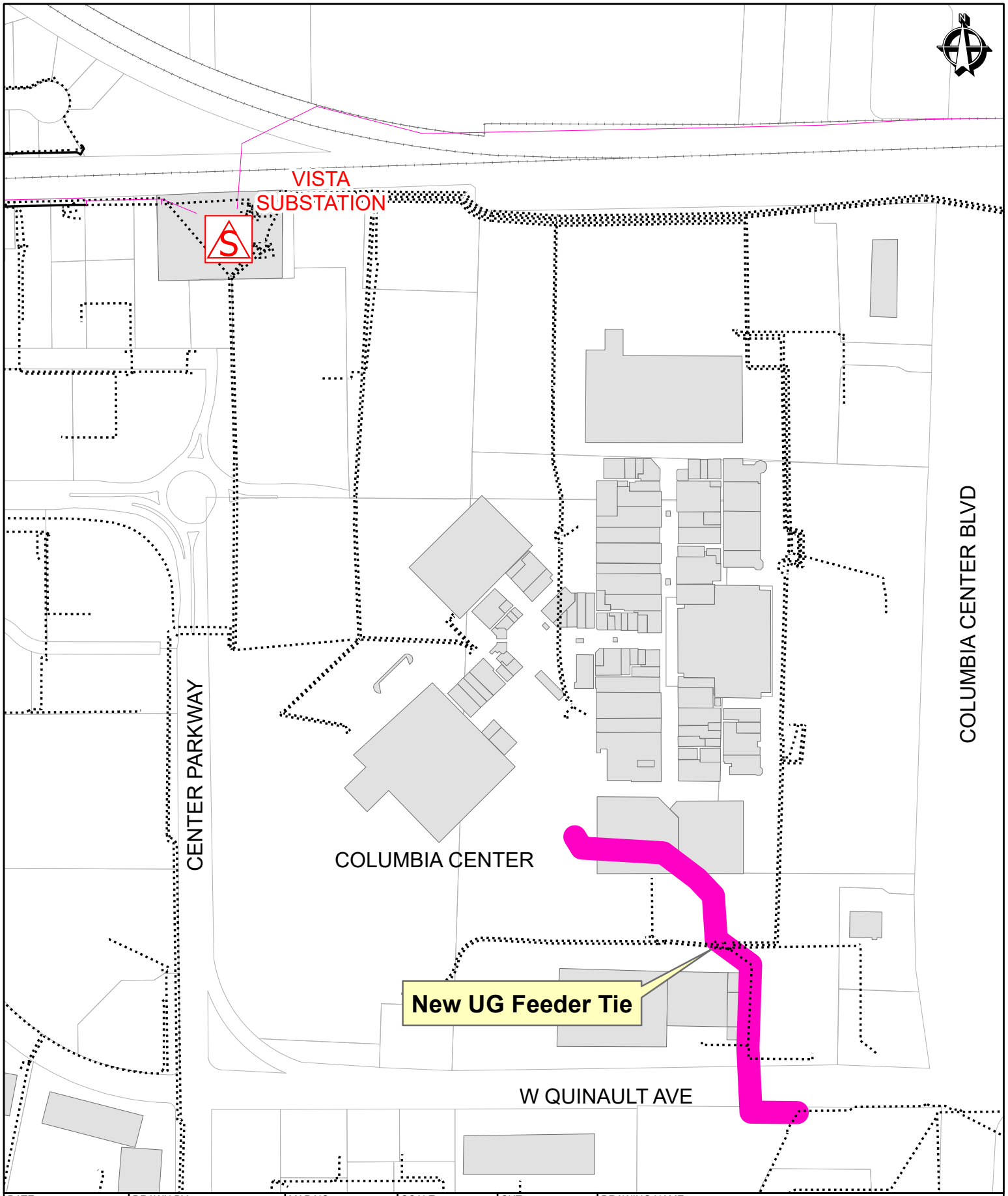
6/1/2022	smitht	92715	N.T.S.	1 of 1	Project 36

BENTON P·U·D

2022 Five Year Plan
SSR-3 (SUNSET RD)
Relocate and Reconductor



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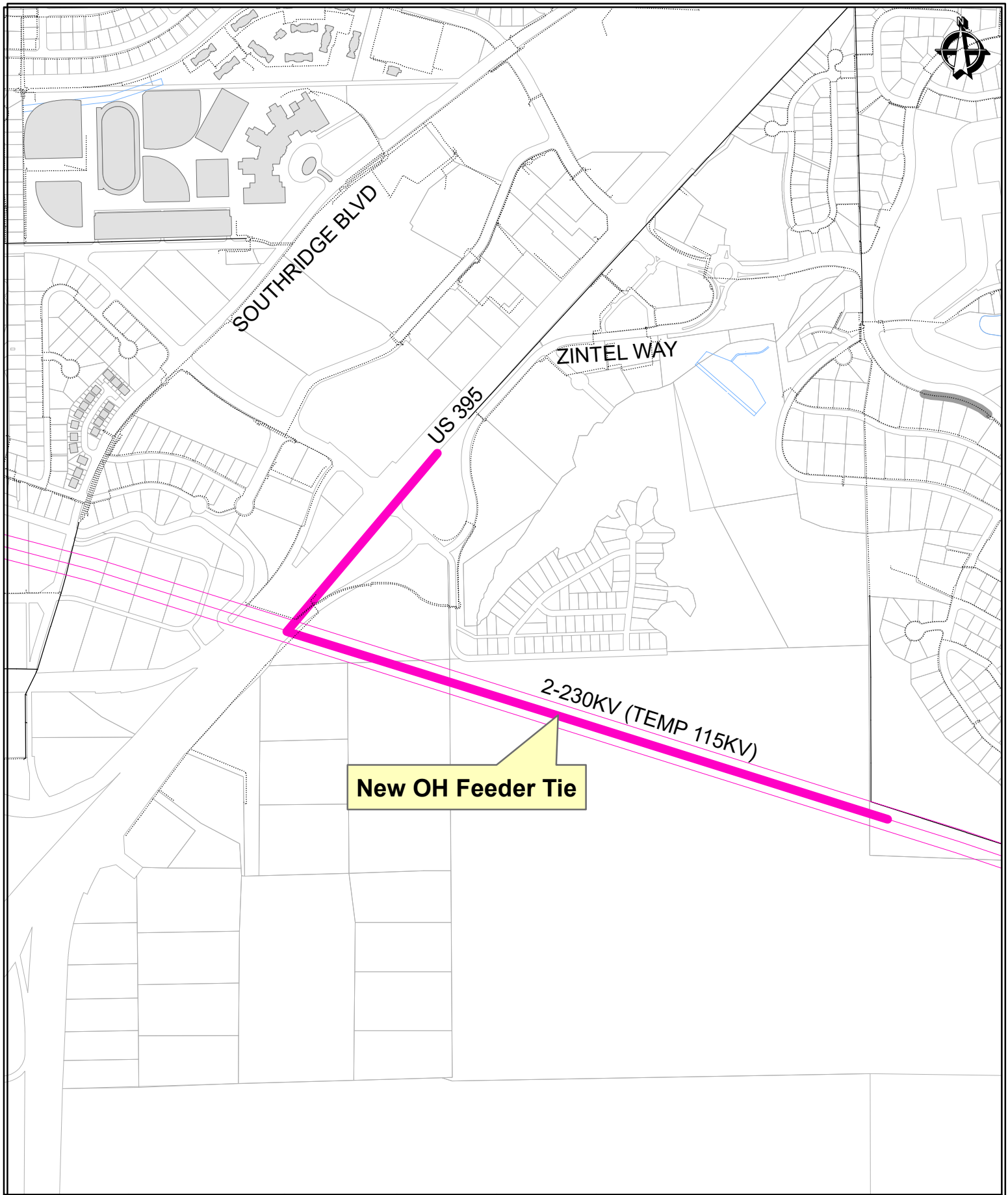
6/1/2022	smitht	92931	N.T.S.	1 of 1	Project 38

BENTON P·U·D

2022 Five Year Plan
VIS-1 to VIS-6 (VISTA)
Feeder Tie



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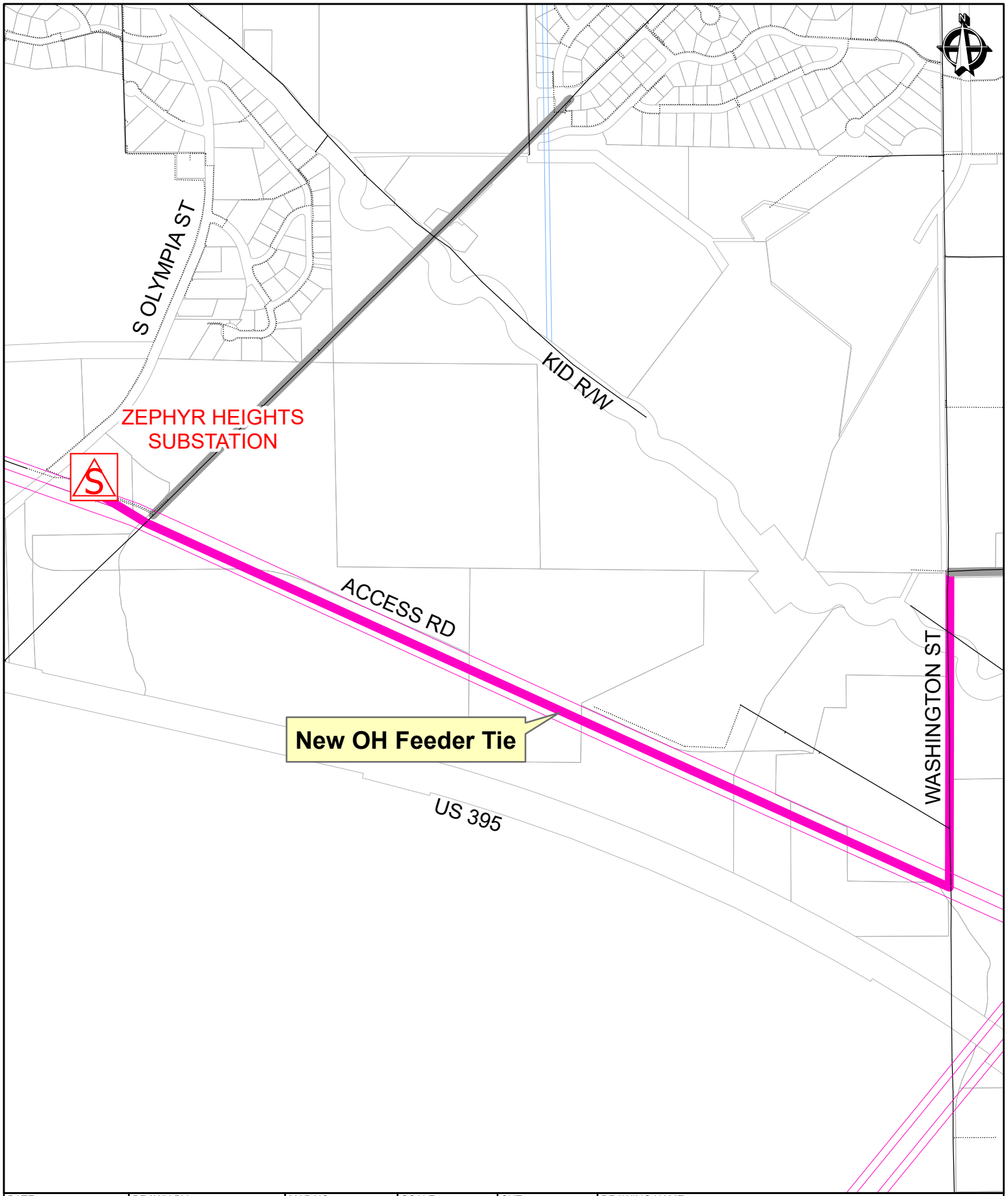
7/28/2022	stiversc	82810	N.T.S.	1 of 1	Project 39

BENTON P·U·D

2022 Five Year Plan
ZEH-1 (ZEPHYR HEIGHTS) to STH-3 (SOUTHRIDGE)
Feeder Tie



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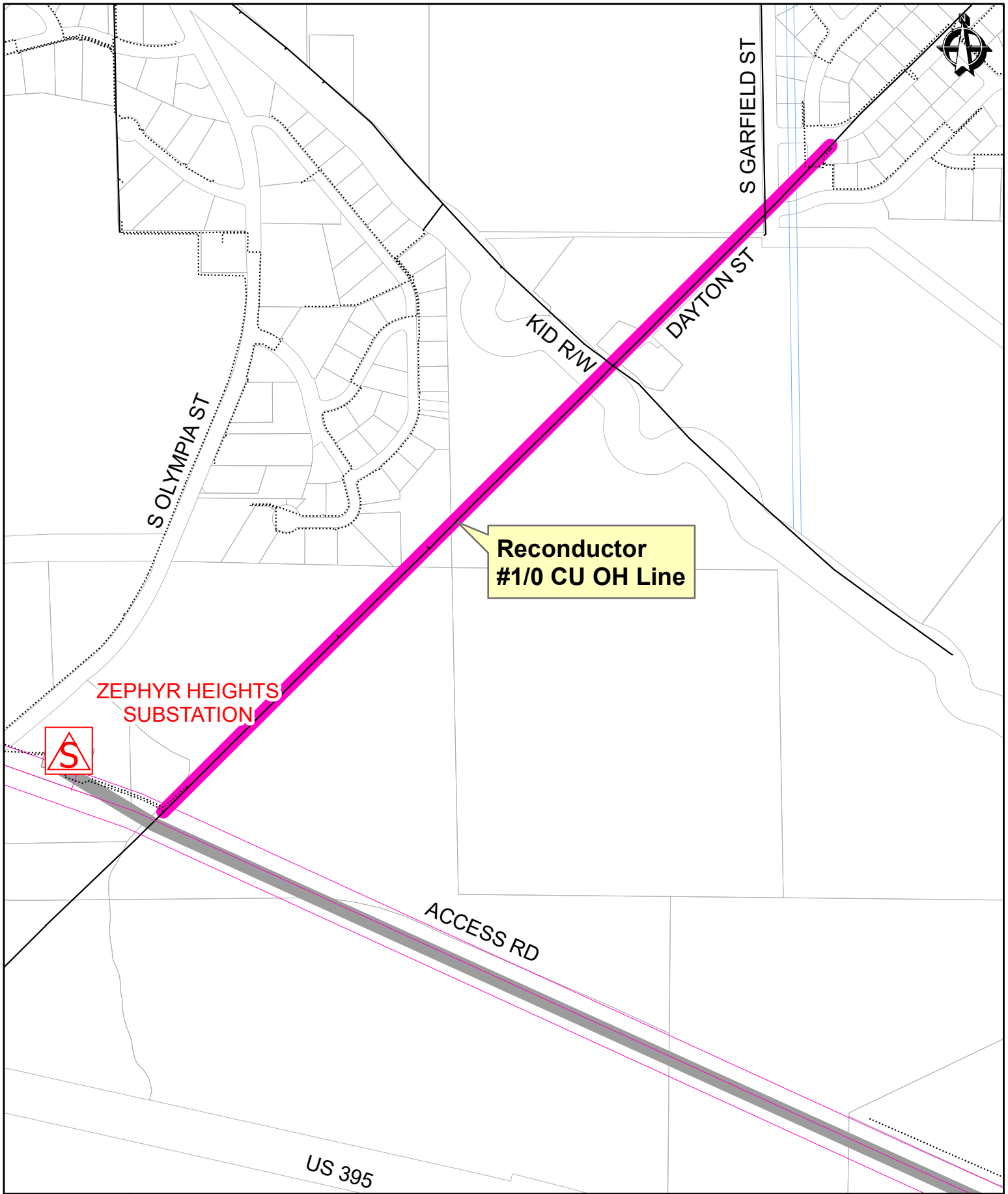
6/1/2022	smitht	82925	N.T.S.	1 of 1	Project 41

BENTON P·U·D

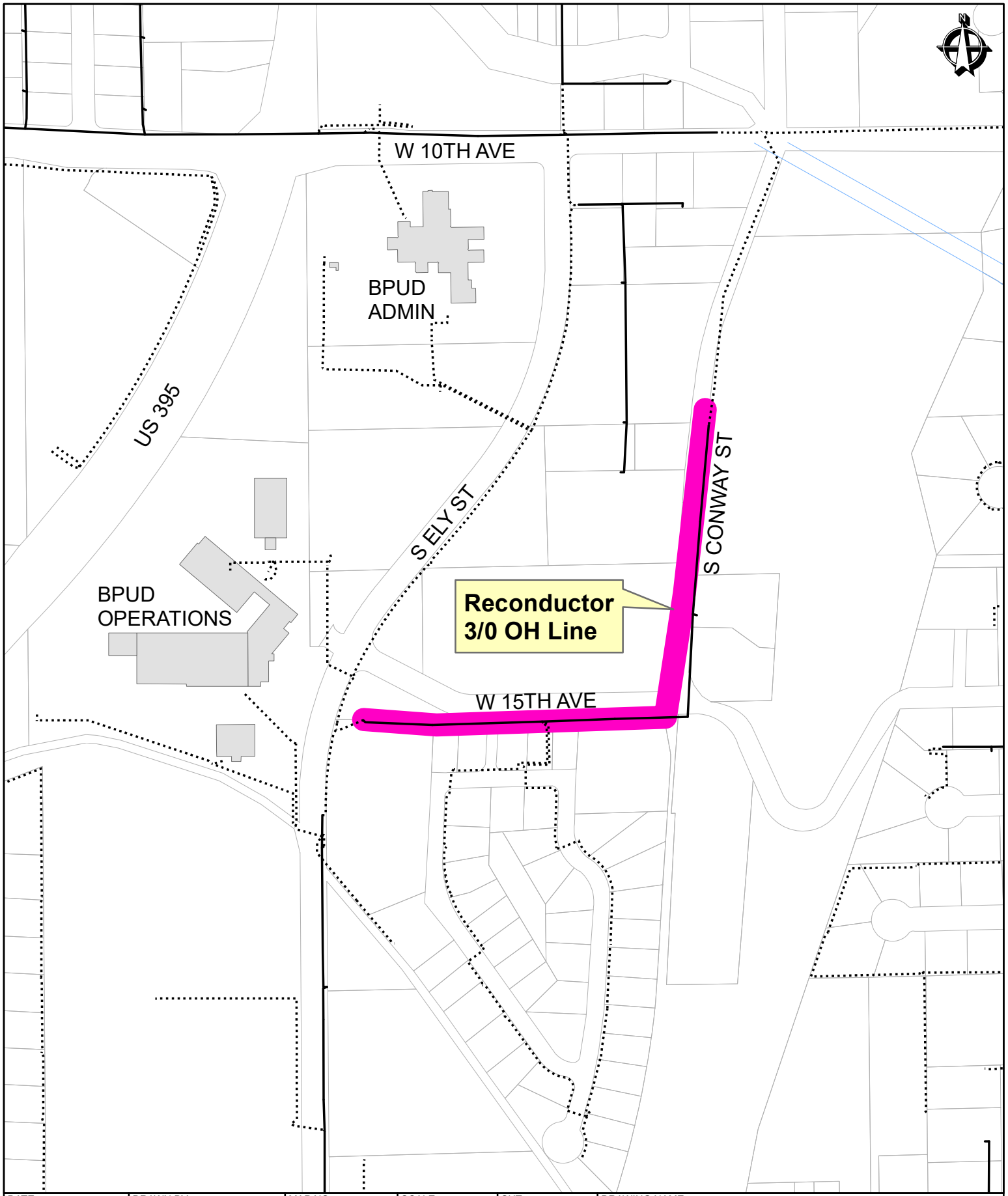
2022 Five Year Plan
ZEH-4 (ZEPHYR HEIGHTS) to GUM-4 (GUM)
Feeder Tie



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	82925	N.T.S.	1 of 1	Project 54

BENTON P·U·D

2022 Five Year Plan
ZEH-3 (ZEPHYR HEIGHTS)
Reconductor



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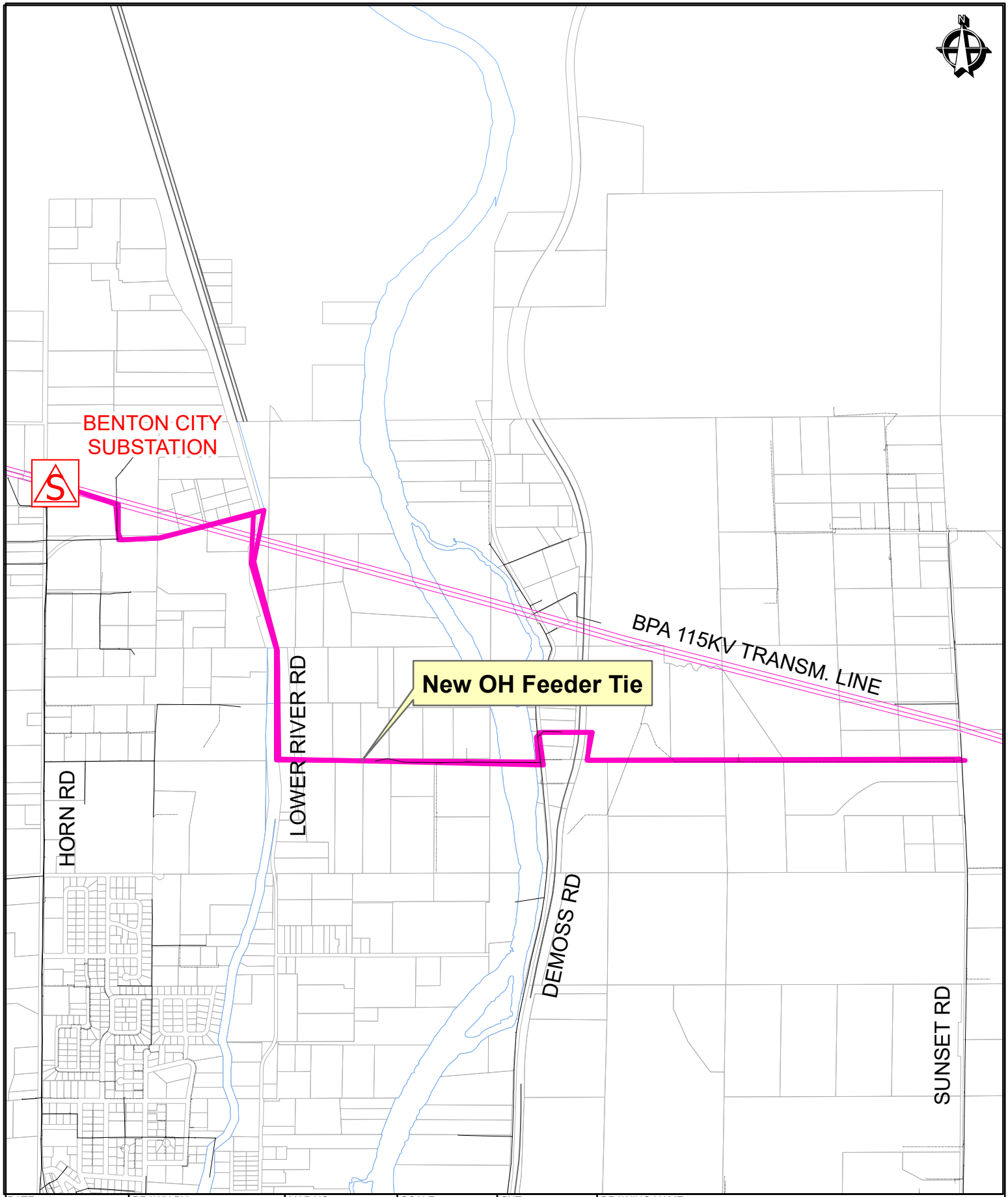
6/1/2022	smitht	82911	N.T.S.	1 of 1	Project 56

BENTON P·U·D

2022 Five Year Plan
ELY-8 (ELY)
Reconductor



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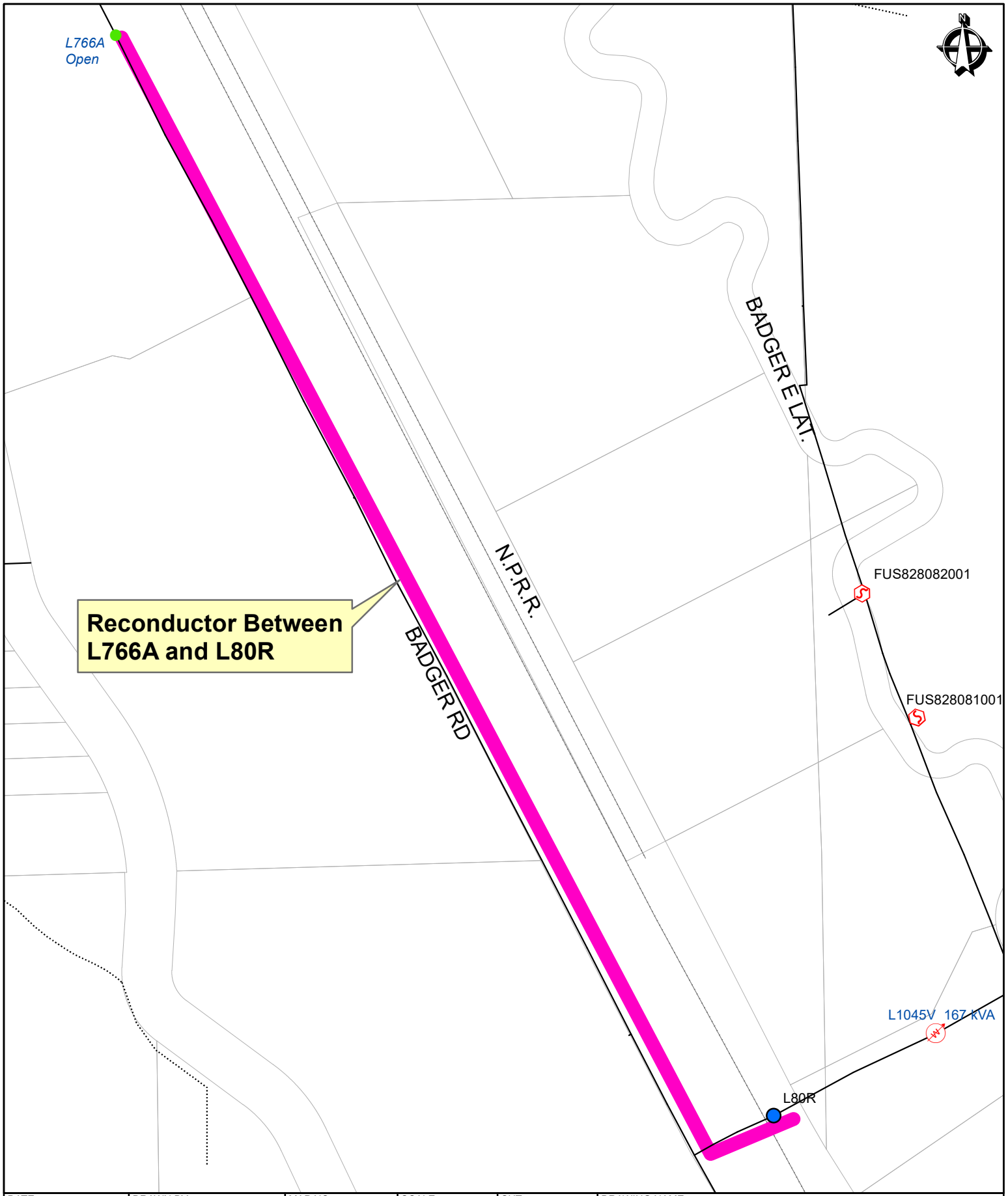
6/1/2022	smitht	92705	N.T.S.	1 of 1	Project 58

BENTON P·U·D

2022 Five Year Plan
BEC-3 (BENTON CITY) to SSR-1 (SUNSET RD)
Feeder Tie



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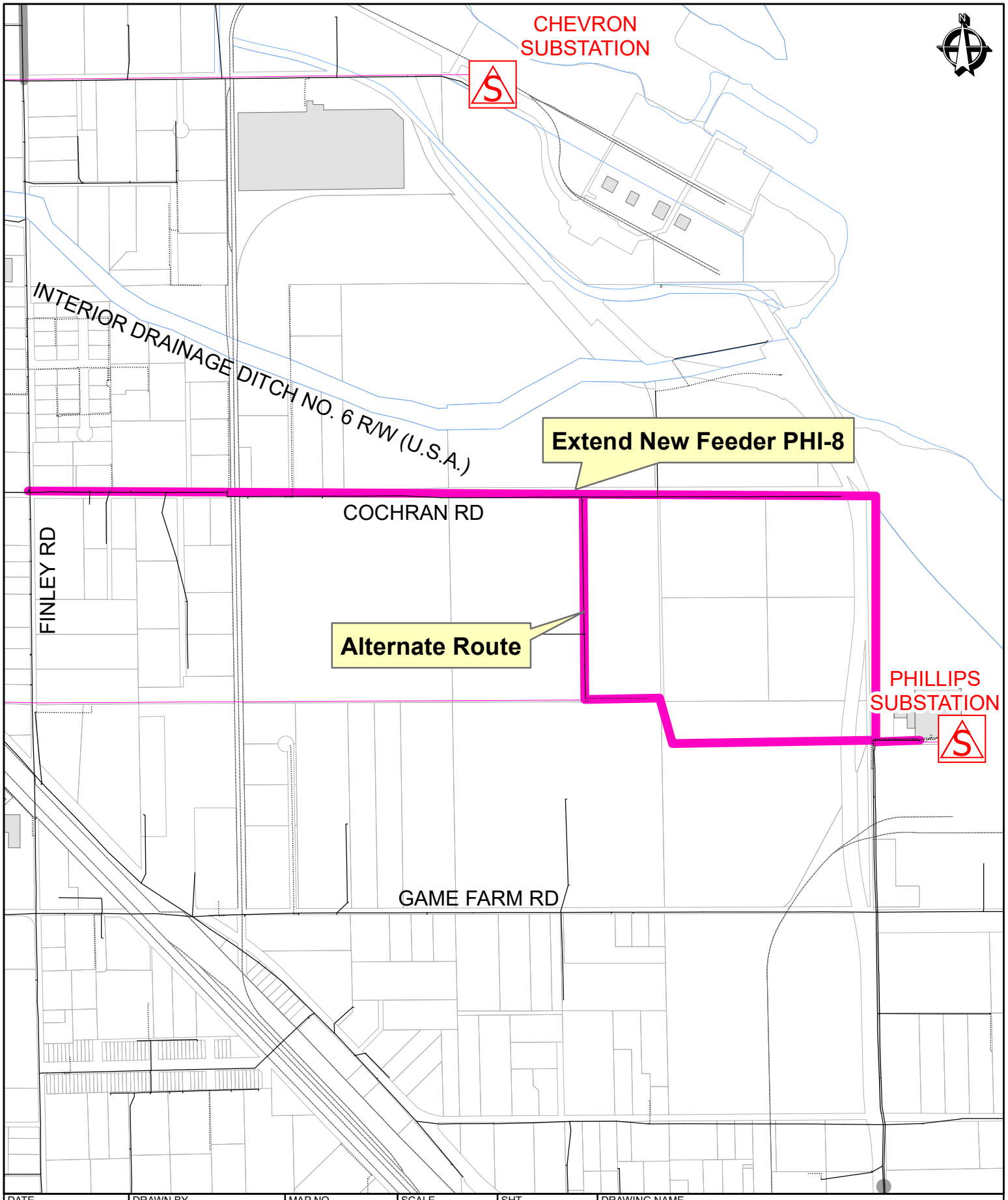
6/1/2022	smitht	82807	N.T.S.	1 of 1	Project 79

BENTON P·U·D

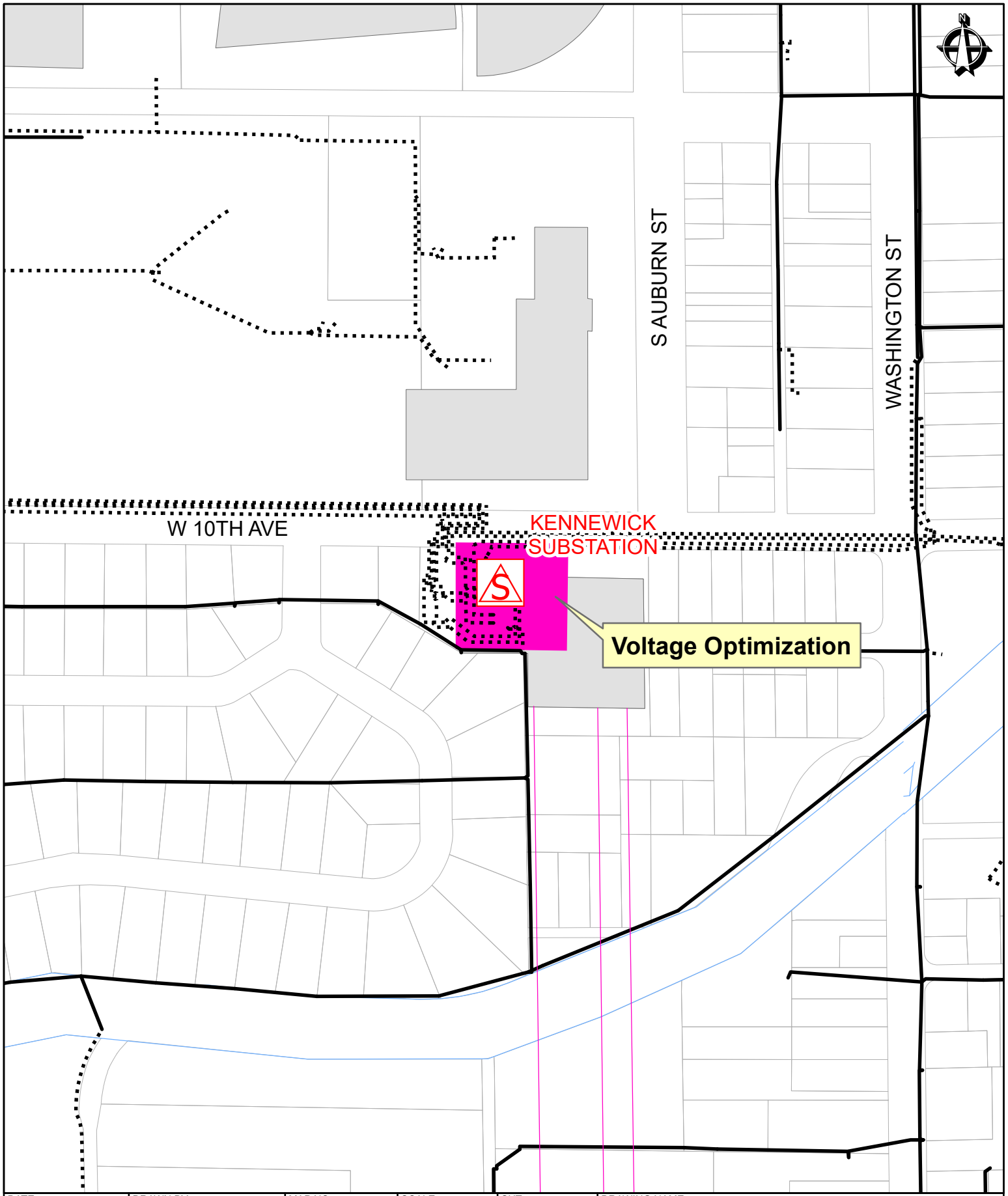
2022 Five Year Plan
Reconductor between L766A and L80R



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	83023	N.T.S.	1 of 1	Project 81

BENTON P·U·D

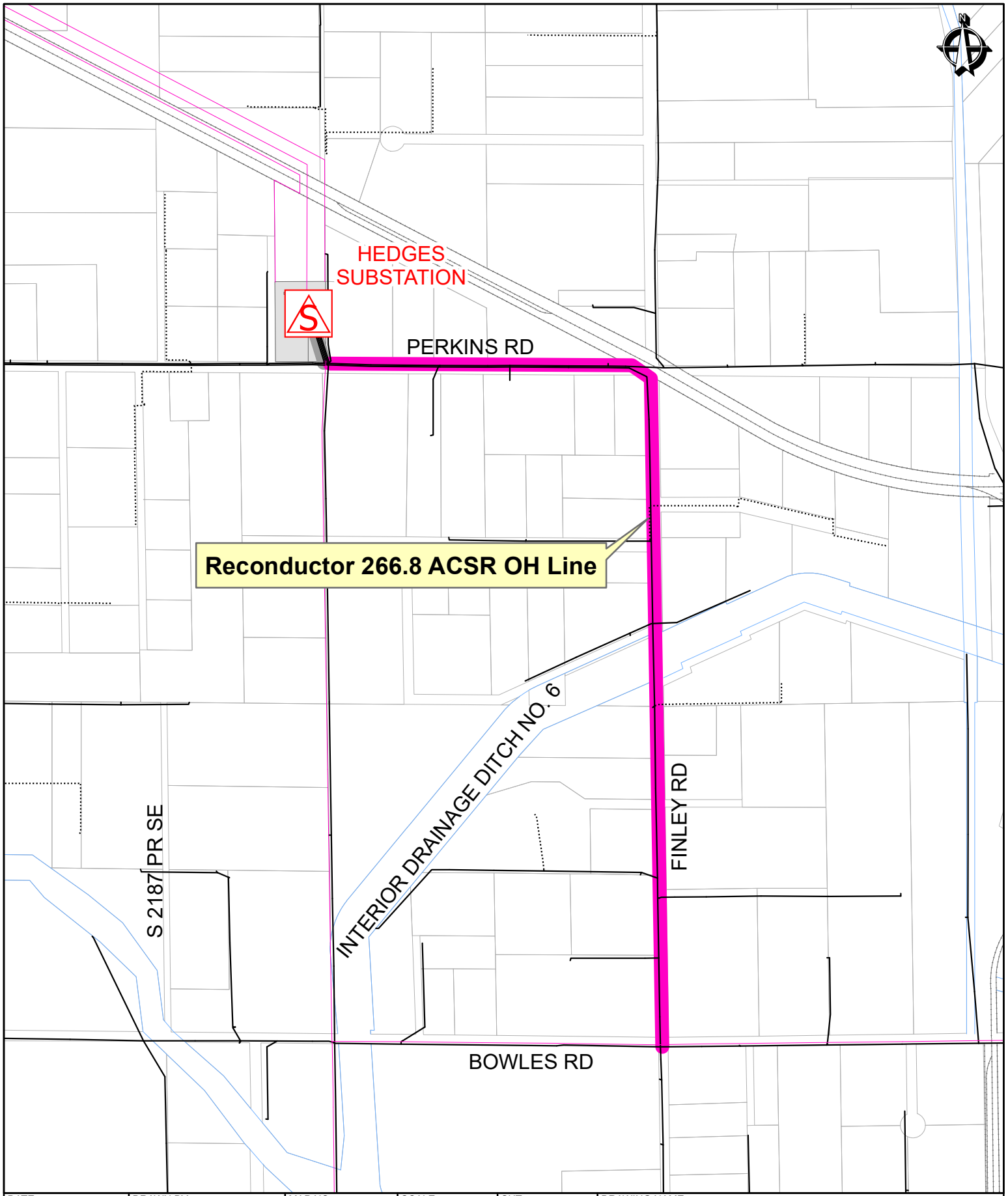
2022 Five Year Plan
Extend New Feeder PHI-8



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	82912	N.T.S.	1 of 1	Project 83

BENTON P·U·D

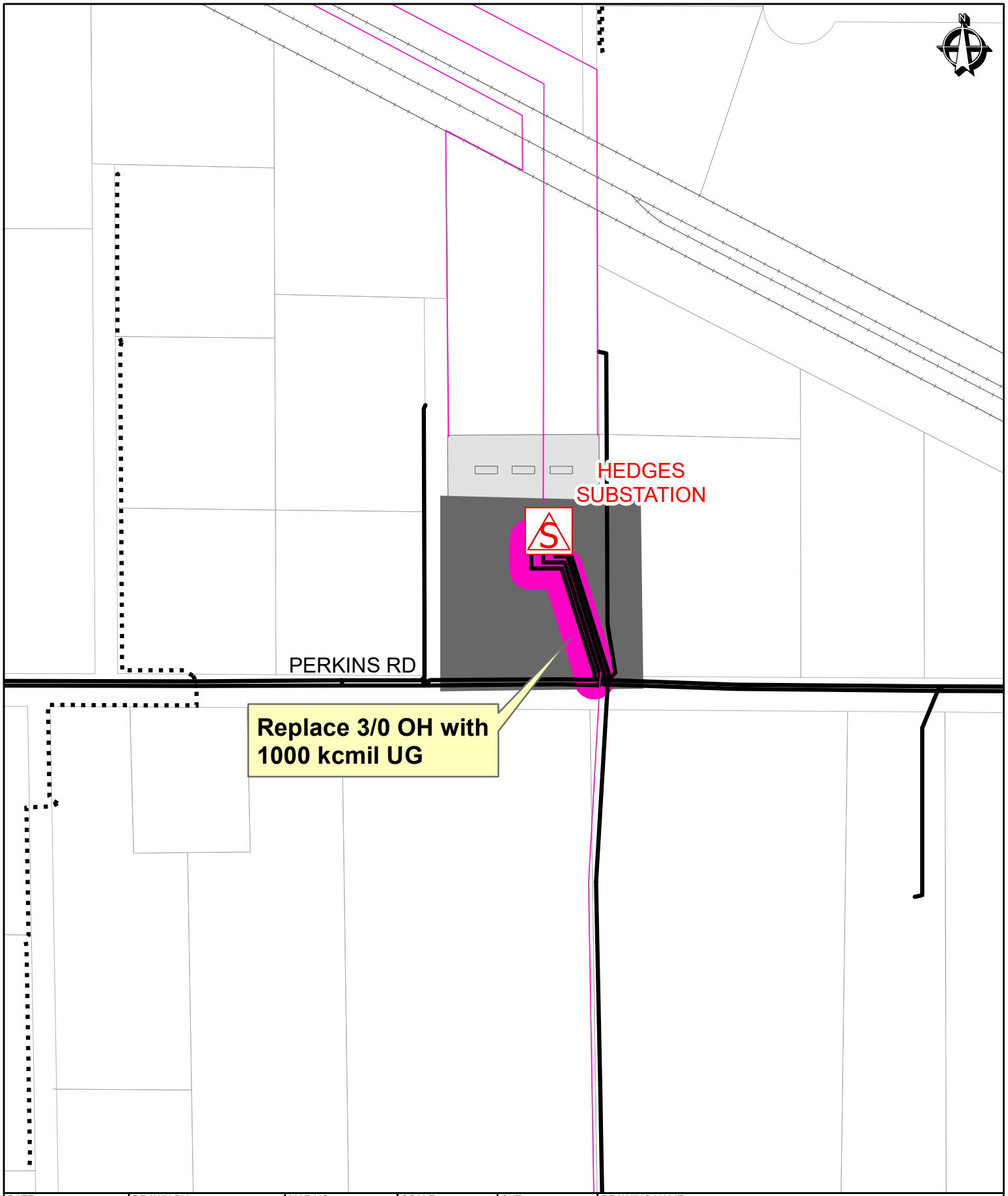
2022 Five Year Plan
Voltage Optimization



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	83015	N.T.S.	1 of 1	Project 95

BENTON P·U·D

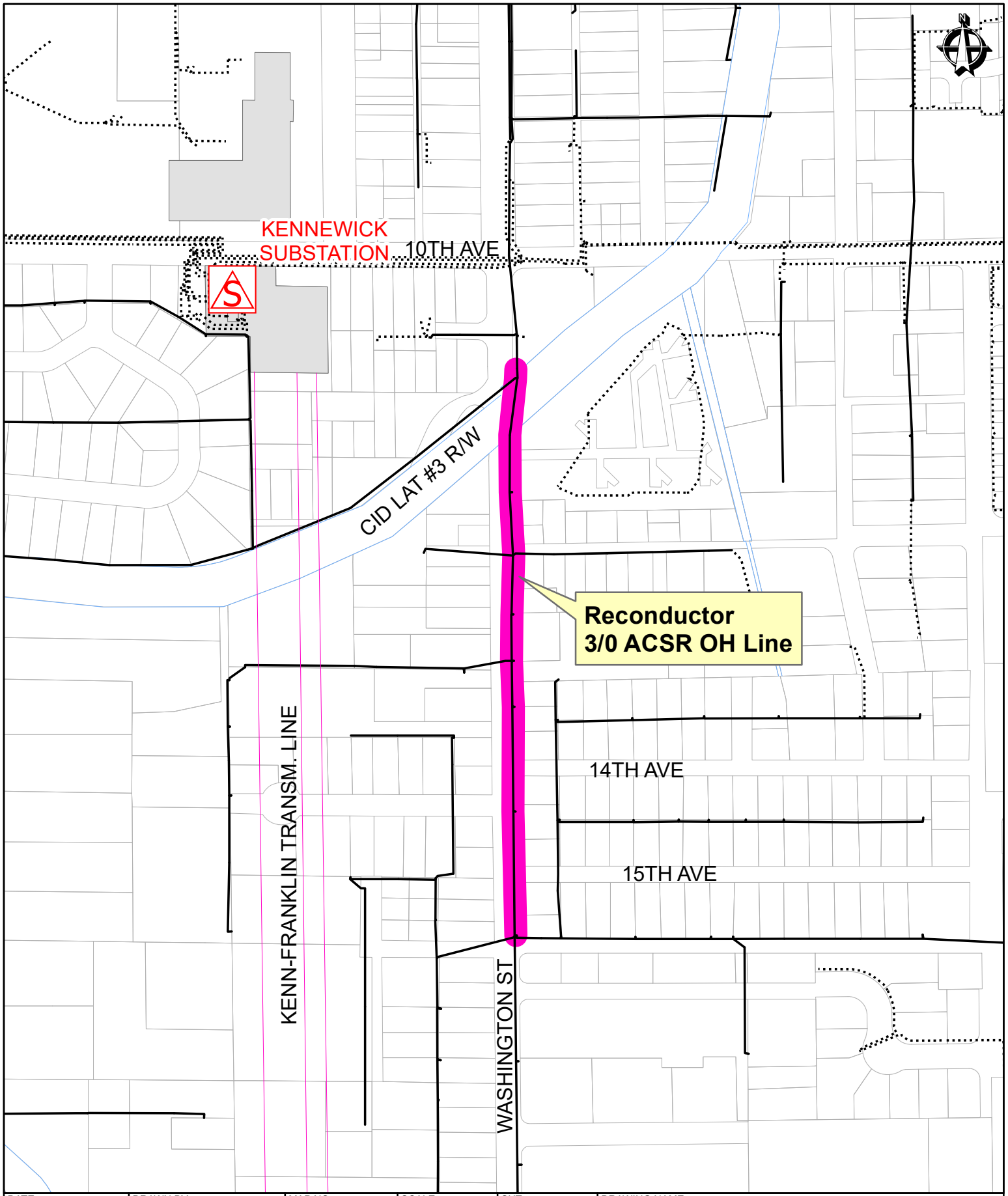
2022 Five Year Plan
Hedges Feeder 2 (HED-2)
Reconductor



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	83015	N.T.S.	1 of 1	Project 102

BENTON P·U·D

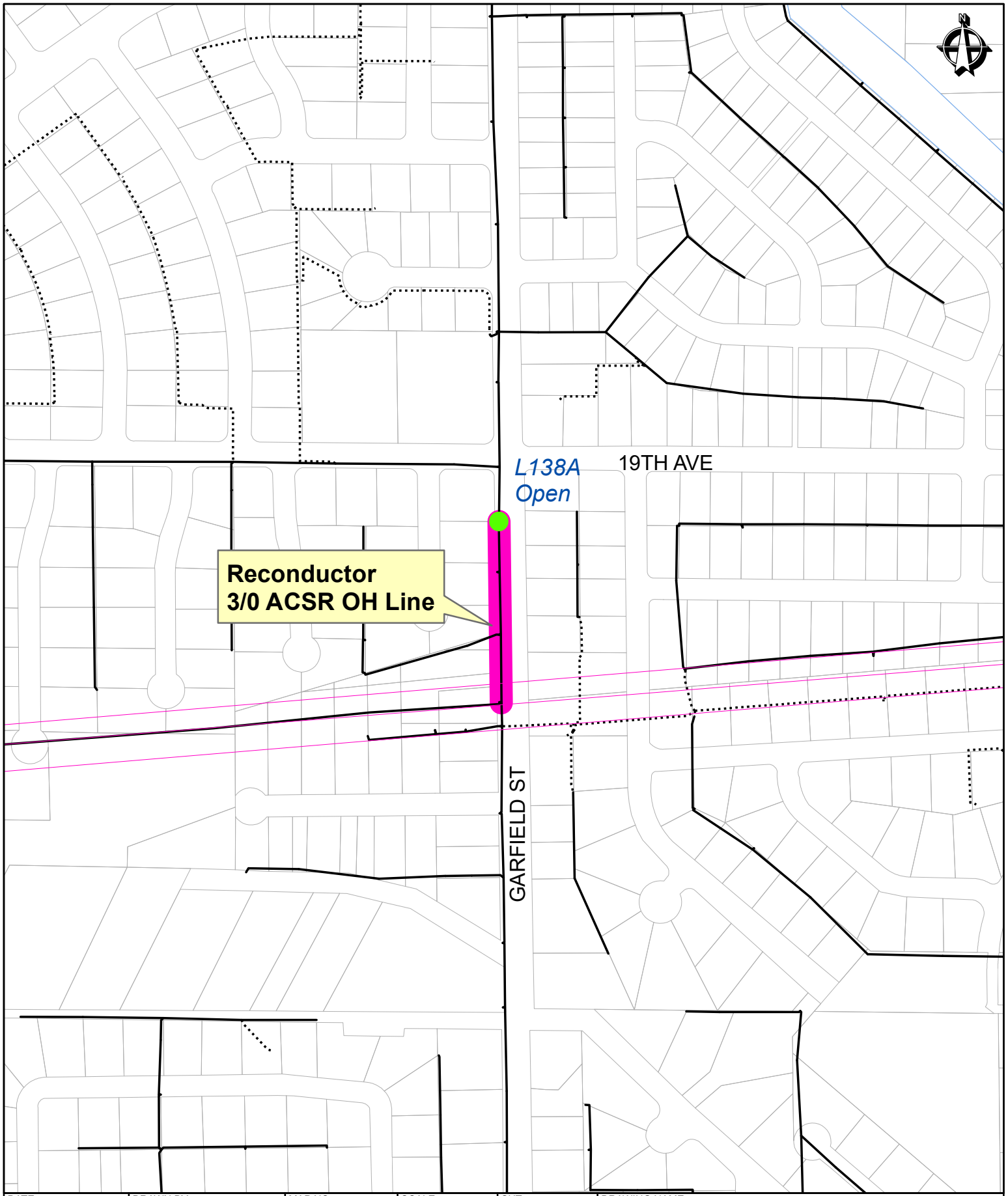
2022 Five Year Plan
HED-4 (HEDGES)
OH to UG Conversion



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	83007	N.T.S.	1 of 1	Project 105

BENTON P·U·D

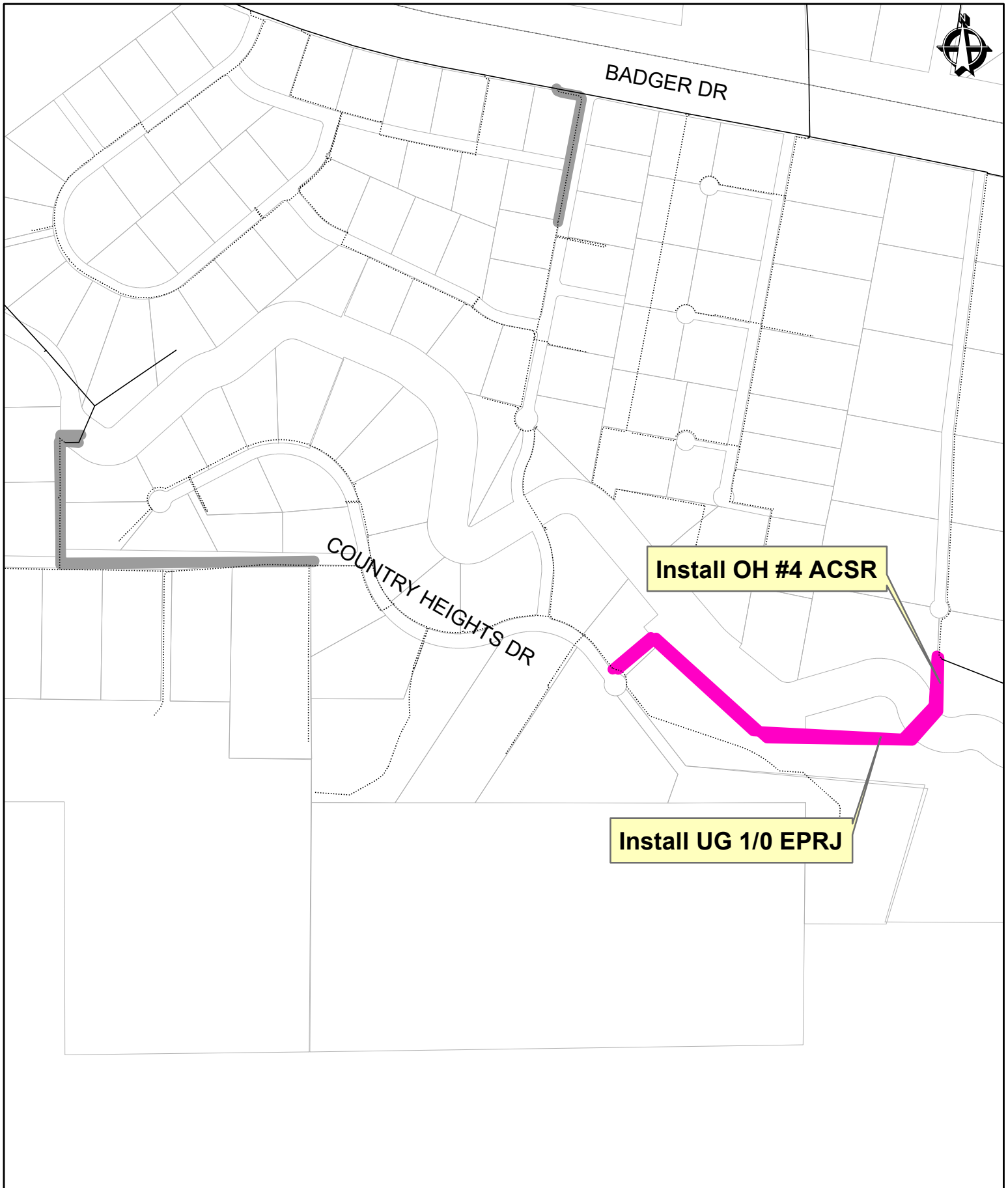
2022 Five Year Plan
KEN-9 (KENNEWICK)
Reconductor



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
6/1/2022	smitht	82912	N.T.S.	1 of 1	Project 113

BENTON P·U·D

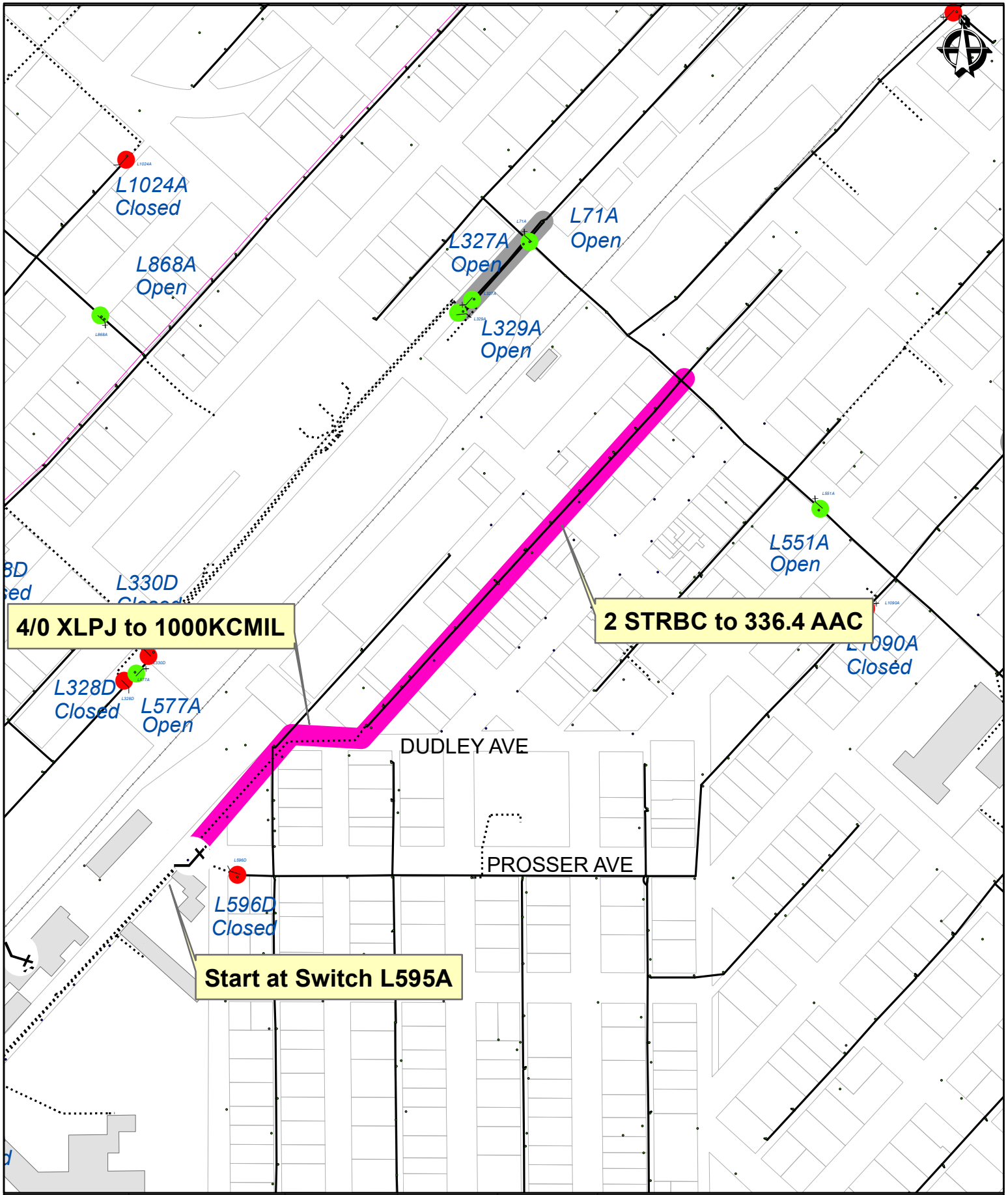
2022 Five Year Plan
ELY-2 (ELY) & KEN-5 (KENNEWICK)
Reconductor



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
7/27/2022	stiversc	82820	N.T.S.	1 of 1	Project 116

BENTON P·U·D

2022 Five Year Plan
RTA-2 Country Meadows Additional Feed



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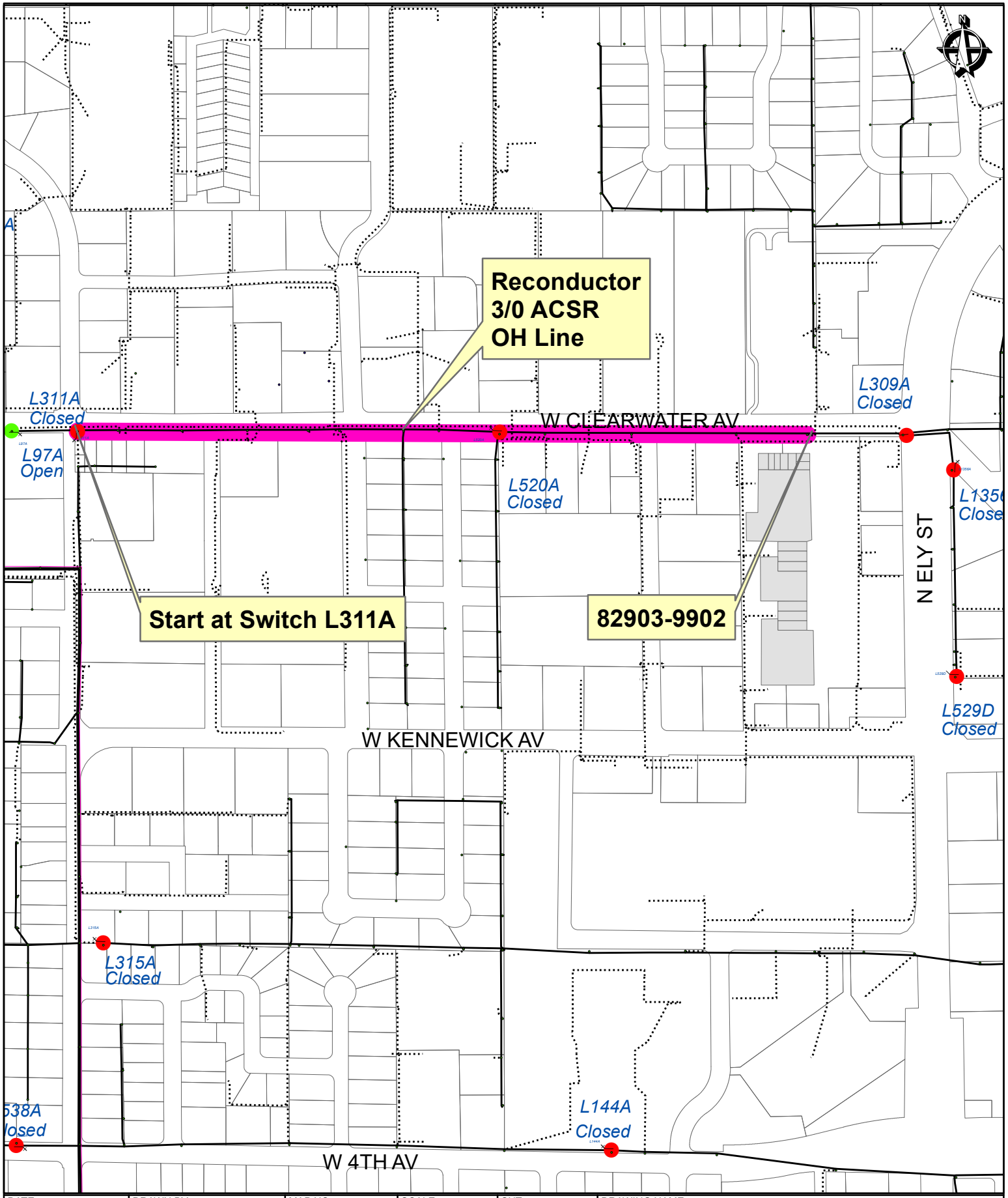
7/27/2022	stiversc	82402	N.T.S.	1 of 1	Project 119

BENTON P·U·D

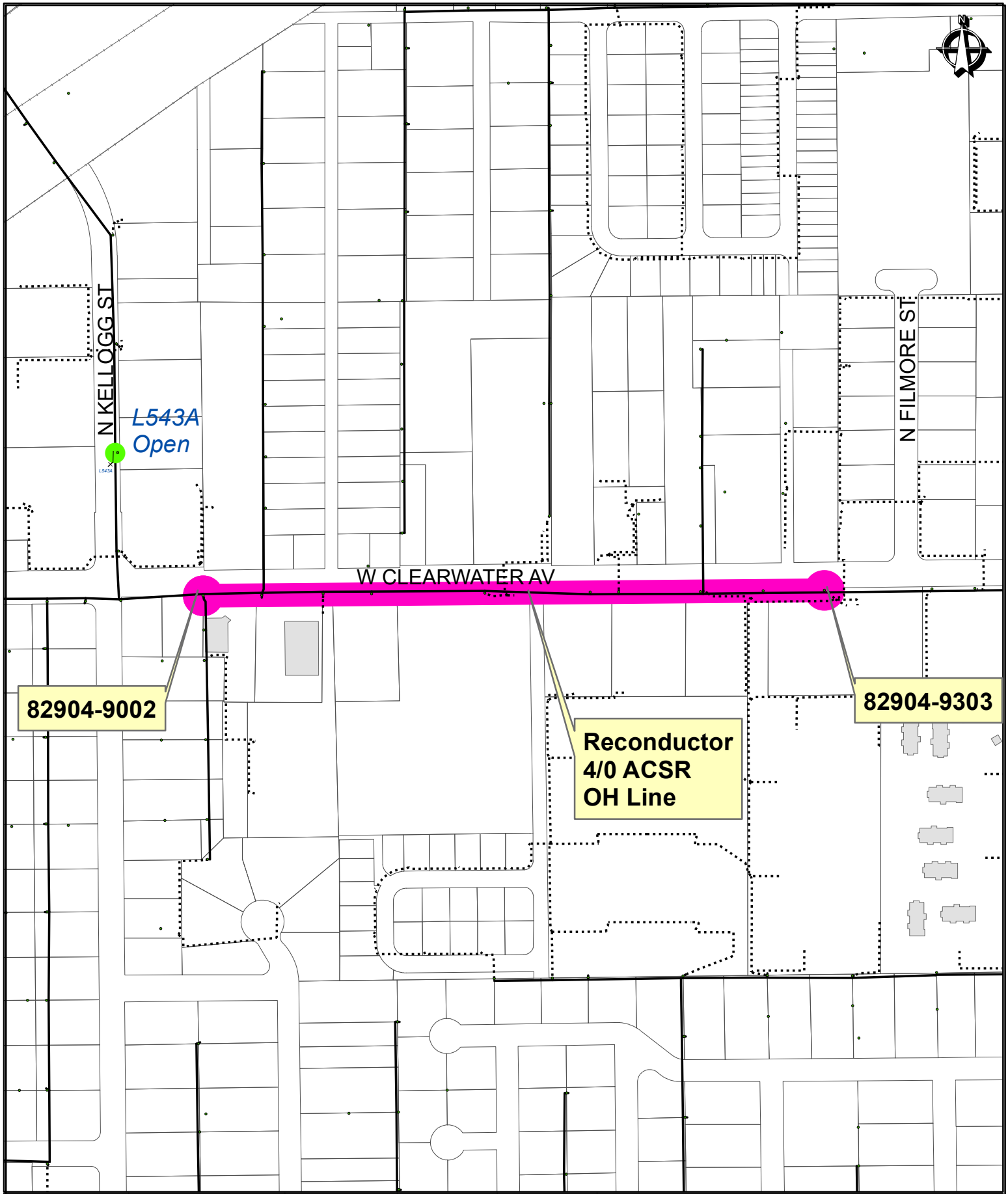
2022 Five Year Plan
PSR-3 Reconductor



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
8/9/2022	stiversc	82903	N.T.S.	1 of 1	Project 120

BENTON P·U·D

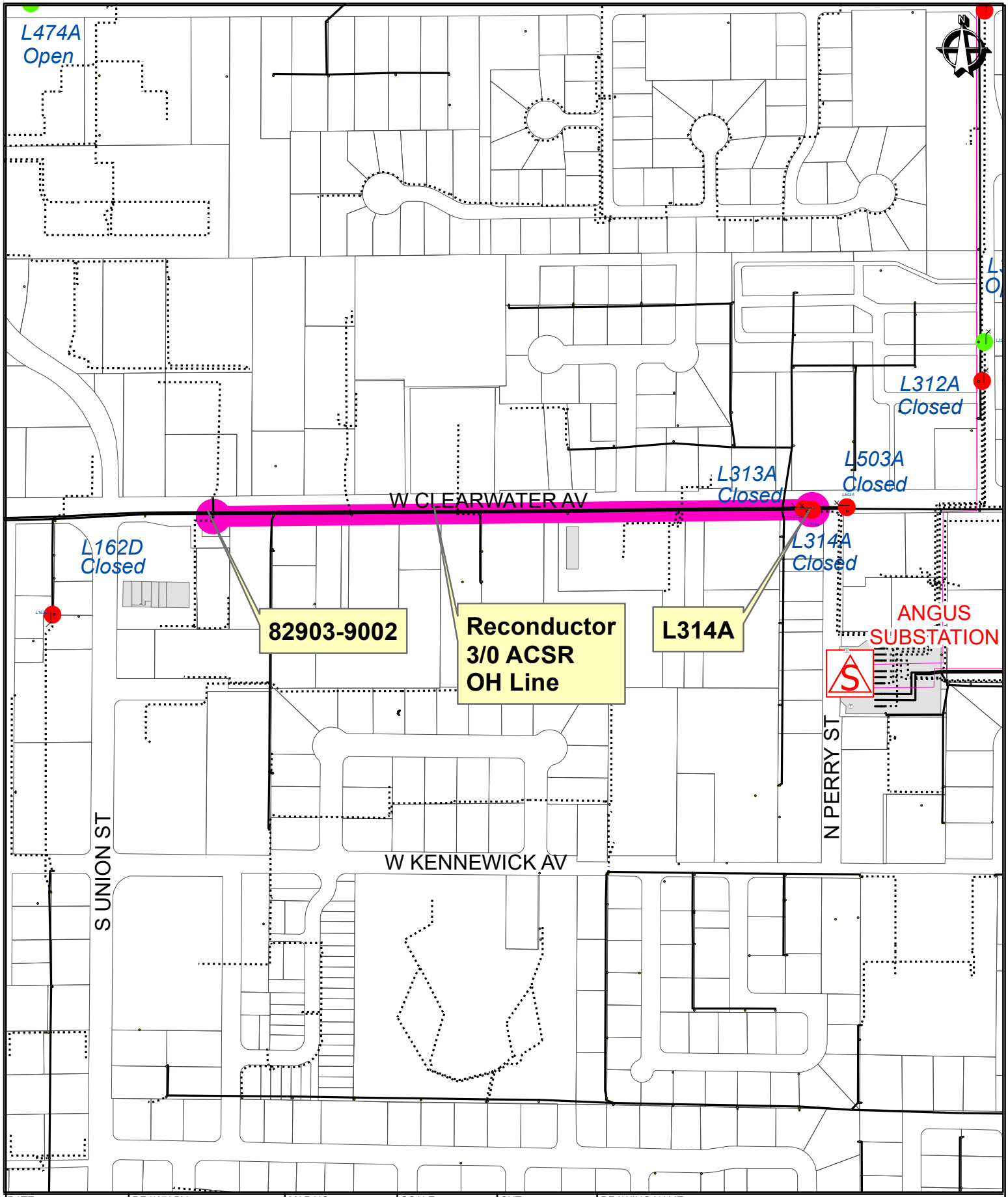
2022 Five Year Plan
ANG-4 Reconductor



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
8/9/2022	stiversc	82904	N.T.S.	1 of 1	Project 121

BENTON P·U·D

2022 Five Year Plan
HLS-7 Reconductor



DATE	DRAWN BY	MAP NO.	SCALE	SHT.	DRAWING NAME
8/9/2022	stiversc	82903	N.T.S.	1 of 1	Project 122

BENTON P·U·D

2022 Five Year Plan
ANG-3 Reconductor

Appendix B

Feeder Peaks

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Table B1

Feeder Non-Coincidental Peaks - Winter

Substation Feeder/Bay (P.O.D)	1.15	1.24	1.18	% of Annual System Growth	Projected Peak (kVA) at 0°F					Peak Season
	19-20	20-21	21-22		22-23	23-24	24-25	25-26	26-27	
Angus *(Kennewick P.O.D.)*										
ANG-9	5,107	5,175	5,406	0.0%	5,406	5,406	5,406	5,406	5,406	Winter
ANG-1	3,833	3,911	4,216	0.0%	4,216	4,216	4,216	4,216	4,216	Winter
ANG-2	5,715	5,609	6,347	0.0%	6,347	6,347	6,347	6,347	6,347	Winter
Bay 3	14,655	14,695	15,968	0.0%	15,968	15,968	15,968	15,968	15,968	Winter
ANG-3	5,638	5,821	6,061	0.0%	6,061	6,061	6,061	6,061	6,061	Winter
ANG-4	4,534	4,612	4,409	0.0%	4,612	4,612	4,612	4,612	4,612	Winter
ANG-5	6,143	5,987	6,937	0.0%	6,937	6,937	6,937	6,937	6,937	Winter
Bay 1	16,315	16,420	17,407	0.0%	17,610	17,610	17,610	17,610	17,610	Winter
ANG-6	4,757	4,815	4,843	0.2%	4,848	4,851	4,854	4,858	4,861	Winter
ANG-7	4,158	4,216	4,723	0.0%	4,723	4,723	4,723	4,723	4,723	Winter
ANG-8	5,313	5,277	5,636	0.0%	5,636	5,636	5,636	5,636	5,636	Winter
Bay 2	14,227	14,308	15,202	0.2%	15,207	15,210	15,214	15,217	15,220	Winter
Benton City *(Benton City P.O.D.)*										
BEC-1	6,425	6,513	7,481	0.0%	7,482	7,483	7,483	7,484	7,484	Winter
BEC-2	5,073	5,046	6,144	2.6%	6,195	6,231	6,267	6,303	6,339	Winter
BEC-3	-	-	-	0.0%	-	-	-	-	-	Winter
BEC-4	-	-	-	0.0%	-	-	-	-	-	Winter
REA	2,000	2,000	2,000	-	2,000	2,000	2,000	2,000	2,000	Winter
Bay 1	13,498	13,559	15,625	2.6%	15,677	15,713	15,750	15,787	15,823	Winter
Note: REA load went away in 11-12 due to their new substation. Projected value of 2,000 kVA is a reserved capacity value.										
Note: Benton City rebuild completed fall 2019. BEC-3, BEC-4 currently spare positions.										
Note: BEC-3 buildout anticipated spring 2021.										
Cold Creek *(Cold Creek P.O.D.)*										
CCR-1	565	341	360	0.0%	360	360	360	360	360	Summer
Bay 1	565	341	360	-	360	360	360	360	360	Summer
Notes: Cold Creek added to 5 Year Plan in 2018.										
Ely *(Kennewick P.O.D.)*										
ELY-1	4,568	4,529	5,563	2.8%	5,617	5,655	5,693	5,732	5,770	Winter
ELY-2	2,712	2,583	3,136	0.0%	3,136	3,136	3,136	3,136	3,136	Winter
ELY-3	5,843	6,633	7,260	1.5%	5,582	5,603	5,623	5,644	5,665	Winter
ELY-4	5,227	5,083	6,162	0.0%	6,162	6,162	6,162	6,162	6,162	Winter
Bay 1	18,351	18,828	22,121	4.2%	20,497	20,556	20,615	20,674	20,733	Winter
ELY-5	3,653	3,413	3,967	0.0%	3,967	3,967	3,967	3,967	3,967	Winter
ELY-6	6,562	6,319	7,675	0.1%	7,677	7,678	7,679	7,680	7,681	Winter
ELY-7	4,697	4,428	5,341	0.0%	4,820	4,820	4,820	4,820	4,820	Winter
ELY-8	4,355	4,299	4,871	0.0%	4,871	4,871	4,871	4,871	4,871	Winter
Bay 2	19,266	18,459	21,853	0.1%	21,334	21,335	21,336	21,337	21,338	Winter
Note: Southridge Sub feeders scheduled for completion Summer 2022. Permanent load shift from ELY-7 to STH-3 and from ELY-3 to STH-1, STH-2, STH-3.										
Gum Street *(Kennewick P.O.D.)*										
GUM-1	6,023	7,195	5,594	1.2%	7,218	7,235	7,251	7,267	7,284	Winter
GUM-2	4,004	3,801	3,950	0.0%	3,950	3,950	3,950	3,950	3,950	Winter
GUM-3	5,458	5,277	6,015	0.0%	6,015	6,015	6,015	6,015	6,015	Winter
GUM-4	7,015	7,094	6,498	0.2%	6,502	6,505	6,508	6,511	6,514	Winter
Bay 1	22,500	23,366	22,057	1.4%	23,685	23,705	23,724	23,743	23,763	Winter

Table B1

Feeder Non-Coincidental Peaks - Winter

Substation Feeder/Bay (P.O.D)	1.15	1.24	1.18	% of Annual System Growth	Projected Peak (kVA) at 0°F					Peak Season
	19-20	20-21	21-22		22-23	23-24	24-25	25-26	26-27	
Hedges *(Hedges P.O.D.)*										
HED-1	1,574	1,697	1,734	0.0%	1,734	1,734	1,734	1,734	1,734	Winter
HED-2	6,057	6,088	5,632	0.0%	5,632	5,632	5,632	5,632	5,632	Winter
HED-3	4,337	4,880	4,307	0.8%	4,322	4,333	4,343	4,353	4,364	Winter
HED-4	6,416	6,503	6,152	1.3%	6,178	6,196	6,214	6,232	6,250	Winter
Bay 1	18,385	19,169	17,826	2.1%	17,866	17,894	17,923	17,951	17,980	Winter
Highlands *(Kennewick P.O.D.)*										
HLS-1	3,431	4,742	5,415	1.2%	5,438	5,454	5,470	5,486	5,502	Winter
HLS-2	3,781	3,718	4,133	0.3%	4,138	4,142	4,146	4,150	4,154	Summer
HLS-3	6,220	6,688	7,260	2.9%	7,316	7,356	7,395	7,435	7,475	Winter
Bay 1	13,432	15,147	16,808	4.3%	16,892	16,952	17,011	17,071	17,131	Winter
HLS-4	5,133	4,972	5,812	0.3%	5,818	5,823	5,827	5,832	5,836	Winter
HLS-5	3,251	3,745	4,539	12.3%	2,762	2,933	3,103	3,274	3,445	Summer
HLS-6	4,834	4,649	5,286	0.0%	5,286	5,286	5,286	5,286	5,286	Winter
Bay 2	13,218	13,367	15,636	12.6%	13,865	14,041	14,216	14,392	14,567	Winter
HLS-7	5,065	5,802	6,273	0.3%	6,278	6,281	6,285	6,288	6,292	Winter
HLS-8	4,971	4,815	5,599	0.0%	5,599	5,599	5,599	5,599	5,599	Winter
HLS-9	5,766	5,360	6,531	1.4%	6,559	6,578	6,597	6,617	6,636	Winter
Bay 3	15,801	15,977	18,403	1.6%	18,436	18,459	18,482	18,504	18,527	Winter
Note: Southridge Sub feeders scheduled for completion Summer 2022. Permanent load shift from HLS-5 to STH-1 and STH-4.										
Kennewick *(Kennewick P.O.D.)*										
KEN-1	5,073	4,815	7,075	0.0%	7,075	7,075	7,075	7,075	7,075	Winter
KEN-2	5,279	5,378	4,612	0.0%	4,612	4,612	4,612	4,612	4,612	Winter
KEN-3	6,639	6,633	6,334	0.1%	6,336	6,338	6,340	6,341	6,343	Winter
Bay 1	16,991	16,826	18,022	0.1%	18,024	18,026	18,027	18,029	18,031	Winter
KEN-4	5,946	6,245	5,450	1.0%	6,264	6,278	6,292	6,305	6,319	Winter
KEN-5	5,552	5,304	5,230	0.0%	5,230	5,230	5,230	5,230	5,230	Winter
KEN-6	5,835	6,079	5,352	0.0%	6,079	6,079	6,079	6,079	6,079	Summer
Bay 2	17,333	17,629	16,032	1.0%	17,573	17,587	17,600	17,614	17,628	Winter
KEN-7	5,244	5,083	4,263	0.0%	4,263	4,263	4,263	4,263	4,263	Summer
KEN-8	7,588	8,145	7,070	0.3%	7,075	7,079	7,082	7,086	7,089	Winter
KEN-9	3,816	3,635	3,549	0.6%	3,560	3,568	3,576	3,584	3,592	Winter
Bay 3	16,648	16,863	14,882	0.8%	14,898	14,909	14,921	14,932	14,944	Winter
Leslie Road *(Kennewick P.O.D.)*										
LES-1	5,689	5,535	6,026	0.8%	6,041	6,052	6,063	6,075	6,086	Winter
LES-2	3,123	3,238	2,567	1.2%	2,591	2,609	2,626	2,643	2,661	Summer
LES-3	3,200	3,256	3,050	0.0%	3,050	3,050	3,050	3,050	3,050	Winter
LES-4	1,754	1,836	1,004	0.0%	2,678	2,678	2,678	2,678	2,678	Summer
Bay 1	13,765	13,865	12,647	2.0%	14,360	14,389	14,417	14,446	14,474	Winter
Note: Out years assume completion of FYP #115. Permanent load shift from RTA-1 to LES-4.										

Table B1

Feeder Non-Coincidental Peaks - Winter

Substation Feeder/Bay (P.O.D)	1.15	1.24	1.18	% of Annual System Growth	Projected Peak (kVA) at 0°F					Peak Season
	19-20	20-21	21-22		22-23	23-24	24-25	25-26	26-27	
Orchard View *(Kennewick P.O.D.)*										
ORV-1	-	-	-	0.0%	-	-	-	-	-	-
ORV-2	3,585	5,387	4,216	3.3%	5,452	5,499	5,545	5,591	5,637	Summer
ORV-3	5,184	5,240	7,029	4.9%	7,126	7,195	7,264	7,332	7,401	Winter
ORV-4	-	3,155	3,210	4.3%	3,295	3,355	3,415	3,474	3,534	Summer
Bay 1	8,769	13,782	14,455	12.5%	15,874	16,048	16,223	16,398	16,572	Winter
ORV-5	4,440	5,175	6,301	4.5%	6,389	6,451	6,514	6,576	6,639	Winter
ORV-6	4,817	4,603	5,249	0.1%	5,251	5,253	5,254	5,256	5,258	Summer
ORV-7	-	-	-	0.0%	-	-	-	-	-	-
ORV-8	-	-	-	0.0%	-	-	-	-	-	-
Bay 2	9,257	9,778	11,549	4.6%	11,640	11,704	11,768	11,832	11,896	Winter
Note: Orchard View Bay 2 energized Fall 2019. Permanent load shifts from ORV-1 to ORV-5 and ORV-4 to ORV-6.										
Note: ORV-4 buildout to Vista Field completed in fall 2020.										
Phillips *(Hedges P.O.D.)*										
PHL-6	103	157	157	0.0%	157	157	157	157	157	Summer
PHL-7	4,235	4,732	4,732	5.1%	4,833	4,904	4,975	5,046	5,117	Winter
Bay 4	4,337	4,889	4,889	5.1%	4,990	5,061	5,132	5,203	5,274	Summer
Note: Feeder PHI-7 growth attributed to addition of PHI-7 feeder to offload approximately half of HED-1										
Prosser *(Prosser P.O.D.)*										
PSR-1	4,406	4,539	4,317	0.1%	4,541	4,543	4,545	4,546	4,548	Winter
PSR-2	3,730	3,718	3,847	0.0%	3,847	3,847	3,847	3,847	3,847	Winter
PSR-3	5,946	6,042	6,328	0.0%	6,329	6,330	6,330	6,331	6,331	Winter
Bay 1	14,082	14,298	14,492	0.0%	14,717	14,719	14,721	14,724	14,726	Winter
PSR-4	5,732	5,452	5,765	0.0%	5,765	5,765	5,765	5,765	5,765	Winter
PSR-5	1,395	1,301	1,255	0.0%	1,301	1,301	1,301	1,301	1,301	Winter
PSR-6	5,655	5,230	5,885	0.2%	5,889	5,892	5,895	5,897	5,900	Winter
REA	8,400	7,700	7,390	1.0%	7,410	7,484	7,559	7,634	7,711	Summer
Bay 2	21,182	19,683	20,295	0.2%	20,365	20,442	20,519	20,598	20,677	Winter
Reata *(Kennewick P.O.D.)*										
RTA-1	2,028	4,649	4,783	1.3%	6,644	6,662	6,680	6,698	6,716	Winter
RTA-2	8,778	9,197	9,158	2.0%	5,555	5,583	5,611	5,640	5,668	Winter
RTA-3	6,288	3,911	4,121	0.7%	4,136	4,147	4,157	4,167	4,178	Winter
RTA-4	3,679	3,563	3,541	0.0%	3,563	3,563	3,563	3,563	3,563	Winter
Bay 1	20,772	21,321	21,604	4.1%	19,899	19,955	20,012	20,069	20,126	Winter
Note: RTA-3 to RTA-1 offload completed fall 2020.										
Note: Out years assume completion of FYP #115. Permanent load shift from RTA-1 to LES-4 & RTA-2 to RTA-1.										
Riverfront *(Prosser P.O.D.)*										
RVF-1	5,133	5,286	4,975	0.0%	4,975	4,975	4,975	4,975	4,975	Winter
RVF-2	385	249	517	0.0%	517	517	517	517	517	Winter
RVF-3	4,654	4,732	4,812	1.0%	4,832	4,847	4,861	4,876	4,890	Winter
Bay 1	10,172	10,267	10,304	1.0%	10,324	10,339	10,353	10,368	10,382	Winter

Table B1

Feeder Non-Coincidental Peaks - Winter

Substation Feeder/Bay (P.O.D)	1.15	1.24	1.18	% of Annual System Growth	Projected Peak (kVA) at 0°F					Peak Season
	19-20	20-21	21-22		22-23	23-24	24-25	25-26	26-27	
Southridge *(Kennewick P.O.D.)*										
STH-1	-	-	-	10.1%	1,497	1,511	1,526	1,540	1,555	Summer
STH-2	-	-	-	3.4%	761	776	790	804	819	Winter
STH-3	-	-	-	2.6%	936	936	936	936	936	Summer
STH-4	-	-	-	17.4%	1,123	1,264	1,404	1,545	1,685	Summer
Bay 1	-			16.1%	3,194	3,223	3,252	3,281	3,310	Summer
Note: Southridge Sub feeders scheduled for energization Spring 2022.										
Note: Permanent load shift from ELY-7 to STH-3, ELY-3 to STH-1, STH-2, STH-3, and HLS-5 to STH-1 and STH-4.										
Sunset Road *(Benton City P.O.D.)*										
SSR-1	3,191	3,487	4,575	0.0%	4,575	4,575	4,575	4,575	4,575	Winter
SSR-2	3,653	3,321	4,151	0.1%	4,152	4,153	4,154	4,156	4,157	Winter
SSR-3	1,951	2,933	1,937	0.0%	2,933	2,933	2,933	2,933	2,933	Summer
SSR-4	2,284	2,684	3,883	0.4%	1,755	1,760	1,765	1,770	1,774	Winter
Bay 1	11,079	12,426	14,547	0.1%	11,661	11,662	11,663	11,665	11,666	Winter
Note: RTA-2 load past L70R shifted to SSR-4 during SSR-4 peak for load banacing purposes.										
Vista *(Kennewick P.O.D.)*										
VTA-1	2,079	1,993	2,343	0.0%	2,343	2,343	2,343	2,343	2,343	Summer
VTA-2	3,893	2,684	3,377	0.0%	3,377	3,377	3,377	3,377	3,377	Winter
VTA-3	2,498	2,352	2,239	0.0%	2,239	2,239	2,239	2,239	2,239	Winter
VTA-4	5,535	6,227	4,754	0.0%	6,227	6,227	6,227	6,227	6,227	Summer
Bay 1	14,005	13,256	12,714	0.0%	14,186	14,186	14,186	14,186	14,186	Summer
VTA-5	5,364	4,981	5,096	0.0%	5,096	5,096	5,096	5,096	5,096	Winter
VTA-6	1,728	1,633	1,848	0.0%	1,848	1,848	1,848	1,848	1,848	Summer
VTA-7	4,842	4,428	5,176	0.0%	5,176	5,176	5,176	5,176	5,176	Summer
VTA-8	6,562	6,365	5,995	0.0%	6,365	6,365	6,365	6,365	6,365	Winter
Bay 2	18,496	17,407	18,114	0.0%	18,485	18,485	18,485	18,485	18,485	Winter
Zephyr Heights *(Kennewick P.O.D.)*										
ZEH-1	3,396	4,013	4,188	3.6%	4,258	4,308	4,358	4,407	4,457	Winter
ZEH-2	4,851	5,064	5,904	1.6%	5,935	5,957	5,979	6,001	6,023	Winter
ZEH-3	496	803	507	0.0%	507	507	507	507	507	Summer
Bay 1	8,743	9,880	10,599	5.2%	10,701	10,772	10,844	10,916	10,988	Winter
Continguous P.O.D. Totals (PUD Only)										
Benton City	22,577	23,984	28,172	2.7%	25,338	25,376	25,414	25,451	25,489	Winter
Hedges	22,723	24,058	22,715	7.2%	22,855	22,955	23,054	23,154	23,254	Winter
Kennewick	269,524	277,530	291,877	48.2%	293,135	293,805	294,476	295,147	295,817	Winter
Prosser	37,036	36,549	37,701	1.3%	37,996	38,016	38,035	38,055	38,074	Winter
Total	351,859	362,121	380,465	59%	379,324	380,152	380,979	381,807	382,634	Winter
Miscellaneous Substations & P.O.D.'s										
251 (DOE)	153	122	153	0.0%	162	162	162	162	162	
451B (Ligo)	1,409	1,388	1,409	0.0%	1,015	1,015	1,015	1,015	1,015	
Chevron	8,044	8,606	8,494	0.0%	8,100	8,100	8,100	8,100	8,100	
Cold Creek	281	283	347	0.0%	1,448	1,448	1,448	1,448	1,448	
Phillips 1,2,3	1,300	1,327	1,079	0.0%	1,450	1,450	1,450	1,450	1,450	
Total	11,186	11,724	11,481	0.0%	12,175	12,175	12,175	12,175	12,175	

Table B2

Feeder Non-Coincidental Peaks - Summer

Substation Feeder/Bay *(P.O.D)*	1.03	1.00	0.92	% of Annual System Growth	Projected Peak (kVA) at 104°F					Peak Season
	2019	**2020**	**2021**		**2022**	**2023**	**2024**	**2025**	**2026**	
Angus *(Kennewick P.O.D.)*										
ANG-9	3,574	3,578	6,447	0.0%	3,918	3,918	3,918	3,918	3,918	Winter
ANG-1	3,169	3,816	2,723	0.0%	3,816	3,816	3,816	3,816	3,816	Winter
ANG-2	3,498	3,526	3,710	0.0%	3,710	3,710	3,710	3,710	3,710	Winter
Bay 3	10,241	10,921	12,880	0.0%	11,444	11,444	11,444	11,444	11,444	Winter
ANG-3	4,300	4,040	4,086	0.0%	4,086	4,086	4,086	4,086	4,086	Winter
ANG-4	3,971	3,578	2,327	0.0%	4,029	4,029	4,029	4,029	4,029	Winter
ANG-5	3,689	3,496	5,681	0.0%	3,537	3,537	3,537	3,537	3,537	Winter
Bay 1	11,960	11,114	12,094	0.0%	11,652	11,652	11,652	11,652	11,652	Winter
ANG-6	4,025	3,787	3,675	0.2%	3,790	3,793	3,797	3,801	3,805	Winter
ANG-7	3,261	2,953	4,688	0.0%	2,764	2,764	2,764	2,764	2,764	Winter
ANG-8	3,513	3,422	-	0.0%	4,286	4,286	4,286	4,286	4,286	Winter
Bay 2	10,799	10,162	8,364	0.2%	10,840	10,843	10,847	10,851	10,855	Winter
Note: Feeder ANG-8 was switched onto ANG-5 and ANG-9 during 2021 summer peak due to a get-away cable failure.										
Note: Feeder ANG-4 partially switched to VIS-7 to balance bays to support ANG-8 get-away failure.										
Benton City *(Benton City P.O.D.)*										
BEC-1	3,460	3,496	3,436	0.0%	3,497	3,498	3,498	3,499	3,499	Winter
BEC-2	2,704	2,842	2,854	2.6%	2,886	2,927	2,968	3,009	3,049	Winter
BEC-3	-	-	-	0.0%	-	-	-	-	-	Winter
BEC-4	-	-	-	0.0%	-	-	-	-	-	Winter
REA	2,000	2,000	2,000	-	2,000	2,000	2,000	2,000	2,000	Winter
Bay 1	8,163	8,338	8,290	2.6%	8,383	8,425	8,466	8,507	8,549	Winter
Notes: REA load went away in 11-12 due to their new substation. Projected value of 2,000 kVA is a reserved capacity value.										
Note: Benton City rebuild completed fall 2019. BEC-3, BEC-4 currently spare positions.										
Note: BEC-3 buildout anticipated spring 2023.										
Cold Creek *(Cold Creek P.O.D.)*										
CCR-1	3,765	4,040	4,079	0.0%	4,079	4,079	4,079	4,079	4,079	Summer
Bay 1	3,765	4,040	4,079	-	4,079	4,079	4,079	4,079	4,079	Summer
Notes: Cold Creek added to 5 Year Plan in 2018.										
Ely *(Kennewick P.O.D.)*										
ELY-1	2,566	2,760	2,580	2.8%	2,794	2,837	2,881	2,924	2,967	Winter
ELY-2	1,573	1,726	1,711	0.0%	1,726	1,726	1,726	1,726	1,726	Winter
ELY-3	5,850	6,026	6,392	1.5%	6,411	4,433	4,456	4,479	4,503	Winter
ELY-4	4,094	7,305	4,421	0.0%	4,421	4,421	4,421	4,421	4,421	Winter
Bay 1	14,083	17,817	15,105	4.2%	15,352	13,417	13,484	13,551	13,617	Winter
ELY-5	3,811	5,088	3,949	0.0%	3,949	3,949	3,949	3,949	3,949	Winter
ELY-6	4,330	-	4,538	0.1%	4,539	4,540	4,541	4,542	4,544	Winter
ELY-7	4,682	-	4,921	0.0%	4,921	4,610	4,610	4,610	4,610	Winter
ELY-8	3,192	3,072	3,025	0.0%	3,025	3,025	3,025	3,025	3,025	Winter
Bay 2	16,015	8,161	16,433	0.1%	16,434	16,124	16,125	16,127	16,128	Winter
Note: Southridge Sub feeders scheduled for completion Summer 2022. Permanent load shift from ELY-7 to STH-3 and from ELY-3 to STH-1, STH-2, STH-3.										
Note: Additional load switched onto ELY-4 during 2020 peak to support Ely Bay 2 relay upgrade project.										
Note: ELY-6 and ELY-7 switched out during 2020 peak as part of Ely Bay 2 relay upgrade project.										
Gum Street *(Kennewick P.O.D.)*										
GUM-1	3,177	4,783	3,141	1.2%	3,156	3,174	3,193	3,211	3,230	Winter
GUM-2	2,261	4,240	2,423	0.0%	2,423	2,423	2,423	2,423	2,423	Winter
GUM-3	3,124	3,162	3,121	0.0%	3,162	3,162	3,162	3,162	3,162	Winter
GUM-4	4,781	4,761	4,627	0.2%	4,764	4,767	4,771	4,774	4,778	Winter
Bay 1	13,342	16,947	13,312	1.4%	13,504	13,526	13,548	13,570	13,592	Winter
Note: Additional load switched onto GUM-1 & GUM-2 during 2020 peak to support Ely Bay 2 relay upgrade project.										

Table B2

Feeder Non-Coincidental Peaks - Summer

Substation Feeder/Bay *(P.O.D)*	1.03	1.00	0.92	% of Annual System Growth	Projected Peak (kVA) at 104°F					Peak Season
	2019	**2020**	**2021**		**2022**	**2023**	**2024**	**2025**	**2026**	
Hedges *(Hedges P.O.D.)*										
HED-1	901	759	814	0.0%	814	814	814	814	814	Winter
HED-2	4,796	4,441	4,914	0.0%	4,914	4,914	4,914	4,914	4,914	Winter
HED-3	2,673	2,805	2,656	0.8%	2,814	2,826	2,838	2,849	2,861	Winter
HED-4	4,063	4,218	4,154	1.3%	4,234	4,255	4,275	4,296	4,316	Winter
Bay 1	12,433	12,223	12,539	2.1%	12,777	12,809	12,841	12,874	12,906	Winter
Highlands *(Kennewick P.O.D.)*										
HLS-1	3,093	3,370	2,840	1.2%	3,384	3,402	3,421	3,439	3,457	Winter
HLS-2	5,338	6,100	5,708	0.3%	6,104	6,108	6,113	6,117	6,122	Summer
HLS-3	5,942	4,873	5,701	2.9%	5,736	5,781	5,826	5,871	5,916	Winter
Bay 1	14,373	14,343	14,250	4.3%	15,225	15,292	15,360	15,427	15,495	Winter
HLS-4	3,238	3,251	3,265	0.3%	3,269	3,274	3,279	3,284	3,289	Winter
HLS-5	4,460	7,439	5,776	12.3%	5,928	3,322	3,515	3,708	3,902	Summer
HLS-6	2,933	3,013	3,607	0.0%	3,607	3,607	3,607	3,607	3,607	Winter
Bay 2	10,631	13,703	12,648	12.6%	12,804	10,202	10,401	10,599	10,798	Winter
HLS-7	3,704	3,913	3,716	0.3%	3,916	3,920	3,924	3,928	3,932	Winter
HLS-8	2,940	5,624	2,929	0.0%	2,929	2,929	2,929	2,929	2,929	Winter
HLS-9	4,651	4,523	4,661	1.4%	4,678	4,700	4,722	4,744	4,766	Winter
Bay 3	11,295	14,060	11,307	1.6%	11,524	11,550	11,575	11,601	11,627	Winter
Note: Southridge Sub feeders scheduled for completion Summer 2022. Permanent load shift from HLS-5 to STH-1 and STH-4.										
Note: Feeder ELY-8 switched onto HLS-8 during 2020 peak due to Ely Bay 1 relay upgrade project.										
Note: Feeder HLS-5 was switched with additional load during 2020 peak due to Ely Bay 1 relay upgrade project.										
Kennewick *(Kennewick P.O.D.)*										
KEN-1	6,262	4,263	4,620	0.0%	4,620	4,620	4,620	4,620	4,620	Winter
KEN-2	3,208	3,727	3,237	0.0%	3,727	3,727	3,727	3,727	3,727	Winter
KEN-3	4,529	4,493	4,743	0.1%	4,495	4,497	4,499	4,501	4,502	Winter
Bay 1	13,999	12,483	12,600	0.1%	12,842	12,844	12,846	12,847	12,849	Winter
KEN-4	4,559	4,426	4,148	1.0%	4,438	4,454	4,469	4,485	4,500	Winter
KEN-5	3,276	5,475	3,224	0.0%	3,224	3,224	3,224	3,224	3,224	Winter
KEN-6	6,102	4,947	6,550	0.0%	6,550	6,550	6,550	6,550	6,550	Summer
Bay 2	13,938	14,849	13,921	1.0%	14,212	14,227	14,243	14,258	14,273	Winter
KEN-7	3,811	3,675	4,579	0.0%	4,579	4,579	4,579	4,579	4,579	Summer
KEN-8	5,018	4,880	5,188	0.3%	5,191	5,195	5,199	5,203	5,207	Winter
KEN-9	2,322	2,314	3,367	0.6%	3,374	3,384	3,393	3,402	3,411	Winter
Bay 3	11,150	10,869	13,134	0.8%	13,144	13,157	13,170	13,183	13,196	Winter
Note: Feeder KEN-5 was switched with additional load during 2020 peak due to Ely Bay 1 relay upgrade project.										
Leslie Road *(Kennewick P.O.D.)*										
LES-1	3,001	3,355	3,449	0.8%	3,459	3,472	3,484	3,497	3,509	Winter
LES-2	2,650	3,973	3,792	1.2%	3,988	4,008	4,027	4,047	4,067	Summer
LES-3	1,634	1,741	1,533	0.0%	1,741	1,741	1,741	1,741	1,741	Winter
LES-4	901	900	1,732	0.0%	2,521	2,521	2,521	2,521	2,521	Summer
Bay 1	8,187	9,969	10,506	2.0%	11,710	11,742	11,774	11,806	11,838	Winter
Note: LES-2 partially loaded with ORV-2 during 2021 peak for load balancing.										
Note: Out years assume completion of FYP #115. Permanent load shift from RTA-1 to LES-4.										

Table B2

Feeder Non-Coincidental Peaks - Summer

Substation Feeder/Bay *(P.O.D)*	1.03	1.00	0.92	% of Annual System Growth	Projected Peak (kVA) at 104°F					Peak Season
	2019	**2020**	**2021**		**2022**	**2023**	**2024**	**2025**	**2026**	
Orchard View *(Kennewick P.O.D.)*										
ORV-1	5,552	-	-	0.0%	-	-	-	-	-	-
ORV-2	2,383	2,418	5,804	3.3%	2,486	2,538	2,590	2,642	2,695	Summer
ORV-3	3,093	3,846	4,230	4.9%	4,291	4,368	4,446	4,524	4,602	Winter
ORV-4	5,430	-	3,997	4.3%	4,050	4,118	4,186	4,253	4,321	Summer
Bay 1	16,458	6,264	14,031	12.5%	10,827	11,025	11,222	11,420	11,617	Winter
ORV-5	-	4,248	4,065	4.5%	4,303	4,374	4,445	4,515	4,586	Winter
ORV-6	-	5,669	5,366	0.1%	7,506	7,508	7,510	7,512	7,514	Summer
ORV-7	-	-	-	0.0%	-	-	-	-	-	-
ORV-8	-	-	-	0.0%	-	-	-	-	-	-
Bay 2	-	9,917	9,431	4.6%	11,810	11,882	11,955	12,027	12,100	Winter
Note: ORV-4 buildout to Vista Field completed fall 2020.										
Note: Orchard View Bay 2 energized Fall 2019. Permanent load shifts from ORV-1 to ORV-5 and ORV-4 to ORV-6.										
Note: ORV-2 partially loaded with ORV-6 & VIS-8 and partially offloaded to LES-2 during 2021 peak for load balancing.										
Note: ORV-1, ORV-7, ORV-8 currently spare circuits. Intention is to build out to west end of Bob Olsen Pkwy area.										
Phillips *(Hedges P.O.D.)*										
PHL-6	6,438	5,914	5,284	0.0%	5,914	5,914	5,914	5,914	5,914	Summer
PHL-7	3,551	3,325	3,395	5.1%	3,458	3,538	3,618	3,699	3,779	Winter
Bay 4	9,989	9,240	8,678	5.1%	9,372	9,452	9,533	9,613	9,693	Summer
Prosser *(Prosser P.O.D.)*										
PSR-1	5,522	4,389	4,004	0.1%	4,005	4,007	4,009	4,011	4,013	Winter
PSR-2	2,940	2,723	2,484	0.0%	2,723	2,723	2,723	2,723	2,723	Winter
PSR-3	5,262	4,962	5,202	0.0%	5,202	5,203	5,203	5,204	5,205	Winter
Bay 1	13,724	12,074	11,690	0.2%	11,930	11,933	11,935	11,938	11,941	Winter
PSR-4	5,995	5,416	5,072	0.0%	5,416	5,416	5,416	5,416	5,416	Winter
PSR-5	863	789	-	0.0%	771	771	771	771	771	Winter
PSR-6	3,864	3,749	3,648	0.2%	3,752	3,755	3,758	3,761	3,764	Winter
REA	7,520	8,010	8,210	1.0%	8,222	8,305	8,388	8,472	8,556	Summer
Bay 2	18,243	17,964	16,929	0.2%	18,161	18,246	18,332	18,419	18,507	Winter
Note: PRO-5 was switched to RVF-3 during 2021 peak for load balancing purposes.										
Reata *(Kennewick P.O.D.)*										
RTA-1	832	2,247	2,573	1.3%	3,440	3,461	3,481	3,501	3,522	Winter
RTA-2	5,445	6,256	5,900	2.0%	4,003	4,035	4,067	4,099	4,131	Winter
RTA-3	3,971	2,857	2,238	0.7%	2,866	2,878	2,890	2,901	2,913	Winter
RTA-4	2,077	1,994	2,087	0.0%	2,087	2,087	2,087	2,087	2,087	Winter
Bay 1	12,326	13,354	12,799	0	12,396	12,461	12,525	12,589	12,653	Winter
Note: RTA-3 to RTA-1 offload completed fall 2020.										
Note: RTA-2 load past L70R shifted to SSR-4 during 2021 peak for load banacing purposes.										
Note: Out years assume completion of FYP #115. Permanent load shift from RTA-1 to LES-4 & RTA-2 to RTA-1.										
Riverfront *(Prosser P.O.D.)*										
RVF-1	4,246	4,471	3,593	0.0%	4,471	4,471	4,471	4,471	4,471	Winter
RVF-2	412	268	459	0.0%	268	268	268	268	268	Winter
RVF-3	2,696	2,760	3,319	1.0%	2,638	2,654	2,671	2,687	2,703	Winter
Bay 1	7,355	7,499	7,371	1.0%	7,377	7,393	7,409	7,426	7,442	Winter
Note: PRO-5 was switched on RVF-3 during 2021 peak for load balancing purposes.										
Southridge *(Kennewick P.O.D.)*										
STH-1	-	-	-	10.1%	-	2,135	2,260	2,384	2,509	Summer
STH-2	-	-	-	3.4%	-	743	785	828	870	Winter
STH-3	-	-	-	2.6%	-	1,177	1,210	1,242	1,274	Summer
STH-4	-	-	-	17.4%	-	1,412	1,627	1,843	2,059	Summer
Bay 1	-	-	-	16.1%	-	5,467	5,882	6,297	6,712	Summer
Note: Southridge Sub feeders scheduled to be completed August 2022.										
Note: Permanent load shift from ELY-7 to STH-3, ELY-3 to STH-1, STH-2, STH-3, and HLS-5 to STH-1 and STH-4.										

Table B2

Feeder Non-Coincidental Peaks - Summer

Substation Feeder/Bay (P.O.D)	1.03	1.00	0.92	% of Annual System Growth	Projected Peak (kVA) at 104°F					Peak Season
	2019	2020	2021		2022	2023	2024	2025	2026	
Sunset Road *(Benton City P.O.D.)*										
SSR-1	4,155	4,553	4,011	0.0%	4,553	4,553	4,553	4,553	4,553	Winter
SSR-2	2,719	3,110	2,703	0.1%	3,111	3,112	3,113	3,114	3,116	Winter
SSR-3	5,209	4,672	4,414	0.0%	4,672	4,672	4,672	4,672	4,672	Summer
SSR-4	3,414	2,842	3,381	0.4%	3,385	3,391	3,396	3,402	3,407	Winter
Bay 1	15,496	15,176	14,510	0.1%	15,721	12,337	12,338	12,339	12,340	Winter
Note: RTA-2 load past L70R shifted to SSR-4 during 2021 peak for load banacing purposes.										
Vista *(Kennewick P.O.D.)*										
VTA-1	3,192	2,864	2,909	0.0%	2,909	2,909	2,909	2,909	2,909	Summer
VTA-2	3,047	3,095	2,813	0.0%	3,095	3,095	3,095	3,095	3,095	Winter
VTA-3	1,512	1,399	1,348	0.0%	1,399	1,399	1,399	1,399	1,399	Winter
VTA-4	4,239	5,126	5,872	0.0%	5,126	5,126	5,126	5,126	5,126	Summer
Bay 1	11,990	12,483	12,942	0.0%	12,528	12,528	12,528	12,528	12,528	Summer
VTA-5	5,063	5,051	5,010	0.0%	5,051	5,051	5,051	5,051	5,051	Winter
VTA-6	2,192	1,287	2,149	0.0%	2,149	2,149	2,149	2,149	2,149	Summer
VTA-7	7,064	6,100	6,119	0.0%	6,100	6,100	6,100	6,100	6,100	Summer
VTA-8	5,697	5,594	3,771	0.0%	6,630	6,630	6,630	6,630	6,630	Winter
Bay 2	20,017	18,033	17,049	0.0%	19,931	19,931	19,931	19,931	19,931	Winter
Note: Feeder VIS-8 partially off-loaded to ORV-2 during 2021 peak for load balancing.										
Zephyr Heights *(Kennewick P.O.D.)*										
ZEH-1	2,375	2,306	2,450	3.6%	2,494	2,551	2,607	2,663	2,719	Winter
ZEH-2	4,330	4,664	5,277	1.6%	4,684	4,709	4,734	4,759	4,784	Winter
ZEH-3	359	387	712	0.0%	712	712	712	712	712	Summer
Bay 1	7,064	7,357	8,439	5.2%	7,890	7,971	8,053	8,134	8,215	Winter
Continguous P.O.D. Totals (PUD Only)										
Benton City	21,659	21,515	20,799	2.7%	22,104	18,761	18,804	18,847	18,889	Winter
Hedges	22,423	21,462	21,217	7.2%	22,149	22,261	22,374	22,487	22,599	Winter
Kennewick	219,683	212,921	221,305	48.2%	222,548	218,194	218,953	219,712	220,471	Winter
Prosser	31,801	29,527	27,781	1.4%	29,246	29,268	29,290	29,312	29,334	Winter
Total	295,566	285,425	291,102	59.4%	296,046	288,484	289,421	290,357	291,293	Winter
Miscellaneous Substations & P.O.D.'s										
251 (DOE)	58	70	75	0.0%	87	87	87	87	87	
451B (Ligo)	1,025	978	2,023	0.0%	1,265	1,265	1,265	1,265	1,265	
Chevron	7,150	6,875	7,045	0.0%	8,210	8,210	8,210	8,210	8,210	
Cold Creek	2,910	2,156	3,568	0.0%	3,168	3,168	3,168	3,168	3,168	
Phillips #1,2,3	1,060	910	799	0.0%	1,120	1,120	1,120	1,120	1,120	
Total	12,203	10,989	13,510	0.0%	13,850	13,850	13,850	13,850	13,850	

Table B3
Feeder Metered Peak Amps Winter - 2021-2022

Feeder Id	AØ Amps	BØ Amps	CØ Amps	Avg. Amps	AØ Calc. kVA	BØ Calc. kVA	CØ Calc. kVA	Total Calc. kVA	Total Meas. kVA	Calc to Meas kVA % diff	Unbalance Amps
ANG-9	183	222	181	195	1362	1652	1347	4359	4379	0%	40
ANG-1	158	217	82	152	1176	1614	610	3400	3400	0%	117
ANG-2	295	201	192	229	2195	1495	1428	5118	5128	0%	99
ANG-3	228	207	222	219	1696	1540	1652	4888	4805	2%	19
ANG-4	158	179	141	159	1176	1332	1049	3556	3445	3%	33
ANG-5	263	221	268	251	1957	1644	1994	5594	5623	-1%	45
ANG-6	148	197	180	175	1101	1466	1339	3906	3926	-1%	43
ANG-7	180	184	148	171	1339	1369	1101	3809	3791	0%	34
ANG-8	170	221	220	204	1265	1644	1637	4545	4624	-2%	51
BEC-1	266	278	267	270	1979	2068	1986	6033	6105	-1%	12
BEC-2	238	200	228	222	1771	1488	1696	4955	4979	0%	34
CCR-1	21	9	9	13	156	67	67	290	330	-14%	12
ELY-1	241	182	180	201	1793	1354	1339	4486	4471	0%	60
ELY-2	117	103	120	113	870	766	893	2529	2525	0%	16
ELY-3	283	284	220	262	2106	2113	1637	5855	5855	0%	64
ELY-4	208	279	181	223	1548	2076	1347	4969	4966	0%	88
ELY-5	136	173	121	143	1012	1287	900	3199	3276	-2%	46
ELY-6	257	294	281	277	1912	2187	2091	6190	6179	0%	33
ELY-7	185	178	216	193	1376	1324	1607	4307	4311	0%	35
ELY-8	241	118	169	176	1793	878	1257	3928	3989	-2%	107
GUM-1	262	228	262	251	1949	1696	1949	5594	5571	0%	34
GUM-2	192	151	188	177	1428	1123	1399	3950	4102	-4%	39
GUM-3	171	237	281	245	1272	1763	2091	5468	5626	-3%	96
GUM-4	317	224	253	265	2358	1667	1882	5907	5922	0%	82
HEG-1	81	93	14	63	603	692	104	1399	1407	-1%	74
HEG-2	221	240	296	252	1644	1786	2202	5632	5662	-1%	68
HEG-3	243	160	176	193	1808	1190	1309	4307	4422	-3%	76
HEG-4	227	307	293	276	1689	2284	2180	6152	6585	-7%	74
HLS-1	238	177	172	196	1771	1317	1280	4367	4205	4%	64
HLS-2	166	139	143	149	1235	1034	1064	3333	3324	0%	25
HLS-3	282	254	251	262	2098	1890	1867	5855	5726	2%	30
HLS-4	191	265	174	210	1421	1972	1295	4687	4667	0%	84
HLS-5	202	161	129	164	1503	1198	960	3660	3610	1%	63
HLS-6	216	166	191	191	1607	1235	1421	4263	4282	0%	43
HLS-7	199	220	261	227	1481	1637	1942	5059	5069	0%	55
HLS-8	187	182	238	202	1391	1354	1771	4516	4542	-1%	54
HLS-9	266	208	234	236	1979	1548	1741	5267	5284	0%	50
KEN-1	250	244	273	256	1860	1815	2031	5706	5636	1%	27
KEN-2	201	208	211	207	1495	1548	1570	4612	5012	-9%	9
KEN-3	257	243	274	258	1912	1808	2039	5758	5795	-1%	27
KEN-4	221	255	190	222	1644	1897	1414	4955	5023	-1%	56
KEN-5	193	256	254	234	1436	1905	1890	5230	5346	-2%	62
KEN-6	216	243	195	218	1607	1808	1451	4865	4906	-1%	42
KEN-7	186	186	201	191	1384	1384	1495	4263	4370	-3%	15
KEN-8	331	315	295	314	2463	2344	2195	7000	6773	3%	31
KEN-9	150	141	186	159	1116	1049	1384	3549	3684	-4%	41
LES-1	247	293	270	270	1838	2180	2009	6026	6013	0%	40
LES-2	86	137	122	115	640	1019	908	2567	2549	1%	45
LES-3	149	71	190	137	1109	528	1414	3050	3055	0%	105
LES-4	0	78	57	45	0	580	424	1004	1030	-3%	70
ORV-2	155	156	146	152	1153	1161	1086	3400	3379	1%	10
ORV-3	264	221	277	254	1964	1644	2061	5669	5673	0%	51
ORV-4	111	112	125	116	826	833	930	2589	2562	1%	14
ORV-5	227	237	219	228	1689	1763	1629	5081	5025	1%	16
ORV-6	186	154	229	190	1384	1146	1704	4233	4285	-1%	65
PHL-6	4	7	6	6	30	52	45	126	169	-34%	3
PHL-7	180	173	160	171	1339	1287	1190	3816	3831	0%	18
PSR-1	152	167	149	156	1131	1242	1109	3482	3513	-1%	17
PSR-2	149	130	138	139	1109	967	1027	3102	3092	0%	17
PSR-3	226	258	202	229	1681	1920	1503	5103	5108	0%	49
PSR-4	245	157	223	208	1823	1168	1659	4650	4561	2%	79
PSR-5	47	54	35	45	350	402	260	1012	1035	-2%	17
PSR-6	220	200	218	213	1637	1488	1622	4746	4699	1%	19
RTA-1	225	216	202	214	1674	1607	1503	4783	4781	0%	20
RTA-2	441	365	425	410	3281	2716	3162	9158	9160	0%	69
RTA-3	272	124	158	185	2024	923	1176	4121	4112	0%	134
RTA-4	159	157	160	159	1183	1168	1190	3541	3534	0%	3
RVF-1	263	158	187	203	1957	1176	1391	4523	4572	-1%	94
RVF-2	28	14	14	19	208	104	104	417	538	-29%	14
RVF-3	205	195	188	196	1525	1451	1399	4374	4326	1%	15
SSR-1	224	128	144	165	1667	952	1071	3690	3682	0%	89
SSR-2	179	211	157	182	1332	1570	1168	4069	3961	3%	47
SSR-3	73	67	70	70	543	498	521	1562	1467	6%	5
SSR-4	124	158	240	174	923	1176	1786	3883	3825	2%	103
VTA-1	87	86	81	85	647	640	603	1890	1896	0%	6
VTA-2	152	178	124	151	1131	1324	923	3377	3329	1%	47
VTA-3	87	117	97	100	647	870	722	2239	2236	0%	26
VTA-4	196	203	240	213	1458	1510	1786	4754	4734	0%	41
VTA-5	237	246	202	228	1763	1830	1503	5096	5128	-1%	40
VTA-6	78	72	66	72	580	536	491	1607	1606	0%	10
VTA-7	209	200	196	202	1555	1488	1458	4501	4469	1%	12
VTA-8	287	237	266	263	2135	1763	1979	5877	5894	0%	43
ZEH-1	146	120	188	151	1086	893	1399	3377	3345	1%	59
ZEH-2	238	200	202	213	1771	1488	1503	4761	4716	1%	37
ZEH-3	35	10	10	18	260	74	74	409	400	2%	25

Table B4
Feeder Metered Peak Amps Winter - 2020-2021

Feeder Id	AØ Amps	BØ Amps	CØ Amps	Avg. Amps	AØ Calc. kVA	BØ Calc. kVA	CØ Calc. kVA	Total Calc. kVA	Total Meas. kVA	Calc to Meas kVA % diff	Unbalance Amps
ANG-9	185	197	179	187	1376	1466	1332	4173	4111	1%	16
ANG-1	146	195	83	141	1086	1451	618	3154	3127	1%	97
ANG-2	245	189	174	203	1823	1406	1295	4523	4419	2%	65
ANG-3	220	204	207	210	1637	1518	1540	4694	4674	0%	15
ANG-4	157	195	148	167	1168	1451	1101	3720	3601	3%	43
ANG-5	222	196	231	216	1652	1458	1719	4828	4824	0%	31
ANG-6	155	197	170	174	1153	1466	1265	3883	3861	1%	37
ANG-7	159	167	131	152	1183	1242	975	3400	3372	1%	33
ANG-8	144	215	213	191	1071	1600	1585	4255	4171	2%	70
BEC-1	242	222	242	235	1800	1652	1800	5252	5228	0%	20
BEC-2	225	149	173	182	1674	1109	1287	4069	4165	-2%	67
CCR-1	22	9	6	12	164	67	45	275	276	0%	15
ELY-1	199	153	139	164	1481	1138	1034	3653	3660	0%	54
ELY-2	96	83	101	93	714	618	751	2083	2158	-4%	16
ELY-3	251	282	186	240	1867	2098	1384	5349	5318	1%	85
ELY-4	155	237	159	184	1153	1763	1183	4099	4074	1%	80
ELY-5	107	170	93	123	796	1265	692	2753	2758	0%	71
ELY-6	216	240	229	228	1607	1786	1704	5096	5233	-3%	21
ELY-7	133	152	195	160	990	1131	1451	3571	3686	-3%	55
ELY-8	201	116	149	155	1495	863	1109	3467	3516	-1%	74
GUM-1	267	290	223	260	1986	2158	1659	5803	5784	0%	59
GUM-2	159	119	134	137	1183	885	997	3065	3011	2%	35
GUM-3	171	182	219	191	1272	1354	1629	4255	4245	0%	44
GUM-4	305	203	261	256	2269	1510	1942	5721	5647	1%	89
HEG-1	75	91	18	61	558	677	134	1369	1364	0%	66
HEG-2	191	219	250	220	1421	1629	1860	4910	4960	-1%	51
HEG-3	215	161	153	176	1600	1198	1138	3935	3960	-1%	58
HEG-4	239	241	225	235	1778	1793	1674	5245	5318	-1%	15
HLS-1	199	156	159	171	1481	1161	1183	3824	3534	8%	42
HLS-2	149	114	140	134	1109	848	1042	2998	2999	0%	31
HLS-3	256	240	229	242	1905	1786	1704	5394	5292	2%	24
HLS-4	145	230	164	180	1079	1711	1220	4010	3986	1%	77
HLS-5	170	121	115	135	1265	900	856	3020	3000	1%	52
HLS-6	197	141	166	168	1466	1049	1235	3749	3750	0%	49
HLS-7	193	200	236	210	1436	1488	1756	4679	4694	0%	40
HLS-8	159	155	208	174	1183	1153	1548	3883	3903	-1%	51
HLS-9	213	170	198	194	1585	1265	1473	4322	4302	0%	38
KEN-1	157	159	206	174	1168	1183	1533	3883	3881	0%	48
KEN-2	177	193	213	194	1317	1436	1585	4337	4350	0%	31
KEN-3	230	215	274	240	1711	1600	2039	5349	5362	0%	53
KEN-4	216	263	198	226	1607	1957	1473	5036	5016	0%	58
KEN-5	166	184	225	192	1235	1369	1674	4278	4272	0%	52
KEN-6	228	229	202	220	1696	1704	1503	4903	4910	0%	27
KEN-7	179	171	201	184	1332	1272	1495	4099	4044	1%	27
KEN-8	314	302	267	294	2336	2247	1986	6569	6553	0%	42
KEN-9	142	112	140	131	1056	833	1042	2931	2890	1%	29
LES-1	196	198	206	200	1458	1473	1533	4464	4448	0%	9
LES-2	101	115	135	117	751	856	1004	2611	2620	0%	30
LES-3	114	61	178	118	848	454	1324	2626	2568	2%	101
LES-4	29	103	67	66	216	766	498	1480	1467	1%	64
ORV-2	208	172	204	195	1548	1280	1518	4345	4374	-1%	34
ORV-3	188	194	186	189	1399	1443	1384	4226	4516	-7%	7
ORV-4	120	113	109	114	893	841	811	2544	2487	2%	10
ORV-5	188	201	172	187	1399	1495	1280	4173	4242	-2%	25
ORV-6	170	130	199	166	1265	967	1481	3712	3787	-2%	60
PHL-6	4	7	6	6	30	52	45	126	169	-34%	3
PHL-7	299	186	167	171	2225	1384	1242	3816	3983	-4%	124
PSR-1	163	175	154	164	1213	1302	1146	3660	3598	2%	18
PSR-2	131	122	150	134	975	908	1116	2998	2926	2%	25
PSR-3	213	238	204	218	1585	1771	1518	4873	4826	1%	31
PSR-4	224	159	208	197	1667	1183	1548	4397	4355	1%	59
PSR-5	46	56	39	47	342	417	290	1049	1045	0%	15
PSR-6	209	165	193	189	1555	1228	1436	4218	4181	1%	39
RTA-1	177	166	161	168	1317	1235	1198	3749	3720	1%	14
RTA-2	347	301	349	332	2582	2239	2597	7417	7376	1%	47
RTA-3	144	173	107	141	1071	1287	796	3154	3056	3%	57
RTA-4	163	138	178	160	1213	1027	1324	3563	3434	4%	35
RVF-1	234	163	176	191	1741	1213	1309	4263	4320	-1%	65
RVF-2	29	29	10	9	216	216	74	201	500	-149%	19
RVF-3	191	189	215	171	1421	1406	1600	3816	4166	-9%	25
SSR-1	165	202	110	126	1228	1503	818	2812	3241	-15%	80
SSR-2	153	135	160	120	1138	1004	1190	2678	3215	-20%	22
SSR-3	77	104	105	106	573	774	781	2366	2376	0%	28
SSR-4	81	98	101	97	603	729	751	2165	2314	-7%	19
VTA-1	81	73	76	72	603	543	565	1607	1778	-11%	7
VTA-2	164	156	159	97	1220	1161	1183	2165	3007	-39%	7
VTA-3	102	91	80	85	759	677	595	1897	1915	-1%	19
VTA-4	209	214	189	225	1555	1592	1406	5022	4567	9%	23
VTA-5	209	191	222	180	1555	1421	1652	4017	4474	-11%	27
VTA-6	66	56	62	59	491	417	461	1317	1315	0%	9
VTA-7	192	180	163	160	1428	1339	1213	3571	3687	-3%	25
VTA-8	265	242	224	230	1972	1800	1667	5133	5254	-2%	36
ZEH-1	134	115	103	145	997	856	766	3236	2673	17%	27
ZEH-2	197	188	179	183	1466	1399	1332	4084	4032	1%	16
ZEH-3	32	36	24	29	238	268	179	647	400	38%	11

Table B5
Feeder Metered Peak Amps Summer - 2021

Feeder Id	AØ Amps	BØ Amps	CØ Amps	Avg. Amps	AØ Calc. kVA	BØ Calc. kVA	CØ Calc. kVA	Total Calc. kVA	Total Meas. kVA	Calc to Meas kVA % diff	Unbalance Amps
ANG-9	272	343	327	314	2024	2552	2433	7008	6883	2%	65
ANG-1	122	166	78	122	908	1235	580	2723	2687	1%	76
ANG-2	213	169	160	181	1585	1257	1190	4032	3972	1%	49
ANG-3	231	178	188	199	1719	1324	1399	4441	4369	2%	49
ANG-4	108	127	105	113	804	945	781	2529	1680	34%	21
ANG-5	259	288	283	277	1927	2143	2106	6175	6091	1%	27
ANG-6	158	198	181	179	1176	1473	1347	3995	3952	1%	35
ANG-7	225	244	216	228	1674	1815	1607	5096	5084	0%	25
ANG-8	0	0	0	0	0	0	0	0	0	#DIV/0!	0
BEC-1	169	171	162	167	1257	1272	1205	3735	3783	-1%	8
BEC-2	166	109	142	139	1235	811	1056	3102	3092	0%	50
BEC-3	0	0	0	0	0	0	0	0	0	#DIV/0!	0
BEC-4	0	0	0	0	0	0	0	0	0	#DIV/0!	0
CCR-1	202	196	198	199	1503	1458	1473	4434	4232	5%	5
ELY-1	155	116	106	126	1153	863	789	2805	2865	-2%	45
ELY-2	86	86	78	83	640	640	580	1860	1871	-1%	8
ELY-3	332	342	260	311	2470	2544	1934	6948	6995	-1%	77
ELY-4	200	258	188	215	1488	1920	1399	4806	4823	0%	65
ELY-5	183	223	171	192	1362	1659	1272	4292	4229	1%	47
ELY-6	218	200	245	221	1622	1488	1823	4932	4890	1%	39
ELY-7	214	257	248	240	1592	1912	1845	5349	5177	3%	39
ELY-8	167	120	155	147	1242	893	1153	3288	3492	-6%	42
GUM-1	161	149	149	153	1198	1109	1109	3415	3408	0%	12
GUM-2	136	104	114	118	1012	774	848	2634	2597	1%	28
GUM-3	146	150	160	152	1086	1116	1190	3392	3344	1%	12
GUM-4	250	210	216	225	1860	1562	1607	5029	5095	-1%	37
HEG-1	43	65	11	40	320	484	82	885	876	1%	47
HEG-2	231	237	250	239	1719	1763	1860	5341	5405	-1%	17
HEG-3	162	110	116	129	1205	818	863	2886	3869	-34%	49
HEG-4	205	215	187	202	1525	1600	1391	4516	4468	1%	25
HLS-1	173	126	116	138	1287	937	863	3087	3040	2%	53
HLS-2	313	253	268	278	2329	1882	1994	6204	5969	4%	54
HLS-3	295	271	267	278	2195	2016	1986	6197	6111	1%	26
HLS-4	141	206	130	159	1049	1533	967	3549	3542	0%	71
HLS-5	327	264	253	281	2433	1964	1882	6279	6003	4%	69
HLS-6	196	166	165	176	1458	1235	1228	3921	3789	3%	31
HLS-7	173	173	197	181	1287	1287	1466	4040	4064	-1%	24
HLS-8	137	125	166	143	1019	930	1235	3184	3185	0%	37
HLS-9	233	274	174	227	1734	2039	1295	5066	4961	2%	87
KEN-1	212	221	242	225	1577	1644	1800	5022	5244	-4%	27
KEN-2	142	156	175	158	1056	1161	1302	3519	3442	2%	29
KEN-3	222	217	254	231	1652	1614	1890	5155	5075	2%	35
KEN-4	191	238	177	202	1421	1771	1317	4508	4490	0%	55
KEN-5	131	166	174	157	975	1235	1295	3504	3436	2%	40
KEN-6	337	331	289	319	2507	2463	2150	7119	6925	3%	45
KEN-7	229	199	241	223	1704	1481	1793	4977	4932	1%	37
KEN-8	270	257	231	253	2009	1912	1719	5639	5674	-1%	34
KEN-9	167	153	172	164	1242	1138	1280	3660	3632	1%	17
LES-1	160	165	179	168	1190	1228	1332	3749	3738	0%	17
LES-2	157	223	174	185	1168	1659	1295	4121	4111	0%	59
LES-3	79	43	102	75	588	320	759	1666	1644	1%	52
LES-4	59	117	77	84	439	870	573	1882	1857	1%	51
ORV-2	250	295	303	283	1860	2195	2254	6309	6290	0%	49
ORV-3	211	188	219	206	1570	1399	1629	4598	4534	1%	28
ORV-4	195	206	183	195	1451	1533	1362	4345	4284	1%	20
ORV-5	196	206	192	198	1458	1533	1428	4419	4472	-1%	12
ORV-6	263	254	267	261	1957	1890	1986	5832	5735	2%	12
PHL-6	254	264	254	257	1890	1964	1890	5743	5557	3%	10
PHL-7	173	166	157	165	1287	1235	1168	3690	3719	-1%	14
PSR-1	191	204	190	195	1421	1518	1414	4352	4299	1%	14
PSR-2	127	106	130	121	945	789	967	2700	2803	-4%	23
PSR-3	267	255	238	253	1986	1897	1771	5654	5501	3%	25
PSR-4	265	207	269	247	1972	1540	2001	5513	5298	4%	60
PSR-5	0	0	0	0	0	0	0	0	0	#DIV/0!	0
PSR-6	190	168	175	178	1414	1250	1302	3965	3873	2%	19
RTA-1	128	126	122	125	952	937	908	2797	2735	2%	5
RTA-2	295	264	303	287	2195	1964	2254	6413	6222	3%	36
RTA-3	103	149	75	109	766	1109	558	2433	2375	2%	65
RTA-4	106	90	109	102	789	670	811	2269	2274	0%	18
RVF-1	216	223	161	175	1607	1659	1198	3906	4161	-7%	59
RVF-2	29	25	13	22	216	186	97	498	475	5%	14
RVF-3	166	162	157	162	1235	1205	1168	3608	3755	-4%	8
SSR-1	232	166	188	195	1726	1235	1399	4359	4250	3%	58
SSR-2	129	146	120	132	960	1086	893	2939	2944	0%	23
SSR-3	218	212	215	215	1622	1577	1600	4798	4321	10%	5
SSR-4	156	173	165	165	1161	1287	1228	3675	3679	0%	15
VTA-1	140	146	139	142	1042	1086	1034	3162	3095	2%	7
VTA-2	156	149	106	137	1161	1109	789	3058	3068	0%	47
VTA-3	68	65	64	66	506	484	476	1466	1453	1%	4
VTA-4	286	290	282	286	2128	2158	2098	6383	6263	2%	7
VTA-5	235	263	234	244	1748	1957	1741	5446	5491	-1%	29
VTA-6	106	107	101	105	789	796	751	2336	2340	0%	6
VTA-7	302	296	296	298	2247	2202	2202	6651	6612	1%	6
VTA-8	200	172	179	184	1488	1280	1332	4099	4090	0%	25
ZEH-1	140	86	132	119	1042	640	982	2663	2587	3%	50
ZEH-2	291	261	219	257	2165	1942	1629	5736	5691	1%	63
ZEH-3	40	30	34	35	298	223	253	774	763	1%	9

Table B6
Feeder Metered Peak Amps Summer - 2020

Feeder Id	AØ Amps	BØ Amps	CØ Amps	Avg. Amps	AØ Calc. kVA	BØ Calc. kVA	CØ Calc. kVA	Total Calc. kVA	Total Meas. kVA	Calc to Meas kVA % diff	Unbalance Amps
ANG-9	149	167	165	160	1109	1242	1228	3578	3558	1%	17
ANG-1	167	196	150	171	1242	1458	1116	3816	3776	1%	40
ANG-2	174	160	140	158	1295	1190	1042	3526	3486	1%	30
ANG-3	201	159	183	181	1495	1183	1362	4040	3971	2%	36
ANG-4	158	180	143	160	1176	1339	1064	3578	3461	3%	32
ANG-5	169	150	151	157	1257	1116	1123	3496	3501	0%	19
ANG-6	146	196	167	170	1086	1458	1242	3787	3769	0%	43
ANG-7	133	135	129	132	990	1004	960	2953	2961	0%	5
ANG-8	122	189	149	153	908	1406	1109	3422	3451	-1%	58
BEC-1	157	157	156	157	1168	1168	1161	3496	3493	0%	1
BEC-2	148	99	135	127	1101	737	1004	2842	2811	1%	44
CCR-1	182	185	176	181	1354	1376	1309	4040	3986	1%	8
ELY-1	150	121	100	124	1116	900	744	2760	2801	-1%	43
ELY-2	79	81	72	77	588	603	536	1726	1748	-1%	8
ELY-3	299	297	214	270	2225	2210	1592	6026	6071	-1%	84
ELY-4	327	325	330	327	2433	2418	2455	7305	7343	-1%	4
ELY-5	231	243	210	228	1719	1808	1562	5088	5057	1%	29
ELY-6	0	0	0	0	0	0	0	0	0	#DIV/0!	0
ELY-7	0	0	0	0	0	0	0	0	0	#DIV/0!	0
ELY-8	159	106	148	138	1183	789	1101	3072	3216	-5%	48
GUM-1	222	183	238	214	1652	1362	1771	4783	4837	-1%	49
GUM-2	188	200	182	190	1399	1488	1354	4240	4221	0%	16
GUM-3	133	141	151	142	990	1049	1123	3162	3182	-1%	16
GUM-4	236	192	212	213	1756	1428	1577	4761	4768	0%	38
HEG-1	40	51	11	34	298	379	82	759	815	-7%	36
HEG-2	183	191	223	199	1362	1421	1659	4441	4466	-1%	37
HEG-3	158	102	117	126	1176	759	870	2805	2864	-2%	50
HEG-4	185	201	181	189	1376	1495	1347	4218	4208	0%	18
HLS-1	183	144	126	151	1362	1071	937	3370	3342	1%	50
HLS-2	290	261	269	273	2158	1942	2001	6100	5839	4%	26
HLS-3	239	214	202	218	1778	1592	1503	4873	4615	5%	33
HLS-4	133	196	108	146	990	1458	804	3251	3253	0%	79
HLS-5	412	327	261	333	3065	2433	1942	7439	7238	3%	131
HLS-6	148	115	142	135	1101	856	1056	3013	2972	1%	30
HLS-7	165	168	193	175	1228	1250	1436	3913	3913	0%	27
HLS-8	266	215	275	252	1979	1600	2046	5624	5622	0%	56
HLS-9	207	245	156	203	1540	1823	1161	4523	4524	0%	77
KEN-1	187	183	203	191	1391	1362	1510	4263	4277	0%	18
KEN-2	127	182	192	167	945	1354	1428	3727	3726	0%	61
KEN-3	206	183	215	201	1533	1362	1600	4493	4436	1%	29
KEN-4	181	238	176	198	1347	1771	1309	4426	4379	1%	60
KEN-5	249	238	249	245	1853	1771	1853	5475	5450	0%	11
KEN-6	240	226	199	222	1786	1681	1481	4947	4854	2%	36
KEN-7	157	160	177	165	1168	1190	1317	3675	3512	4%	19
KEN-8	245	219	192	219	1823	1629	1428	4880	4841	1%	46
KEN-9	112	85	114	104	833	632	848	2314	2325	0%	28
LES-1	145	154	152	150	1079	1146	1131	3355	3341	0%	8
LES-2	160	225	149	178	1190	1674	1109	3973	3979	0%	71
LES-3	81	44	109	78	603	327	811	1741	1687	3%	56
LES-4	19	63	39	40	141	469	290	900	896	0%	38
ORV-2	96	121	108	108	714	900	804	2418	2460	-2%	22
ORV-3	174	160	183	172	1295	1190	1362	3846	3903	-1%	20
ORV-4	0	0	0	0	0	0	0	0	0	0%	0
ORV-5	188	202	181	190	1399	1503	1347	4248	4307	-1%	19
ORV-6	248	252	262	254	1845	1875	1949	5669	5544	2%	12
PHL-6	264	272	259	265	1964	2024	1927	5914	5725	3%	11
PHL-7	159	147	141	149	1183	1094	1049	3325	3376	-2%	16
PSR-1	192	205	193	197	1428	1525	1436	4389	4376	0%	13
PSR-2	132	109	125	122	982	811	930	2723	2715	0%	20
PSR-3	225	231	211	222	1674	1719	1570	4962	4852	2%	18
PSR-4	262	210	256	243	1949	1562	1905	5416	5175	4%	49
PSR-5	32	48	26	35	238	357	193	789	794	-1%	20
PSR-6	186	157	161	168	1384	1168	1198	3749	3647	3%	27
RTA-1	95	110	97	101	707	818	722	2247	2196	2%	14
RTA-2	284	282	275	280	2113	2098	2046	6256	6038	3%	8
RTA-3	114	161	109	128	848	1198	811	2857	2812	2%	50
RTA-4	90	85	93	89	670	632	692	1994	1982	1%	7
RVF-1	216	162	223	200	183	1205	1659	4471	4275	4%	58
RVF-2	28	4	4	12	208	30	30	268	469	-75%	24
RVF-3	121	130	120	124	900	967	893	2760	2725	1%	10
SSR-1	209	232	171	204	1555	1726	1272	4553	4423	3%	53
SSR-2	102	156	160	139	759	1161	1190	3110	3380	-9%	56
SSR-3	225	205	198	209	1674	1525	1473	4672	4479	4%	24
SSR-4	147	113	122	127	1094	841	908	2842	2587	9%	31
VTA-1	141	119	125	128	1049	885	930	2864	2758	4%	20
VTA-2	144	139	133	139	1071	1034	990	3095	2703	13%	10
VTA-3	67	58	63	63	498	432	469	1399	1388	1%	8
VTA-4	180	259	250	230	1339	1927	1860	5126	5446	-6%	75
VTA-5	214	224	241	226	1592	1667	1793	5051	5134	-2%	24
VTA-6	56	60	57	58	417	446	424	1287	1314	-2%	4
VTA-7	279	273	268	273	2076	2031	1994	6100	6105	0%	10
VTA-8	264	240	248	251	1964	1786	1845	5594	5588	0%	21
ZEH-1	131	73	106	103	975	543	789	2306	2249	2%	50
ZEH-2	230	198	199	209	1711	1473	1481	4664	4612	1%	32
ZEH-3	19	11	22	17	141	82	164	387	382	1%	10

Appendix C

Bank Peaks

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Table C1
Bank Loading - Winter

SUBSTATION BANK	Winter Rating (Amps)		Winter Rating (KVA)		17/18	18/19	19/20	20/21	21/22	Projected Peak (kVA)[2]		% of Normal Winter Rating		% of Emer. Winter Rating	
	Normal	Emer.	Normal	Emer.	18°F	-1°F	10°F	18°F	7°F	22/23	24/25	22/23	24/25	22/23	24/25
Angus #1 (A3,A4,A5)	1235	1482	26,674	32,009	12,540	15,320	13,200	13,040	13,730	15,886	15,886	60%	60%	50%	50%
Angus #2 (A6,A7,A8)	1235	1482	26,674	32,009	11,460	12,890	11,350	10,730	12,010	13,434	13,445	50%	50%	42%	42%
Angus #3 (A9,A1,A2)	1235	1482	26,674	32,009	11,040	13,160	11,340	11,120	12,510	13,929	13,929	52%	52%	44%	44%
Benton City	1436	1616	31,016	34,903	8,410	10,890	9,212	8,979	10,493	11,759	11,869	38%	38%	34%	34%
Cold Creek	367	440	7,927	9,503	254	856	246	246	288	751	751	9%	9%	8%	8%
Ely #1	1296	1555	27,992	33,586	14,410	17,500	15,070	14,550	17,090	18,824	19,040	67%	68%	56%	57%
Ely #2	1296	1555	27,992	33,586	14,830	17,170	15,060	14,289	16,762	19,743	19,748	71%	71%	59%	59%
Gum Street	1296	1500	27,992	32,398	17,010	21,420	17,470	16,720	21,318	22,012	22,084	79%	79%	68%	68%
Hedges	1235	1389	26,674	30,001	13,580	17,240	15,510	14,060	17,430	15,581	15,681	58%	59%	52%	52%
Highlands #1	1235	1372	26,674	29,633	10,300	12,325	11,300	10,925	12,150	14,617	17,131	55%	64%	49%	58%
Highlands #2	1235	1372	26,674	29,633	9,500	11,550	10,150	10,025	11,700	11,348	11,922	43%	45%	38%	40%
Highlands #3	1235	1460	26,674	31,534	12,775	15,125	12,225	12,450	14,200	15,968	16,048	60%	60%	51%	51%
Kennewick #1	1235	1248	26,674	26,955	13,030	15,020	13,200	12,730	13,600	14,400	14,405	54%	54%	53%	53%
Kennewick #2	1235	1248	26,674	26,955	13,210	15,710	13,810	13,600	14,420	15,441	15,488	58%	58%	57%	57%
Kennewick #3	1235	1248	26,674	26,955	12,130	14,420	13,180	13,090	14,900	13,197	13,238	49%	50%	49%	49%
Leslie Road	1296	1555	27,992	33,586	17,094	4,620	10,295	10,215	11,833	9,488	9,573	34%	34%	28%	29%
Orchard View #1	1280	1440	27,646	31,102	18,320	20,500	9,570	7,644	9,616	17,324	18,086	63%	65%	56%	58%
Orchard View #2	1296	1555	27,992	33,586	8,577	0	8,082	6,617	8,001	10,163	10,386	36%	37%	30%	31%
Phillips #4	1296	1555	27,992	33,586	3,130	3,530	3,680	6,360	3,660	4,490	4,746	16%	17%	13%	14%
Prosser #1	962	1097	20,778	23,694	10,340	12,800	10,690	10,240	10,690	13,218	13,226	64%	64%	56%	56%
Prosser #2 (Includes BREA)	962	1154	20,778	24,925	17,560	21,600	18,120	16,800	16,800	18,701	18,987	90%	91%	75%	76%
Reata	1235	1482	26,674	32,009	18,420	21,090	15,740	15,980	20,650	19,573	19,778	73%	74%	61%	62%
Riverfront	1296	1555	27,992	33,586	7,275	8,850	8,150	7,700	8,625	8,767	8,816	31%	31%	26%	26%
Sunset Road	1235	1440	26,674	31,102	7,490	11,720	13,130	8,200	11,050	11,456	11,460	43%	43%	37%	37%
Vista #1	1296	1512	27,992	32,657	10,950	13,450	13,700	10,450	11,250	11,949	11,949	43%	43%	37%	37%
Vista #2	1296	1555	27,992	33,586	16,550	17,400	14,850	14,350	15,900	15,079	15,079	54%	54%	45%	45%
Zephyr Heights	1280	1440	27,646	31,102	6,900	7,700	6,700	6,700	8,000	8,787	9,023	32%	33%	28%	29%
Total Benton City POD (includes REA)					15,900	22,610	22,342	17,179	21,543	23,215	23,329				
Total Hedges POD					16,710	20,770	19,190	20,420	21,090	20,071	20,427				
Total Kennewick POD					240,469	266,370	228,210	218,608	251,639	244,185	275,852				
Total Prosser POD (includes REA)					35,175	43,250	36,960	34,740	36,115	40,686	41,030				
Total 5-Year Plan Loads					308,254	353,000	306,702	290,947	330,387	328,157	360,637				

Note:

1. Historical peaks are non-coincidental from BPA meters. Loss factors were applied for 06/07, 07/08 but not in other years.
2. Projected peaks are the summation of feeder non-coincidental peak projections.
3. Phillips Bay 4 was added due to the addition of PHI-7 feeder, which offloaded some of Hedges.

Table C2
Bank Loading - Summer

SUBSTATION BANK	Summer Rating (Amps)		Summer Rating (KVA)		2017	2018	2019	2020	2021	Projected Peak (kVA)[2]		% of Normal Summer Rating		% of Emer. Summer Rating	
	Normal	Emer.	Normal	Emer.	104°F	106°F	103°F	108°F	110°F	2022	2026	2022	2026	2022	2026
Angus #1 (A3,A4,A5)	933	1037	20,152	22,398	11,310	11,200	11,080	10,900	14,050	13,537	13,537	67%	67%	60%	60%
Angus #2 (A6,A7,A8)	933	1037	20,152	22,398	10,170	10,250	13,430	10,030	9,070	11,755	11,772	58%	58%	52%	53%
Angus #3 (A9,A1,A2)	933	1037	20,152	22,398	8,820	8,880	9,010	9,430	13,090	11,631	11,631	58%	58%	52%	52%
Benton City	744	827	16,069	17,862	5,660	5,780	5,600	6,152	6,629	6,704	6,836	42%	43%	38%	38%
Cold Creek	330	367	7,128	7,927	3,756	3,936	3,564	3,960	4,112	4,112	4,112	58%	58%	52%	52%
Ely #1	1041	1157	22,484	24,990	13,550	13,500	12,840	15,880	15,970	16,231	14,397	72%	64%	65%	58%
Ely #2	1166	1296	25,184	27,992	15,160	15,460	15,520	14,933	16,906	16,907	16,128	67%	64%	60%	58%
Gum Street	1166	1296	25,184	27,992	12,150	12,990	12,180	16,000	14,081	14,285	14,377	57%	57%	51%	51%
Hedges	833	926	17,992	20,000	10,950	11,210	11,180	11,920	12,900	13,145	13,278	73%	74%	66%	66%
Highlands #1	834	927	18,013	20,022	11,525	12,725	14,750	12,375	14,450	15,439	15,713	86%	87%	77%	78%
Highlands #2	834	927	18,013	20,022	9,600	9,425	9,450	12,900	12,475	12,629	10,650	70%	59%	63%	53%
Highlands #3	1040	1155	22,463	24,946	11,300	11,250	11,000	13,600	12,425	12,664	12,777	56%	57%	51%	51%
Kennewick #1	860	1090	18,575	23,543	11,370	13,430	10,640	11,220	11,560	11,782	12,849	63%	69%	50%	55%
Kennewick #2	1111	1128	23,996	24,363	12,980	12,980	12,660	13,370	14,230	14,527	14,590	61%	61%	60%	60%
Kennewick #3	933	1037	20,152	22,398	9,950	9,940	13,870	10,440	11,340	11,349	11,394	56%	57%	51%	51%
Leslie Road	1166	1296	25,184	27,992	0	0	10,396	7,832	8,961	9314	9424	37%	37%	33%	34%
Orchard View #1	1130	1296	24,407	27,992	15,060	15,480	15,030	6,081	11,054	8,530	9,153	35%	38%	30%	33%
Orchard View #2	1166	1296	25,184	27,992	0	0	0	9,357	9,005	11276	11553	45%	46%	40%	41%
Phillips #4	1130	1296	24,407	27,992	8,180	10,880	8,280	8,210	8,490	9,169	9,483	38%	39%	33%	34%
Prosser #1	667	741	14,406	16,005	10,940	11,140	12,810	10,970	11,810	12,053	12,063	84%	84%	75%	75%
Prosser #2 (Includes BREA)	827	827	17,862	17,862	19,250	17,290	16,420	16,660	17,090	18,333	18,682	103%	105%	103%	105%
Reata	1040	1155	22,463	24,946	15,710	16,570	12,770	12,240	13,220	14,280	14,545	64%	65%	57%	58%
Riverfront	1130	1296	24,407	27,992	6,125	6,375	6,300	6,525	7,650	7,656	7,724	31%	32%	27%	28%
Sunset Road	1112	1235	24,018	26,674	12,040	12,040	13,980	15,010	13,430	14,551	11,422	61%	48%	55%	43%
Vista #1	1166	1296	25,184	27,992	11,550	11,100	12,050	12,950	11,900	11,519	11,519	46%	46%	41%	41%
Vista #2	1130	1296	24,407	27,992	19,150	18,900	18,350	18,200	18,750	21,919	21,919	90%	90%	78%	78%
Zephyr Heights	1166	1296	25,184	27,992	5,900	6,400	6,100	10,900	9,800	9,163	9,540	36%	38%	33%	34%
Total Benton City POD (includes REA)					17,700	17,820	19,580	21,162	20,059	21,255	18,258				
Total Hedges POD					19,130	22,090	19,460	20,130	21,390	22,314	13,400				
Total Kennewick POD					205,255	210,480	221,126	219,281	233,332	237,459	235,915				
Total Prosser POD (includes REA)					36,315	34,805	35,530	34,155	36,550	38,042	38,470				
Total 5-Year Plan Loads					278,400	285,195	295,696	294,728	311,331	319,069	306,043				

Note:

1. Historical peaks are non-coincidental from BPA meters. Loss factors were applied for 2006, 2007 but not for other years.
2. Projected peaks are the summation of feeder non-coincidental peak projections scaled by calculated coincidence factors

Table C3 Bank Peaks - Winter 2021-2022								
		During BPUD System Peak[1]	Non-Coincidental Bank Peak					Non-Coincidental Feeder Peaks
Meter #	Substation Bay	(kW)	(kW)	(kvar)	Date	Hour	PF	(kVA)
854	Angus #1 (A3, A4, A5)	13,730	13,730	170	1/1/2022	7	100.0%	17,407
855	Angus #2 (A6, A7, A8)	11,660	12,010	-500	1/1/2022	9	99.9%	15,202
1074	Angus #3 (A9, A1, A2)	12,260	12,510	-110	1/1/2022	9	100.0%	15,968
221+213	Benton City (includes REA)	10,493	10,493	1,105	1/1/2022	7	99.5%	15,625
94	Cold Creek	280	288	0	1/1/2022	6	100.0%	360
913	Ely #1	17,010	17,090	750	1/1/2022	9	99.9%	22,121
940	Ely #2	16,748	16,762	1,330	1/1/2022	9	99.7%	21,853
1106	Gum Street	21,318	21,318	1,667	1/1/2022	7	99.7%	22,057
119	Hedges	17,340	17,430	720	1/1/2022	7	99.9%	17,826
1120	Highlands #1	12,125	12,150	0	1/1/2022	8	100.0%	16,808
945	Highlands #2	11,550	11,700	700	1/1/2022	9	99.8%	15,636
946	Highlands #3	14,050	14,200	975	1/1/2022	8	99.8%	18,403
173	Kennewick #1	13,140	13,600	520	1/2/2022	20	99.9%	18,022
175	Kennewick #2	14,420	14,420	0	1/1/2022	7	100.0%	16,032
1111	Kennewick #3	14,900	14,900	270	1/1/2022	7	100.0%	14,882
4892	Leslie Road	11,802	11,833	879	1/1/2022	8	99.7%	12,647
2034	Orchard View #1	9,526	9,616	131	1/1/2022	8	100.0%	14,455
4979	Orchard View #2	6,544	8,001	-964	1/4/2022	17	99.3%	11,549
4111	Phillips Bay 4	3,540	3,660	-150	1/27/2022	10	99.9%	4,889
870	Prosser #1	8,580	10,690	280	1/4/2022	9	100.0%	14,492
869+190	Prosser #2 (Includes REA)	16,350	16,800	40	2/23/2022	7	100.0%	20,295
1156	Reata	20,650	20,650	830	1/1/2022	7	99.9%	21,604
1789	Riverfront	7,450	8,625	675	2/23/2022	7	99.7%	10,304
2628	Sunset Road	9,760	11,050	1,240	2/23/2022	7	99.4%	14,547
966	Vista #1	10,900	11,250	150	1/1/2022	10	100.0%	12,714
967	Vista #2	15,700	15,900	1,650	1/1/2022	8	99.5%	18,114
3150	Zephyr Heights	7,900	8,000	500	1/1/2022	8	99.8%	10,599
Subtotal - 5 Year Plan Loads (includes REA)		**329,726**	**338,676**					**414,411**
921	Chevron	6,850	7,145	1,920	11/24/2021	9	96.6%	
799	Phillips #1	870	1,050	820	12/8/2021	6	78.8%	
800	Phillips #2	0	0	0	-	-	N/A	
801	Phillips #3	0	0	0	-	-	N/A	
355	251 (4th Street)	123	142	-6	1/1/2022	5	99.9%	
2023	451B LIGO 1	1,136	1,340	-396	2/23/2022	6	95.9%	
x	River System	1,852						
Subtotal - Non 5 Year Plan Loads		**10,831**						
Total - System (without losses)		**340,557**						

Note:
1. Winter 21/22 system peak 340,557 kW in HE7, January 1, 2022. Low in hour temperature of 2°F, low daily temp of -5°F.
2. REA total load during BPUD System Peak = 7,260 kW, (Benton City = 0; Prosser = 7,260), total system without REA = 333,297 kW (no losses).

Table C4
Bank Peaks - Winter 2020-2021

Meter #	Substation Bay	During BPUD System Peak[1] (kW)	Non-Coincidental Bank Peak (kW)	(kvar)	Date	Hour	PF	Non-Coincidental Feeder Peaks (kVA)
854	Angus #1 (A3, A4, A5)	13,040	13,040	330	2/12/2021	9	100.0%	16,420
855	Angus #2 (A6, A7, A8)	10,660	10,730	220	2/12/2002	19	100.0%	14,308
1074	Angus #3 (A9, A1, A2)	11,120	11,120	-180	2/12/2021	9	100.0%	14,695
221+213	Benton City (includes REA)	8,937	8,979	743	2/12/2021	8	99.7%	13,559
94	Cold Creek	228	246	0	2/10/2021	8	100.0%	341
913	Ely #1	14,510	14,550	620	2/12/2021	10	99.9%	18,828
940	Ely #2	14,289	14,289	1,349	2/12/2021	9	99.6%	18,459
1106	Gum Street	16,710	16,720	1,520	2/12/2021	8	99.6%	23,366
119	Hedges	13,880	14,060	640	2/20/2021	8	99.9%	19,169
1120	Highlands #1	10,925	10,925	0	2/12/2021	9	100.0%	15,147
945	Highlands #2	10,025	10,025	725	2/12/2021	9	99.7%	13,367
946	Highlands #3	12,450	12,450	950	2/12/2021	9	99.7%	15,977
173	Kennewick #1	12,070	12,730	900	2/12/2021	19	99.8%	16,826
175	Kennewick #2	13,300	13,600	0	2/12/2021	10	100.0%	17,629
1111	Kennewick #3	13,030	13,090	270	2/12/2021	10	100.0%	16,863
4892	Leslie Road	9,960	10,215	869	2/12/2021	8	99.6%	13,865
2034	Orchard View #1	6,972	7,644	-479	11/3/2020	7	99.8%	13,782
4979	Orchard View #2	6,613	6,617	-910	2/12/2021	10	99.1%	9,778
4111	Phillips Bay 4	3,550	6,360	-590	2/20/2021	9	99.6%	4,889
870	Prosser #1	10,170	10,240	440	2/11/2021	11	99.9%	14,298
869+190	Prosser #2 (Includes REA)	17,870	16,800	300	2/12/2021	9	100.0%	19,683
1156	Reata	15,400	15,980	380	2/13/2021	8	100.0%	21,321
1789	Riverfront	7,650	7,700	600	2/12/2021	19	99.7%	10,267
2628	Sunset Road	8,130	8,200	700	2/12/2021	8	99.6%	12,426
966	Vista #1	10,100	10,450	100	2/12/2021	11	100.0%	13,256
967	Vista #2	14,150	14,350	1,400	2/12/2021	10	99.5%	17,407
3150	Zephyr Heights	6,700	6,700	500	2/12/2021	9	99.7%	9,880
Subtotal - 5 Year Plan Loads (includes REA)		**292,439**	**297,810**					**395,805**
921	Chevron	6,940	7,515	1,575	12/15/2020	1	97.9%	
799	Phillips #1	1,070	1,190	910	12/23/2020	7	79.4%	
800	Phillips #2	0	0	0	-	-	N/A	
801	Phillips #3	0	0	0	-	-	N/A	
355	251 (4th Street)	98	131	1	2/17/2021	6	100.0%	
2023	451B LIGO 1	1,119	1,184	-300	2/12/2021	7	96.9%	
x	River System	1,021						
Subtotal - Non 5 Year Plan Loads		**10,248**						
Total - System (without losses)		**302,687**						

Note:
1. Winter 20/21 system peak 302,687 kW in HE9, February 12, 2021. Low in hour temperature of 18°F, low daily temp of 17°F.
2. REA total load during BPUD System Peak = 7,700 kW, (Benton City = 0; Prosser = 7,700), total system without REA = 294,987 kW (no losses).

Table C5
Bank Peaks - Summer 2021

Meter #	Substation Bay	During BPUD System Peak (kW)	Non-Coincidental Bank Peak (kW)	(kvar)	Date	Hour	PF	Non-Coincidental Feeder Peak (kVA)
854	Angus #1 (A3, A4, A5)	14,040	14,050	2,240	6/29/2021	17	98.8%	12,094
855	Angus #2 (A6, A7, A8)	7,250	9,070	-1,390	6/2/2021	18	98.8%	8,364
1074	Angus #3 (A9, A1, A2)	12,010	13,090	960	6/27/2021	18	99.7%	12,880
221+213	Benton City (includes REA)	6,562	6,629	1,505	6/28/2021	17	97.5%	8,290
94	Cold Creek	3,568	4,112	1,330	7/26/2021	8	95.1%	4,079
913	Ely #1	15,970	15,970	2,360	6/29/2021	18	98.9%	15,105
940	Ely #2	16,906	16,906	4,189	6/29/2021	18	97.1%	16,433
1106	Gum Street	14,081	14,081	1,777	6/29/2021	18	99.2%	13,312
119	Hedges	12,640	12,900	2,550	6/28/2021	18	98.1%	12,539
1120	Highlands #1	14,450	14,450	2,700	6/29/2021	18	98.3%	14,250
945	Highlands #2	12,475	12,475	21,215	6/29/2021	18	50.7%	12,648
946	Highlands #3	12,025	12,425	1,800	6/23/2021	18	99.0%	11,307
173	Kennewick #1	11,510	11,560	1,920	6/29/2021	17	98.6%	12,600
175	Kennewick #2	13,940	14,230	660	6/28/2021	15	99.9%	13,921
1111	Kennewick #3	11,340	11,340	1,250	6/29/2021	18	99.4%	13,134
4892	Leslie Road	8,867	8,961	1,939	6/28/2021	18	97.7%	10,506
2034	Orchard View #1	10,449	11,054	985	6/28/2021	16	99.6%	14,031
4979	Orchard View #2	8,301	9,005	1,452	6/28/2021	15	98.7%	9,431
4111	Phillips Bay 4	8,480	8,490	3,060	6/29/2021	15	94.1%	8,678
870	Prosser #1	11,590	11,810	1,840	6/30/2021	16	98.8%	11,690
869+190	Prosser #2 (Includes BREA)	8,650	17,090	2,420	6/27/2021	18	99.0%	16,929
1156	Reata	12,970	13,220	2,220	6/28/2021	19	98.6%	12,799
1789	Riverfront	7,625	7,650	1,725	6/28/2021	17	97.6%	7,371
2628	Sunset Road	13,190	13,430	3,450	6/30/2021	14	96.9%	14,510
966	Vista #1	11,200	11,900	1,250	6/23/2021	18	99.5%	12,942
967	Vista #2	17,450	18,750	5,650	6/28/2021	15	95.7%	17,049
3150	Zephyr Heights	7,600	9,800	1,000	8/11/2021	18	99.5%	8,439
Subtotal - 5 Year Plan Loads (includes REA)		**305,139**	**324,448**					**325,328**
921	Chevron	7,045	8,835	2,560	6/15/2021	1	96.0%	
799	Phillips #1	799	1,090	870	7/5/2021	22	78.2%	
800	Phillips #2	0	0	0	N/A	N/A	-	
801	Phillips #3	0	0	0	N/A	N/A	-	
355	251 (4th Street)	75	81	47	6/30/2021	16	86.5%	
2023	451B LIGO 1	2,023	1,177	0	8/12/2021	17	100.0%	
x	River System	174,480						
Subtotal - Non 5 Year Plan Loads		**184,422**						
Total - System (without losses)		**489,561**						

Note:
1. Summer 2021 system peak of 483,111 kW (includes losses, excludes REA) was hour 18, June 29, 2021. High in hour temperature of 110°F.
2. REA total load during BPUD System Peak = 6,450 kW (Benton City = 0; Prosser = 6,450),
3. During Summer 2021 System Peak the River System comprised 174,480 kW of the Total; the River System controls the Peak day.

Table C6
Bank Peaks - Summer 2020

Meter #	Substation Bay	During BPUD System Peak (kW)	Non-Coincidental Bank Peak (kW)	(kvar)	Date	Hour	PF	Non-Coincidental Feeder Peak (kVA)
854	Angus #1 (A3, A4, A5)	10,730	10,900	1,390	7/20/2020	17	99.2%	11,114
855	Angus #2 (A6, A7, A8)	10,030	10,030	120	7/30/2020	18	100.0%	10,162
1074	Angus #3 (A9, A1, A2)	9,430	9,430	6,152	7/30/2020	18	83.8%	10,921
221+213	Benton City (includes REA)	6,152	6,152	1,277	7/30/2020	18	97.9%	8,338
94	Cold Creek	2,156	3,960	566	8/6/2020	8	99.0%	4,040
913	Ely #1	15,880	15,880	2,840	7/30/2020	18	98.4%	17,817
940	Ely #2	7,754	14,933	3,954	8/18/2020	18	96.7%	8,161
1106	Gum Street	15,090	16,000	1,650	7/21/2020	18	99.5%	16,947
119	Hedges	11,920	11,920	2,120	7/30/2020	18	98.5%	12,223
1120	Highlands #1	12,375	12,375	2,500	7/30/2020	18	98.0%	14,343
945	Highlands #2	10,650	12,900	2,075	7/21/2020	18	98.7%	13,703
946	Highlands #3	11,025	13,600	1,900	7/21/2020	18	99.0%	14,060
173	Kennewick #1	11,220	11,220	1,400	7/30/2020	18	99.2%	12,483
175	Kennewick #2	13,340	13,370	600	7/30/2020	17	99.9%	14,849
1111	Kennewick #3	10,440	10,440	980	7/30/2020	18	99.6%	10,869
4892	Leslie Road	7,738	7,832	1,777	7/30/2020	19	97.5%	9,969
2034	Orchard View #1	6,081	6,081	5,776	7/30/2020	18	72.5%	6,264
4979	Orchard View #2	9,246	9,357	1,478	7/30/2020	17	98.8%	9,917
4111	Phillips Bay 4	6,860	8,210	2,920	7/21/2020	14	94.2%	9,240
870	Prosser #1	10,810	10,970	1,790	7/30/2020	17	98.7%	12,074
869+190	Prosser #2 (Includes BREA)	16,660	16,660	2,260	7/30/2020	17	99.1%	17,964
1156	Reata	12,120	12,240	2,010	7/30/2020	19	98.7%	13,354
1789	Riverfront	6,250	6,525	1,550	7/29/2020	18	97.3%	7,499
2628	Sunset Road	12,420	15,010	3,260	7/8/2020	19	97.7%	15,176
966	Vista #1	10,300	12,950	1,400	7/21/2020	16	99.4%	12,483
967	Vista #2	18,200	18,200	5,050	7/30/2020	18	96.4%	18,033
3150	Zephyr Heights	10,700	10,900	2,600	7/28/2020	17	97.3%	7,357
Subtotal - 5 Year Plan Loads (includes REA)		**285,577**	**308,045**					**319,359**
921	Chevron	6,875	7,240	1,745	6/19/2020	5	97.2%	
799	Phillips #1	910	1,110	890	6/28/2020	24	78.0%	
800	Phillips #2	0	0	0	N/A	N/A	-	
801	Phillips #3	0	0	0	N/A	N/A	-	
355	251 (4th Street)	70	134	47	6/8/2020	13	94.4%	
2023	451B LIGO 1	978	1,042	0	6/23/2020	13	100.0%	
x	River System	142,634						
Subtotal - Non 5 Year Plan Loads		**151,467**						
Total - System (without losses)		**437,044**						

Note:
1. Summer 2020 system peak of 426,814 kW (includes losses, excludes REA) was hour 18, July 30, 2020. High in hour temperature of 108°F, high daily temp of 110°F
2. REA total load during BPUD System Peak = 10,260 kW (Benton City = 0; Prosser = 10,260).
3. During Summer 2020 System Peak the River System comprised 142,634 kW of the Total; the River System controls the Peak day.

Appendix D

Customer Growth

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Customer Growth Overview

Prosser Area – In December 2017 the City of Prosser (COP) held a meeting with local utilities to share a plan to extend city services to existing undeveloped land within the city limits. The infrastructure expansion is expected to bring about the construction of up to 500 new homes play fields and an Amphitheater. The first development has been received by customer engineering and will include 140 residential lots north of Old Inland Empire Highway west of Gap Road. This development will be fed from River Front Substation (feeder RVF-3) which currently has roughly 4 MW of capacity remaining. The Playfields and Amphitheater along with part of the 500 new homes would be developed near Old Inland Empire Highway, Bettison Road and the Chandler Canal and could be served by Prosser Substation (feeder PSR-2) which currently has 4.5 MW of capacity remaining.

In Summer 2017 Prosser Bay 2 Load was made up of more than 50% Benton REA (BREA) load (10.9 MW). For the 2020 Plan Prosser Bay 2 load was made up of approximately 42% BREA load (7.8 MW). BREA's current schedule will energize Huard substation fall 2022 that will relieve some loading on the bay 2 power transformer. BREA is also planning on installing a substation bay in their equipment yard adjacent to Prosser substation. This bay will remove the remaining BREA load from the bay 2 power transformer. Currently during contingencies the District is unable to pick up all native load for Prosser Bay 1 during the summer and for Riverfront during both summer and winter. Projects have been identified that will allow for picking up of all native load on Prosser Bay 1. However, picking up native load for Riverfront requires either a REA load reduction on Prosser Bay 2 or a bay capacity increase for Prosser Bay 1 and Bay 2 to allow for more efficient use of the feeder infrastructure. During a Prosser Bay 2 outage the District would not be able to support BREA load. BREA has been notified of the deficiency should a contingency occur and may request that the District install its Mobile Substation assuming it is not otherwise in use.

Benton City/Red Mountain Area – The Kennewick Irrigation District (KID) has completed the Demoss Road Pumping station and the "810 Reservoir" near Via Antinori Road; both became operational in 2016. Land development has continued to occur in the area including vineyards, wine making, and other agricultural support. Growth in the area has slowed as the area continues to mature and development moves beyond the District's service territory and into Benton REA's service territory. The Port of Kennewick and the City of West Richland are working with the Department of Transportation to revive the Red Mountain Interchange project which has the potential to result in some further growth in the District's territory but no additional progress has been announced. Load transfer capability from Sunset Road Substation to Benton City Substation is limited due to circuit distance and the increasing load resulting in the need to employ the Mobile substation for a Sunset Rd. outage during both Summer and Winter peak events. This is driving the requirement for additional capacity in the way of a new Benton City Substation Feeder to the area.

Badger Canyon/Reata Area – Development in the Summit View, Ridge at Reata West, and continued development in the Cottonwood Springs Area has led to increasing residential loads in the area over the last few planning cycles. The installation of Leslie Road Substation and Orchard View Bay 2 allowed for significant load reduction of Reata Substation. However feeder

RTA-2 remains heavily loaded. Projects have been identified to reduce loading on RTA-2, but this is a short term solution should load growth continue. The medium to long term plan for load reduction on feeders RTA-2 and SSR-4 requires the installation of the future Badger Canyon Substation.

Previously the District was evaluating partnering with City of Richland on their Dallas Rd substation site in much the same vein as the agreement on Leslie Road. While this site should be kept in mind as a backup, the Dallas Rd site is far from ideal as it is located away from the load it would need to serve, and feeder routes out of the area are extremely constrained.

While the construction of Badger Canyon substation is beyond the scope of the 2022 FYP, the District needs to move towards evaluating properly for purchase, preferentially near L80R. This location places the substation local to the loads it would serve; and provides a crossroads of existing main line conductor that would facilitate feeder distribution out of the substation.

Kennewick Urban Growth Area (UGA) – Approximately 500 acres south of I-82 and west of U.S. 395 are included within the recently approved Urban Growth Area (UGA) expansion. The city has indicated that this area will be zoned for commercial/industrial development similar to the Brinkley Rd. area. The City of Kennewick has not yet developed infrastructure into the area. The District currently has a circuit going east to west on Christianson Rd. that is an extension of Southridge Substation (feeder STH-2), however it is a small tie line that is used to pick up load in the Triple Vista Area of Badger Canyon should outages occur. This line can be upgraded to accommodate short term growth until additional capacity is installed. Southridge Substation includes a transmission tap that can be extended to follow the same STH-2 route to a future substation site that would likely be located on the south side of I-82 in the UGA area near Locust Grove Rd. Additionally the District has acquired property for the future Ridgeline substation that would support medium term growth. Commercial/Industrial growth in the proposed UGA will be needed in order to foster a new substation project.

Southridge Area – The City of Kennewick has developed a master plan to coordinate the development of the Southridge Planning Area. The Southridge Planning Area is about 2,500 acres of mostly undeveloped land. The Southridge area is located on the south end of Kennewick, between U.S. 395 and Clodfelter Road. It is expected that the area will be developed over a 40-year period and is being planned for the following:

- ≈1100 acres of residential units (houses, condos and apartments)
- 64 acres of light industrial development
- 92 acres of commercial/office space
- 20 acres of village center type area.

Based on load densities in similar areas currently served by the District it is estimated this type of development would have a peak demand of about 32 MW. Ultimately, it is expected the District will need two substations to serve this area. Fortunately, BPA has a double circuit 115 kV transmission line running through the area that can be tapped to serve new substations.

A number of major projects are in the planning phases for the Southridge area as you move west from S. Sherman Street. Currently, the Southcliffe and Apple Valley developments are the largest, and include a total of 1,045 residential lots.

On the west end of the Southridge area feeder ORV-3 from Orchard View Bay 1 serves current loads. Additional feeders from Orchard View Bay 1 (ORV-1) & Bay 2 (ORV-7, ORV-8) will be used to support growth in the western end of the Southridge area. On the east end a feeder from Southridge Bay 1 (STH-4) and Highlands feeder HLS-5 will be used to support growth on the eastern end of the Southridge area. Purchase of the Ridgeline substation property in the middle portion the development area is complete and will be utilized to accommodate long term growth in the area.

Peak summer loading was utilized for the study as the winter loading is not as extreme in the Southridge area due to gas heating. The summer air conditioning loads are all electric.

On the east end feeders HLS-5 and STH-4 have a capacity for an additional 12 MW of peak load based on temperature corrected Summer 2021 loading. For the west end ORV-3 has approximately 1MW of capacity. Load growth beyond these limits or the arrival of commercial "anchor tenants" along the Hildebrand/Bob Olson Parkway corridor will require extension(s) of Orchard View Substation (feeders ORV-1 & ORV-7) to the area via conduit infrastructure installed during construction of Bob Olsen Pkwy. This expansion would include conductor installations for ORV-3 to facilitate feeder ties.

While the city's plans to extend Ridgeline Drive from S. Sherman St to Clodfelter Road is being modified due to being unable to acquire all the land on the preferred path, the city continues to have future plans for installing freeway entry/exit ramp(s) that will feed into the area from I-82 and provide additional access to the City of Kennewick UGA expansion on the south side of I-82. The extension of these roads allows the District to expand its infrastructure as well. It is planned that this area will continue to be served with existing area feeders in the near term. With the addition of Orchard View Bay 2, feeder support will be routed in from the west as necessary and will make ties with feeders from Southridge Substation. Continuing to extend new feeders into the area, creating new feeder ties and upgrading the existing facilities will establish the distribution circuits needed for medium term future growth. Longer term growth will be supported by the future installation of Ridgeline substation.

See appendix G (Capitol Planning Strategic Planning Discussion, June 13, 2017)

Vista Field – In October 2017, the Port of Kennewick approved a master plan to coordinate the development of the approximately 100 acre Vista Field area. The Port's plan anticipated developing the area over an 8-year period over 8 phases and is being planned for the following:

- 1,095 residential units (houses, condos and apartments)
- 740,000 sq. ft. of commercial/office space

It is estimated this type of development would have a peak demand of approximately 13 MW (5.5 MW of residential load and 7.5 MW of commercial/office load). The Port's initial schedule indicated that that the design for the first phase will take place during 2018, with construction during 2018/2019. While the Port does have a schedule for phased development, the timeline is fluid as it is dependent on the Port attracting developers and tenants. COVID-19 impacts limited opportunities for new businesses to move into the area over the previous planning cycle. Several major system upgrade projects have been completed in this area and several are planned to ensure that the distribution system is adequate to serve the undeveloped areas within Vista Field.

Feeders from Orchard View Bay 1 (ORV-4) and Bay 2 (ORV-5) and Vista Bay 1 (VIS-4) will be utilized to cover the near term load growth of the Vista field area. As loads continue to grow in this area, the District owns a substation site on Edison Street that is currently slated to be energized in 2027 to support long-term development and relieve existing feeders. The plan for Vista Field is currently for a complete build out in the year 2031. Although the master plan that was approved by the Port of Kennewick indicated an 8-year buildout, the District is assuming a slower buildout with one phase completed every other year. With the addition of an express feeder from Orchard View Bay 1 (ORV-4) into Vista Field, plus available capacity in the vicinity of Vista Field, the District will have 9.2 MW available utilizing Vista Substation (feeder VIS – 4) Orchard View Substation (feeders ORV-4, ORV-5). This should be considered a shorter-term solution, however, if additional Electrically Intense Load (EIL) tenant or tenants were to be located in the area, the long term plan would be to utilize new conduits installed down Metaline Ave. to install feeders from the future Edison Street Substation site.

Bridge to Bridge/River to Railroad Project – The City of Kennewick, Port of Kennewick, Downtown Kennewick, and Columbia Drive Association formed the Historic Downtown Kennewick Partnership. The partnership hired a consulting team in 2003 to develop a plan for the future of the area roughly between the Blue and Cable Bridges from the Columbia River to Canal Drive. The result was a 20 year plan that laid out a vision the group had for re-development of the area.

While the Port of Kennewick has built a few commercial buildings and has near term plans for a small culinary school, significant development or increased load appears to be outside of the scope of the Five Year Plan. The first 10 years were concentrated on laying the ground work and getting funding. Significant load increases were expected in the 10 to 20 year time frame. While we are currently nearing the end of the 10-20 year timeframe, load has been materializing at a slow rate. The Study had low, medium, and high forecasts for growth. The medium forecast expected an additional 82 boat slips, 71,350 sq. ft of retail space, 125 lodging rooms, 277,500 sq. ft. of office space, 615 residential units (530 condominiums and 85 apartments), and 100 RV spaces.

Currently Kennewick Substation (feeders KEN – 4 & KEN – 1) feed the west end and east end respectively in the development area. Their combined available capacity is about 3MW and about 60% of that capacity on KEN-4 on the west end. Should load growth accelerate, it is anticipated the District could serve this area from either the future Oak Street Substation on

the east end or form the future Entiat Street substation site near Fruitland Park on the west end.

Future Main Feeder Routes -- Areas within our system have also been identified for potential future main feeder routes. These areas are typically denoted on our system planning maps as a reminder that we may be upgrading in the future and that it may be feasible to upgrade these areas or install spare conduit and vaults when doing other projects or customer development is going on in the area. Additionally, as conductor upgrades are required on main portions of feeders in town, the standard practice is to install 556.4 AAC.

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Table D1 - Customer Growth List

Map Key	Project Name or Customer	Area Eng.	Growth Potential[1]	Electrical Status[1]	Cust. Type[2]
	Kennewick Area				
A6-A	Zook apartments (JO#583323)	Chad	24 unit apartment	Installed	Res
E1-A	Zintel Creek (JO# 602477)	Tina	11 Lots Left	Installed	Res
E3-A	Southridge Development Ph 6 (JO #595616) (See H5-C)	Rick	7 remaining	Installed	Res
E3-B	COK Creekstone Reservoir (JO#586171)	Chad	(2) 75HP pumps 3 future 125HP	Operations	Com
E3-C	Southridge Dental (JO#604909)	Chad	1200A 3-ph	Installed	Com
E6-A	Lauria Meadows (JO #539155)	Tina	2 lots remaining	Installed	Res
G1-A	Highland View Heights subdivision (JO #514484)	Shanna	2 lots remaining	Installed	Res
G1-B	Orchard View (JO #612610)	Tina	6 Lots remaining	Installed	Res
G1-C	Highland Vineyards (JO #626006)	Chad	37 lots	Design	Res
G4-A	Schmelzer SR-397 Seal Springs (JO #107002)	Dave	3 lots remaining	Installed	Res
G4-C	Kingwood Phase 1 - Brad Beauchamp (JO #533995)	Shanna	6 lots remaining	Installed	Res
G4-E	Nunez (JO #589815)	Shanna	2 - 5 acre lots	Installed	Res
HE3-A	GMP orchards - Migrant housing (JO #525996)	Shanna	4-200a services 3 services remain	Installed	Res
HE4-A	Rocking River (JO#633745)	Chad	(2) 600A 3-ph (2) 200A 1-ph	Installed	Com
H1-A	Citiadel Estates (JO #616029) (See H5-D)	Chad	36 lots	Design	Res
H2-B	Anderson short plat (JO#567980)	Chad	1 lots	Installed	Res
H2-C	Fairchild short plat (JO#572020)	Chad	8 lots	Designed	Res
H3-A	Vista Field Area - see H3, O4, O5, V4 (build A9 to support)				
	Vista Field Development Phase 2 (2025) - Split between O5 & H3 - See O5-A	Mike	0.3 MW Res 0.55 MW Com	Planning	Res/Com
	Vista Field Development Phase 4 (2029) - Split between H3 & V4 - See V4-A	Mike	0.3 MW Res 0.05 MW Com	Planning	Res/Com
	Vista Field Development Phase 7 (2031) - Split between V4 & H3 - See V4-A	Mike	0.48 MW Res 0.25 MW Com	Planning	Res/Com
	Vista Field Development Phase 8 (2037) - Split between V4 & H3 - See V4-A	Mike	0.34 MW Res 0.48 MW Com	Planning	Res/Com
H3-D	JSI Construction (JO#590003)	Chad	Office building	Operations	Com
	JSI Construction (future)		Future office bldg	Planning Planning	Com
H4-A	Circle K Remodel (JO#614215)	Chad	1600A 3-ph	Installed	Com
H5-A	Symphone Ridge Ph 1 (JO# 587394)	Chad	4 Lots Remaining	Installed	Red
	Symphony Ridge Ph2 (future)	Chad	21 lots	Planning	Res
H5-B	Valley View Homes (JO #605792)	Chad	32 lots	Operations	Res
H5-C	South Ridge PH 5 (#516877) (See E3-A)	Dave	1 Lots remaining	Installed	Res
	Southridge Ph 7, 16, 20 (JO #608070) (See E3-A)	Chad	36 lots remaining	Planning	Res
	Southridge Development Future Phases	Rick	95 lots remaining	Planning	Res
H5-D	Citiadel Estates (JO #616029) (See H1-A)	Chad	36 lots	Design	Res

Table D1 - Customer Growth List - Continued

Map Key	Project Name or Customer	Area Eng.	Growth Potential[1]	Electrical Status[1]	Cust. Type[2]
	Kennewick Area (Continued)				
H5-E	Southridge Development Ph7&8 (JO#549856)	Chad	2 lots remaining	Installed	Res
	Southridge Development Future Phases (See E3-A)	Rick	23 lots remaining	Planning	Res
H5-F	Southcliffe Phase 2 (JO #551203) 14 Lots	Chad	8 lots Remaining	Installed	Res
	Southcliff Phase 4 (#513345)	Dave	2 Lots Remaining	Installed	Res
	Southcliff Phase 5 (#574933)	Chad	8 Lots Remaining	Installed	Res
	Southcliffe Phase7 (JO #615851)	Chad	16 lots	Design	Res
	Southcliffe, Sherman Rd., Milo Bauder, Phase 6 -15	Rick	274 lots remaining	Planning	Res
H7-A	AAA Storage Units/office building (JO#557275)	Chad	600A 3-ph(done) 800A 3-ph(future)	Installed Planning	Comm
H9-A	Hansen Park Mixed Use (JO#641921) (See O3-B)	Shanna	96 apartments 75 apt + mixed use	Desgn	Res/Com
K3-A	Habitat for Humanity (JO #125893)	Ken	3 Lots remaining	Installed	Res
K4-A	Clover Island Misc.???	Dave	3 buildings	Installed	Com
K4-B	Clover Island Mobile Home Park, Blue Bridge	Rick	Unknown	Planning	Com
K4-C	PMI Townhomes - Entiat (JO# 618838)	Tina	36 Townhomes	Installed	Res
K8-A	Carbitex (JO#624143)	Chad	800A 3-ph	Installed	Com
K9-A	Washington Meadows (JO#636379)	Chad	18 lots	Operations	Res
L1-A	Badger Canyon Apartments (See O3-E)	Rick	596 units 94.44% Occupied	Installed	Res
	Badger Canyon Apartments	Rick	1 bldgs. 48 units	Installed	Res
L1-C	Canyon Ranch Ph 9 & 10 (#527809)	Dave	7 Lots remaining	Installed	Res
L1-F	Canyon Ranch Phase 2 (JO #117179)	Rick	1 lot remaining	Installed	Res
L2-B	Cottonwood Creek Ph3 (#532446)	Chad	29 lots remaining	Installed	Res
	Cottonwood Creek Ph. 4 (JO# 645333)	Tina	13 Lots	Design	Res
L2-C	J. Sullins, Cottonwood Dr. (JO #105290)	Ken	1 lot remaining	Installed	Res
L2-D	A. Sidibe, Cottonwood Dr. (JO #105264)	Ken	3 lots remaining	Installed	Res
	Sidibe, Aissata (JO #124826)	Dave	1 lot remaining	Installed	Res
	Aissata Sidibe (JO #123891)	Dave	1 lot remaining	Installed	Res
L2-G	Wiser (#516974)	Chad	5-5acre lots 2-5acre remaining	Installed	Res
O2-A	Crimson Hills (JO#618016)	Shanna	138 lots	Installed	Res
O3-A	Apple Valley Future (See S4-A)	Chad	151 Lots remaining	Planning	Res
O3-B	Hansen Park Mixed Use (JO#641921) (See H9-A)	Shanna	96 apartments 75 apt + mixed use	Desgn	Res/Com
O3-C	Hansen Park, Div 4 Ph 4 (JO#106635)	Rick	3 lots remaining	Installed	Res
O3-D	Ridge at Hanson Park Ph 2 (#526423)	Dave	2 Lots remaining	Installed	Res

Table D1 - Customer Growth List - Continued

Map Key	Project Name or Customer	Area Eng.	Growth Potential[1]	Electrical Status[1]	Cust. Type[2]
	Kennewick Area (Continued)				
O3-E	Badger Canyon Apartments (See L1-A)	Rick	596 units 94.44% Occupied	Installed	Res
O3-F	Lenkersdorfer, Travis Ln (JO #124003)	Dave	1 lot remaining	Installed	Res
O3-G	Western Construction Rock Crusher (JO #646052)	Tina	4000A Service	Design	Comm
O3-H	Mammoth Acres (JO# 639685)	Tina	12 Lots	Design	Res
O3-I	Anderson (JO #595270)	Shanna	10 Lots remaining	Installed	Res
O3-J	KID Amon Pump (JO#614208)	Chad	200HP pump addition	Installed	Irr
O4-A	Vista Field Area - see H3, O4, O5, V4 (build A9 to support)				
	Vista Field Development Phase 1 (2023) - Split between O4 & O5 - See O5-A	Mike	0.43 MW Res 1.2 MW Com	Planning	Res/Com
	Vista Field Development Phase 3 (2027) - Split between O4 & O5 - See O5-A	Mike	0.29 MW Res 0.23 MW Com	Planning	Res/Com
	Vista Field Development Phase 5 (2031) - Split between O4 & O5 - See O5-A	Mike	0.17 MW Res 0.05 MW Com	Planning	Res/Com
	Vista Field Development Phase 6 (2033) - Split between O4 & O5 - See O5-A	Mike	0.47 MW Res 0.9 MW Com	Planning	Res/Com
O5-A	Vista Field Area - see H3, O4, O5, V4 (build A9 to support)				
	Vista Field Development Phase 1 (2023) - Split between O4 & O5 - See O4-A	Mike	0.43 MW Res 1.2 MW Com	Planning	Res/Com
	Vista Field Development Phase 2 (2025) - Split between O5 & H3 - See H3-A	Mike	0.3 MW Res 0.55 MW Com	Planning	Res/Com
	Vista Field Development Phase 3 (2027) - Split between O4 & O5 - See O4-A	Mike	0.28 MW Res 0.23 MW Com	Planning	Res/Com
	Vista Field Development Phase 5 (2031) - Split between O4 & O5 - See O4-A	Mike	0.17 MW Res 0.05 MW Com	Planning	Res/Com
	Vista Field Development Phase 6 (2033) - Split between O5 & H7 - See H7-B	Mike	0.47 MW Res 0.9 MW Com	Planning	Res/Com
O6-A	Hansen Park, Div 4 Ph 3 (JO#108349)	Rick	1 lot remaining	Installed	Res
	Hansen Park, Div 4 Ph 4 (JO#106635)	Rick	1 lot remaining	Installed	Res
O6-B	TMG NW Commercial Bldg (JO#594303)	Chad	1600A 3-ph (1)400A CT, (6)200A	Installed	Com
P7-A	Provision Capital (JO #582587)	Rick	(1) 2500kVA xfmr	Installed	EIL
P7-B	Purdie (JO#627104)	Chad	2500A 3-ph	Installed	Com
R1-A	Steeplechase Phase 1&2 (JO #576483) (See R3-A)	Shanna	16 lots remaining	Installed	Res
	Steeplechase Future Phase	Shanna	26 lots	Planning	Res
R1-B	Ridgeview Lane (JO #576479)	Shanna	4 lots remaining	Installed	Res
R1-C	Bridlewood Subdivision (JO #579212)	Shanna	1 lot remaining	Installed	Res
R1-D	Bermuda Infill (JO #639684)	Tina	12 Lots	Operations	Res
R2-A	Country Acres (JO #599244)	Shanna	14 lots	Installed	Res
R2-B	Harvest Ridge Ph. 1 (JO# TBD)	Tina	42 Lots	Design	Res
R2-E	Country Heights (JO #22108)	Ken	3 lots remaining	Installed	Res
R2-F	Booth, Goose Gap Rd (JO #125922)	Rick	2 lots remaining	Installed	Res

Table D1 - Customer Growth List - Continued

Map Key	Project Name or Customer	Area Eng.	Growth Potential[1]	Electrical Status[1]	Cust. Type[2]
	Kennewick Area (Continued)				
R3-A	Steeplechase Phase 1&2 (JO #576483) (See R1-A)	Shanna	16 lots remaining	Installed	Res
	Steeplechase Future Phase	Shanna	26 lots	Planning	Res
R3-D	Summitview Ph11 (JO #129498)	Chad	1 lot remaining	Installed	Res
S1-A	Southridge Ph 5 (JO #623885)	Shanna	85 Lots	Operations	Res
	Southridge Ph 6 (JO #625342)	Shanna	138 Lots	Operations	Res
	Southridge Ph 20 (JO #608070)	Chad	20 lots remaining	Installed	Res
S1-B	Sunridge Subdivision (JO#631649) (See S4-C)	Shanna	141 lots	Design	Res
S1-C	Southridge Estates Ph 1 (#516627)	Dave	1 lot remaining	Installed	Res
S1-D	Tumbleridge Development (JO #123206)	Ken	2 lots remaining	Installed	Res
S1-E	Sage Crest Phase 4 (JO #118310)	Ken	1 lot remaining	Installed	Res
S2-A	Village at Southridge Phase 4 (JO #632483)	Shanna	44 lots remaining	Operations	Res
	Village at Southridge Phase 3 (JO #604579)	Chad	30 lots remaining	Installed	Res
S2-B	Bruce Bldg (JO#611178)	Chad	600A (4) meter pack	Installed	Com
S3-A	Kennewick Retirement (JO#620739)	Chad	1600A 3-ph	Design	Res/Com
S3-G	BRL Development (JO#563142)	Chad	12 Industrial lots	Designed	Com
S4-A	Apple Valley Ph 1 & 2 (#128123)	Chad	3 Lots remaining	Installed	Res
	Apple Valley Ph 3 & 4A (#542084)	Chad	2 Lots remaining	Installed	Res
	Apple Valley Ph 5A (JO #595880)	Chad	22 lots remaining	Installed	Res
	Apple Valley Ph 5B (JO #609428)	Chad	4 lots remaining	Installed	Res
	Apple Valley Ph 6A (JO #627051)	Chad	38 lots remaining	Installed	Res
	Apple Valley Future (See O3-A)	Chad	151 Lots	Planning	Res
S4-B	Sherman Heights (JO #622551)	Shanna	53 lots	Operations	Res
S4-C	Sunridge Subdivision (JO#631649) (See S1-B)	Shanna	141 lots	Design	Res
V4-A	Vista Field Area - see H3, O4, O5, V4 (build A9 to support)				
	Vista Field Development Phase 4 (2029) - Split between H3 & V4 - See H3-A	Mike	0.6 MW Res 0.1 MW Com	Planning	Res/Com
	Vista Field Development Phase 7 (2031) - Split between V4 & H3 - See H3-A	Mike	0.925 MW Res 0.5 MW Com	Planning	Res/Com
	Vista Field Development Phase 8 (2037) - Split between V4 & H3 - See H3-A	Mike	0.675 MW Res 0.95 MW Com	Planning	Res/Com

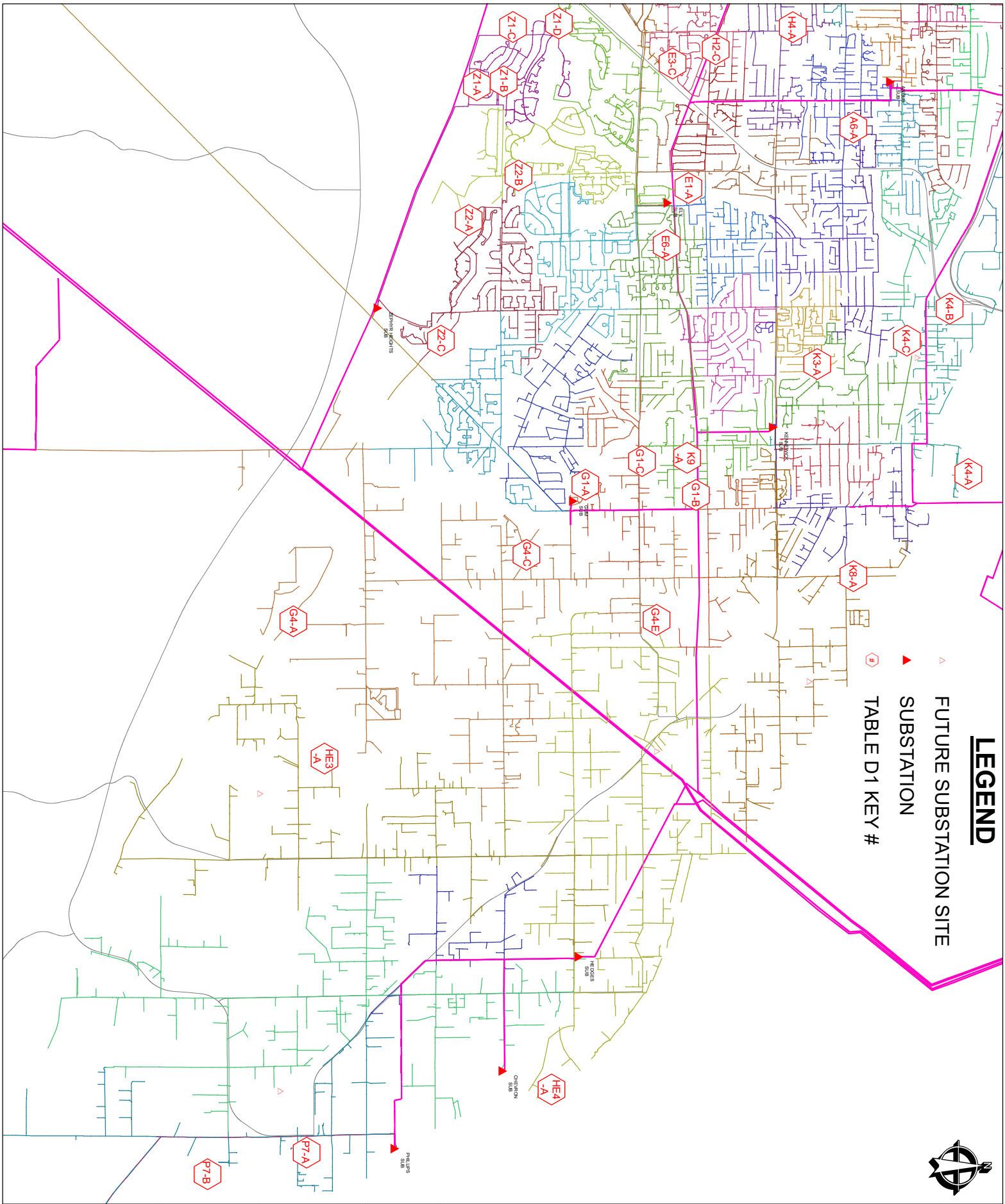
Table D1 - Customer Growth List - Continued

Map Key	Project Name or Customer	Area Eng.	Growth Potential[1]	Electrical Status[1]	Cust. Type[2]
	Kennewick Area (Continued)				
Z1-A	Heights at Canyon Lakes (JO #21640)	Dave	1 lot remaining	Installed	Res
	Heights at Canyon Lakes Ph 5 (JO #117436)	Dave	2 lots remaining	Installed	Res
	Heights at Canyon Lakes Future	Dave	45 lots remaining	Installed	Res
Z1-B	South Hill Estates Ph1 (#130091)	Shanna	7 lots remaining	Installed	Res
	South Hill Estates Ph2 (#577710)	Tina	27 lots remaining	Installed	Res
	South Hill Estates Ph3 (JO #577710)	Tina	27 lots	Installed	Res
Z1-C	Beauchamp Home (JO# 609621)	Tina	800A Service	Installed	Res
Z1-D	Zintel Canyon (JO# 604768)	Tina	6 Lots Left	Installed	Res
Z2-A	Inspiration Estates Ph 4 (JO #105903)	Ken	1 lot remaining	Installed	Res
	Inspiration Estates Ph V, W 52 (JO #118537)	Rick	2 lots remaining	Installed	Res
	Inspiration Estates Ph 7, W 52 (JO #124558)	Rick	6 lots remaining	Installed	Res
	Inspiration estates PH 8 (JO #515700)	Shanna	8 lots remaining	Operations	Res
Z2-B	Cherry Creek Phase 1 (JO #114616)	Dave	2 lots remaining	Installed	Res
	Cherry Creek Phase 3 (JO #130224)	Shanna	3 lots remaining	Installed	Res
Z2-C	Sunrise Ridge-Jim Aust Phase 1& 2 (JO #519961 & #526055)	Shanna	5 lots remaining	Installed	Res
	Sunrise Ridge Ph 3 (JO #597000)	Tina	17 Lots	Installed	Res
Benton City Area					
B1-A	Botaka Addition (JO #21734)	Ken	1 lot remaining	Installed	Res
B2-A	Wrangler Addition (JO #115564)	Ken	1 lot remaining	Installed	Res
B2-B	Blacktop Estates Phase 1, 2, & 3 (JO #592711)	Shanna	24 Lots remaining	Installed	Res
B2-C	Gomez, 11th St (JO #126060)	Rick	2 lots remaining	Installed	Res
B2-D	River North Subdivision (JO #TBD)	Tina	50 Lots	Design	Res
B2-E	Vintners Vista (JO #TBD)	Tina	31 Lots	Design	Res
SR2-A	Yakitat Pl., Cohu Torchey (JO #111174)	Ken	2 lots remaining	Installed	Res
SR4-A	CW Asphault (JO #646416)	Tina	3000A Service	Operations	Comm

Table D1 - Customer Growth List - Continued

Map Key	Project Name or Customer	Area Eng.	Growth Potential[1]	Electrical Status[1]	Cust. Type[2]
Prosser Area					
P1-A	Tree Top (JO #627624)	Tina	5000A Service	Operations	Comm
P3-A	Candy Mt Construction (JO #513384)	Chad	3-5acre lots 1-5acre lot remain	Installed	Res
P6-A	Red Blend Villas (JO #557269)	Shanna	8 lots remaining	Installed	Res
P6-B	Hidden Park (JO #635846)	Tina	11 Townhomes	Operations	Res
RF3-A	Mustang Estates Ph. 1 (JO #620629)	Tina	40 Lots	Operations	Res

Notes: 1. Growth potential and electrical status estimated as of 03/2022. 2. Customer type, Res = Residential, Com = Commercial, Irr = Irrigation, EIL = Electrically Intensive Load



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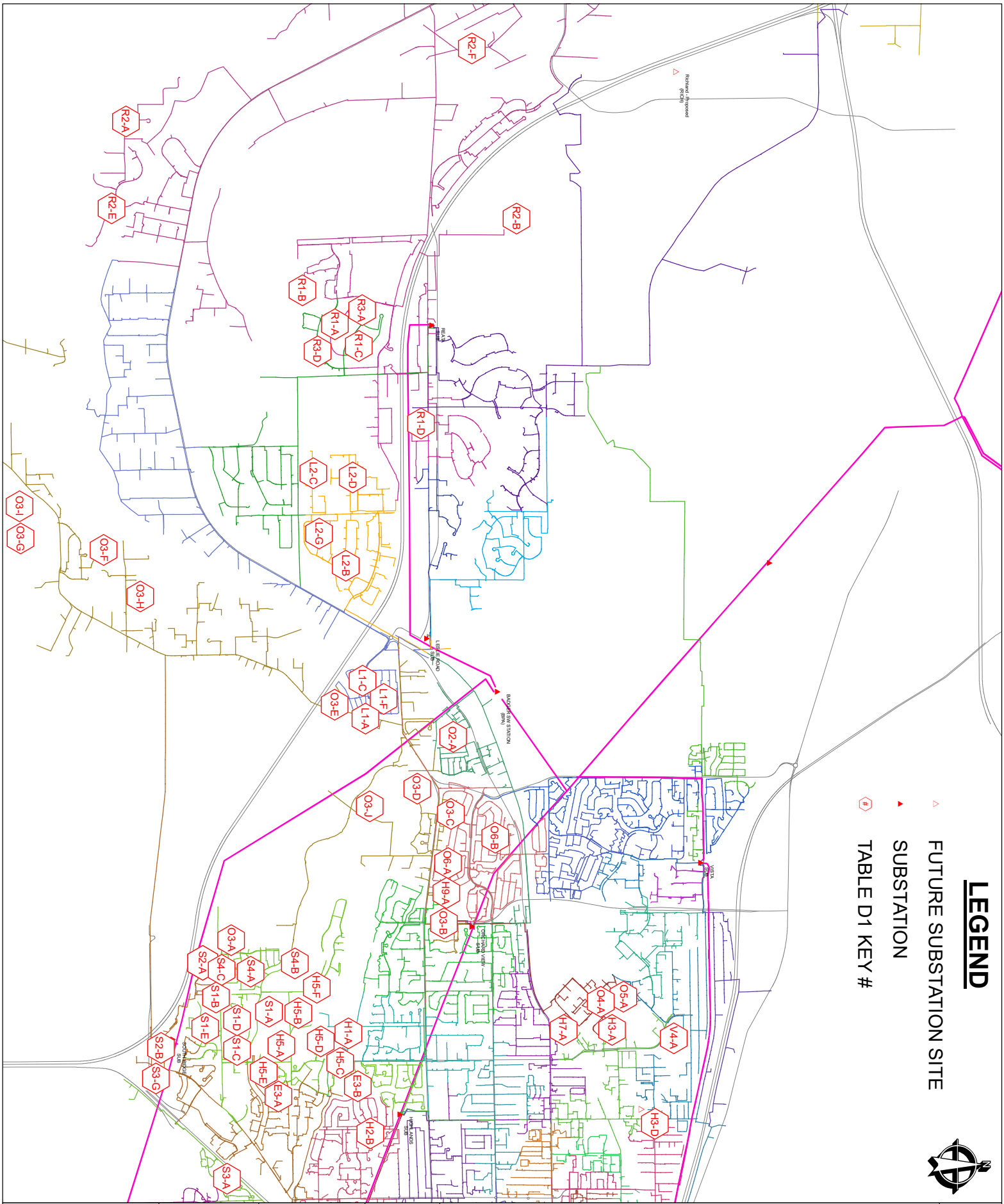
	MAP NO.		
	DRAWING NAME: East Kennewick Growth		

KENNEWICK URBAN AREA CUSTOMER GROWTH LOCATIONS

SHT. 1 of 1



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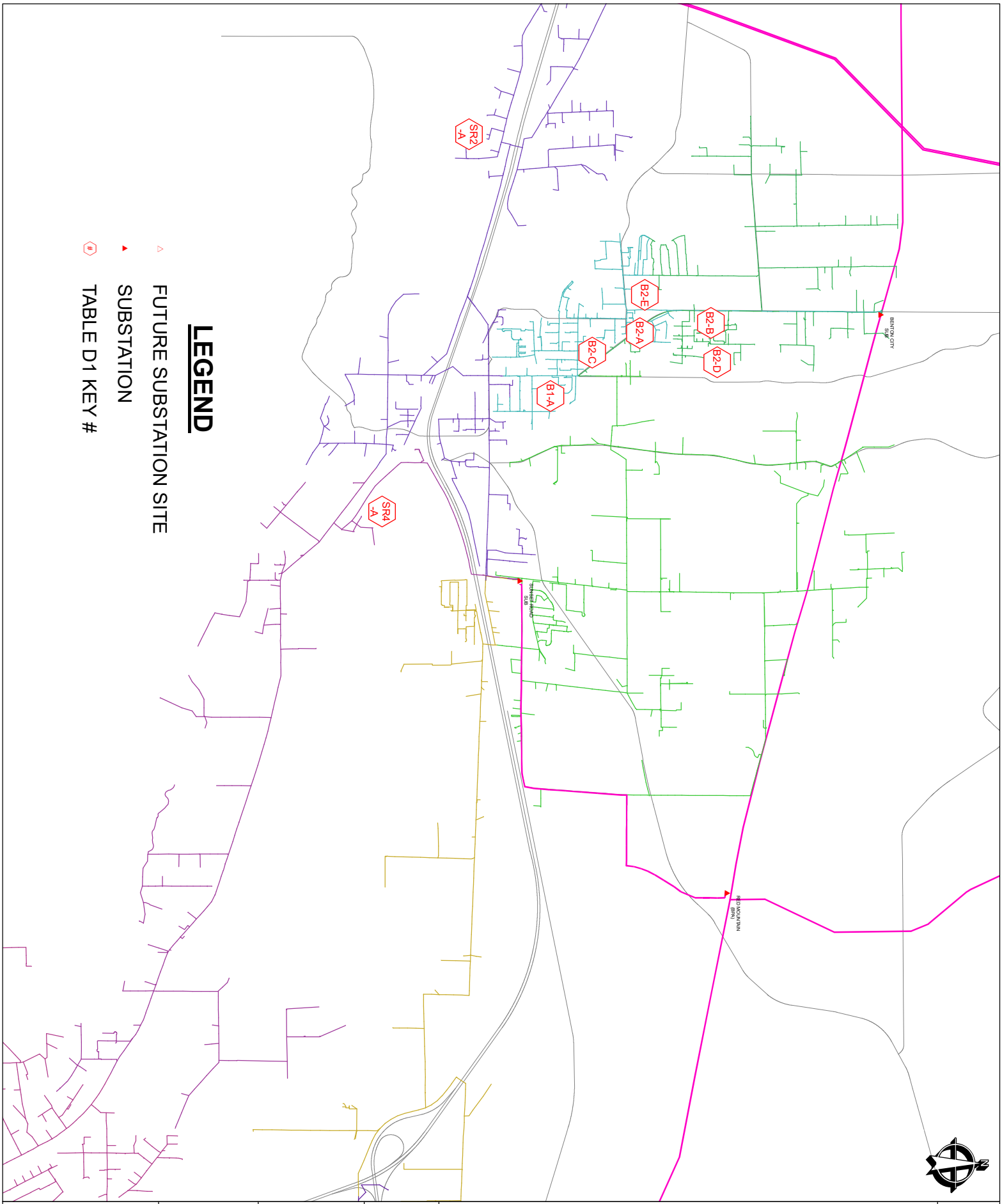
	MAP NO.		
	DRAWING NAME: West Kennewick Growth		

KENNEWICK URBAN AREA CUSTOMER GROWTH LOCATIONS

SHT. 1 of 1



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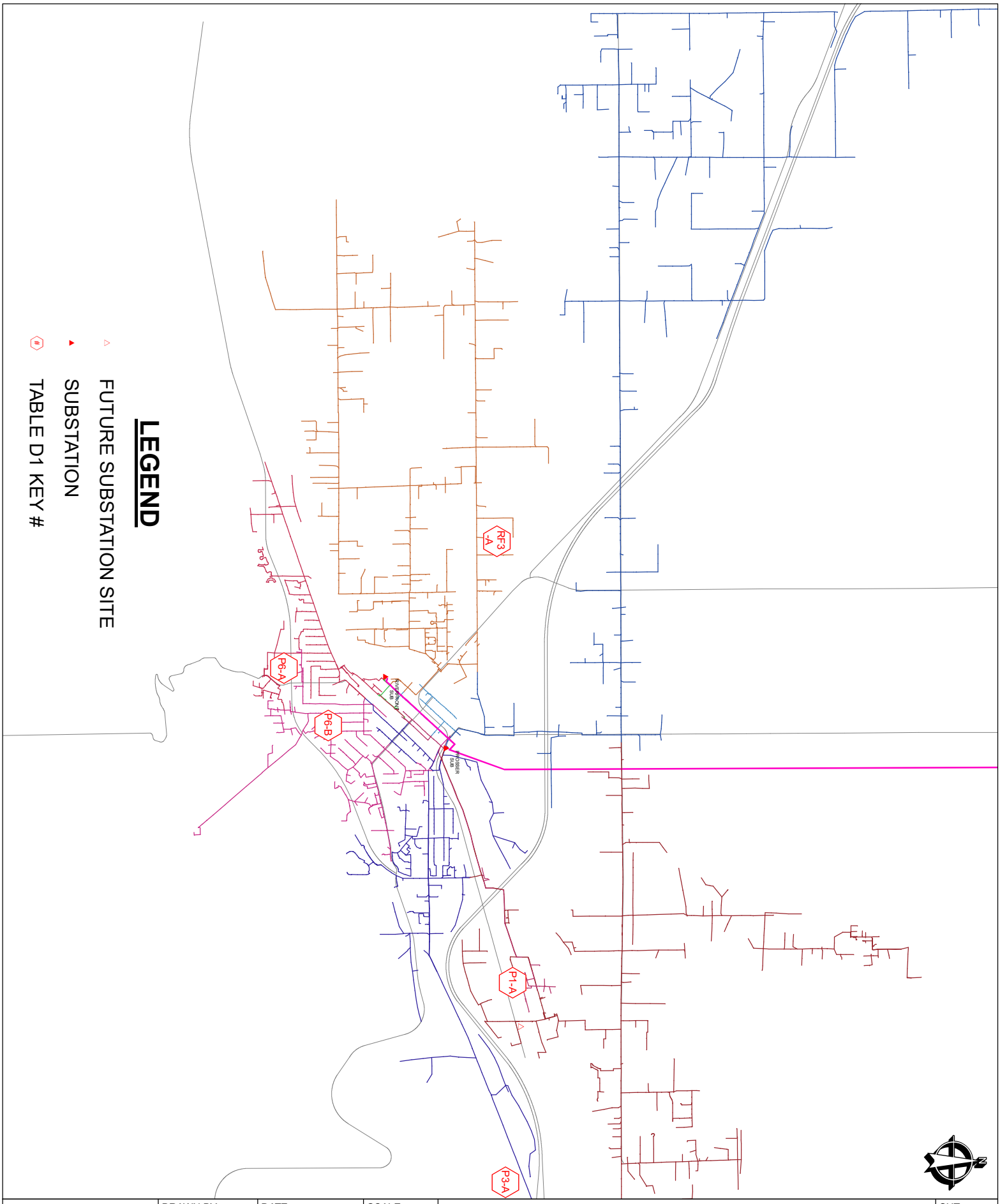
BENTON CITY AREA CUSTOMER GROWTH LOCATIONS

SHT. 1 of 1



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	MAP NO.		
	DRAWING NAME: Prosser Growth		

PROSSER AREA
CUSTOMER GROWTH LOCATIONS

SHT. 1 of 1

Table D2 Rate Schedule Count by Feeder as of March 2022								
	Total	Schedule 11 Residential	Schedule 21 Small General	Schedule 22 Medium General	Schedule 23 Large General Non- TOU	Schedule 34 Industrial	Schedule 70 Irrigation	Schedule 71 Small Irrigation
Angus Substation								
ANG-3	1,018	809	190	18	1	0	0	0
ANG-4	405	206	161	38	0	0	0	0
ANG-5	1,071	1,003	60	6	2	0	0	0
Bank 1	2494	2018	411	62	3	0	0	0
ANG-6	871	745	103	20	3	0	0	0
ANG-7	662	538	111	12	1	0	0	0
ANG-8	1,132	1,065	61	6	0	0	0	0
Bank 2	2665	2348	275	38	4	0	0	0
ANG-9	925	888	35	1	1	0	0	0
ANG-1	752	705	45	2	0	0	0	0
ANG-2	1,043	942	92	7	1	0	0	1
Bank 3	2720	2535	172	10	2	0	0	1
Benton City Substation								
BEC-1	887	778	95	11	1	0	0	2
BEC-2	683	652	24	5	1	0	0	1
BEC-3	0	0	0	0	0	0	0	0
BEC-4	0	0	0	0	0	0	0	0
Bank 1	1570	1430	119	16	2	0	0	3
Cold Creek Substation								
CCR-1	60	19	23	2	0	0	14	2
Bank 1	60	19	23	2	0	0	14	2
Ely Substation								
ELY-1	675	658	15	1	1	0	0	0
ELY-2	380	379	1	0	0	0	0	0
ELY-3	1184	982	173	24	5	0	0	0
ELY-4	943	930	12		1	0	0	0
Bank 1	3182	2949	201	25	7	0	0	0
ELY-5	798	764	32	1	1	0	0	0
ELY-6	927	897	26	2	2	0	0	0
ELY-7	642	557	67	17	1	0	0	0
ELY-8	398	335	47	13	2	0	0	1
Bank 2	2765	2553	172	33	6	0	0	1
Gum Street Substation								
GUM-1	866	820	27	2	0	0	0	17
GUM-2	522	502	10	0	1	0	0	9
GUM-3	702	684	14	1	0	0	0	3
GUM-4	1022	901	69	6	0	0	0	46
Bank 1	3112	2907	120	9	1	0	0	75
Hedges Substation								
HED-1	188	162	19	1	0	0	0	6
HED-2	694	599	36	8	4	0	1	46
HED-3	502	451	20	3	1	0	1	26
HED-4	1001	913	41	3	0	1	0	43
Bank 1	2385	2125	116	15	5	1	2	121

Table D2 Rate Schedule Count by Feeder as of February 2020								
	Total	Schedule 11 Residential	Schedule 21 Small General	Schedule 22 Medium General	Schedule 23 Large General Non- TOU	Schedule 24 Large General TOU	Schedule 71 Small Irrigation	Schedule 72 Large Irrigation
Highlands Substation								
HLS-1	454	442	9	2	1	0	0	0
HLS-2	1009	905	98	5	1	0	0	0
HLS-3	694	505	166	17	6	0	0	0
Bank 1	2157	1852	273	24	8	0	0	0
HLS-4	806	781	18	4	0	0	0	3
HLS-5	1048	988	48	3	7	0	0	2
HLS-6	778	755	21	2	0	0	0	0
Bank 2	2632	2524	87	9	7	0	0	5
HLS-7	924	666	250	8	0	0	0	0
HLS-8	634	611	16	6	1	0	0	0
HLS-9	1020	984	32	3	0	0	0	1
Bank 3	2578	2261	298	17	1	0	0	1
Kennewick Substation								
KEN-1	528	402	103	18	5	0	0	0
KEN-2	989	960	26	2	0	0	0	1
KEN-3	1,558	1,484	64	8	2	0	0	0
Bank 1	3075	2846	193	28	7	0	0	1
KEN-4	767	529	209	25	3	0	0	1
KEN-5	797	777	16	2	0	0	0	2
KEN-6	725	424	255	41	5		0	
Bank 2	2289	1730	480	68	8	0	0	3
KEN-7	829	687	125	16	1	0	0	0
KEN-8	1003	869	83	22	5	0	0	24
KEN-9	579	554	18	5	0	0	0	2
Bank 3	2411	2110	226	43	6	0	0	26
Leslie Road Substation								
LES-1	1006	963	24	13	0	0	0	6
LES-2	203	158	38	5	2	0	0	0
LES-3	257	252	4	1	0	0	0	0
LES-4	102	100	1	1	0	0	0	0
Bank 1	1568	1473	67	20	2	0	0	6
Orchard View Substation								
ORV-1	0	0	0	0	0	0	0	0
ORV-2	336	211	106	18	1	0	0	0
ORV-3	874	793	62	12	1	0	0	6
ORV-4	123		116	5	2	0	0	0
Bank 1	1333	1004	284	35	4	0	0	6
ORV-5	220	1	188	26	5	0	0	0
ORV-6	1,361	1,284	72	5	0	0	0	0
ORV-7	0	0	0	0	0	0	0	0
ORV-8	0	0	0	0	0	0	0	0
Bank 2	1581	1285	260	31	5	0	0	0

Table D2 Rate Schedule Count by Feeder as of February 2020								
	Total	Schedule 11 Residential	Schedule 21 Small General	Schedule 22 Medium General	Schedule 23 Large General Non- TOU	Schedule 24 Large General TOU	Schedule 71 Small Irrigation	Schedule 72 Large Irrigation
Phillips Substation								
PHI-6	39	2	8	0	0	0	25	4
PHI-7	347	275	34	8	6	0	0	24
Bank 4	386	277	42	8	6	0	25	28
Prosser Substation								
PSR-1	73	16	40	9	6	0	0	2
PSR-2	543	428	39	2	2	0	0	72
PSR-3	805	614	157	23	7	0	0	4
Bank 1	1421	1058	236	34	15	0	0	78
PSR-4	453	337	53	20	9	0	1	33
PSR-5	192	154	35	3	0	0	0	0
PSR-6	749	663	72	9	3	0	0	2
Bank 2	1394	1154	160	32	12	0	1	35
Reata Substation								
RTA-1	463	460	2	0	0	0	1	0
RTA-2	866	794	30	3	0	0	13	26
RTA-3	350	343	2	2	0	0	0	3
RTA-4	339	309	22	3	0	0	2	3
Bank 1	2018	1906	56	8	0	0	16	32
River Front Substation								
RVF-1	565	522	29	4	6	0	0	4
RVF-2	3	0	0	0	3	0	0	0
RVF-3	773	645	72	7	2	0	1	46
Bank 1	1341	1167	101	11	11	0	1	50
Sunset Road Substation								
SSR-1	514	413	43	10	0	0	3	45
SSR-2	573	510	43	4	0	0	0	16
SSR-3	133	107	5	4	2	0	9	6
SSR-4	182	120	29	4	2		3	24
Bank 1	1402	1150	120	22	4	0	15	91
Vista Substation								
VIS-1	136		108	26	2	0	0	0
VIS-2	670	551	100	19	0	0	0	0
VIS-3	348	317	26	5	0	0	0	0
VIS-4	528	438	66	23	1	0	0	0
Bank 1	1682	1306	300	73	3	0	0	0
VIS-5	1,047	940	90	17	0	0	0	0
VIS-6	76		64	10	2	0	0	0
VIS-7	162	19	96	37	10	0	0	0
VIS-8	1,133	1001	119	11	2	0	0	0
Bank 2	2418	1960	369	75	14	0	0	0
Zephyr Heights Substation								
ZEH-1	408	397	10	1	0	0	0	0
ZEH-2	972	948	19	3	0	0	0	2
ZEH-3	46	21	20	3	0	0	0	2
Bank 1	1426	1366	49	7	0	0	0	4

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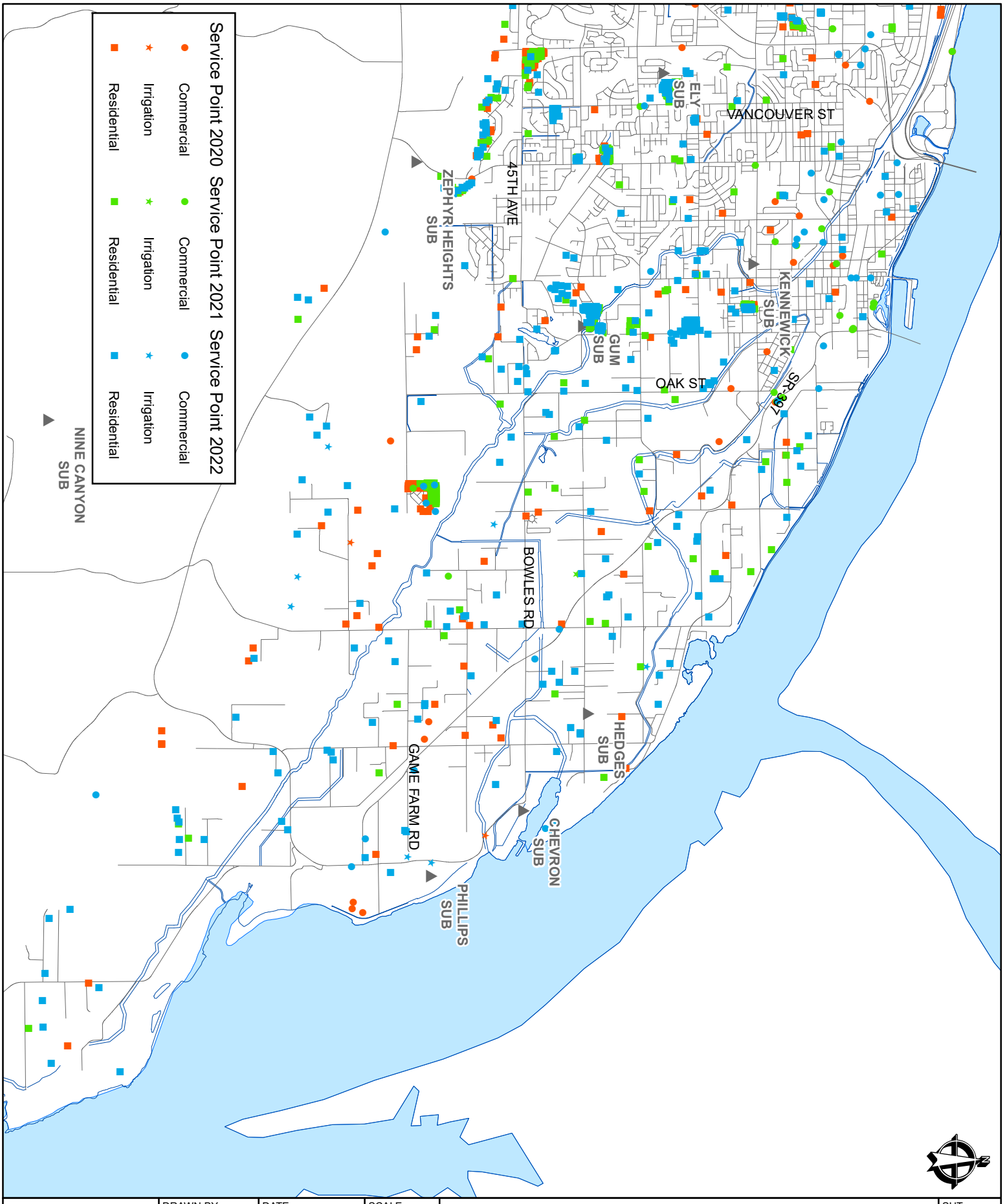

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KENNEWICK EAST AREA NEW CUSTOMERS

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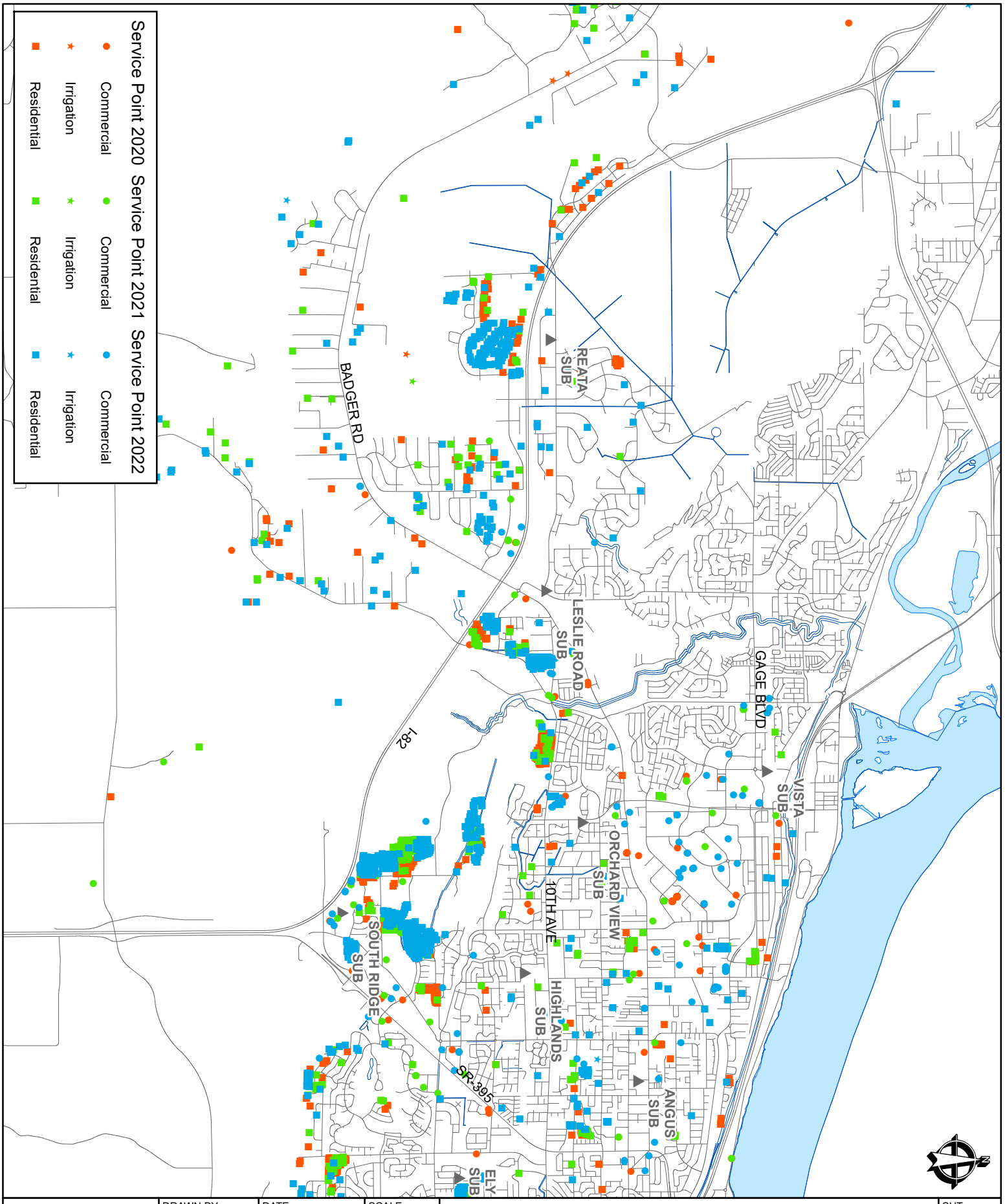

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MAP NO. N/A

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KENNEWICK WEST AREA NEW CUSTOMERS

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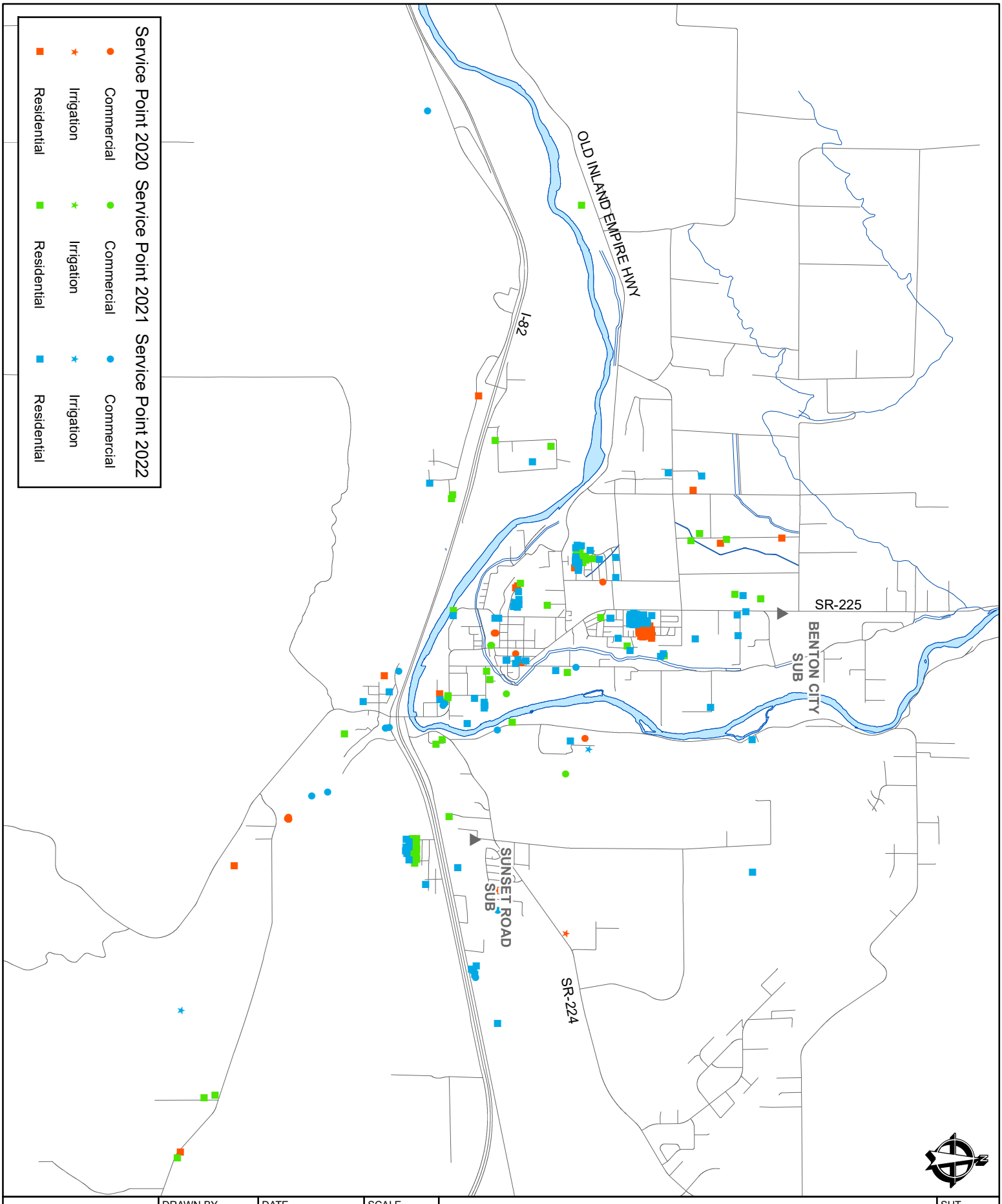

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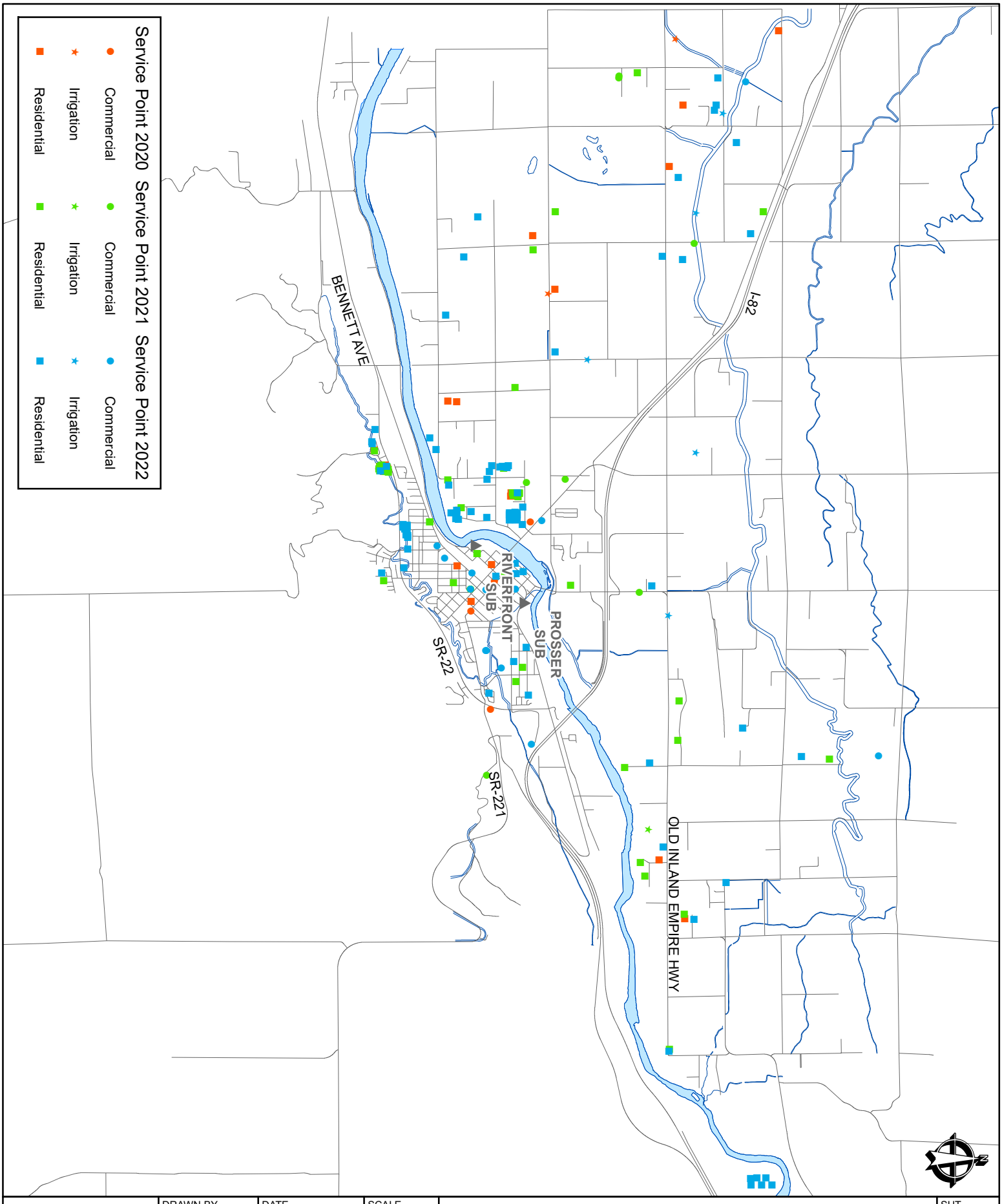
BENTON CITY AREA NEW CUSTOMERS



BENTON P·U·D

DRAWN BY	DATE	SCALE
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MAP NO. N/A

DRAWING NAME Prosser Cust

PROSSER AREA NEW CUSTOMERS

SHT. 1 of 1

Appendix E

Equipment & Conductor Ratings

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Summary of Equipment Ratings

Table #E1

Power Transformer/Regulator Loading Limits[1]	**Normal**	**Emergency**
Ambient - Winter @ 0°F (-18ºC)	136%	150%
Ambient - Summer @ 104°F (40°C)	90%	100%

	(Tapchanging Normal)		**(Tapchanging Blocked)**	
LTC / Regulators Loading Limits [2]	**Normal**	**Emergency**	**Normal**	**Emergency**
Ambient - Winter @ 0°F (-18ºC)	100%	120%	136%	150%
Ambient - Summer @ 104°F (40°C)	90%	100%	90%	100%

			Amibient Temperatures	
Substation Bus Temperature Limits	**Normal**	**Emergency**	**Summer**	**Winter**
Al and Cu	70°C	90°C	40°C	-10°C

	Conductor Temperature		**Ambient Temperatures**		
OH Conductor Temperature Limits	**Normal**	**Emergency**	**Summer**	**Winter**	**Ext. Winter**
AAC & Cu	75°C	85°C	43°C	16°C	-15°C
ACSR	80°C	90°C	43°C	16°C	-10°C

	Conductor Temperature		**Earth Temperatures**	
UG Conductor Temperature Limits	**Normal**	**Emergency**	**Summer**	**Winter**
XLPE/TR-XLPE insulation	90°C	90°C	30°C	16°C
EPR insulation	90°C	90°C	30°C	16°C

	Summer		**Winter**	
Reclosers / Circuit Breakers	**Normal**	**Emergency**	**Normal**	**Emergency**
Reclosers	100%	100%	100%	100%
Breakers	100%	100%	100%	100%

	Summer		**Winter**	
Switches [3]	**Normal**	**Emergency**	**Normal**	**Emergency**
General Switch	100%	125%	150%	175%
S&C Alduti Rupters	1200 A	1820 A	1820 A	2425 A
S&C Disconnects - 600A	600 A	930 A	930 A	1180 A
Table #E6	900 A	1115 A	1115 A	1425 A
S&C Reg. Bypass Disc. - 1200A	1200 A	1820 A	1820 A	2425 A

115 kV Fuses (SMD-2B)	**Normal**	**Emergency**
Ambient - Summer @ 104°F (40°C)	Fuse Size	Cont.Rating
Ambient - Winter @ 61°F (16°C)	1.07 x Fuse size	1.07 x Cont.Rating
Ambient - Winter @ 0°F (-18ºC)	1.24 x Fuse size	1.24 x Cont.Rating

Typical Ambient Temperatures	**Farenheit**	**Celsuis**
Summer	110°F	43°C
Summer	104°F	40°C
Summer	86°F	30°C
Winter	61°F	16°C
Winter Extreme	14°F	-10°C
Winter Extreme	5°F	-15°C
Winter Extreme	0°F	-18°C

Notes

(1) - Recommended loading per PSE study.

(2) - Proposed guideline for limiting tap-changing of LTC's and Regulators.

(3) - Switch ratings are current carrying capacity only.

Table #E2

OVERHEAD CONDUCTOR

OH Conductor	Ambient Temp.	Norm. 75°C	Norm. 80°C	Emer. 85°C	Emer. 90°C
500 Cu	43°C 109°F	640		750	
336 AAC		400		465	
336 ACSR			450		510
266.8 ACSR			390		440
4/0 ACSR			305		350
3/0 ACSR			270		300
500 Cu	16°C 61°F	970		1040	
336 AAC		600		640	
336 ACSR			645		685
266.8 ACSR			555		590
4/0 ACSR			440		465
3/0 ACSR			380		400
500 Cu	-10°C 14°F	1158		1223	
336 AAC		720		760	
336 ACSR			760		790
266.8 ACSR			643		679
4/0 ACSR			513		541
3/0 ACSR			445		470

Ampacity Values from Benton PUD Standard ED-060 for 43^0C and 16^0C
Assumes Wind Velocity 2 Ft.Per Sec, crosswise to conductors

Table #E3

UNDERGROUND CONDUCTOR - IN CONDUIT

		Summer		Winter		Per Okonite*		
UG Conductor	Earth Temp.	Norm.	Emer.	Norm.	Emer.	Norm. 90°C	Norm. 105°C	Emer. 130°C
1000 A		400	500	500	500			
Table #E6		400	445	445	445			
1000 A	30^0C					488	530	593
750 A						425	461	516
4/0 A						214		
1/0 A						146		
#2 A						112		
1000 A	16^0C					541	577	630
750 A						471	502	548
4/0 A						237		
1/0 A						162		
#2 A						125		

* - Based on 100% LF, 3 Conductors in 1 Conduit, No derating for other conduits in close proximity

Table #E4

UNDERGROUND CONDUCTOR - DIRECT BURIED

		Per Okonite*	
UG Conductor	Earth Temp.	Norm. 90°C	Norm. 105°C
1000 kcmil	30°C	740***	795***
4/0 AWG		315**	340**
1/0 AWG		215**	230**
#2 AWG		165	175

* - Based on 100% LF, 3 Single Conductors laid on 7-1/2" centers
** - Limited to 200A due to the elbows utilized.
*** Limited to 600A due to the elbows utilized.

Table #E5

COPPER BUS

		Current Rating in Amperes @ Bus Temperatures										
Size of Tube	Ambient Temp.	0°C	10°C	20°C	30°C	40°C	50°C	60°C	Norm. 70°C	80°C	Emer. 90°C	100°C
1"	-10°C	505	710	860	985	1090	1185	1280	1360	1420	1460	1490
1-1/4"		660	930	1130	1290	1430	1550	1660	1760	1830	1900	1940
1-1/2"		750	1050	1285	1460	1620	1760	1890	2000	2090	2170	2240
2"		925	1300	1585	1800	1980	2140	2240	2350	2430	2500	2580
1"	40°C	---	---	---	---	---	505	710	860	985	1090	1185
1-1/4"		---	---	---	---	---	660	930	1130	1290	1430	1550
1-1/2"		---	---	---	---	---	750	1050	1285	1460	1620	1760
2"		---	---	---	---	---	925	1300	1585	1800	1980	2140

100% I.A.C.S., Schedule 40

Table #E6

ALUMINUM BUS

		Current Rating in Amperes @ Bus Temperatures										
Size of Tube	Ambient Temp.	0°C	10°C	20°C	30°C	40°C	50°C	60°C	Norm. 70°C	80°C	Emer. 90°C	100°C
1"	-10°C	394	554	671	768	850	924	990	1040	1090	1120	1150
1-1/2"		585	819	1002	1139	1264	1373	1470	1560	1640	1690	1730
2"		722	1014	1236	1404	1560	1716	1850	1980	2080	2170	2240
3"		1160	1640	1995	2260	2540	2770	2970	3140	3280	3400	3500
1"	40°C	---	---	---	---	---	394	554	671	768	850	924
1-1/2"		---	---	---	---	---	585	819	1002	1139	1264	1373
2"		---	---	---	---	---	722	1014	1236	1404	1560	1716
3"		---	---	---	---	---	1160	1640	1995	2260	2540	2770

57% I.A.C.S., 6063-T6, Schedule 40

Ampacity values from Benton PUD Standard ED-060
Assumes partially sheltered locations, Wind Velocity 2 Ft.Per Sec, crosswise to conductors

Table #E7

Fuse Ratings

Fuse Type	Summer Normal (40°C)	Summer Emer. (40°C)	Winter Normal (16°C)	Winter Emer. (16°C)	Winter Normal (-10°C)	Winter Emer. (-10°C)
115 kV Fuses (SMD-2B)						
150E	150	207	161	221	186	257
125E	125	181	134	194	155	224
100E	100	165	107	177	124	205
80E	80	132	86	141	99	164

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[For Two Sided Printing]

Appendix F

Substation and Feeder Capability Sheets

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[For Two Sided Printing]

Substation and Feeder Capability Sheets

Substation : ANGUS					
Bay No: #1 (Middle Bay)					
		Winter		Summer	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #40 (BPA Bk #1)	**12/16/20 MVA @55° (1037A)**	1410	1555	**933**	**1037**
	13.44/17.92/22.4 MVA @65°				
Regulator - DN #47 A17V (Siemens SFR)	**2000/2667 kVA (1235A)**	**1235**	**1482**	1111	1235
115 kV (rated by egiuvalent 12 kV Amps)					
Circuit Switcher, BC720	1200 amp (S&C 2030)	11066	11066	11066	11066
12 kV					
Bus - Xfmr to Reg	1-1/4" Cu	1760	1900	1130	1430
Bus/OH - Reg to Dist. Bay	1272 ACSR (verify)	1516	1584	960	1104
Phase Relay Setting (N=80%, E=90%)	Min Trip = 1920A	1536	1728	1536	1728
Regulator Bypass Switches	1200A	1800	2100	1200	1500
Bus Disconnect Switch	1200A	1800	2100	1200	1500
Bay Rating		**1235**	**1482**	**933**	**1037**
Feeders - A3B, A4B					
Circuit Breaker	Westinghouse = 1200A	1200	1200	1200	1200
Disconnect Swt	600A	900	1050	600	750
UG Feeder	1000 A XLP	530	530	530	530
OH Feeder	3/0 ACSR (win. ambient= -10°C)	445	470	270	300
OH Feeder	3/0 ACSR (win. ambient= 16°C)	**380**	**400**	**270**	**300**
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**380**	**400**	**270**	**300**
Feeders - A5B					
Circuit Breaker	Westinghouse = 800A	800	800	800	800
Disconnect Swt	600A	900	1050	600	750
UG Feeder	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Regulator - recommend disable tapchanging if exceed ratings					
Last Updated: 6/26/2012 by EAP					

Substation and Feeder Capability Sheets

Substation : ANGUS					
Bay No: #2 (North Bay)					
		Winter		Summer	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #41 (BPA Bk #2)	**12/16/20 MVA @55° (1037A)**	1410	1555	**933**	**1037**
	13.44/17.92/22.4 MVA @65°				
Regulator - DN #4 A18V (Siemens SFR)	**2000/2667 kVA (1235A)**	**1235**	**1482**	1111	1235
115 kV (rated by egiuvalent 12 kV Amps)					
Circuit Switcher - BC0721	1200 Amp (S&C 2030)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to Reg	1-1/4" Cu	1760	1900	1130	1430
Bus/OH - Reg to Dist. Bay	2 - 500 Cu (@ win amb. 16^{0}C)	1940	2080	1280	1500
Bus/OH - Reg to Dist. Bay	1192 AAC (verify)	1370	1430'	'865'	'980'
Phase Relay Setting (N=80%, E=90%)	Min Trip = 240A @ 115 kV	1770	1992	1770	1992
Regulator Bypass Switches	1200A	1800	2100	1200	1500
Bus Disconnect Switch	1200A	1800	2100	1200	1500
Bay Rating		**1235**	**1482**	**933**	**1037**
Feeders - A6R,A7R,A8R					
Reclosers	G&W Viper Recloser	800	800	800	800
Disconnect Swt	600A	900	1050	600	750
UG Feeder	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Regulator - recommend disable tapchanging if exceed ratings					
Verify Bus conductor size and ratings (1192 AAC)					
Last Updated: 5/16/2022 by DAB					

Substation and Feeder Capability Sheets

Substation : ANGUS					
Bay No: #3 (South Bay)					
		Winter		Summer	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #39 (BPA Bk #3)	**12/16/20 MVA @55° (1037A)**	1410	1555	**933**	**1037**
	13.44/17.92/22.4 MVA @65°				
Regulator - DN #46, A16V (Siemens SFR)	**2000/2667 kVA (1235A)**	**1235**	**1482**	1111	1235
115 kV (rated by egiuvalent 12 kV Amps)					
Circuit Switcher - BC 722	1200 Amp (S&C 2030)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to Reg	1-1/4" Cu	1760	1900	1130	1430
Bus/OH - Reg to Dist. Bay	1272 ACSR (verify)	1516	1584	960	1104
Phase Relay Setting (N=80%, E=90%)	Min Trip = 200A @ 115 kV	1475	1660	1475	1660
Regulator Bypass Switches	1200A	1800	2100	1200	1500
Bus Disconnect Switch	1200A	1800	2100	1200	1500
Bay Rating		**1235**	**1482**	**933**	**1037**
Feeders - A9B					
Circuit Breaker	Westinghouse = 1200A	1200	1200	1200	1200
Disconnect Swt	600A	900	1050	600	750
UG Feeder	1000 A XLP	530	530	530	530
OH Feeder	336.4 AAC	600	640	400	465
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - A1B,A2B					
Circuit Breaker	Westinghouse = 1200A	1200	1200	1200	1200
Disconnect Swt	600A	900	1050	600	750
OH Feeder	336.4 AAC	600	640	400	465
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**576**	**640**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Regulator - recommend disable tapchanging if exceed ratings					
Last Updated: 6/26/2012 by EAP					

Substation and Feeder Capability Sheets

Substation : BENTON CITY					
Bay No: 1					
		Winter		Summer	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer with LTC - DN #67	15/20/25 MVA @55 deg (1296A)	1763	1944	1167	**1296**
	16.8/22.4/28 MVA @65°				
LTC - Reinhausen RMV-II-1500		**1500**	**1800**	1350	1500
115 kV (rated by egiuvalent 12 kV Amps)					
Circuit Switcher - BC 1403	1200A (S&C Model 2010)	11066	11066	11066	11066
12 kV					
Outdoor Bus (transformer - metalclad)	**1-1/4" Cu (1130A @ 30°C rise)**	1760	1900	**1130**	1430
Switch	2000A (ABB)	2000	2000	2000	2000
Main Bus - Metalclad	States Manufacturing - 2000A	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	**Min Trip = 1795A**	1436	1616	1436	1616
Bay Rating		**1436**	**1616**	**1130**	**1296**
Feeders - B1B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - B2B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - B3B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - B4B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Note: B3B and B4B are risers built up on the get-away pole, but do not have any overhead distribution yet.					
Last Updated: 1/23/2020 by DAB					

Substation and Feeder Capability Sheets

Substation : Cold Creek					
Bay No: #1					
		Winter		Summer	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #26	**8.4/10.5 @65° (486A)**	661	729	438	486
Manufacture: HK Porter	7.5/9.375 MVA @55° (434A)				
Conenction type: D-Y	115/12.47kV				
Regulator - C16V (DN #166,67,168)	**750 kVA Regulation**	**367**	**440**	**330**	**367**
115 kV (rated by egiuvalent 12.47kV Amps)					
Switch, B923	Switch (600A)	8300	9683	5533	6917
Switch, B925	Switch (600A)	8300	9683	5533	6917
Bus **(1995A Per Phase)**	3" IPS AL	25537	27597	18398	20790
Bus **(1236A Per Phase)**	2" IPS AL	15821	17098	11399	12880
Fuse, 65E	S&C SM-2B, 65E (65A)	641	1056	599	987
12.47kV					
Bus - Xfmr to Reg by-pass switches	2" IPS AL	1716	1854	1236	1397
Reg by-pass switches	S&C 1200A	1200	1200	1200	1200
Bus - Reg by-pass switches to main	1" IPS AL	1066	1152	768	868
Bus - Main	1" IPS AL	1066	1152	768	868
Bay Rating		**367**	**440**	**330**	**367**
Notes:					
equivelant ratings obtained using:					
Rated current * 115kV / 12.47kV					
Feeder - C1R					
Recloser	Cooper VSA-16	800	800	800	800
UG Getaway	1000 EPRJ	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Feeder Rating		**530**	**530**	**400**	**465**

Substation and Feeder Capability Sheets

Substation : ELY					
Bay No: #1					
		Winter		**Summer**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer - DN #30	15/20/25 MVA @65° (1157A)	1573	1736	**1041**	**1157**
LTC - Reinhausen RMV-II-1500	15/20/25 MVA @55°	**1296**	**1555**	1166	1296
115 kV (rated by egiuvalent 12 kV Amps)					
Circuit Switcher - BC360	1200A (S&C 2010)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to Swt.	1-1/4" Cu	1760	1900	'1130'	1430
Switch - S359A (HK Porter)	1200 Amp	1800	2100	1200	1500
Metal Clad Main Bus	1200 Amp (1/2" x 3" Cu)	1600	1800	1200	1400
Phase Relay Setting (N=80%, E=90%)	Min. Trip = 1805A	1444	1625	1444	1625
Bay Rating		**1296**	**1555**	**1041**	**1157**
Feeders - E1B, E2B, E4B					
Circuit Breaker	ABB AMVAC	1200	1200	1200	1200
UG Getaway (# ckt)	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - E3B					
Circuit Breaker	ABB AMVAC	1200	1200	1200	1200
UG Getaway (# ckt)	1000 EPRJ	**530**	**530**	**530**	**530**
OH Feeder	556.5 AAC	840	890	540	640
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Notes:					
Ratings use KV=12.47					
LTC - recommend disable tapchanging if exceed ratings					
Last Updated: 5/16/2022 by DAB					

Substation and Feeder Capability Sheets

Substation : ELY					
Bay No: #2					
		Winter		Summer	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #31	16.8/22.4/28 MVA @65° (1296A)	1763	1944	1166	1296
LTC - Reinhausen RMV-II-1500	15/20/25 MVA @55°	**1296**	**1555**	**1166**	**1296**
115 kV (rated by eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 469	1200A (S&C 2010)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to Swt.	1-1/4" Cu	1760	1900	'1130'	1430
Switch - S390A (S&C)	1200 Amp - Type?	1800	2100	1200	1500
Metal Clad Main Bus	2000 Amp Al	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	Min Trip = 1908 A	1526	1717	1526	1717
Bay Rating		**1296**	**1555**	**1166**	**1296**
Feeders - E5B, E6B,					
Circuit Breaker	FSV 1200A	1200	1200	1200	1200
UG Getaway (# ckt)	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720 A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - E7B					
Circuit Breaker	FSV 1200A	1200	1200	1200	1200
UG Getaway (# ckt)	1000 EPRJ	**530**	**530**	**530**	**530**
OH Feeder	556.5 AAC	840	890	540	640
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720 A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - E8B					
Circuit Breaker	FSV 1200A	1200	1200	1200	1200
UG Getaway (# ckt)	1000 EPRJ	**530**	**530**	**530**	**530**
OH Feeder	336.4 AAC	600	640	400	465
Phase Relay Setting ( )	Min Trip = 720 A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
LTC - recommend disable tapchanging if exceed ratings					
Last Updated: 4/8/2022 by DAB					

Substation and Feeder Capability Sheets

Substation : GUM STREET					
Bay No:					
		Winter		**Summer**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer - DN # 55	16.8/22.4/28 MVA @65° (1296A)	1762	1944	1166	1296
	15/20/25 MVA @55°				
LTC - Reinhausen RMV-II-1500-15	**1500 Amp**	**1296**	**1500**	**1166**	**1296**
115 kV (rated by eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 129	1200A (S&C 2010)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to Switch/Metalclad	1-1/4" Cu	1760	1900	'1130'	1430
Bus Switch	1200A	1800	2100	1200	1500
Main Bus - Metalclad	2000A	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	Min Trip = 1840 A	1472	1656	1472	1656
Bay Rating		**1296**	**1500**	**1166**	**1296**
Feeders - G1,G2,G3,G4					
Circuit Breaker	FSV-500	1200	1200	1200	1200
UG Getaway (1 ckt)	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720 A	576	648	576	648
Aux Bus Tie Switch	600 Amp	600	600	600	600
Aux Bus - cable tie	1000 A XLP	530	530	530	530
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
LTC - Maximum rating by Reinhausen = 1500A					
Regulator - recommend disable tapchanging if exceed ratings					
Last Updated: 5/4/2021 by MDC					

Substation and Feeder Capability Sheets

Substation : HEDGES					
Bay No: 1					
		Winter		**Summer**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer - DN #43	**12/16/20 MVA @55° (926A)**	1259	**1389**	**833**	**926**
Regulator - DN #10 H16V (Siemens SFR -1983)	**2000/2667 kVA (1235A)**	**1235**	1482	1112	1235
115 kV (rated by eqiuvalent 12 kV Amps)					
Fuse - 125E SMD-2D, (std speed 153-1)		1430	2065	1152	1668
12 kV					
Bus - Xfmr to OCB	1" Cu	1360	1460	860	1090
OCB - Disconnects	1200 Amp (verify)	1800	2100	1200	1800
OCB - S708B	1200 Amp	'1200'	'1200'	1200	1200
Bus - old BPA to Regulator	2 - 500 Cu (@ win amb. 16^{0}C)	1940	2080	1280	1500
Phase Relay Setting (N=80%, E=90%)	Min Trip = 1600 A	1280	1440	1280	1440
Bus - Regulator to Main Bus	1-1/4" Cu	1760	1900	1130	1430
Bay Rating		**1235**	**1389**	**833**	**926**
Feeder - H1B					
Circuit Breaker	VSA = 800A	800	800	800	800
Disconnect Swt	600A	930	1180	600	930
OH Feeder	336.4 AAC	**600**	**640**	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**600**	**640**	**400**	**465**
Feeder - H2B					
Circuit Breaker	VSA = 800A	800	800	800	800
Disconnect Swt	600A	930	1180	600	930
OH Feeder	266.8 ACSR (Win @16^{0}C)	**515**	**550**	**345**	**400**
OH Feeder	266.8 ACSR (Win @-10^{0}C)	643	679	345	400
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**515**	**550**	**345**	**400**
Feeders - H3B,H4B					
Circuit Breaker	VSA = 800A	800	800	800	800
Disconnect Swt	600A	930	1180	600	930
OH Feeder	3/0 ACSR (Win @16^{0}C)	**380**	**400**	**270**	**300**
OH Feeder	3/0 ACSR (Win @-10^{0}C)	445	470	270	300
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**380**	**400**	**270**	**300**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Regulator - Maximum rating by Siemens = 1300A					
Regulator - recommend disable tapchanging if exceed ratings					
Last Updated: 9/24/2008 by MDC					

Substation and Feeder Capability Sheets

Substation : HIGHLANDS					
Bay No: #1					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #36	**12/16/20 MVA @55 deg (927A)**	1261	**1372**	**834**	**927**
Regulator - H17V	**2000/2667 KVA**	**1235**	1482	1112	1235
115 kV (rated in eqiuvalent 12 kV Amps)					
Circuit Switcher BC728	S&C 2030 (1200 Amp)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to Reg	1-1/4" Cu (1130A @ 30^{0}C rise)	1760	1900	1130	1430
Reg by-pass switches	1200A (S&C)	1800	2100	1200	1500
Bus - Reg to Metalclad	1192 AAC	1430	1430	980	980
Metal Clad Main Bus	1200A	1600	1800	1200	1400
Bay Rating		**1235**	**1372**	**834**	**927**
Feeders - HI1B					
Circuit Breaker	1200A (G.E.)	1200	1200	1200	1200
UG Feeder	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - HI2B					
Circuit Breaker	1200A (G.E.)	1200	1200	1200	1200
UG Feeder	1000 A XLP	**530**	**530**	**530**	**530**
OH Feeder	556.5 AAC	840	890	540	640
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - HI3B					
Circuit Breaker	1200A (G.E.)	1200	1200	1200	1200
UG Feeder	1000 EPRJ	**530**	**530**	**530**	**530**
OH Feeder	336.4 AAC	600	640	400	465
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 1/17/2018 by DAB					

Substation and Feeder Capability Sheets

Substation : HIGHLANDS					
Bay No: #2					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #37	**12/16/20 MVA @55 deg (927A)**	1261	**1372**	**834**	**927**
Regulator - H18V	**2000/2667 KVA**	**1235**	1482	1112	1235
115 kV (rated in egiuvalent 12 kV Amps)					
Fuse 125E, SMD-2B		1430	2070	1152	1670
12 kV					
Bus - Xfmr to Reg	1-1/4" Cu (1130A @ 30^{0}C rise)	1760	1900	1130	1430
Reg by-pass switches	1200A (S&C)	1800	2100	1200	1500
Bus - Reg to Metalclad	1192 AAC	1430	1430	980	980
Metal Clad Main Bus	2000	1600	1800	1200	1400
Bay Rating		**1235**	**1372**	**834**	**927**
Feeders - HI4B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 KCM EPR	**530**	**530**	**530**	**530**
OH Feeder	3/0 ACSR (win. ambient= -10^{o}C)	445	470	270	300
OH Feeder	3/0 ACSR (win. ambient= 16^{o}C)	380	400	270	300
Phase Relay Setting (N=80%, E=90%)	720A = min trip	546	648	576	648
Feeder Rating		**380**	**400**	**270**	**300**
Feeders - HI5B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 EPRJ	**530**	**530**	**530**	**530**
OH Feeder	556.5 AAC	840	890	540	640
Phase Relay Setting (N=80%, E=90%)	720A = min trip	546	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - HI6B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 EPRJ	**530**	**530**	**530**	**530**
OH Feeder	336.4 AAC	600	640	400	465
Phase Relay Setting (N=80%, E=90%)	720A = min trip	546	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 8/11/2014 by ECE					

Substation and Feeder Capability Sheets

Substation : HIGHLANDS					
Bay No: #3					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #38	**15/20/25 MVA @65 deg (1155A)**	1571	1709	**1040**	**1155**
Regulator - H19V	**2000/2667 KVA Regulation**	**1235**	1482	1112	1235
115 kV (rated in egiuvalent 12 kV Amps)					
Circuit Switcher BC730	S&C 2030 (1200 Amp)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to Reg	1-1/4" Cu (1130A @ 30^{0}C rise)	1760	1900	1130	1430
Reg By-pass Switches	1200A (S&C)	1800	2100	1200	1500
Bus - Reg by-pass Switches	**1" Cu (860A @ 30^{0}C rise - verify)**	1360	**1460**	'860'	'1090'
Bus - Reg to Metalclad	1292 AAC				
Metal Clad Main Bus	2000	2000	2000	2000	2000
Bay Rating		**1235**	**1460**	**1040**	**1155**
Feeders - HI7B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 KCM EPR	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - HI8B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - HI9B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A XLP	**530**	**530**	**530**	**530**
OH Feeder	556.5 ACSR (win. ambient= -10^{o}C)	840	890	540	640
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 6/28/2018 by DAB					

Substation and Feeder Capability Sheets

Substation : KENNEWICK					
Bay No: #1					
		Winter		**Summer**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer - DN #56	15/20/25 MVA @65° (1157A)	1573	1736	1041	1155
Regulator - DN #62 K16V	**2000/2667 kVA (1235A)**	**1235**	1482	1111	1235
115 kV (rated by eqiuvalent 12 kV Amps)					
Circuit Switcher BC709	S&C 2030 (1200 Amp)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to OCB	**1" Cu**	1360	1460	**860**	**1090**
OCB - Disconnects	1200 Amp	1800	2100	1200	1800
Bus/UG - 3-1000 A XLP / phase	**S=3x376A, W=3x416A**	1248	**1248**	1128	1128
Bus @ Regulator	1-1/4" Cu	1760	1900	1130	1430
Bus - 12 kV Main	2" Al	1980	2170	1236	1560
Phase Relay Setting (N=80%, E=90%)	Min Trip = 1920A	1536	1728	1536	1728
Bay Rating		**1235**	**1248**	**860**	**1090**
Feeders - K1R,K2R,K3R					
Bus	1"Al	1040	1120	671	850
Jumper to Recloser	500 Cu	970	1040	640	750
Circuit Recloser	VSA = 800A	800	800	800	800
Disconnect Swt	600A	930	1180	600	930
UG Feeder	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Regulator - recommend disable tapchanging if exceed ratings					
Last Updated: 6/26/2012 by EAP					

Substation and Feeder Capability Sheets

Substation : KENNEWICK					
Bay No: #2					
		Winter		**Summer**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer - DN #33	16.8/22.4/28 MVA @65° (1296A)	1763	1944	1166	1296
	15/20/25 MVA @55° (1037A)				
Regulator - DN #63 K17V	**2000/2667 kVA (1235A)**	**1235**	1482	**1111**	1235
115 kV (rated by eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 711	1200 Amp (S&C 2030)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to OCB	1" Cu (verify)	1360	1460	'860'	'1090'
Bus - Xfmr to OCB	1-1/2" Al (verify)	1460	1560	'1002'	1264
OCB - S718B	1200 Amp	1200	1200	1200	1200
OCB - Disconnects	1200 Amp	1800	2100	1200	1800
Bus/UG - 3-1000 A XLP / phase	**S=3x376A, W=3x416A**	1248	**1248**	1128	**1128**
Bus @ Regulator	1-1/4" Cu	1760	1900	1130	1430
Bus - 12 kV Main	2" Al	1980	2170	1236	1560
Phase Relay Setting (N=80%, E=90%)	Min Trip = 1920A	1536	1728	1536	1728
Bay Rating		**1200**	**1200**	**1111**	**1128**
Feeders - K4R,K5R,K6R					
Bus	1"Al	1040	1120	671	850
Jumper to Recloser	500 Cu	970	1040	640	750
Circuit Breaker	VSA = 800A	800	800	800	800
Disconnect Swt	600 A	930	1180	600	930
UG Feeder	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Regulator - recommend disable tapchanging if exceed ratings					
Last Updated: 6/26/2012 by EAP					

Substation and Feeder Capability Sheets

Substation : KENNEWICK					
Bay No: #3					
		Winter		**Summer**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer - DN #35	**12/16/20 MVA @55°**	1410	1555	**933**	**1037**
	13.44/17.92/22.4 MVA @65°				
Regulator - DN #63 (K18V)	**2000/2667 kVA (1235A)**	**1235**	1482	1111	1235
115 kV (rated by egiuvalent 12 kV Amps)					
Circuit Switcher - BC 712	1200 Amp (S&C 2030)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to OCB	2"Al	1980	2170	1236	1560
Bus disconnect - S719A	1200A	1800	2100	1200	1800
Bus/UG - 3-1000 A XLP / phase	**S=3x376A, W=3x416A**	1248	**1248**	1128	1128
Bus @ Regulator	1-1/4" Cu	1760	1900	1130	1430
Bus - 12 kV Main	2" Al	1980	2170	1236	1560
Phase Relay Setting (N=80%, E=90%)	MT=204A @ 115 kV(1880A @ 12 kV)	1504	1692	1504	1692
Bay Rating		**1235**	**1248**	**933**	**1037**
Feeders - K7R					
Bus	1"Al	1040	1120	671	850
Jumper to Recloser	500 Cu	970	1040	640	750
Circuit Breaker	VSA = 800A	800	800	800	800
Disconnect Swt	600 A	930	1180	600	930
UG Feeder	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - K8R					
Bus	1"Al	1040	1120	671	850
Jumper to Recloser	500 Cu	970	1040	640	750
Circuit Breaker	VSA = 800A	800	800	800	800
Disconnect Swt	600 A	930	1180	600	930
UG Feeder	1000 EPRJ	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - K9R					
Bus	1"Al	1040	1120	671	850
Jumper to Recloser	500 Cu	970	1040	640	750
Circuit Breaker	VSA = 800A	800	800	800	800
Disconnect Swt	600 A	930	1180	600	930
UG Feeder	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Regulator - recommend disable tapchanging if exceed ratings					
Last Updated: 6/26/2012 by EAP					

Substation and Feeder Capability Sheets

Substation : LESLIE ROAD					
Bay No: #1					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer with LTC - DN #64	15/20/25 MVA @55 deg (1296A)	1763	1944	**1167**	**1296**
	16.8/22.4/28 MVA @65°				
LTC - Reinhausen RMV-II-1500		**1500**	**1800**	1350	1500
115 kV (rated in eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 1374	1200A (S&C Model 2010)	11066	11066	11066	11066
12 kV					
Outdoor Bus (transformer - metalclad)	**3" AL (2260A @ 30^{0}C rise)**	3140	3400	1995	2540
Switch	2000A (ABB)	2000	2000	2000	2000
Main Bus - Metalclad	AZZ - 2000A	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	**Min Trip = 2160A**	1728	1944	1728	1944
Bay Rating		**1500**	**1800**	**1167**	**1296**
Feeders - L1B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - L2B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - L3B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - L4B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
OH Feeder	556.5 AAC	840	890	540	640
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 1/23/2020 by DAB					

Substation and Feeder Capability Sheets

Substation : ORCHARD VIEW					
Bay No: #1					
		Winter (Amps)		**Summer (Amps)**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer with LTC - DN #32	15/20/25 MVA @55 deg (1296A)	1763	1918	1166	**1296**
	16.8/22.4/28 MVA @65°				
LTC - Waukesha UZD		**1296**	**1555**	1166	1296
115 kV (rated in egiuvalent 12 kV Amps)					
Circuit Switcher - BC 687	1200A (S&C Model 2010)	11066	11066	11066	11066
12 kV					
Outdoor Bus (transformer - metalclad)	**1-1/4" Cu (1130A @ 30^{0}C rise)**	1760	1900	**1130**	1430
Switch	2000A (ABB)	2000	2000	2000	2000
Main Bus - Metalclad	Pederson - 2000A	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	**Min Trip = 2052A**	1642	1847	1642	1847
Bay Rating		**1296**	**1555**	**1130**	**1296**
Feeders - O1B					
Circuit Breaker	Siemens 1200A	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
OH Feeder	556.5 AAC	840	890	540	640
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - O2B					
Circuit Breaker	Siemens 1200A	1200	1200	1200	1200
UG Feeder	1000 A XLP	**530**	**530**	**530**	**530**
OH Feeder	336.4 AAC	600	640	400	465
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - O3B					
Circuit Breaker	Siemens 1200A	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
OH Feeder	556.5 AAC	840	890	540	640
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - O4B					
Circuit Breaker	Siemens 1200A	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
OH Feeder	556.5 AAC	840	890	540	640
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Note: As part of bay 2 build out and feeder rerouting, O1B 1000 kcmil get-away taken to vault and landed on DBC's with 600A elbows, but does not have distribution yet.					
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 9/5/2018 by DAB					

Substation and Feeder Capability Sheets

Substation : ORCHARD VIEW					
Bay No: #2					
		Winter (Amps)		**Summer (Amps)**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer with LTC - DN #65	15/20/25 MVA @55 deg (1296A)	1763	1944	1167	**1296**
	16.8/22.4/28 MVA @65°				
LTC - Reinhausen RMV-II-1500		1500	1800	1350	1500
115 kV (rated in eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 1403	1200A (S&C Model 2010)	11066	11066	11066	11066
12 kV					
Outdoor Bus (transformer - metalclad)	**1-1/4" Cu (1130A @ 30^{0}C rise)**	1760	1900	**1130**	1430
Switch	2000A (ABB)	2000	2000	2000	2000
Main Bus - Metalclad	AZZ - 2000A	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	**Min Trip = 1735A**	**1388**	**1562**	1388	1562
Bay Rating		**1388**	**1562**	**1130**	**1296**
Feeders - O5B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - O6B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A XLP	**530**	**530**	**530**	**530**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - O7B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - O8B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Note: As part of bay 2 build out and feeder rerouting, O7B & O8B 1000 kcmil get-aways taken to vault and landed on DBC's with 600A elbows, but do not have distribution yet.					
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 1/23/2020 by DAB					

Substation and Feeder Capability Sheets

Substation : Phillips					
Bay No: #4					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer with LTC - DN #60	15/20/25 MVA @55 deg (1296A)	1763	1918	**1166**	**1296**
	16.8/22.4/28 MVA @65°				
LTC - Reinhousen		1296	1555	1166	1296
115 kV (rated in eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 817	1200A (S&C Model 2010)	11066	11066	11066	11066
12 kV					
Outdoor Bus	**3" Al**	3140	3400	1995	2540
Switch	2000A (Pascor)	2000	2000	2000	2000
Transfer Bus	**2" Al**	1980	2170	1236	1560
Phase Relay Setting (N=80%, E=90%)	**Min Trip = 1632A**	**1306**	**1469**	1306	1469
Bay Rating		**1296**	**1469**	**1166**	**1296**
Feeders - P6R					
Circuit Breaker	G&W Viper Recloser	800	800	800	800
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - P7R					
Circuit Breaker	G&W Viper Recloser	800	800	800	800
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - P8R					
Circuit Breaker	G&W Viper Recloser	800	800	800	800
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 5/16/2022 by DAB					

Substation and Feeder Capability Sheets

Substation : PROSSER					
Bay No: #1					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #47	**12/16 MVA @55 deg (741A)**	1008	**1097**	**667**	**741**
	(12/16/20, but pumps not installed)				
Regulator - P16V (DN #30)	**1500/2000 KVA Regulation**	**962**	1154	866	962
115 kV (rated in egiuvalent 12 kV Amps)					
Fuse 125E, SMD-2B		1430	2070	1152	1670
12 kV					
Bus - Xfmr to Reg	1192 AAC	1430	1430	980	980
Reg by-pass switches	1200A (S&C)	1800	2100	1200	1500
Bus - Reg by-pass Switches	1" Cu (860A @ 30^0C rise)	1360	1460	860	1090
Bus - Reg to Main Bus	2" Alum	1716	1872	1236	1404
Bus - Main	2" Alum	1716	1872	1236	1404
Bus - Disconnect Switches	1200A (S&C)	1800	2100	1200	1500
Bay Rating		**962**	**1097**	**667**	**741**
Feeders - P1B & P2B					
Circuit Breaker	560A VSML Recloser	560	560	560	560
UG Feeder	1000 XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - P3B					
Circuit Breaker	560A VSML Recloser	560	560	560	560
UG Feeder	1000 XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC (3/0 ACSR)	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 6/26/2012 by EAP					

Substation and Feeder Capability Sheets

Substation : PROSSER					
Bay No: #2					
		Winter (Amps)		**Summer (Amps)**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer - DN #48	**12/16/20 MVA @55 deg (927A)**	1261	1372	**834**	**927**
Regulator - P17V (DN #29)	**1500/2000 KVA Regulation**	**962**	**1154**	866	962
115 kV (rated in eqiuvalent 12 kV Amps)					
Fuse 125E, SMD-2B		1430	2070	1152	1670
12 kV					
Bus - Xfmr to Reg	1192 AAC	1430	1430	980	980
Reg by-pass switches	1200A (S&C)	1800	2100	1200	1500
Bus - Reg by-pass Switches	1" Cu (860A @ 30^0C rise)	1360	1460	860	1090
Bus - Reg to Main Bus	2" Alum	1716	1872	1236	1404
Bus - Main	2" Alum	1716	1872	1236	1404
Bus - Disconnect Switches	1200A (S&C)	1800	2100	1200	1500
Bay Rating		**962**	**1154**	**834**	**927**
Feeders - P4B & P5B					
Circuit Breaker	560A VSML Recloser	560	560	560	560
UG Feeder	1000 XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - P6B					
Circuit Breaker	560A VSA Recloser	560	560	560	560
UG Feeder	1000 XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC (3/0 ACSR)	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 6/26/2012 by EAP					

Substation and Feeder Capability Sheets

Substation : REATA					
Bay No: #1					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer - DN #42	**15/20/25 MVA @65 deg (1155A)**	1571	1709	**1040**	**1155**
Regulator - R16V (VTC w/ Reinhausen)	**2000/2667 KVA (1235A)**	**1235**	**1482**	1112	1235
115 kV (rated by eqiuvalent 12 kV Amps)					
Switch - BC 739	Side Break - 600A	5533	5533	5533	5533
Bus	2" & 3" NPS Alum	15825	15825	11398	11398
Circuit Switcher - BC 739	S&C Model 2030 -1200A	11066	11066	11066	11066
12 kV					
Bus - Xfmr to Reg	2" NPS Alum	1716	1872	1236	1404
Reg by-pass switches	1200A	1800	2100	1200	1500
Bus @ Reg	1-1/4" CU	1760	1900	1130	1430
Bus - Reg to Dist. Bay)	3" NPS Alum	2770	3000	1995	2260
Bus - Main	2" Al	1716	1872	1236	1404
Phase Relay Setting (N=80%, E=90%)	SEL-787W2 pickup = 2316A	1851	2084	1851	2084
Bay Rating		**1235**	**1482**	**1040**	**1155**
Feeders - R1R					
Circuit Recloser	G&W Viper-S	800	800	800	800
Disconnect Switch	600A	900	1050	600	750
UG Feeder	1000 XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - R2R					
Circuit Recloser	Cooper VSA 16	800	800	800	800
Disconnect Switch	600A	900	1050	600	750
UG Feeder	1000 XLP	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - R3R					
Circuit Recloser	G&W Viper-S	800	800	800	800
Disconnect Swt	600A	900	1050	600	750
UG Feeder	1000 EPRJ	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - R4R					
Circuit Recloser	Cooper VSA 16	800	800	800	800
Disconnect Swt	600A	900	1050	600	750
UG Feeder	1000 EPRJ	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	800A = min trip	640	720	640	720
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 5/22/2014 by MDC					

Substation and Feeder Capability Sheets

Substation : RIVERFRONT					
Bay No: #1					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer with LTC - DN #19	**15/20/25 MVA @55 deg (1296A)**	**1296**	1918	1166	**1296**
	16.8/22.4/28 MVA @65°				
LTC - Allis Chambers TLH-21		1500	**1800**	1350	1500
115 kV (rated in eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 586	1200A (S&C Model 2010)	11066	11066	11066	11066
12 kV					
Outdoor Bus (transformer - metalclad)	**1-1/4" Cu (1130A @ 30^{0}C rise)**	1760	1900	**1130**	1430
Switch	2000A (ABB)	2000	2000	2000	2000
Main Bus - Metalclad	2000A (Pederson)	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	Min Trip = 251 @115kv (2315A)	1852	2084	1852	2084
Bay Rating		**1296**	**1800**	**1130**	**1296**
Feeders - RF1B & RF2B					
Circuit Breaker	1200A (Siemens)	1200	1200	1200	1200
UG Feeder	1000 XLP	**530**	**530**	**530**	**530**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - RF3B					
Circuit Breaker	1200A (Siemens)	1200	1200	1200	1200
UG Feeder	1000 EPRJ	**530**	**530**	**530**	**530**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 2/18/2020 by DAB					

Substation and Feeder Capability Sheets

Substation : SOUTHRIDGE					
Bay No: 1					
		Winter		**Summer**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer with LTC - DN #68	15/20/25 MVA @55 deg (1296A)	1763	1944	1167	**1296**
	16.8/22.4/28 MVA @65°				
LTC - Reinhausen RMV-II-1500		**1500**	**1800**	1350	1500
115 kV (rated by eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 1403	1200A (S&C Model 2010)	11066	11066	11066	11066
12 kV					
Outdoor Bus (transformer - metalclad)	**1-1/4" Cu (1130A @ 30^{0}C rise)**	1760	1900	**1130**	1430
Switch	2000A (ABB)	2000	2000	2000	2000
Main Bus - Metalclad	States Manufacturing - 2000A	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	**Min Trip = 2316**	1853	2084	1853	2084
Bay Rating		**1500**	**1800**	**1130**	**1296**
Feeders - S1B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - S2B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	**530**	**530**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**530**	**530**
Feeders - S3B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Feeders - S4B					
Circuit Breaker	1200A (ABB)	1200	1200	1200	1200
UG Feeder	1000 A EPR-J	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720A	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Last Updated: 3/17/2020 by DAB					

Substation and Feeder Capability Sheets

Substation : SUNSET ROAD					
Bay No: 1					
		Winter		**Summer**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer - DN #51	16.8/22.4/28 MVA @65° (1296A)	1762	1944	1166	1296
	15/20/25 MVA @55°				
Regulator - DN #123 S16V (Siemens SFR)	**2000/2667 KVA (1235 A)**	**1235**	1482	**1112**	**1235**
115 kV (rated by eqiuvalent 12 kV Amps)					
Switch - BC 805	600 Amp	5532	5532	5532	5532
Circuit Switcher - BC 806	1200 Amp (S&C 2010)	11064	11064	11064	11064
12 kV					
Bus - Xfmr to Regulator	3" Al tube	3140	3400	1995	2540
Regulator Switch - S&C	1200A	1820	2425	1200	1820
Bus - Reg. To Switch	1-1/4" Cu	1760	1900	1130	1430
Main Bus	3" Al tube	3140	3400	1995	2540
Phase Relay Setting (N=80%, E=90%)	**Min Trip = 1600 A**	1280	**1440**	1280	1440
Bay Rating		**1235**	**1440**	**1112**	**1235**
Feeders - SSR-1,SSR-2,SSR-3, SSR-4					
Bus	1-1/2" Al tube	1460	1560	1002	1264
Disconnect Switches	900 Amp	1115	1425	900	1115
Jumpers	500 Cu	1158	1223	640	750
Circuit Breaker	NOVA - 800 A	800	800	800	800
UG Getaway (1 ckt)	1000 EPRJ	**530**	**530**	530	530
OH Feeder	336 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 800 A	640	720	640	720
Aux Bus Tie Switch	900 Amp	1115	1425	900	1115
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Regulator - Maximum rating by Siemens = 1300A					
Regulator - recommend disable tapchanging if exceed ratings					
Phase Relay needs to be raised if projected loading approaches setting.					
Last Updated: 9/5/2018 by DAB					

Substation and Feeder Capability Sheets

Substation : VISTA					
Bay No: #1					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer with LTC - DN #9	**15/20/25 MVA @55 deg (1296A)**	1763	1918	1166	1296
	16.8/22.4/28 MVA @65°				
LTC - Reinhausen RMV-II-1500		**1296**	1555	**1166**	**1296**
115 kV (rated in eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 192	1200A (S&C 2010)	11066	11066	11066	11066
12 kV					
Outdoor Bus - Xfmr to Metalclad	2" CU (1585A @ 30^{0}C rise)	2350	2500	1585	2000
Switch	1200A (S&C)	1800	2100	1200	1500
Metal Clad Main Bus	2000A (FPE)	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	Min Trip = 1680A	1344	**1512**	1344	1512
Bay Rating		**1296**	**1512**	**1166**	**1296**
Feeders - V1B, V3B & V4B					
Circuit Breaker	Pacific Breaker 1200A	1200	1200	1200	1200
UG Feeder	750 AA	**445**	**445**	445	**445**
OH Feeder	336.4 AAC	600	640	**400**	465
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**445**	**445**	**400**	**445**
Feeders - V2B					
Circuit Breaker	Pacific Breaker 1200A	1200	1200	1200	1200
UG Feeder	1000 EPRJ	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 5/22/2014 by MDC					

Substation and Feeder Capability Sheets

Substation : VISTA					
Bay No: #2					
		Winter (Amps)		Summer (Amps)	
Equipment	Size / Type	Normal	Emer.	Normal	Emer
Power Transformer with LTC - DN #61	15/20/25 MVA @55 deg (1296A)	1763	1918	1166	1296
LTC - Reinhausen RMV-II-1500	16.8/22.4/28 MVA @65°	1296	1555	1166	1296
115 kV (rated in eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 127	1200A (S&C Mark V)	11066	11066	11066	11066
12 kV					
Outdoor Bus (transformer - metalclad)	1-1/4" Cu (1130A @ 30^{0}C rise)	1760	1900	1130	1430
Switch	1200A (S&C)	1800	2100	1200	1500
Metal Clad Main Bus	2000A (Phoenix)	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	Min Trip = 1740A	1392	1566	1392	1566
Bay Rating		1296	1555	1130	1296
Feeders - V5B					
Circuit Breaker	Siemens 1200A	1200	1200	1200	1200
UG Feeder	1000 XLP	530	530	530	530
OH Feeder	336.4 AAC	600	640	400	465
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		530	530	400	465
Feeders - V6B & V8B					
Circuit Breaker	Siemens 1200A	1200	1200	1200	1200
UG Feeder	1000 EPRJ	530	530	530	530
OH Feeder	336.4 AAC	600	640	400	465
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		530	530	400	465
Feeders - V7B					
Circuit Breaker	Siemens 1200A	1200	1200	1200	1200
UG Feeder	750 AA	445	445	445	445
OH Feeder	336.4 AAC	600	640	400	465
Phase Relay Setting (N=80%, E=90%)	720A = min trip	576	648	576	648
Feeder Rating		445	445	400	445
Notes:					
Ratings use KV=12.47 => 12.47*1.732=21.6					
Last Updated: 6/26/2012 by EAP					

Substation and Feeder Capability Sheets

Substation : ZEPHYR HEIGHTS					
Bay No: n/a					
		Winter		**Summer**	
Equipment	**Size / Type**	**Normal**	**Emer.**	**Normal**	**Emer**
Power Transformer - DN # 58	**16.8/22.4/28.0 MVA @65°**	1762	1944	1166	1296
	15/20/25 MVA @55°				
LTC - Reinhausen RMV-II-1500-15	**1500 Amp**	1296	1500	**1166**	**1296**
115 kV (rated by eqiuvalent 12 kV Amps)					
Circuit Switcher - BC 986	1200A (S&C 2010)	11066	11066	11066	11066
12 kV					
Bus - Xfmr to Switch/Metaclad	3" Al	3140	3400	1995	2540
Bus Switch	2000 amp - Pascor TTR-8	2000	2000	2000	2000
Main Bus - Metalclad	2000 amp	2000	2000	2000	2000
Phase Relay Setting (N=80%, E=90%)	**Min Trip = 1600 A**	**1280**	**1440**	1280	1440
Bay Rating		**1280**	**1440**	**1166**	**1296**
Feeders - Z1,Z2,Z3					
Circuit Breaker	ABB-AMVAC (1200 amp)	1200	1200	1200	1200
UG Getaway (1 ckt)	1000 EPR 1/6N	**530**	**530**	530	530
OH Feeder	336.4 AAC	600	640	**400**	**465**
Phase Relay Setting (N=80%, E=90%)	Min Trip = 720 A	576	648	576	648
Aux Bus Tie Switch	1200 amp	1200	1200	1200	1200
Feeder Rating		**530**	**530**	**400**	**465**
Notes:					
LTC - Maximum rating by Reinhausen = 1500A					
Regulator - recommend disable tapchanging if exceed ratings					
Last Updated: 6/26/2012					

Appendix G

Capital Planning Strategic Planning Discussion, June 13, 2017

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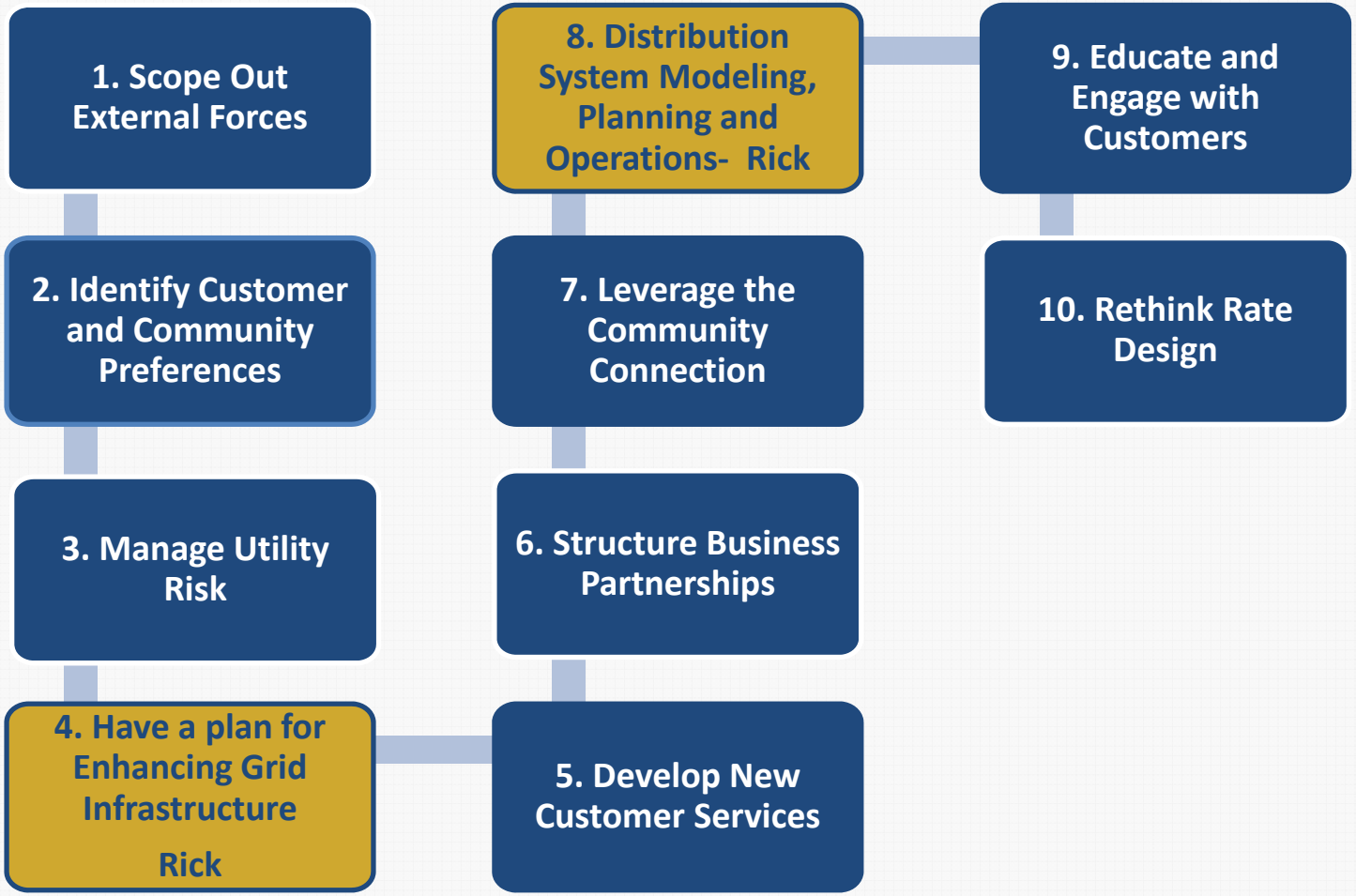
CAPITAL PLANNING STRATEGIC DISCUSSION
June 13, 2017





The Future by Design
10-Step Action Plan for Transition



Agenda

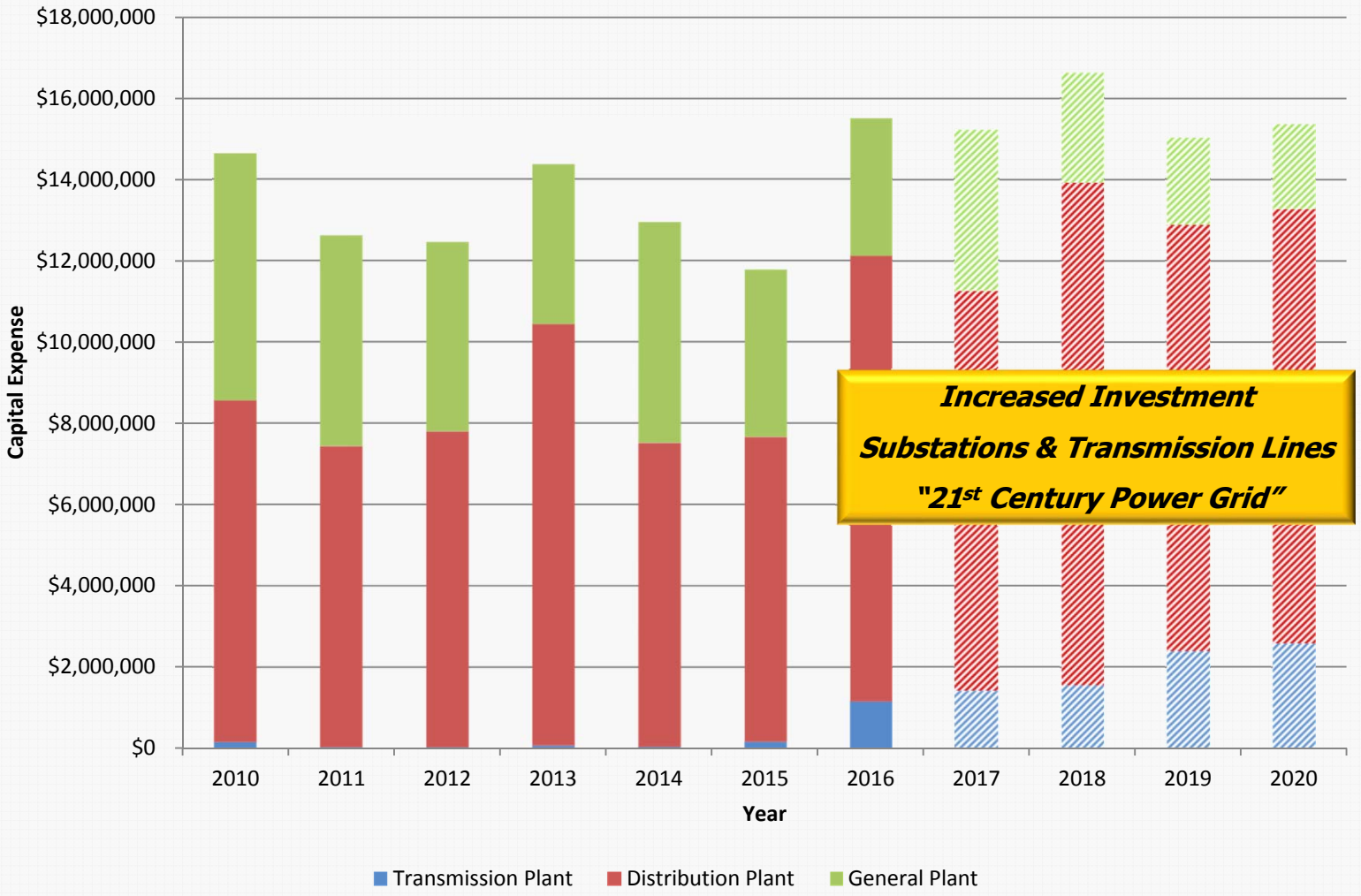
- **Discuss strategy for ensuring the District's Electrical System is able to:**

1) Meet continued incremental customer growth
   - Substations and Distribution Feeders
     - ✓ Proximity to high growth areas
     - ✓ Spacial Load Density
     - ✓ Available capacity

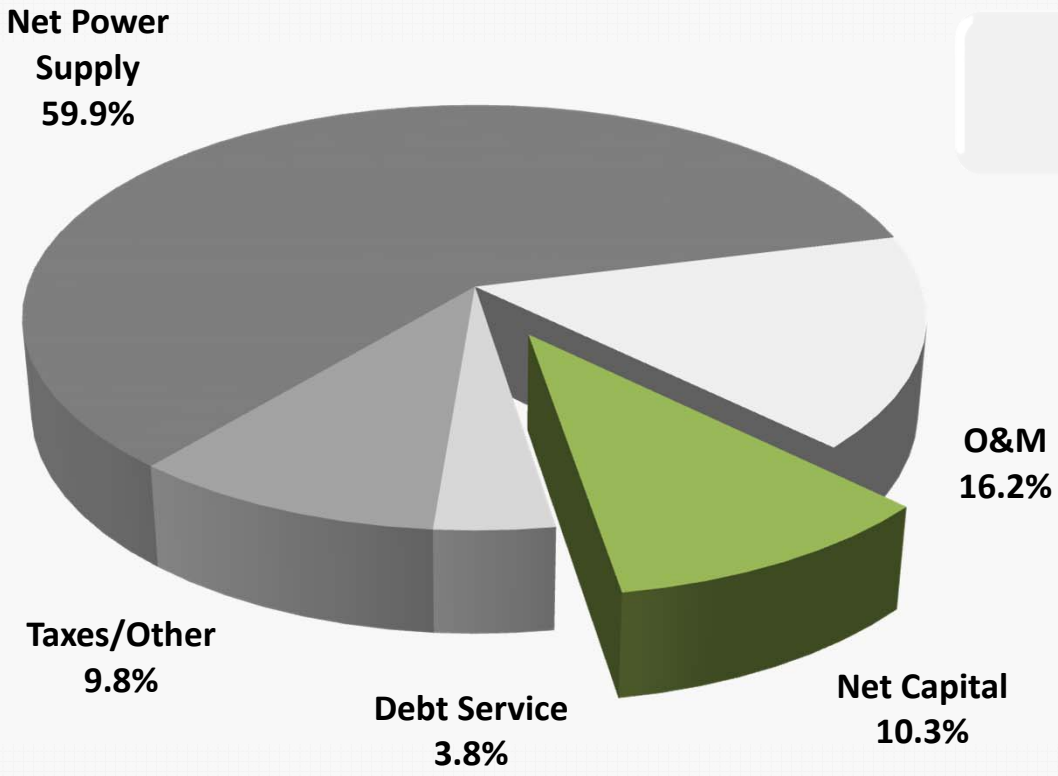
2) Accommodate new large load interconnections and associated revenue growth opportunities
   - Identify "Spot Load" Zones
   - Fast Track (<1 year) vs. Longer Term (>2 to 3 years)
     - ✓ BPA Process Time (≈3 years)

3) Meet customer expectations for a "21st Century Power Grid"
   - Flexible/Reliable and Always On
   - Smart Grid is Happening @ Benton PUD

Capital Expense History & Forecast



2017 Net Capital Expense



***Net Capital*:**

$14.0 million*

**** Capital is net of $1.1 million of capital contributions***

Meet continued incremental customer growth

Customer Growth

Total System	
Load Growth	
Average Growth	Range
0.27%	2017-2021
0.30%	2017-2026

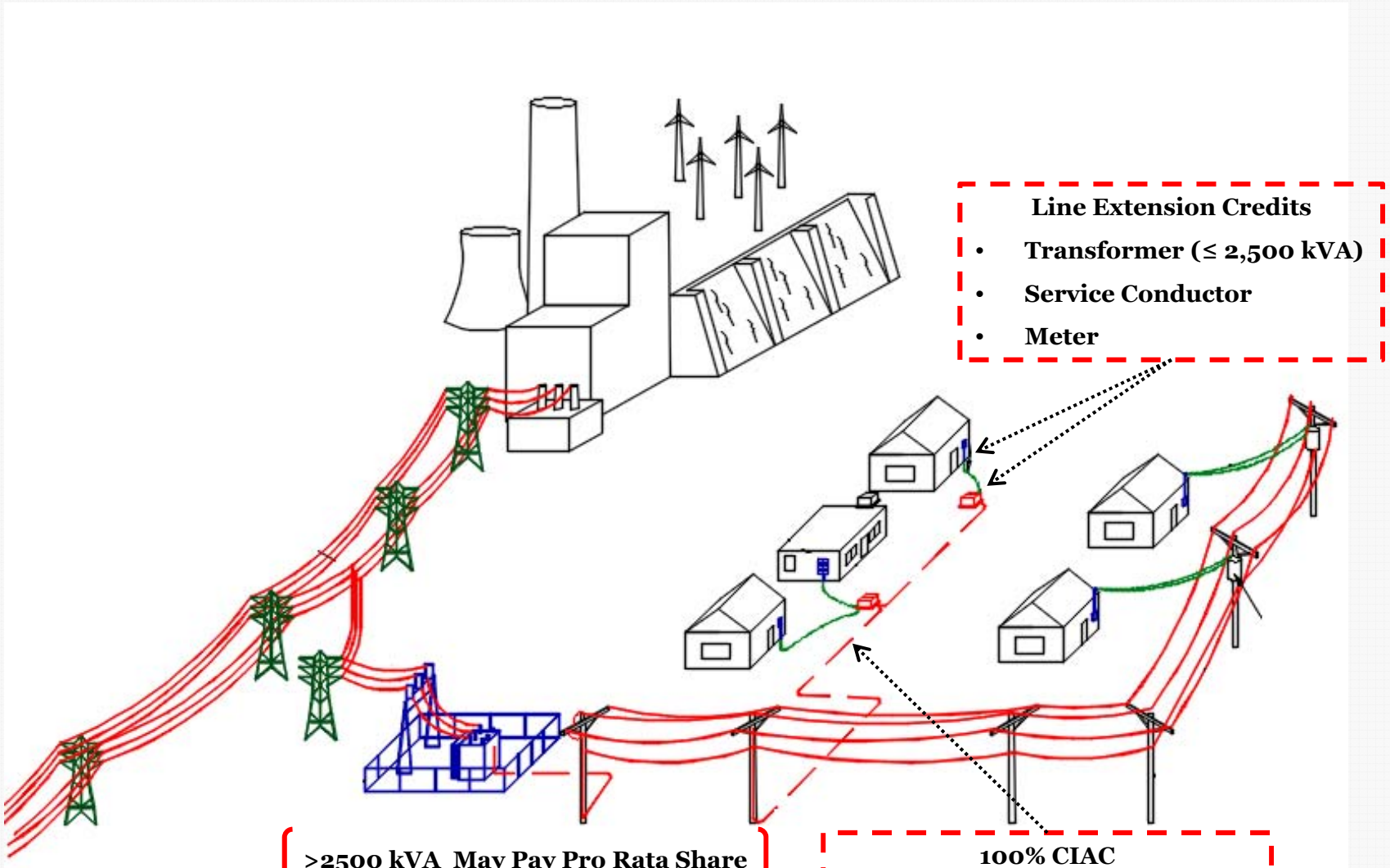
Year	Actuals		Forecast		Forecast - No Conservation		% Change	Cust Count	Change	Usage Per Cust	% Change
	MWh	aMW	MWh	aMW	MWh	aMW					
2000	1,779,257	202.56									
2001	1,569,982	179.22					-11.76%				
2002	1,587,678	181.24					1.13%				
2003	1,580,751	180.45					-0.44%				
2004	1,597,054	181.81					1.03%				
2005	1,602,508	182.93					0.34%	44,389		36.10	
2006	1,555,710	177.59					-2.92%	44,855	466	34.68	-3.93%
2007	1,607,265	183.48					3.31%	45,570	715	35.27	1.69%
2008	1,639,856	186.69					2.03%	46,601	1,031	35.19	-0.23%
2009	1,726,341	197.07					5.27%	47,074	473	36.67	4.22%
2010	1,592,802	181.83					-7.74%	47,616	542	33.45	-8.79%
2011	1,648,362	188.17					3.49%	48,197	581	34.20	2.24%
2012	1,645,277	187.30					-0.19%	48,710	513	33.78	-1.24%
2013	1,696,774	193.70					3.13%	49,519	809	34.26	1.44%
2014	1,781,322	203.35					4.98%	50,052	533	35.59	3.87%
2015	1,738,022	198.40					-2.43%	50,761	709	34.24	-3.79%
2016	1,694,078	192.86					-2.53%	51,642	881	32.80	-4.19%
2017			1,746,052	199.32	1,746,208	199.34	3.07%	52,550	907	33.23	1.29%
2018			1,752,043	200.00	1,753,113	200.13	0.34%	53,260	710	32.90	-0.99%
2019			1,756,996	200.57	1,759,836	200.89	0.28%	53,965	706	32.56	-1.03%
2020			1,765,511	200.99	1,770,850	201.60	0.48%	54,654	689	32.30	-0.78%
2021			1,765,239	201.51	1,773,166	202.42	-0.02%	55,325	671	31.91	-1.23%
2022			1,769,850	202.04	1,779,764	203.17	0.26%	55,995	670	31.61	-0.94%
2023			1,775,064	202.63	1,786,260	203.91	0.29%	56,665	670	31.33	-0.89%
2024			1,785,402	203.26	1,796,977	204.57	0.58%	57,336	671	31.14	-0.59%
2025			1,787,710	204.08	1,799,254	205.39	0.13%	57,996	660	30.82	-1.01%
2026			1,794,019	204.80	1,805,563	206.11	0.35%	58,644	648	30.59	-0.76%

Average 659 new customers per year

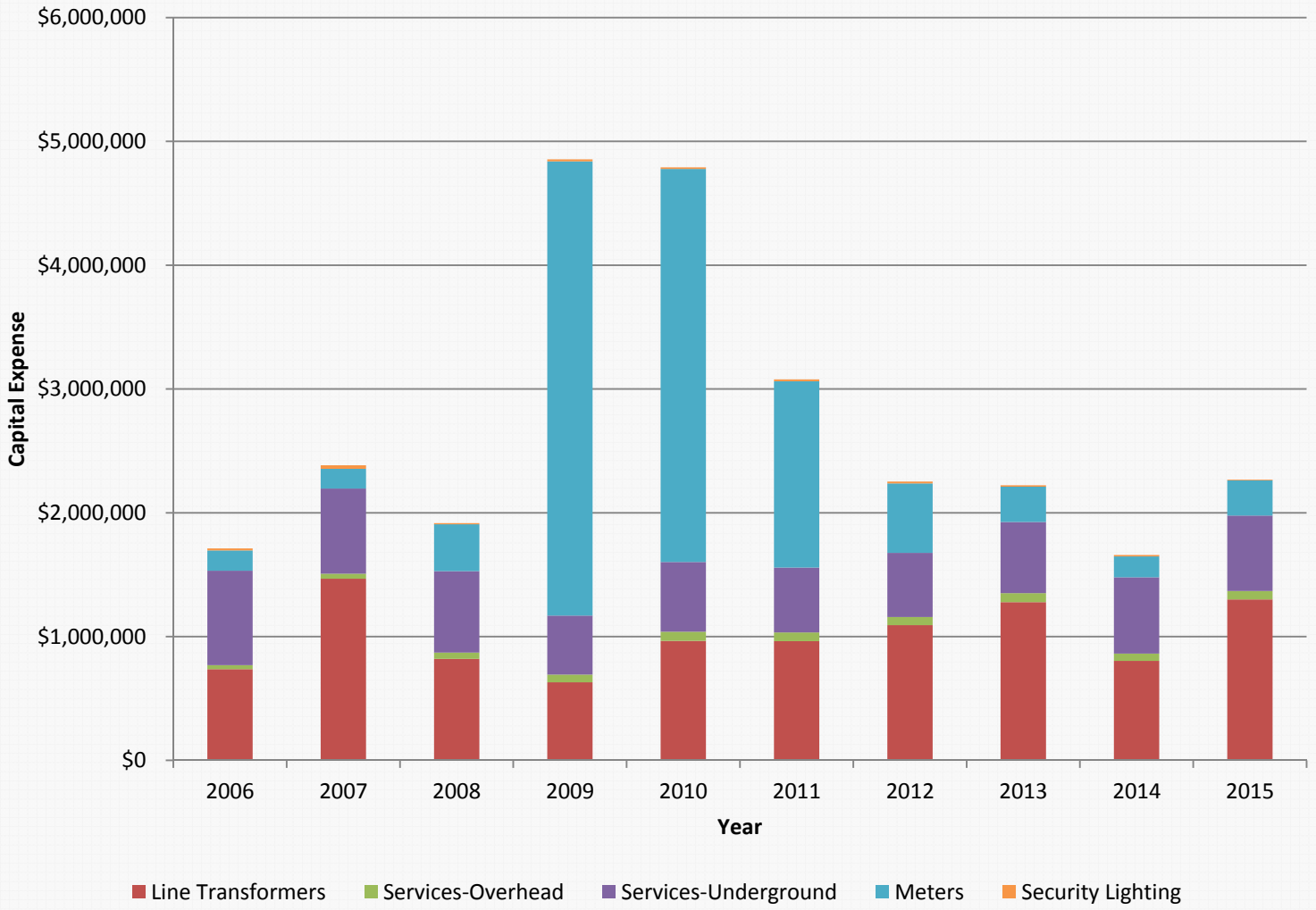
Average 700 new customers per year

Table 15 – Total System History and Retail Load Forecast

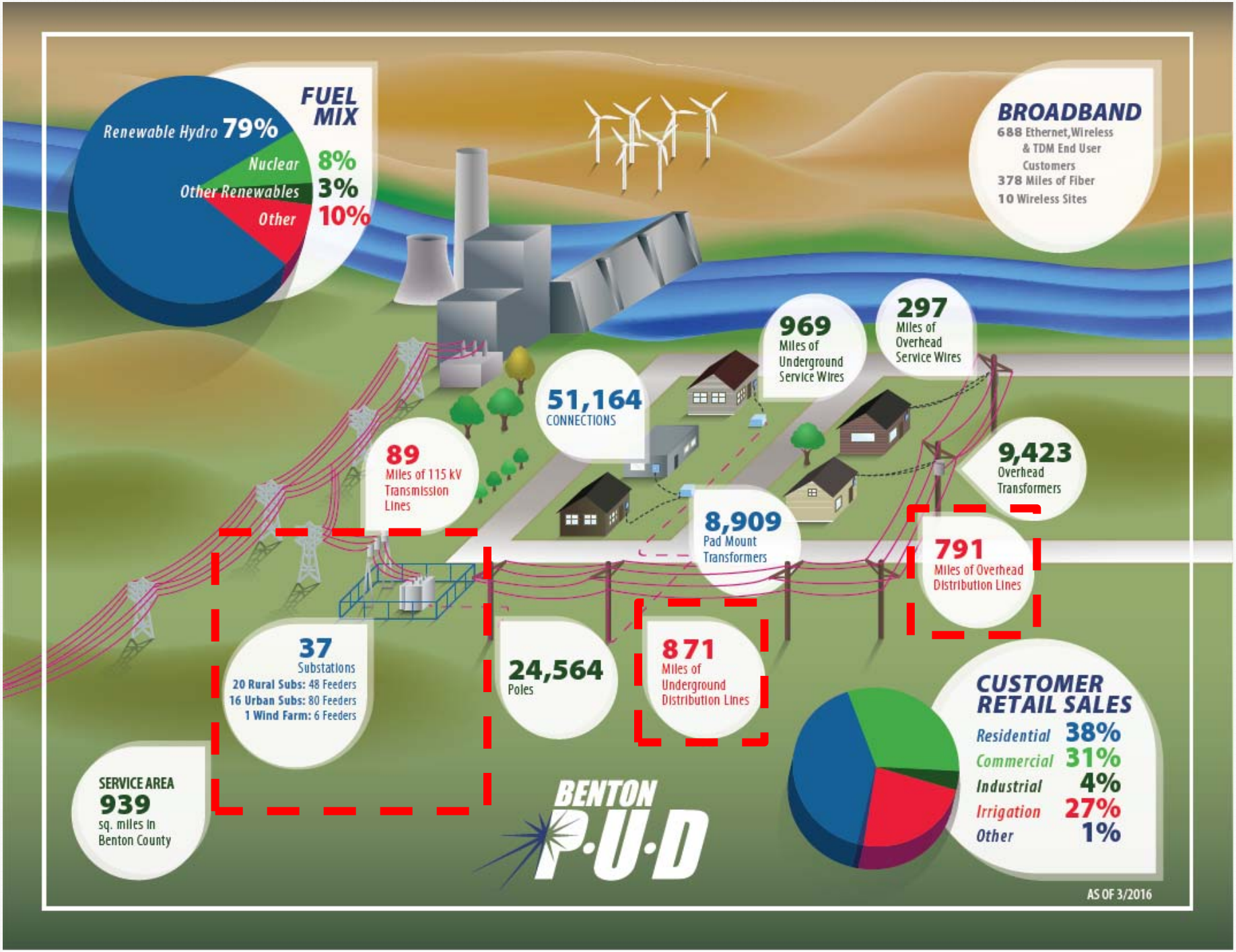
Line Extension Policy



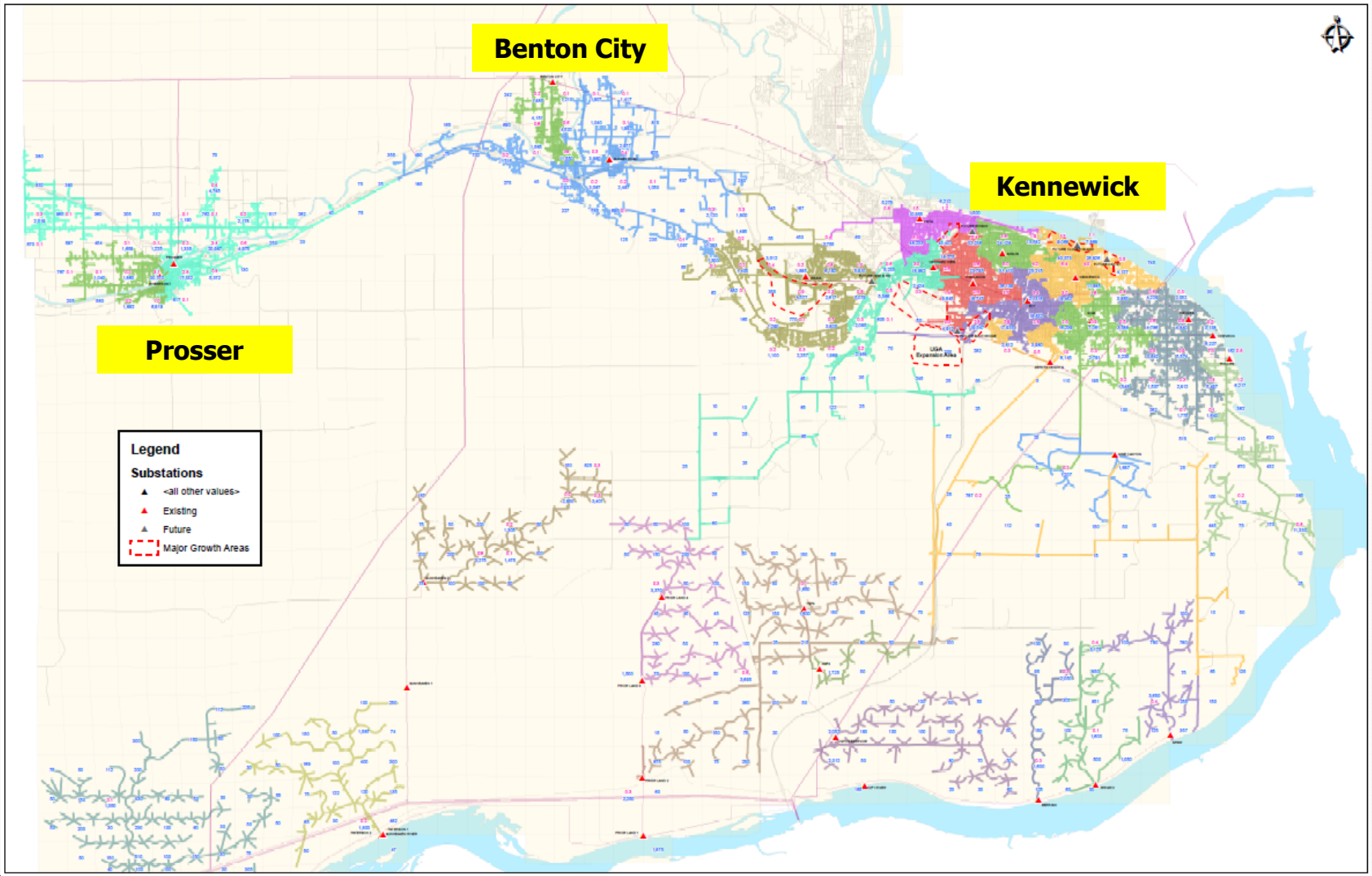
Customer Services - Capital Expense History



Substations
&
Distribution Feeders

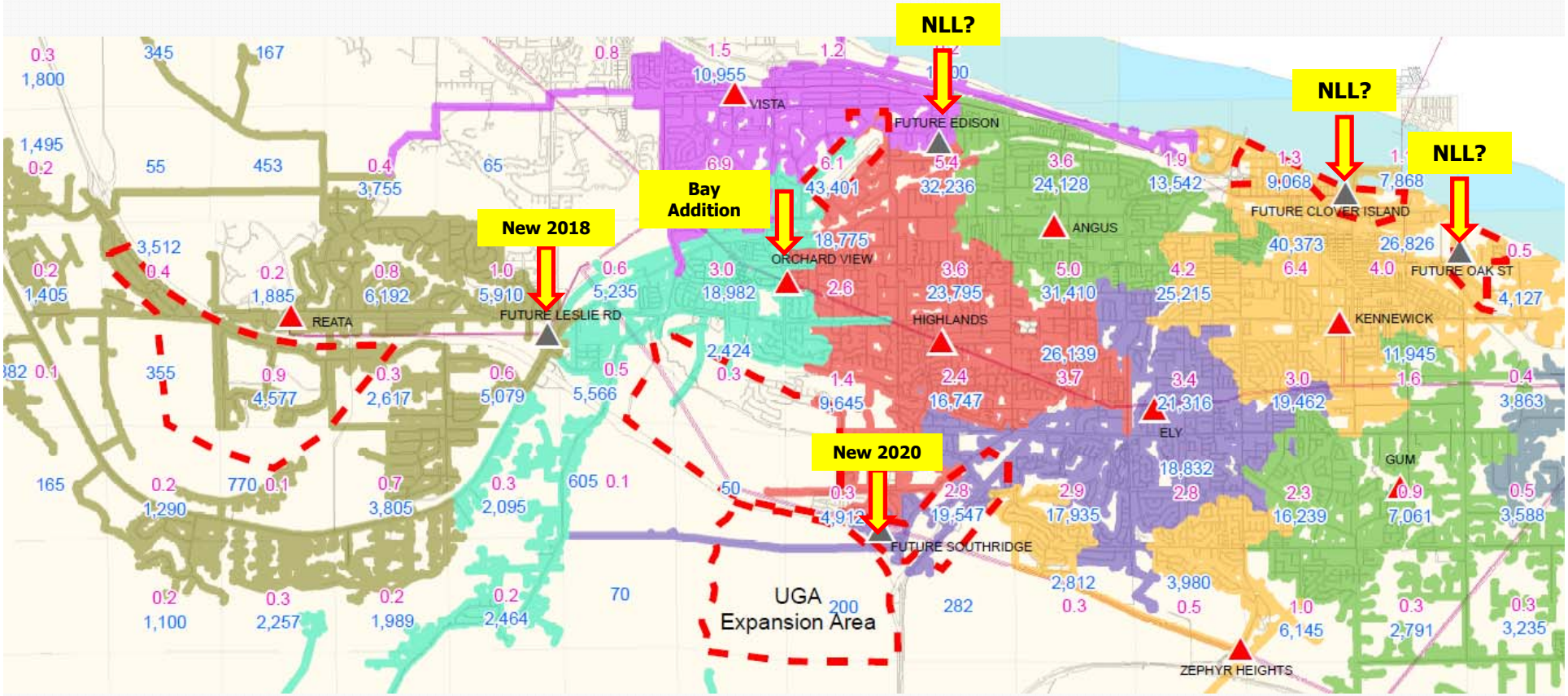

FUEL MIX
Renewable Hydro 79%
Nuclear 8%
Other Renewables 3%
Other 10%
BROADBAND
688 Ethernet, Wireless & TDM End User Customers
378 Miles of Fiber
10 Wireless Sites
969 Miles of Underground Service Wires
297 Miles of Overhead Service Wires
51,164 CONNECTIONS
89 Miles of 115 kV Transmission Lines
9,423 Overhead Transformers
8,909 Pad Mount Transformers
791 Miles of Overhead Distribution Lines
37 Substations
20 Rural Subs: 48 Feeders
16 Urban Subs: 80 Feeders
1 Wind Farm: 6 Feeders
24,564 Poles
871 Miles of Underground Distribution Lines
CUSTOMER RETAIL SALES
Residential 38%
Commercial 31%
Industrial 4%
Irrigation 27%
Other 1%
SERVICE AREA
939 sq. miles in Benton County
BENTON P·U·D
AS OF 3/2016

Substation – Service Areas



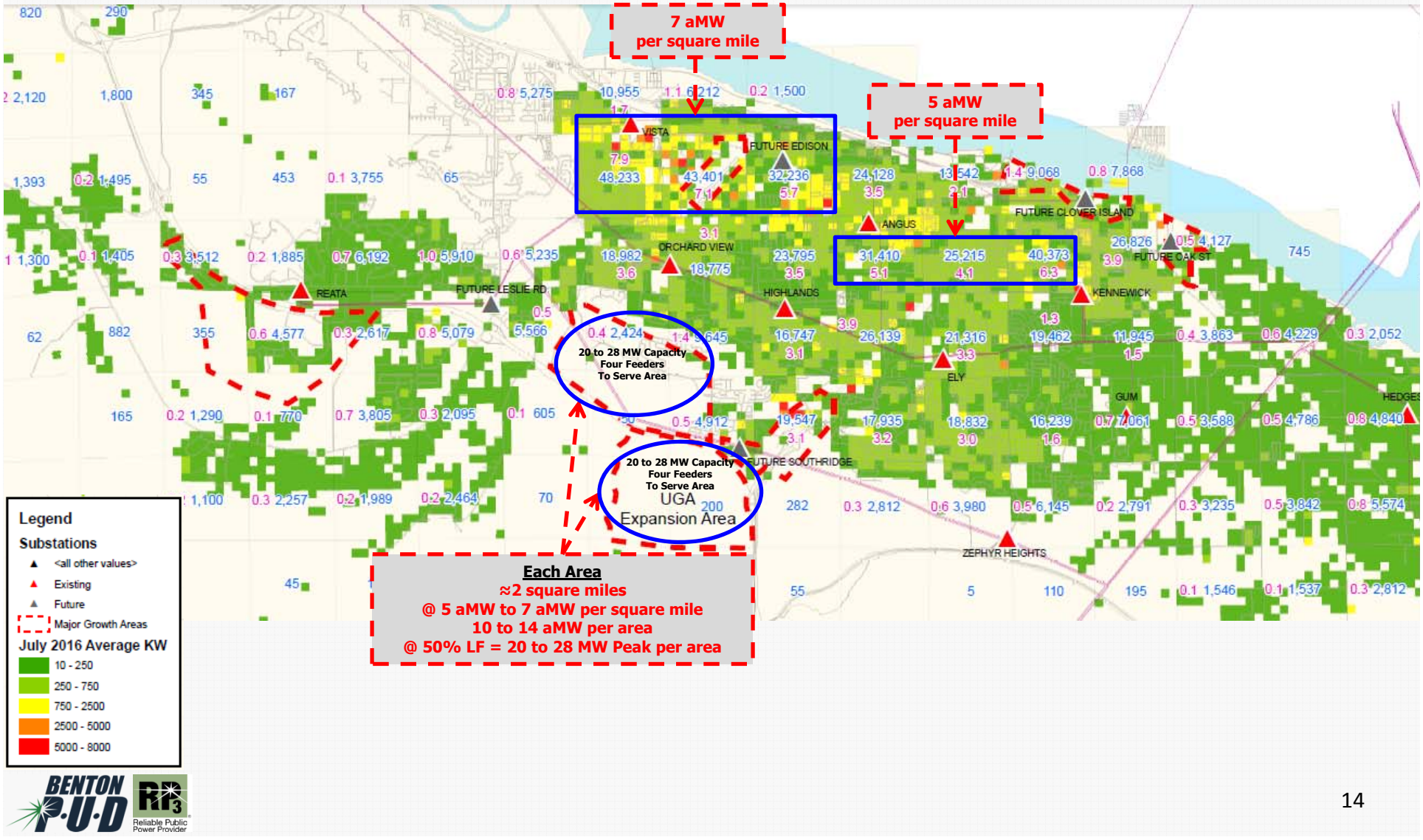
Note: Cold Creek and Hanford Site Substations and Feeders located in northwest Benton County not shown.

Substations – Plans for High Growth Areas

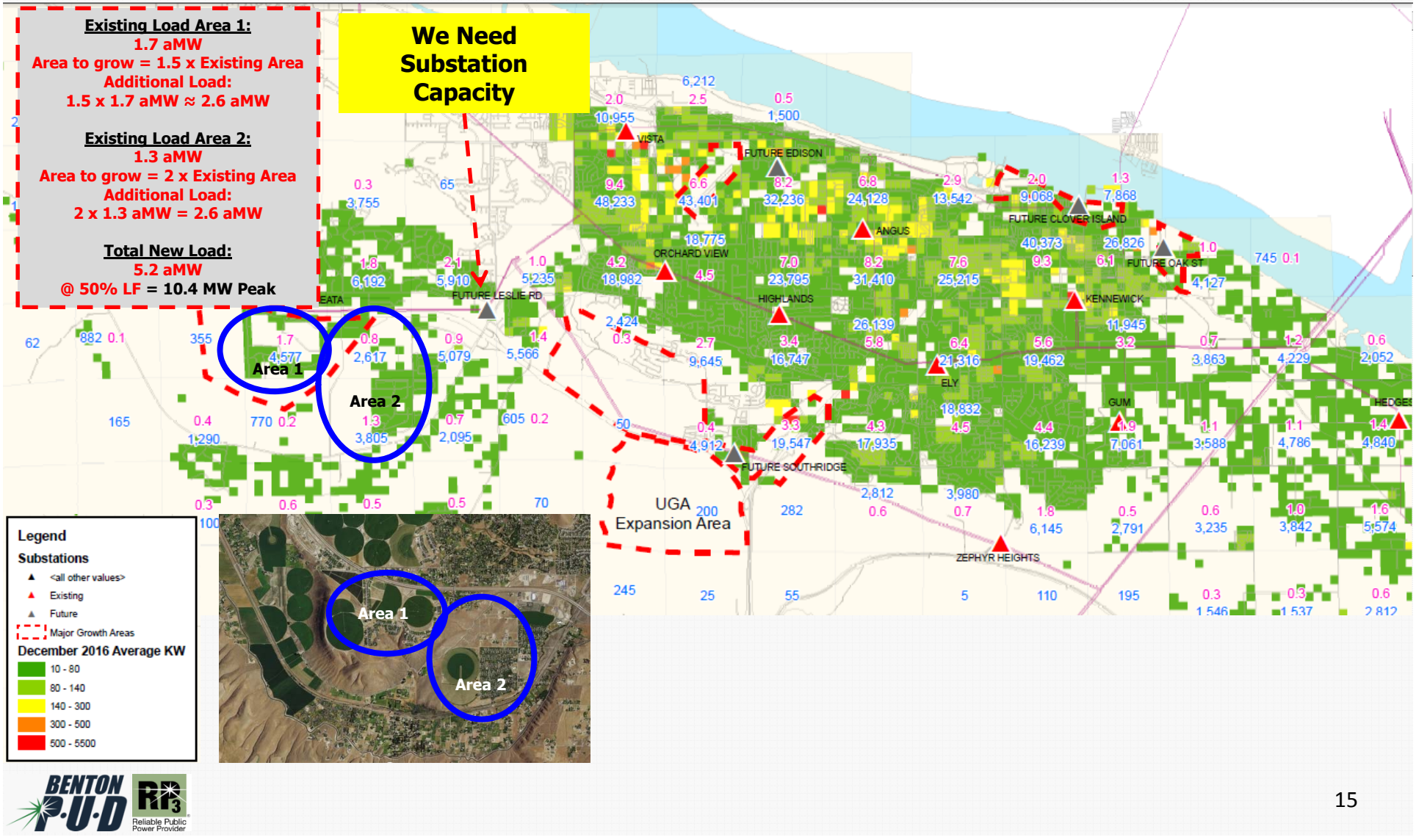


NLL? = Contingent on New Large and/or Significant Commercial Load Development

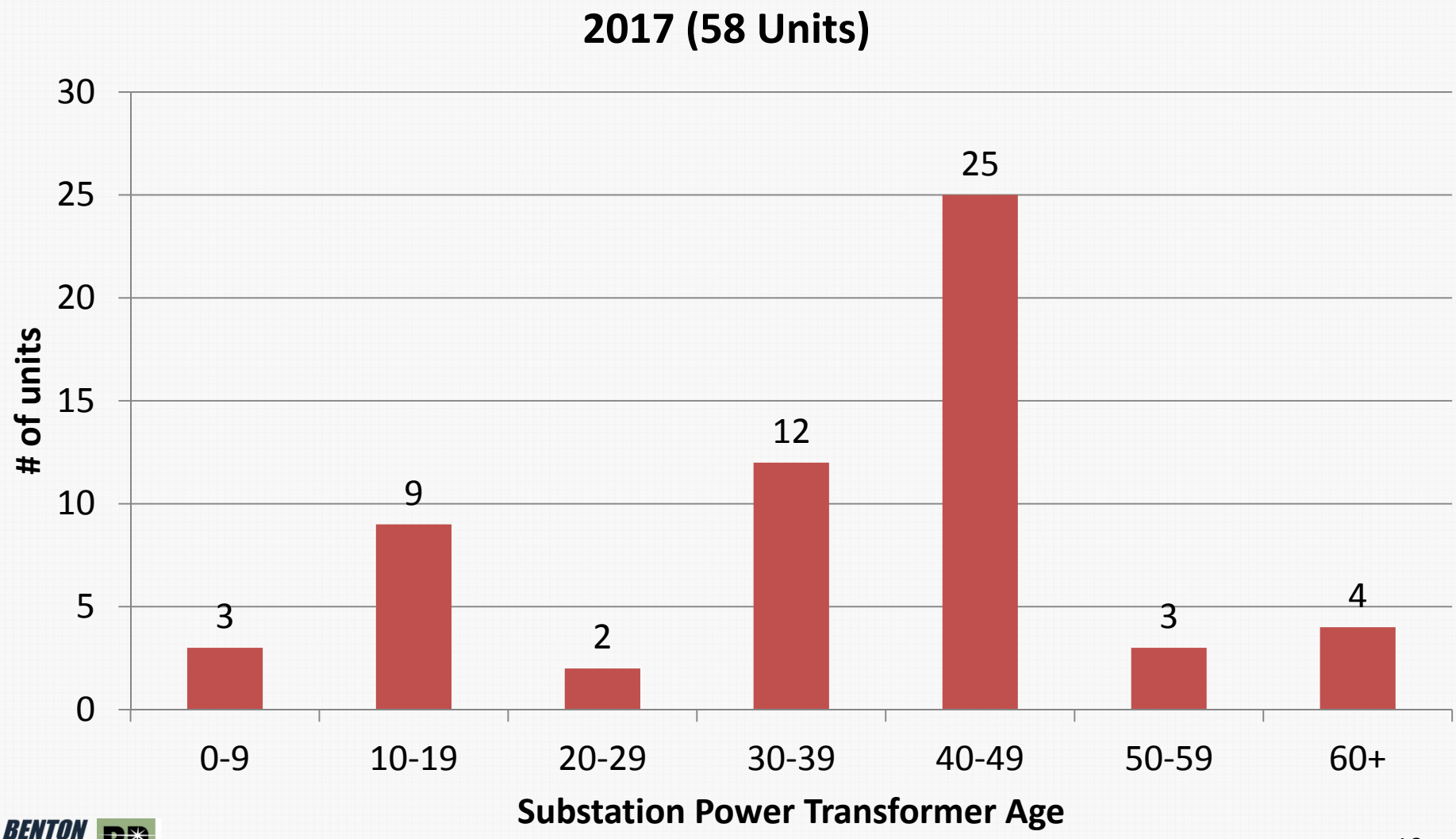
Electrical Load Density (Summer)



Electrical Load Density (Winter)

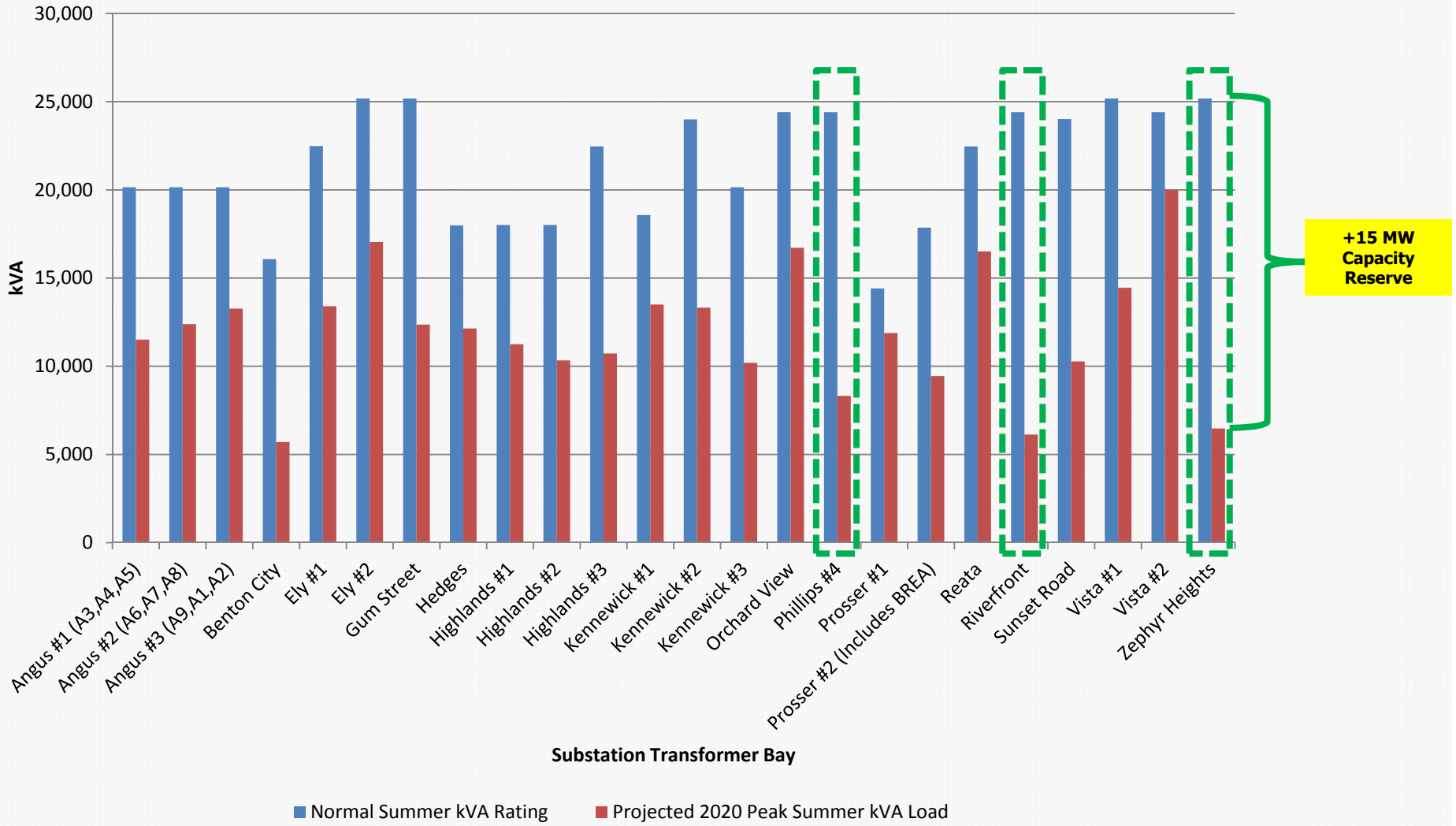


Substation Transformers – Aged Equipment



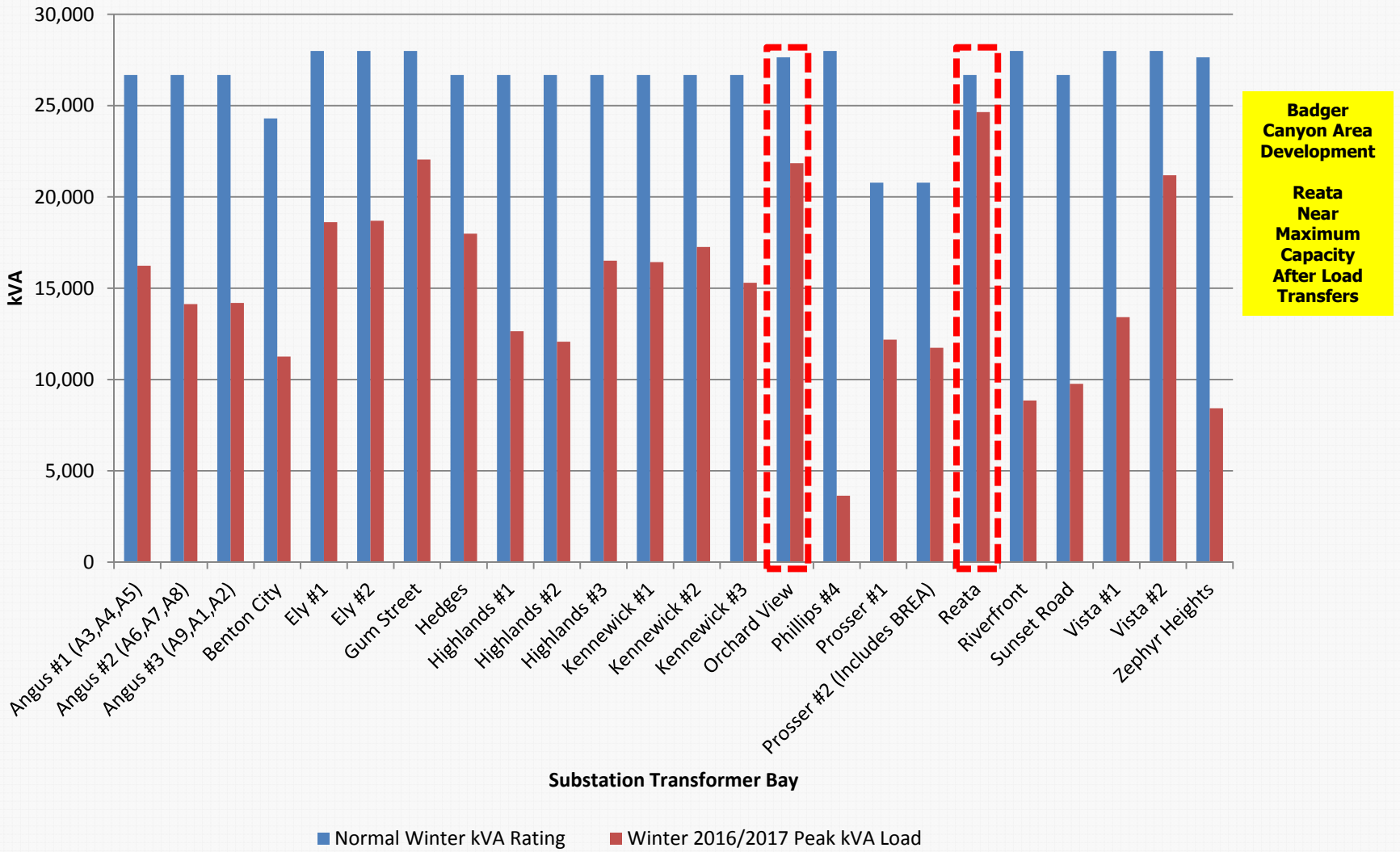
Spare Transformer Inventory

Substation Transformer Summer Loading

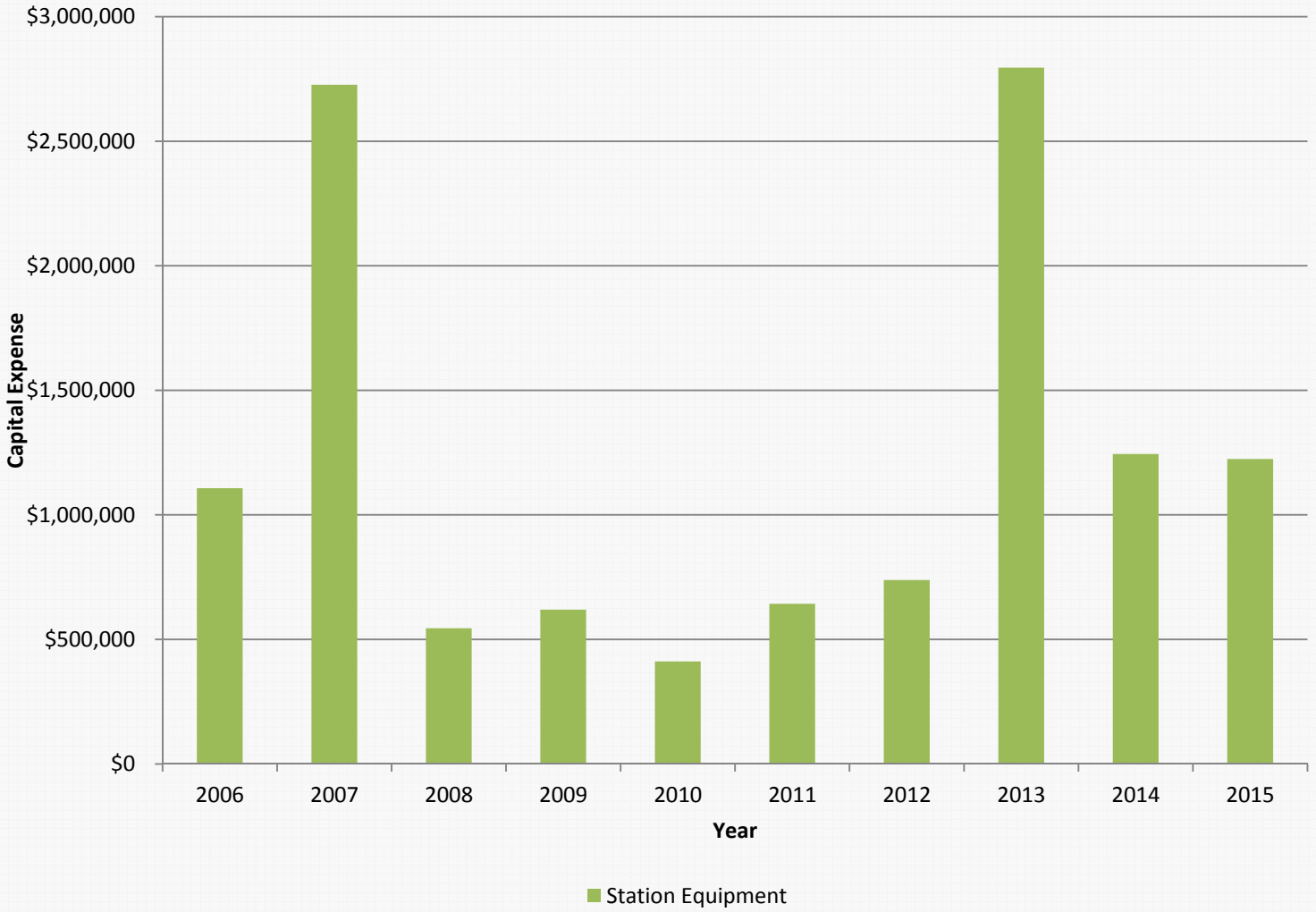


Note: Summer 2015 Load Data

Substation Transformer Winter Loading



Substation - Capital Expense History



Substation Improvements

Substation Transformer Improvements
Circuit Switcher Additions
Capacitor Bank Additions

Control House Additions
Switchgear Upgrades

Substation Improvements

New Technology

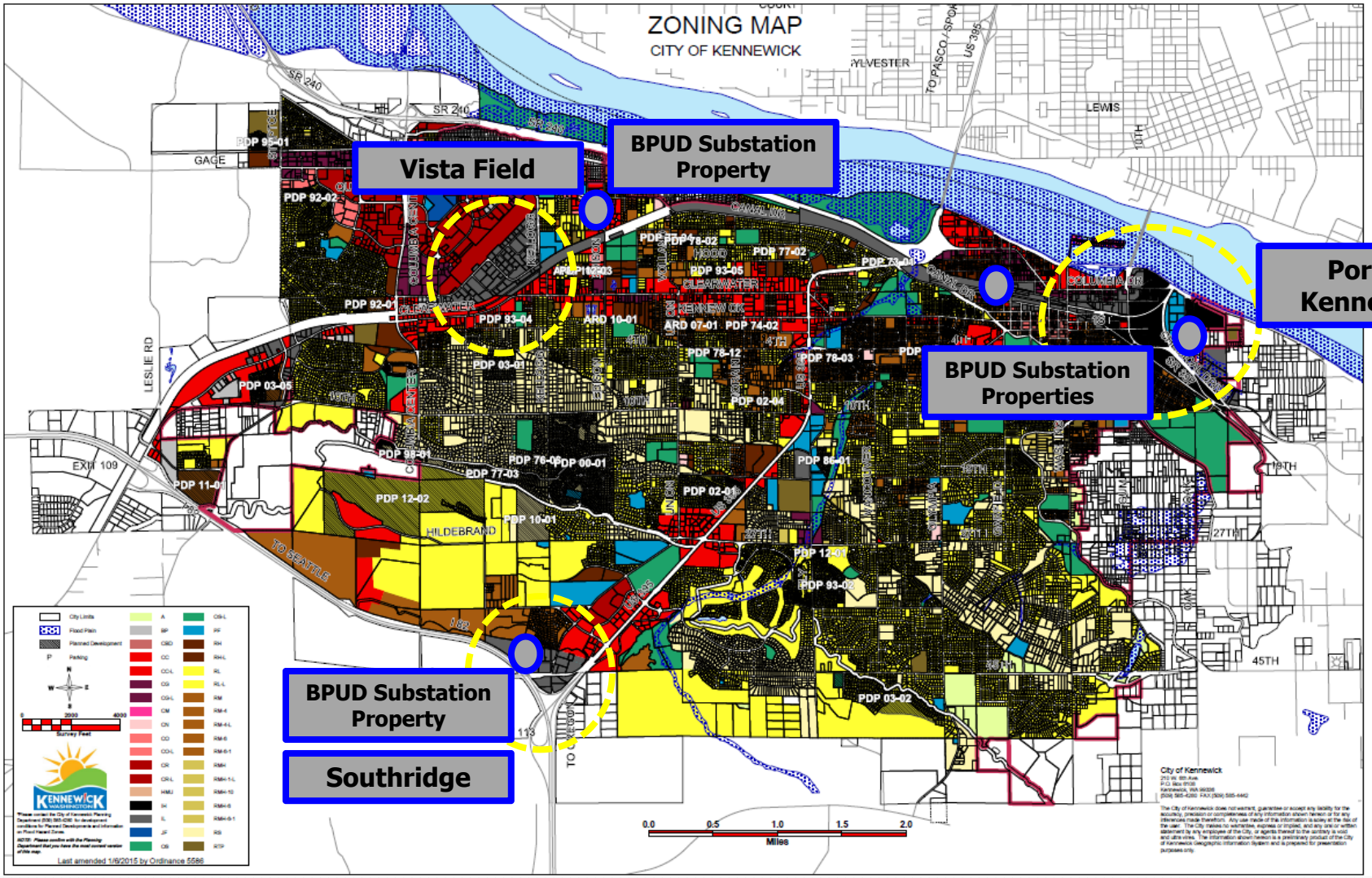
Protective Relay Upgrades

Substation Projects & Budgets

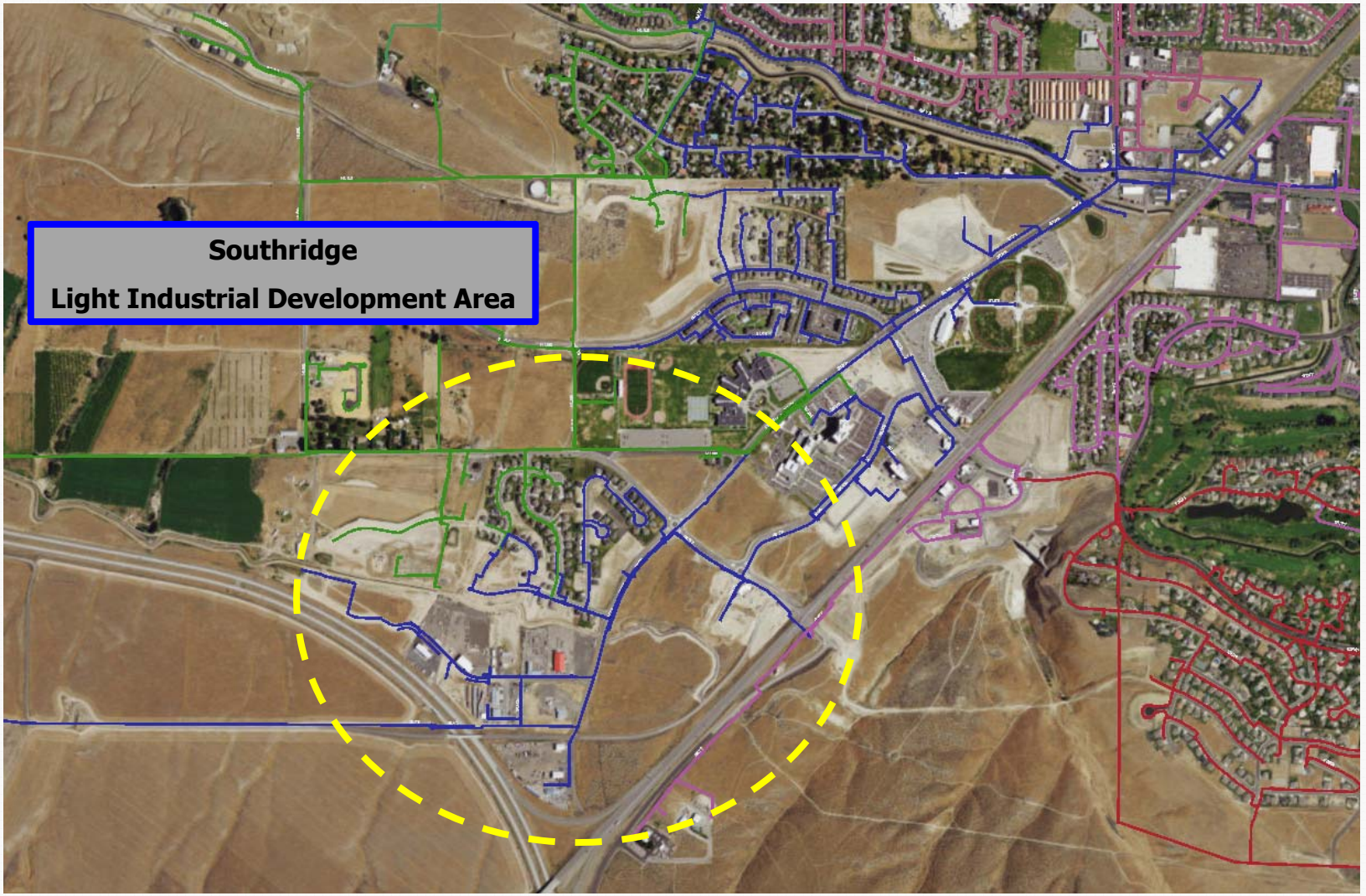
Project Description	Year (amounts in constant year dollars) 2017	2018	2019	2020
SUBSTATIONS				
Cap Bank - 2,400 kVAR - Carma		180,000		
Cap Bank - 900 kVAR - Whitcomb		85,000		
Cap Bank - 1,800 kVAR - Irrigro		150,000		
Cap Bank - 2,400 kVAR Prior #3			180,000	
Cap Bank - 2,400 kVAR Prior #2			180,000	
Cap Bank - 2,400 kVAR Prior #1				180,000
Power Xfmr LTC Retrofit - Riverfront TLH-21		335,000		
Diff. Relay for Circuit Switcher - Highlands #3	75,000			
Circuit Switcher Addition - Highlands #1 & #2	400,000			
Circuit Switcher Addition - Prosser #1 & #2			400,000	
Benton City Substation Upgrade			1,300,000	
Feeder Position Addition - Phillips P8R	50,000			
Metalclad/Breaker/Relay Replacement - Highlands #3	400,000			
Breaker Retrofit & Relay Upgrade - Gum Street	150,000			
Breaker Retrofit & Relay Upgrade - Vista #2		125,000		
Breaker Replacement & Relay Upgrade - Angus #1, #2, #3				250,000
Feeder Relay Upgrade - Ely #1	25,000			
Feeder Relay Upgrade - Ely #2	25,000			
Feeder Relay Upgrade - Vista #1	-	25,000		
Feeder Relay Upgrade - Riverfront	-	25,000		
Feeder Relay Upgrade - Orchard View		-	25,000	
Feeder Relay Upgrade - Hedges			-	25,000
Control House Addition & Batteries - Gum Street		145,000		
Substation Misc. Aux. Equip., Relays/Controls	25,000	25,000	25,000	25,000
New Substation - Leslie Road		2,100,000		
New Substation - Southridge				2,100,000
Project Subtotal	1,150,000	3,195,000	2,110,000	2,580,000

Accommodate new large load interconnections and associated revenue growth opportunities

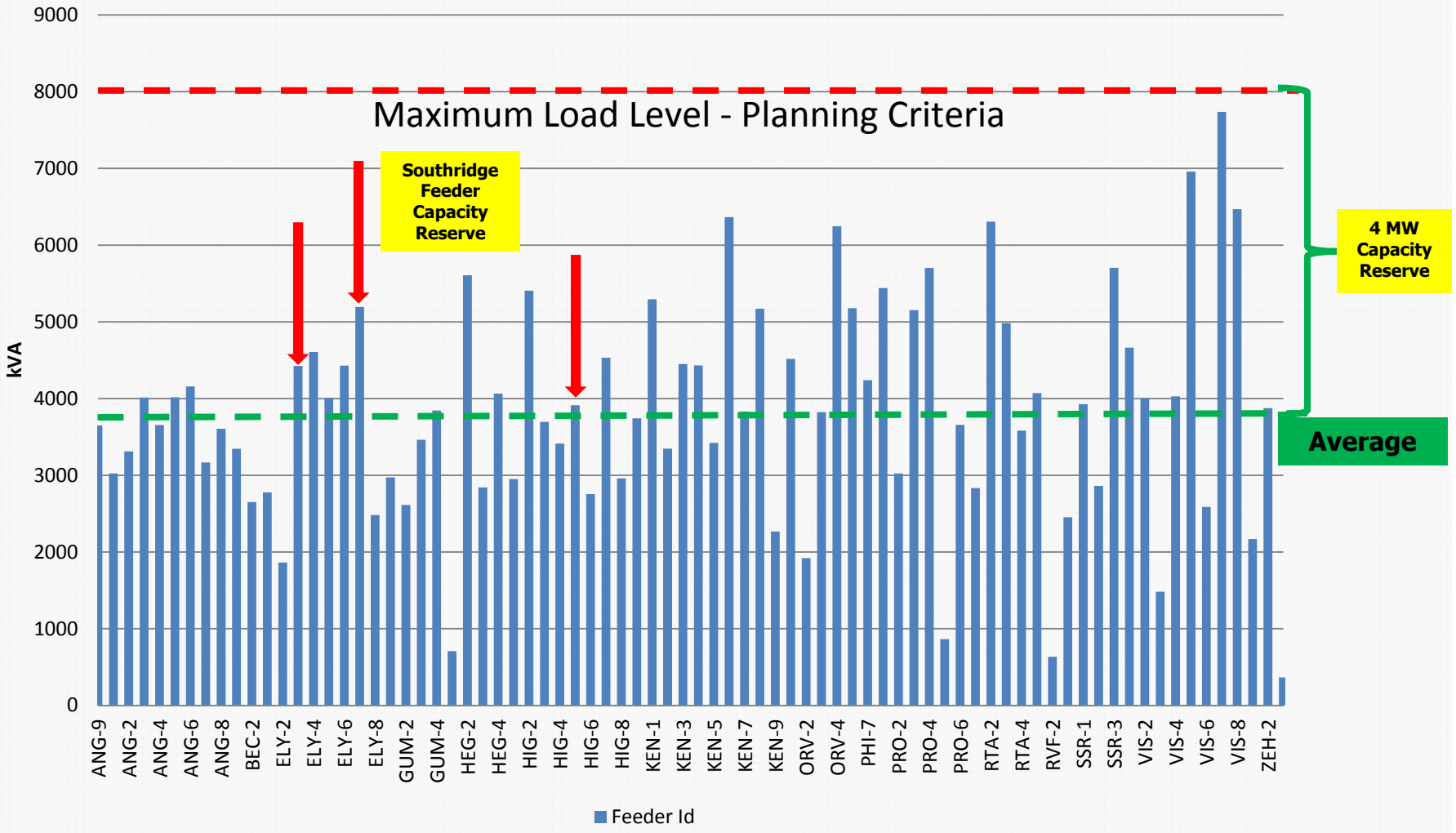
New Large Loads – Development Areas



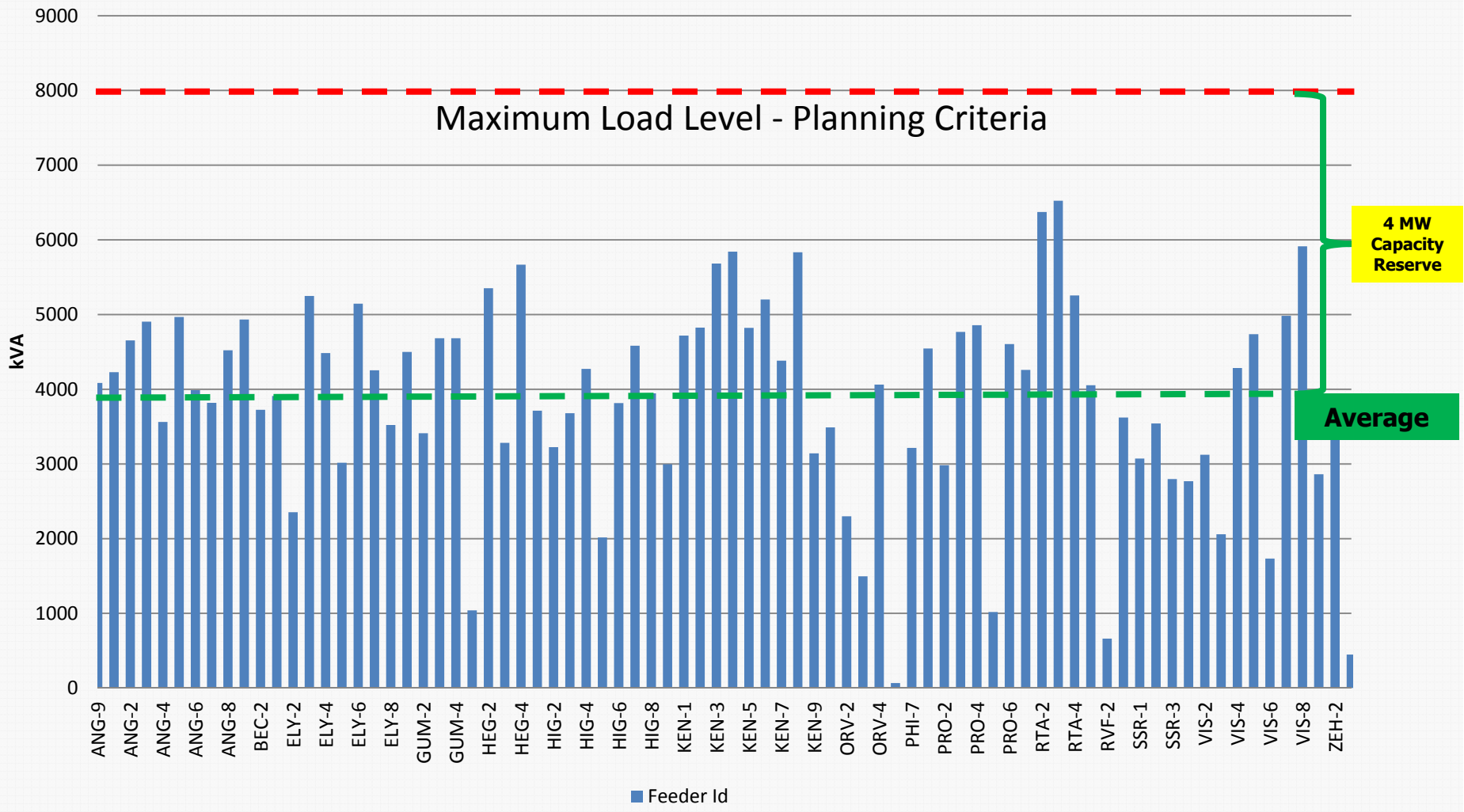
Development Areas
Feeder Penetration & Available Capacity



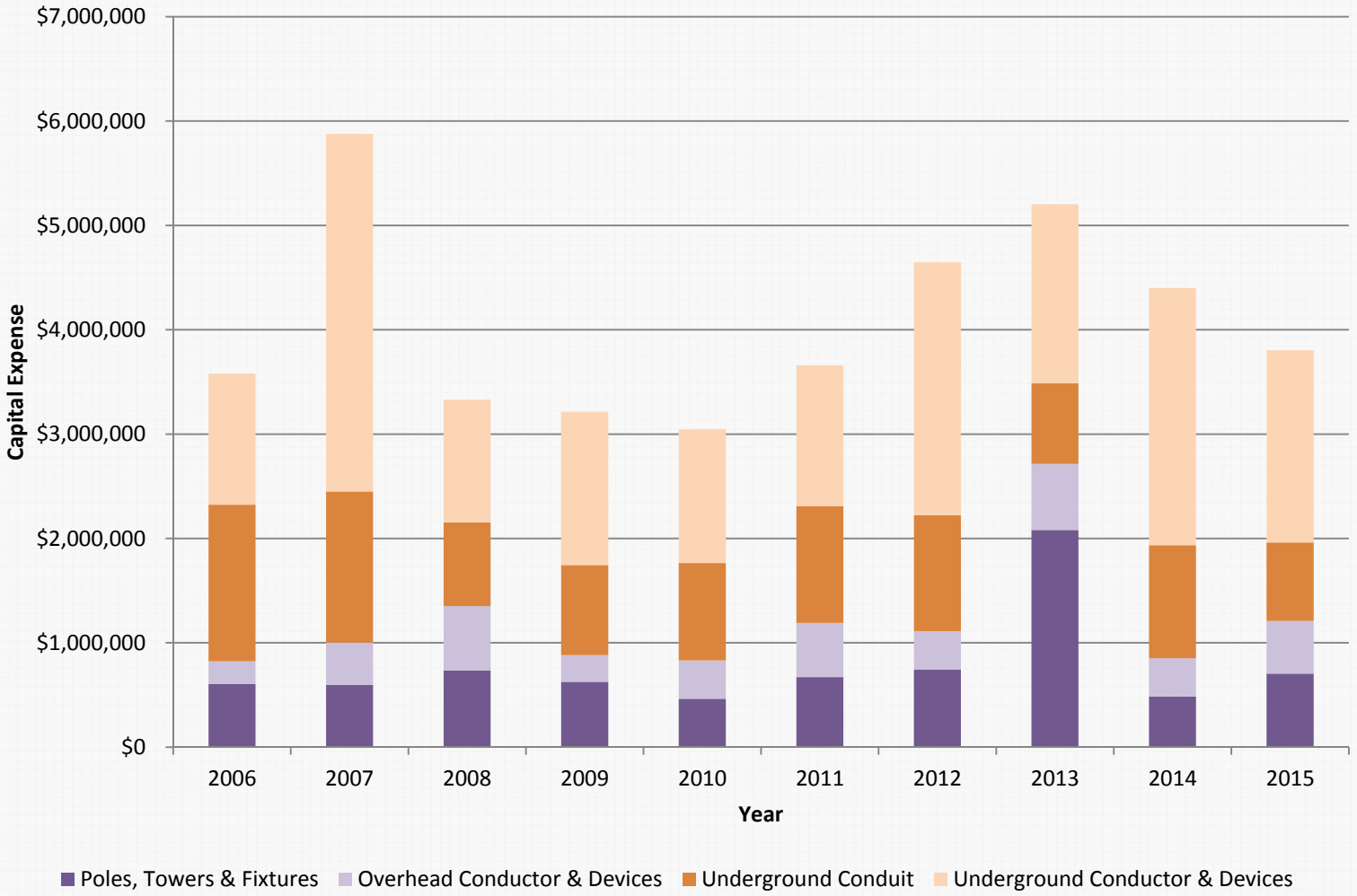
Feeder Capacity Reserves – Summer 2015



Feeder Capacity Reserves – Winter 2015/2016



Distribution Feeders - Capital Expense History



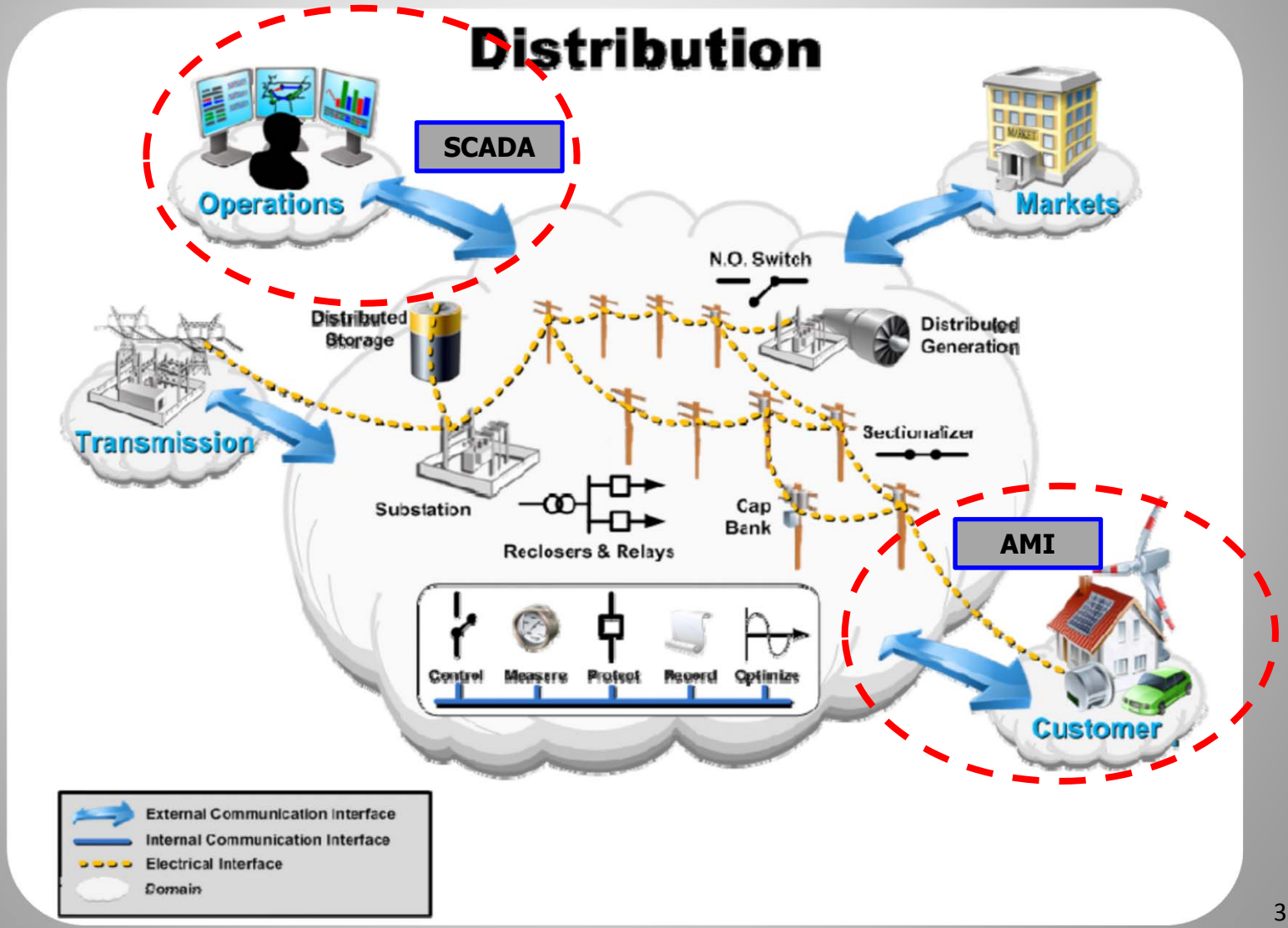
New Large Load Response Capabilities

- **< 1 Year**
  - Exploit Feeder Capacity Reserves (0 to 10 MW Loads)
    - 0 to 5 MW Individual Spot Loads
    - 5 to 10 MW Aggregate Spot Loads on One Property
    - Short term "risk" of reduced operational flexibility
    - Build back reserves in subsequent years
    - Identify "spot load" zones based on specific feeder capacity & available properties
  - Exploit Substation Capacity Reserves (0 to 15 MW Loads)
    - Phillips, Riverfront and Zephyr Heights Substations (15 MW Load Level)

- **> 2 to 3 Years**
  - Collaborate to Develop Loads Near Future Substation Sites
    - Light and Heavy Industrial Zoning

Meet customer expectations for a “21st Century Power Grid

Distribution Utility - Smart Grid



Smart Grid Behaviors

- ✓ **Enable Active Participation by Consumers**
- ✓ **Accommodate all Generation and Storage Options**
- ✓ **Enable New Products, Services, and Markets**
- ✓ **Provide Power Quality for the Digital Economy**
- ✓ **Optimize Asset Utilization and Operate Efficiently**
- ✓ **Anticipate and Respond to System Disturbances (Self-heal)**
- ✓ **Operate Resiliently to Attack and Natural Disaster**

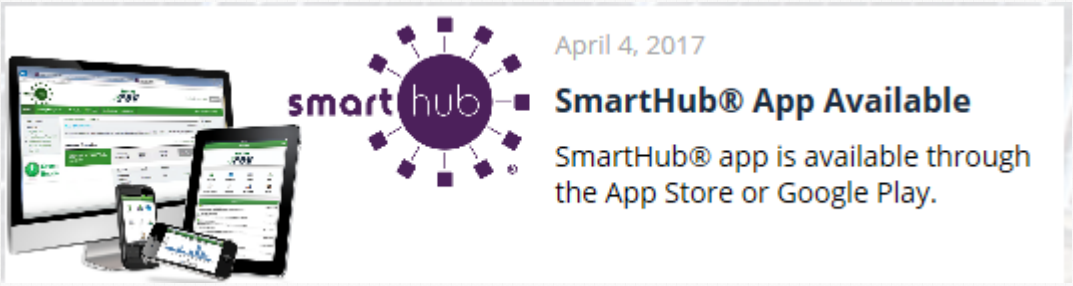
Electric Power Research Institute

BENTON P·U·D RP3 Reliable Public Power Provider

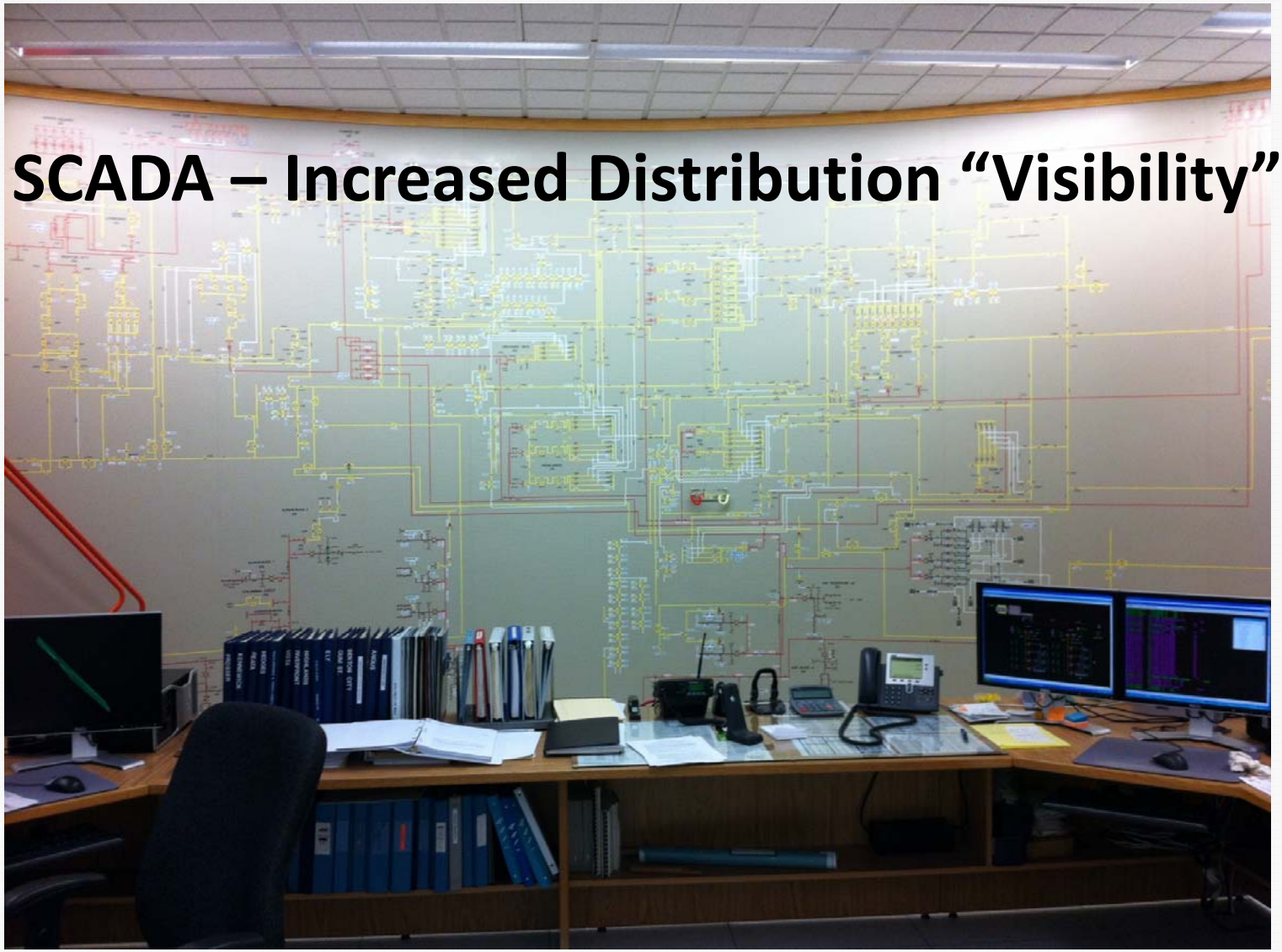
Smart Grid is Happening @ BPUD: AMI

- ✓ **Energy Use Data on Short Time Intervals**
- ✓ **Remote Service Connection & Disconnection**
- ✓ **On-Demand Reads**
- ✓ **Service Theft and Tamper Detection**
- ✓ **Power Quality Monitoring**
- ✓ **Outage Detection and Reporting**

- ✓ **Enable Active Participation by Consumers**
- ✓ **Customer Internet Access to Energy Use Data**



Smart Grid is Happening @ BPUD: SCADA



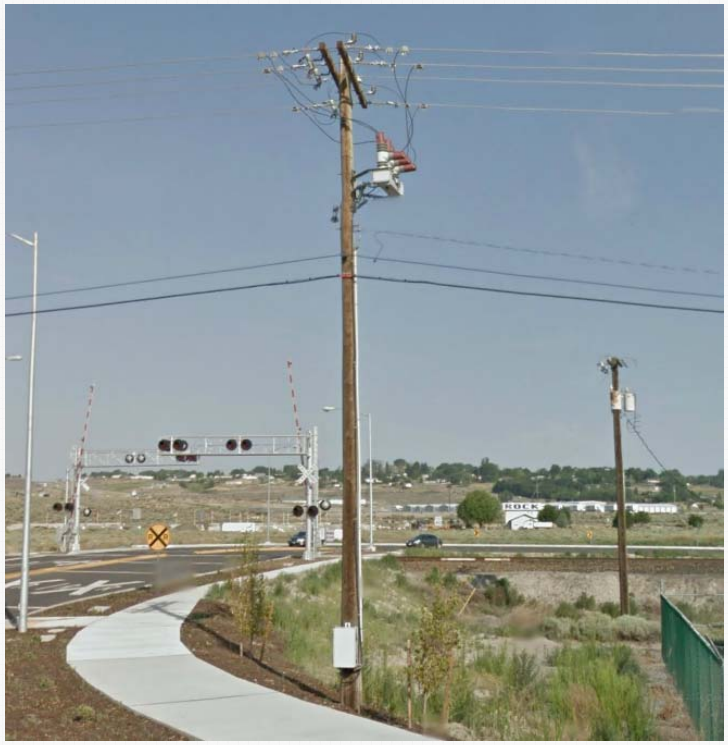
- Control
- Measure
- Protect
- Record
- Optimize

BENTON P·U·D

Reliable Public Power Provider

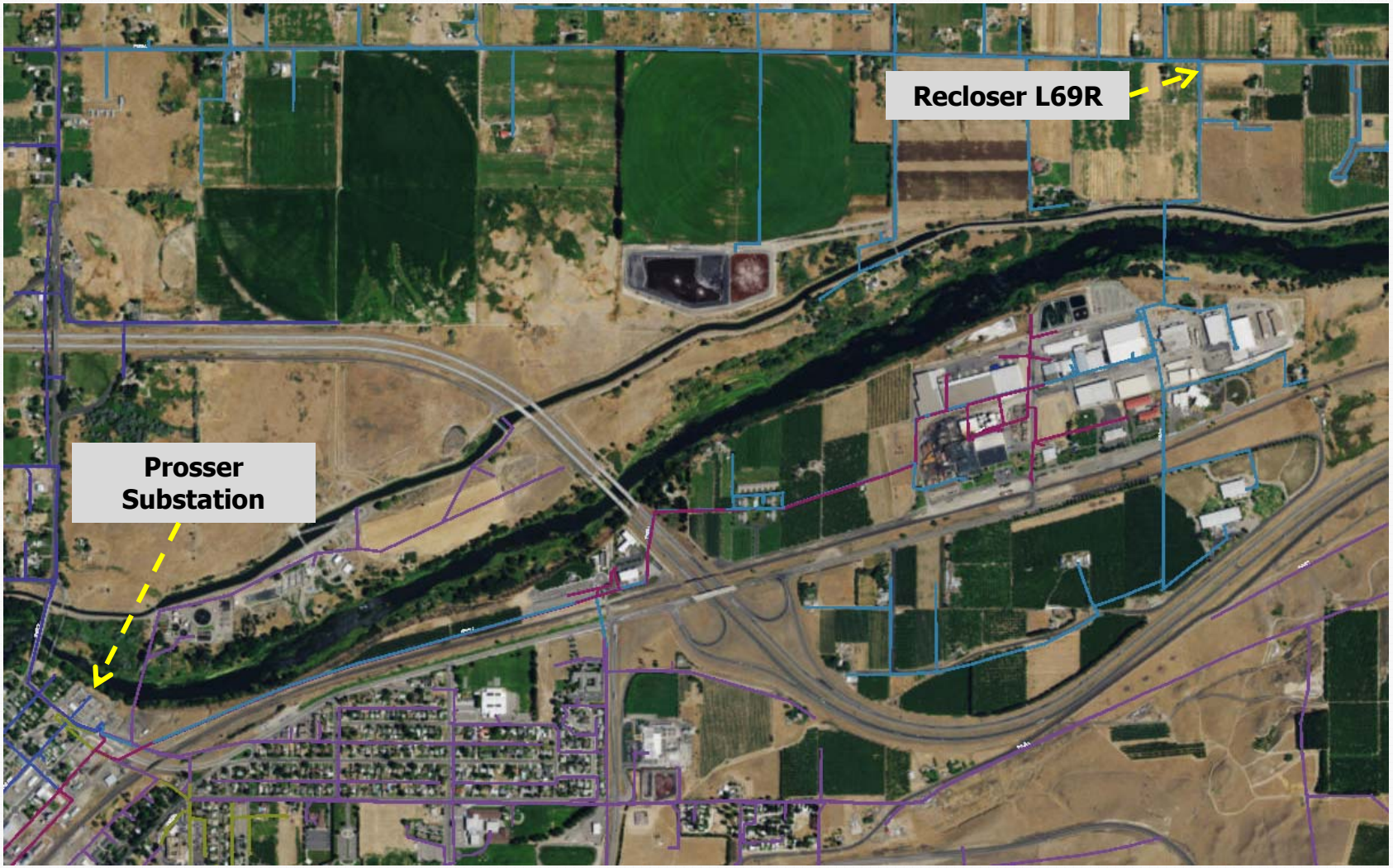
Smart Grid is Happening @ BPUD: SCADA

Voltage Regulator
SCADA Automation

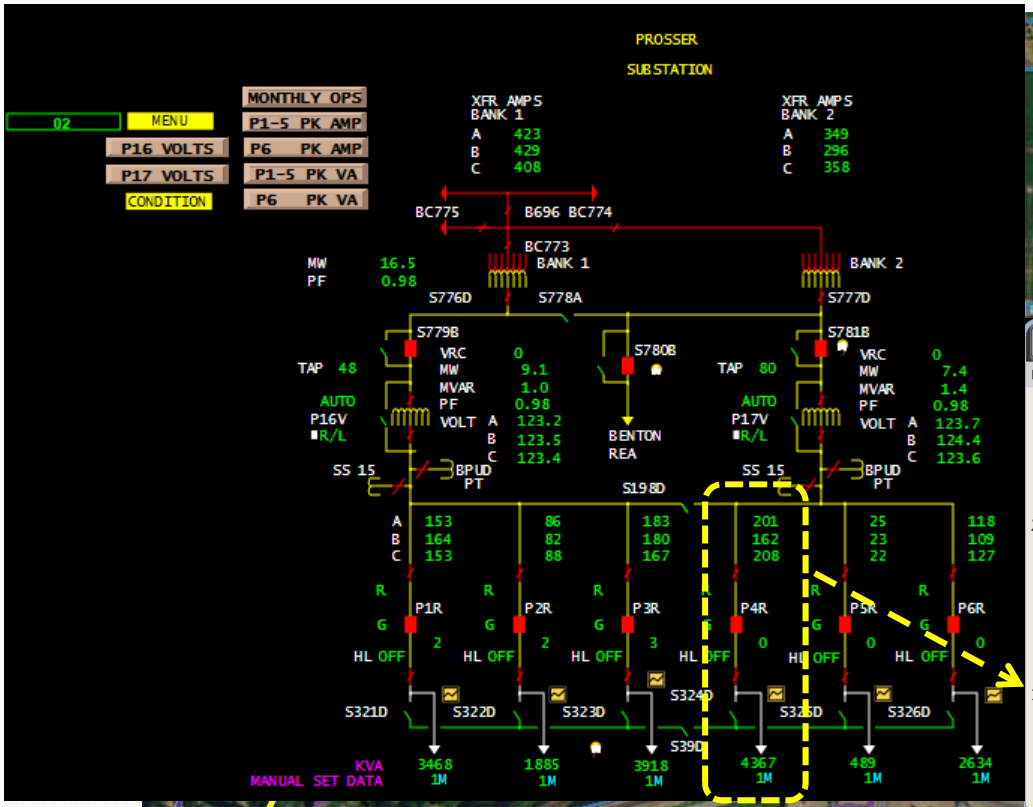


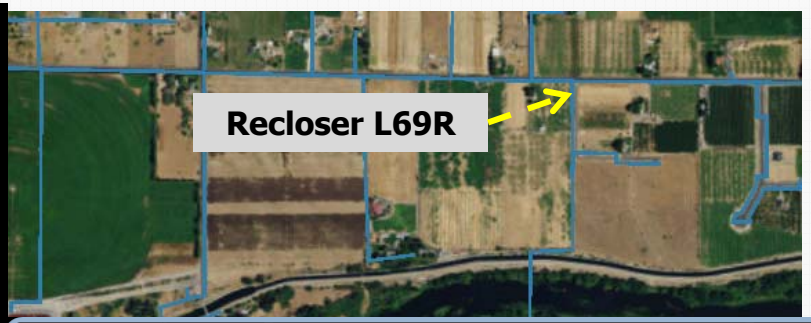
Recloser (Circuit Breaker)
SCADA Automation

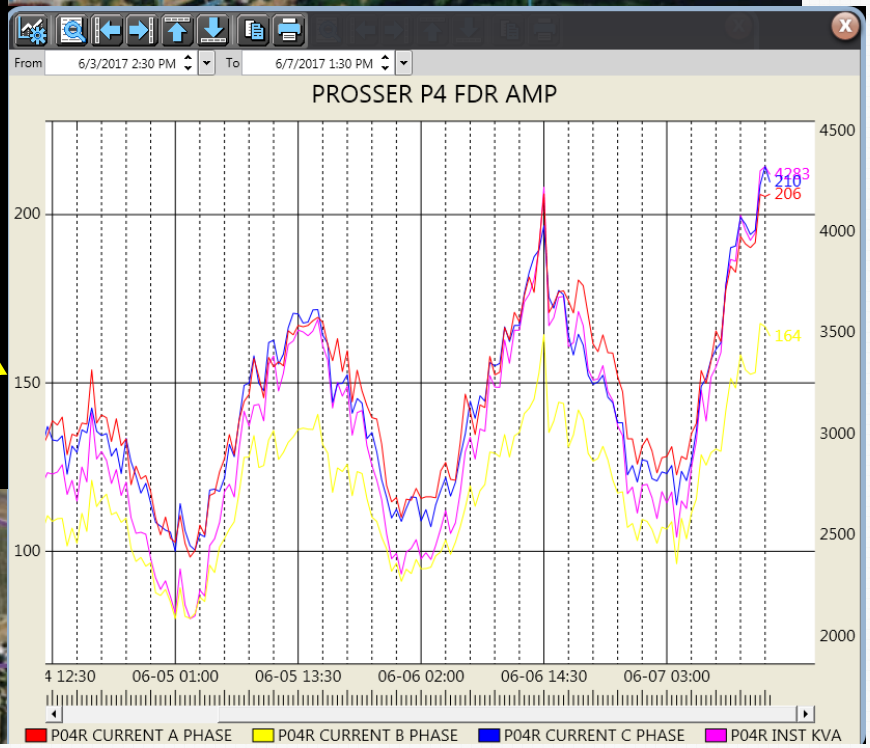
SCADA – Increased Distribution "Visibility"

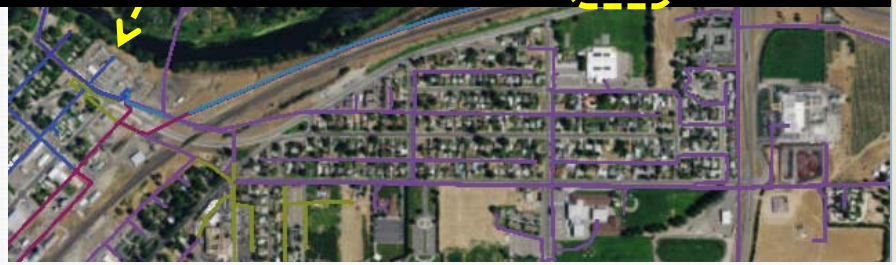


SCADA – Increased Distribution "Visibility"

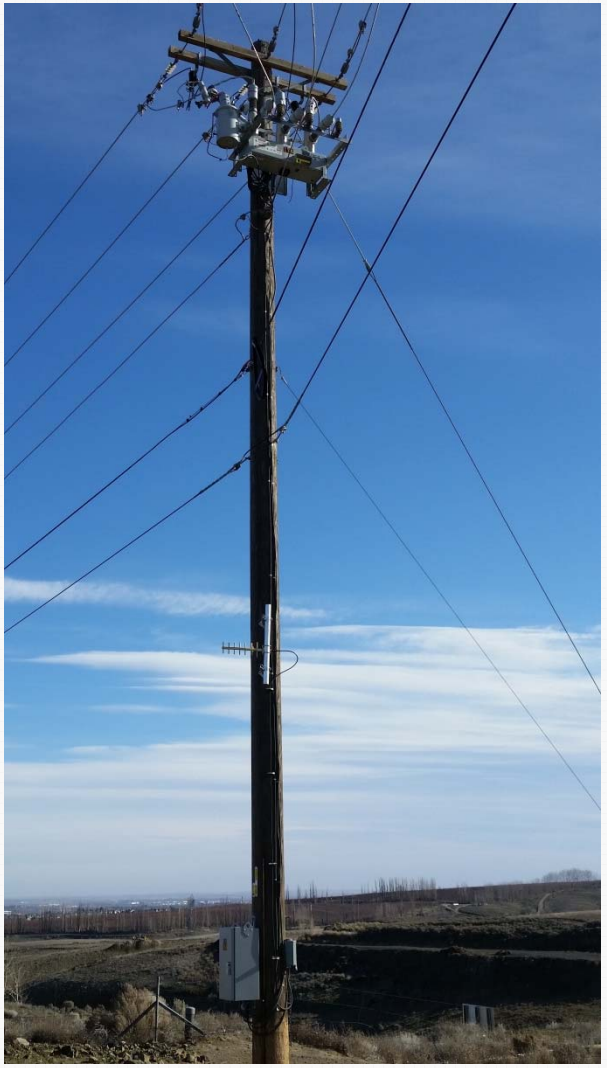




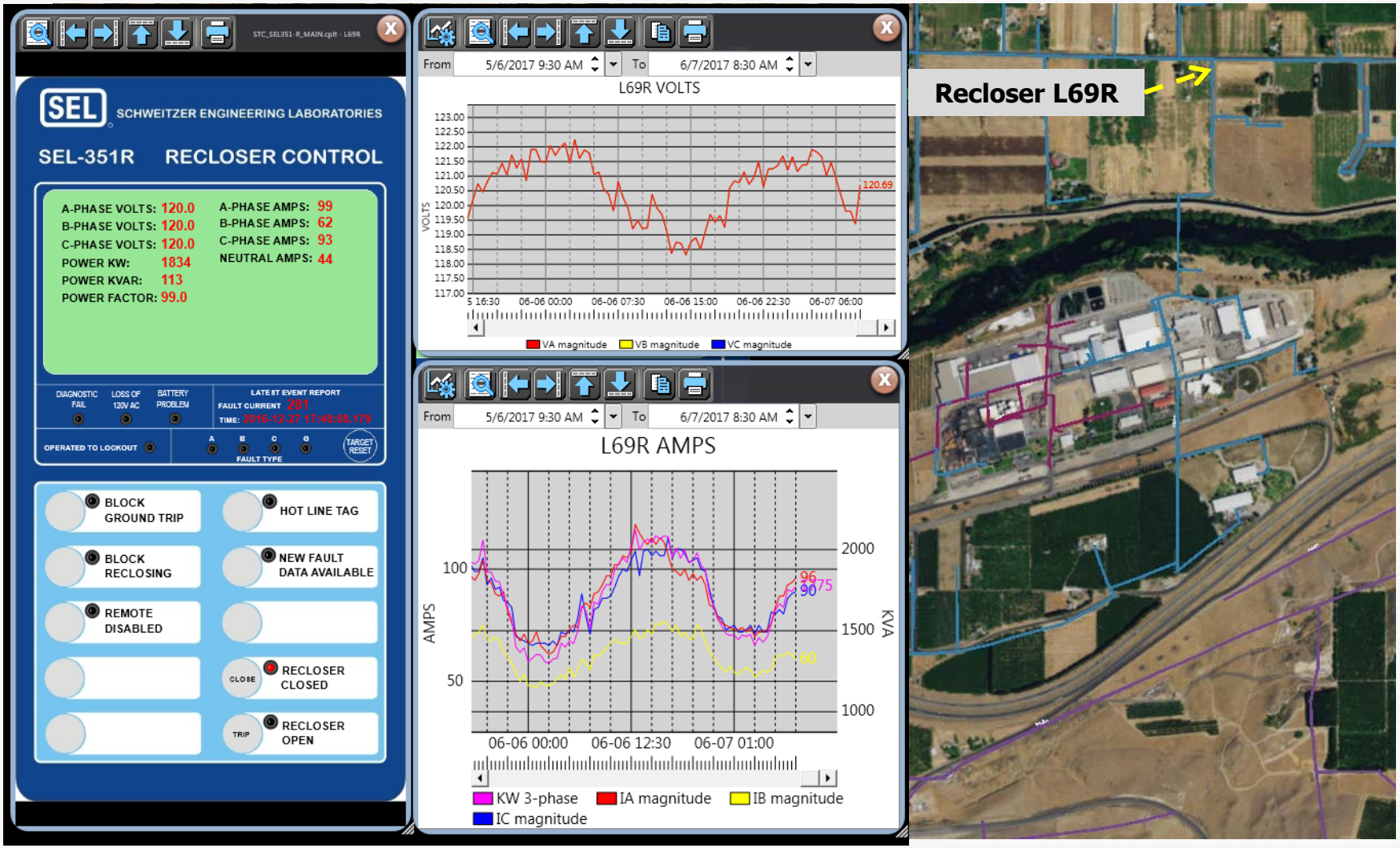




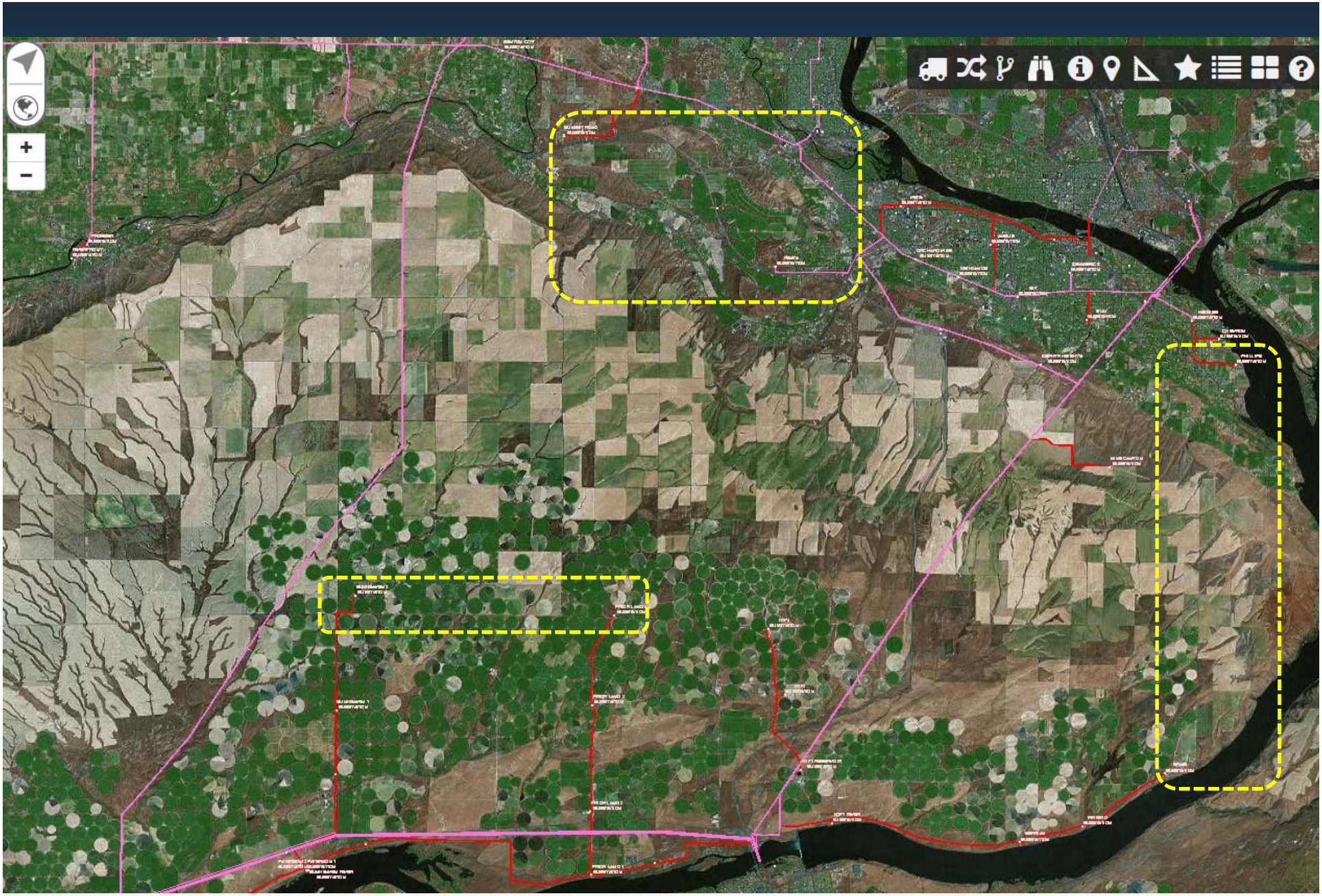
SCADA – Increased Distribution "Visibility"

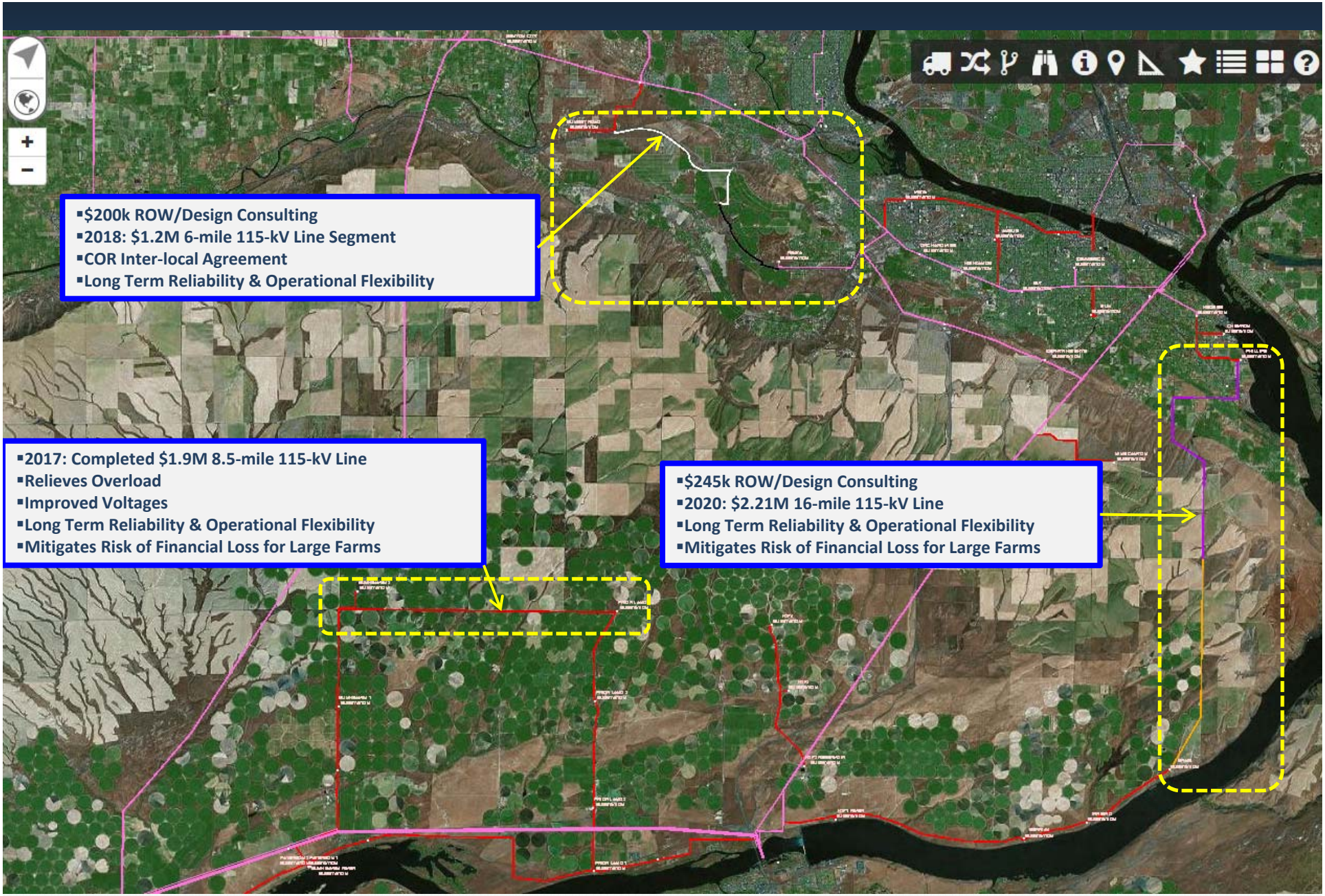


SCADA – Increased Distribution "Visibility"

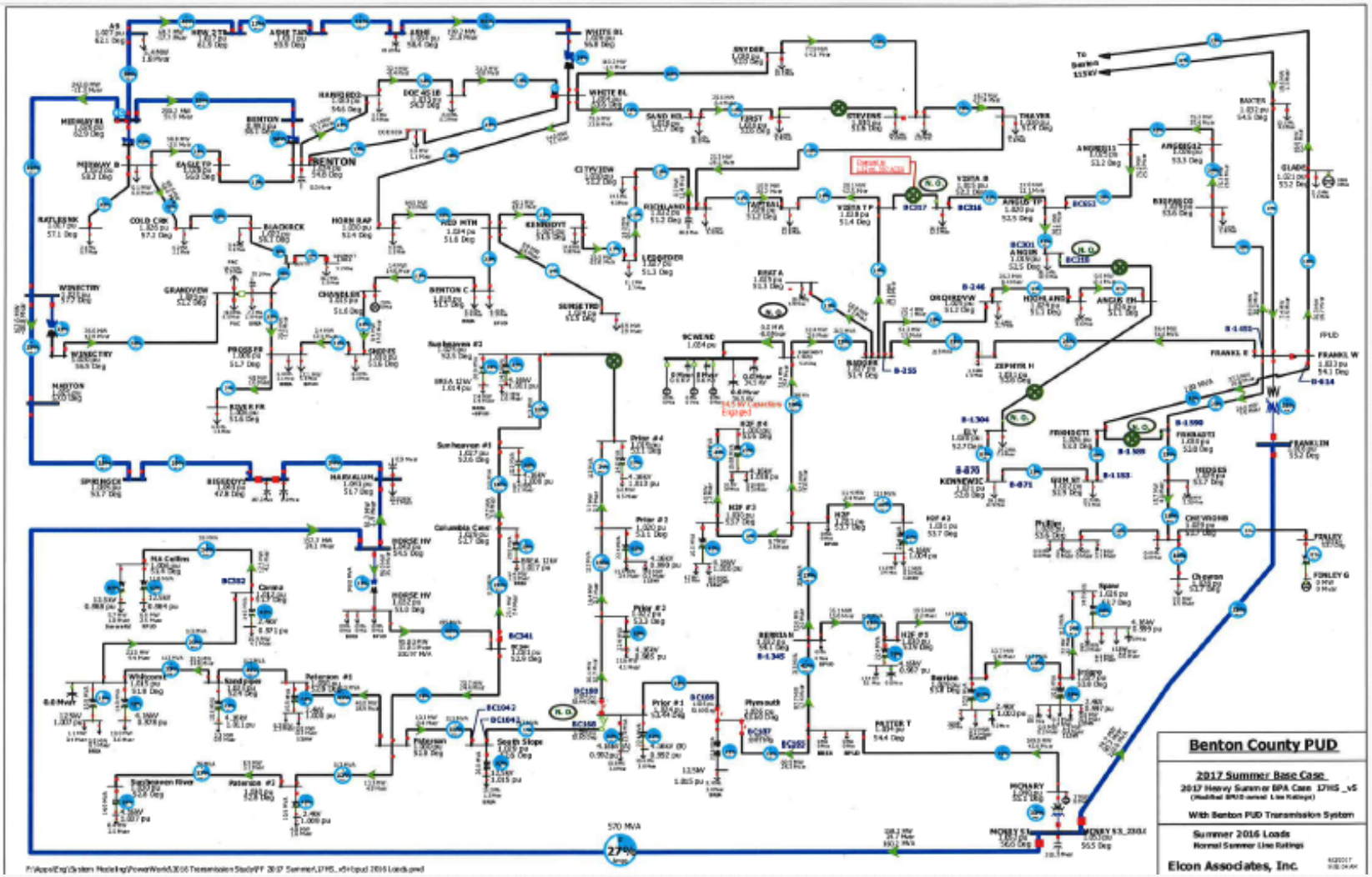


Transmission Reliability Improvement Projects "TRIP"




▪$200k ROW/Design Consulting
▪2018: $1.2M 6-mile 115-kV Line Segment
▪COR Inter-local Agreement
▪Long Term Reliability & Operational Flexibility
▪2017: Completed $1.9M 8.5-mile 115-kV Line
▪Relieves Overload
▪Improved Voltages
▪Long Term Reliability & Operational Flexibility
▪Mitigates Risk of Financial Loss for Large Farms
▪$245k ROW/Design Consulting
▪2020: $2.21M 16-mile 115-kV Line
▪Long Term Reliability & Operational Flexibility
▪Mitigates Risk of Financial Loss for Large Farms

Transmission System Analysis



Improved Planning and Coordination with BPA

Transmission Switching Improvements

Evaluate Existing Switches

- **Transmission Switching is not a trivial matter**
  - ✓ **Operator and Public Safety**
  - ✓ **Mechanical and Electrical condition is important**
- **Operational Requirements**
  - ➢ **Circuit Interrupting Capabilities:**
    - ✓ **Line Dropping**
    - ✓ **Loop Breaking**
    - ✓ **Load Breaking**

Transmission Switching Improvements

Add New Switches

- ✓ **Operational Flexibility**
- ✓ **Facilitates Transmission Line Maintenance**
- ✓ **Improves Outage Response and Reliability**

Transmission Projects & Budgets

			Accounting Codes			Year (amounts in constant year dollars)			
Project Description	Project	Comments	Dept	Res	FERC	2017	2018	2019	2020
BPA Interconnection - Leslie Road	121357	Joint w/ COR near Reata & Leslie Rd.	21	021	353.00	208,627			
BPA Interconnection - Southridge	121359	At BPA Franklin-Badger tower 12/3	21	021	353.00			600,000	
Transmission Line - Sunheaven#2 to Prior #4	124255	River System (TRIP-A) - 8.5 mi., 397.5 ACSR	21	total	varies	549,008			
Transmission Line - Red Mountain to Reata	124479	Reata tie - w/City of Richland - 6 mi.	21	total	varies	200,000	1,200,000		
Transmission Line - Phillips to Spaw	121360	River System (TRIP-E,F) - 15.8 mi., 397.5 ACSR	21	tbd	355.00			245,690	2,211,210
Transmission Line - Mabton to Riverfront	tbd	Prosser tie - split 50/50 w/Benton REA - 10.2 mi.	21	tbd	355.00		120,000	1,200,000	
Transmission Steel Pole - Kennedy Rd.	124832	Resolve easement issue and provide tap to Reata	21	total	varies				
Switch Upgrade/Additions	tbd	$31 K per switch	21	total	varies	62,000	62,000	62,000	62,000
Poles & Fixtures, Misc repairs	n/a	Replace Poles/Davit Arms	21	total	varies	15,000	15,000	15,000	15,000
Misc		BPUD Labor & Overheads				52,121			
Transmission (Table 1)						$ 1,086,756	$ 1,397,000	$ 2,122,690	$ 2,288,210

Conclusions

- **District's Electrical System is well positioned to:**

1) Meet continued incremental customer growth
   - Distribution system keeping up with growth (Some Reata Area Challenges)
   - Feeder capacity reserves are adequate for growth and contingencies
   - Reata area needs additional substation capacity to meet expected growth rate
     - Leslie Road Substation lease with City of Richland

2) Accommodate new large load interconnections and associated revenue growth opportunities
   - Feeder and Substation Capacity Reserves available for "spot load" growth
   - Need to improve coordination with local economic development entities

3) Meet customer expectations for a "21st Century Power Grid"
   - Smart Grid is Happening at Benton PUD
   - Improved distribution visibility (AMI & SCADA)
     - Anticipate and respond more quickly to disturbances
     - Optimize system operations and asset utilization
   - 115-kV Transmission Loops
   - Improved Transmission System Analysis and Planning
     - Continue to work closely with BPA Operations and Planning to minimize outages