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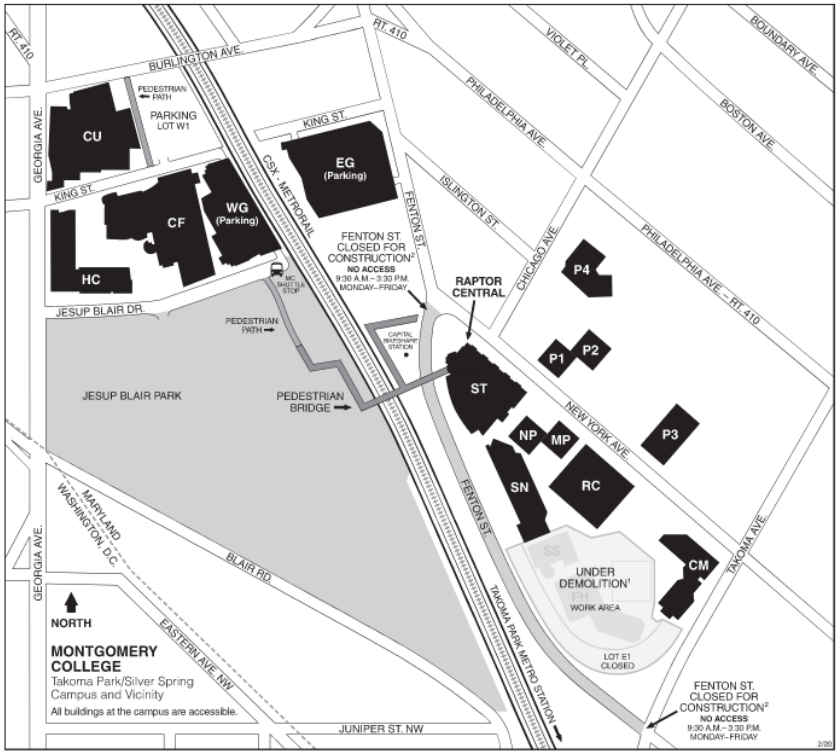
MONTGOMERY COLLEGE



Montgomery College
Takoma Park/Silver Spring Campus
Utility Master Plan

Final Report

June 2022

BKM No. 19021.03

Burdette, Koehler, Murphy and Associates, Inc.
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FORWARD

This and earlier Utilities Master Plans have been prepared to support their respective Facilities Master Plans and to provide utility details useful to planners, designers, and operations staff. The recommendations in these plans have been based upon knowledge of existing technology and practices. Climate change and resulting impacts are influencing master planning efforts, some of which are being addressed in this current plan.

MONTGOMERY COLLEGE SUSTAINABLITY STATEMENT

In December 2017, Montgomery County Council declared a climate emergency. In response, the Montgomery County Executive published a Climate Action Plan (CAP), June 2021, with the goal of reducing Greenhouse Gas (GHG) by 80% by 2027 and 100% by 2035. The Executive also published Building Energy Performance standards (BEPS), which was introduced to the County Council as Bill 16-21, on May 4, 2021. BEPS requires all buildings, 25,000 Gross Square Foot (GSF) and larger, to benchmark and establish a plan to reduce GHG by the proposed CAP dates.

Future Facilities Master Plans and Utilities Master Plans should address both the CAP and BEPS, specifically in the following area:

- **Buildings:** Increase energy conservation and efficiency, decrease fossil fuel use in buildings, and support carbon neutral building design.
- **Carbon Sequestration:** Retain, increase, and restore terrestrial ecosystems, including forest, meadows, wetlands, green spaces, and urban trees.
- **Climate Adaptation Actions:** Provide suitable infrastructure and tools to reduce the risks and impacts of more extreme climate hazards, i.e., resilience, enhanced storm water management, and green infrastructure.
- **Climate Governance Actions:** Align and orient staffing, technical capacity, process, and decision-making to address climate change.
- **Clean Energy Actions:** Ensure carbon-free electricity, expand renewable electricity generation and use of distributed energy resources.
- **How Can I act on Climate Change:** Public awareness for transportation, home energy, business, consumption, and resilience.
- **Public Engagement, Partnerships, and Education Actions:** Facilitate inclusive, community-driven leadership, build strategic partnerships, empower youth to act at home and in their community, build community trust and partnerships.
- **Transportation Actions:** Transition to 100% zero emissions transportation and expand supporting infrastructure, public transit, reduce use of personal automobiles, and introduce new technologies such as EV charging stations. The placement of EV charging stations in parking lots which are remote from the buildings will become a utility master planning issue. Decisions will need to be made on the location, costs, access and who is responsible for paying for the use of the electricity.

Update History

Original Issue Date: July 5, 2022
BKM No. 19021.03

Updated No.	Date	Revised By	Section Revised	Update Notes

Table of Contents

EXECUTIVE SUMMARY

Burdette, Koehler, Murphy & Associates, Inc. (BKM) was retained by Montgomery College (MC) to provide new Utilities Master Plans (UMP) for the Germantown, Rockville (RV), and Takoma Park/Silver Spring (TP/SS) campuses. The following Utility Master Plan report focuses on the Takoma Park/Silver Spring Campus. The Takoma Park/Silver Spring Campus is split between an East and West Campus by the Washington DC metro service tracks and historic Baltimore & Ohio Railroad. An overhead covered walkway connects to the east and west campuses. The western campus currently consists of three buildings, Cultural Arts Center (CU), The Morris & Gwendoyln Cafrtiz Foundation Arts Center (CF) and Health Sciences Center (HC). The east campus consists of several smaller pavilion buildings with residential buildings surrounding the campus to the east and south. The buildings on the east campus consist of Mathematics Pavilion (MP), North Pavilion (NP), Pavilion One (P1), Pavilion Two (P2), Pavilion Three (P3), Pavilion Four (P4), Catherine F. Scott Commons (CM), Resource Center (RC), Science North Building (SN) and Charles R. Nunley Student Services Center (ST). Montgomery College currently constructing the new Catherine and Isiah Leggett Math & Science building (LB), which will utilize the footprint of the recently demolished Falcon Hall (FH) and Science South (SS) buildings. The TP/SS campus currently consists of thirteen buildings and two garages which are shown on the campus map at the end of the Executive Summary.

The goal of this report is to document the capacity of the central cooling and heating systems, plumbing systems (domestic cold water, stormwater, sanitary and natural gas) and electrical systems that serve the Takoma Park/Silver Spring (TP/SS) Campus in regard to future expansions outlined in the 2013-2023 Facilities Master Plan (FMP) produced by Cho Benn Holback & Associates. The emphasis of this study is on the construction of the new Leggett Math & Science Building (LB). Both the generation and distribution systems of the utilities were evaluated in this study and recommendations are provided to satisfy the campus future requirements. The 2022 utilities master plan for the Takoma Park/Silver Spring campus provides documentation of the existing campus utilities as well as planning for future campus buildings and renovations. The UMP has been divided into three timelines to provide appropriate planning and documentation for the existing, near-term (2022-2036) and long-term (2037-beyond). A summary of "near-term" planned campus additions includes:

- Completion of systematic HVAC renovation of Pavilion One (P1) & Pavilion Two (P2) in Fall 2022.
- Removal of Falcon Hall (FH) and Science South buildings in 2020 to make way for the construction of the new (108,238 GSF) Catherine and Isiah Leggett Math & Science Building (LB) in Fall 2023.
- Renovation of the Resource Center (RC) in 2023.
- Removal of Mathematic Pavilion (MP) and North Pavilion (NP) to make way for the construction of a new (45,600 GSF) Math building in 2036.

Numerous changes to the Takoma Park/Silver Spring campus have been identified in the Facilities Master Plan, and have been determined to be a part of the long-term future of the campus as their projected timeline are beyond 2036. These planned campus projects include:

- Removal of the Science North (SN) building to make way for the construction of a new (49,230 GSF) Health and Fitness Center building.
- Renovation of the existing Pavilion 1 (P1) & Pavilion 2 (P2) buildings.

This Utility Master Plan (UMP) documents and provides analysis of the existing and future projected requirements for heating, cooling, and electrical distribution systems. The UMP also documents the existing site utilities of domestic/fire water, sanitary sewer, stormwater drainage and natural gas and their proximity to future building footprints. The UMP

will provide an update to previous utilities master plan to document existing conditions in addition to utility planning based on the current Facilities Master plan and its known updates. An overview of equipment documentation, significant findings and recommendations will be detailed in individual sections. A summary of building abbreviations and a timeline for buildings existing in 2022 and for the proposed future campus can be found in Appendix 1.

Domestic Water, Sanitary Sewer, Stormwater and Natural Gas

The domestic cold water, sanitary sewer, stormwater and natural gas systems were reviewed as part of this study. The main focus of this study with relation to the plumbing systems is identification of conflicts with existing utilities and the footprints of future buildings. The analysis of any existing or future capacities has been documented based on the previous 2013 UMP, and is understood to remain accurate for the purposes of this study.

The domestic/fire water system on campus is supplied and serviced by the Washington Suburban Sanitary Commission (WSSC). Each building is served by combination incoming underground domestic water piping which splits between fire protection piping and domestic water piping in an incoming service mechanical room. Individual meters are installed to each building, where currently not provided meters and sub-meters should be installed to report water usage of domestic water and make-up water usage. Adding these meters will provide trending and monitoring through the campus building automation systems for maintenance purposes and reduce overall usage to meet sustainability goals. The WSSC system is expected to be capable of providing the existing and future flow rates required for domestic water usage. Based on 2013 UMP update the WSSC system does not presently provide the recommended water flow rates needed for fire protection for the un-sprinkled buildings. Montgomery College will install sprinklers in all new buildings and existing buildings as they are renovated, and will likely require fire pumps based on previous UMP flow calculations. The existing water distribution system is adequate to provide the required flow for the planned new buildings on campus and will be modified from the distribution piping location under the public roads adjacent to campus.

The campus sanitary system discharges into the WSSC sewer system through collector pipes through campus. The existing collector lines are adequately sized for the current building capacity. New collector lines will be installed or replaced as existing buildings are replaced with future buildings with new footprints.

The stormwater drainage is managed differently on the two sides of campus. On the east campus leaching basins are utilized, but they do not provide adequate stormwater drainage. Recommendations from previous UMP's suggest that the stormwater systems be addressed as buildings are renovated or replaced. The west campus discharges stormwater directly to the WSSC stormwater drainage system. As no campus growth or renovations are currently proposed the stormwater drainage system for the west campus is adequate. All new buildings will be required to provide on-site stormwater management which would include bio-retention, green roofs or raingarden areas.

Natural gas is currently distributed to ST on the east campus, CF, and HC on the west campus by Washington Gas (WGL). A 6" underground pipe distributes gas to the east campus buildings and remains clear of any future building footprints. A 6" underground pipe branches off of an 8" gas main located under Georgia Avenue and distributes gas to the west campus and should remain in place with no campus changes planned. A 4" underground gas piping branches from the 6" serving the west campus along King Street and terminates outside the CU building adjacent to Georgia Avenue. The plumbing systems will be further described in a later section of this study along with site plans located in Appendix 2 to reference the location of existing systems.

It is recommended that the existing campus metering be expanded to include major uses of water, sanitary sewer, and natural gas. These meters should be integrated with the campus energy management and control system (EMCS). This expanded metering will help facilities staff identify and diagnose maintenance issues as they arise on these systems. It will also help MC comply with Montgomery County's new benchmarking law.

Mechanical Systems

The campus heating and cooling utilities are segregated and independent of each other due to the railroad that separates the east and west campuses. Each campus has a central heating and cooling plant to serve the adjacent satellite buildings currently operating on heating and chilled water systems. It is planned for all existing buildings that are to remain as part of the long-term facility master plan to be connected to the campus heating and chilled water systems as they are renovated. All new buildings will be connected to the campus heating and chilled water piping. Due to cost constraints, a new satellite plant will not be included in the new LB building, but will be provided with new heating and cooling generation equipment to support the building loads. Provisions for connection to the campus distribution piping in the future will be provided for further campus redundancy.

The west campus central plant is located in the basement of the CF building. The west campus plant consists of condensing boilers and primary pumps for heating and chillers, cooling towers, ice thermal storage tanks and primary pumps for chilled water distribution. The heating water is distributed through underground piping to the CF and CU buildings, while the HC building has stand-alone boilers. Chilled water is distributed from the CF central plant to CF, CU and the HC buildings by underground piping. The CF and HC buildings have additional chillers systems that are further described in the cooling section later in this study. The heating water and chilled water central plant capacities for the west campus are believed to be sufficient for the existing buildings. With no future buildings for the west campus the central plant is believed to be sufficient for the future with planned maintenance and replacement as equipment reaches the end of its useful life. The CF plant was initially designed with extra capacity and a piping vault to the north to serve CU and an additional multi-story building in the footprint of parking lot W1. This multi-story building is no longer included in the recent updates to the FMP. Minor projects are expected to allow HC's local chiller to backfeed the campus distribution to provide redundancy to the west campus.

The east campus consists of ten (10) buildings, which have varying levels of reliability on the east campus central plant. The Student Service Building (ST) includes the east campus central plant, which closely resembles the CF central plant, in equipment capacity, installation date and piping configuration. The heating and chilled water piping are distributed to the ST building, then to the rest of campus through direct-buried insulated underground piping along New York Avenue. Currently, RC, P3, P4 and CM buildings are connected to the east campus central plant utilities. The FH building was previous connected to heating water only, but was demolished in 2020. P1 & P2 are currently under renovation to be connected to the ST central plant. The NP, MP & SN buildings are currently installed with stand-along direct expansion (DX) HVAC equipment and are not expected to be renovated prior to their demolition.

Electrical Systems

The campus is served by the Potomac Electric Power Company (PEPCO) from a combination of overhead and underground distribution lines owned by the utility. Each building is served through separate feeders and utility meters with the exception of the Math Pavilion (MP) and Pavilion Two (P2) which are served from the North Pavilion (NP) and Pavilion One (P1) respectively. The PEPCO 13.2kV feeders are routed on poles along the streets of the campus. A section of feeders along King Street has been installed underground, accessible by manholes along the street. This section of feeders are also interconnected which allows for greater reliability. Most buildings are served by pad-

mounted transformers fed by the 13.2kV underground distribution loop with the exception of Pavilion Three (P3) and Science South (SS) which are served from pole-mounted transformers.

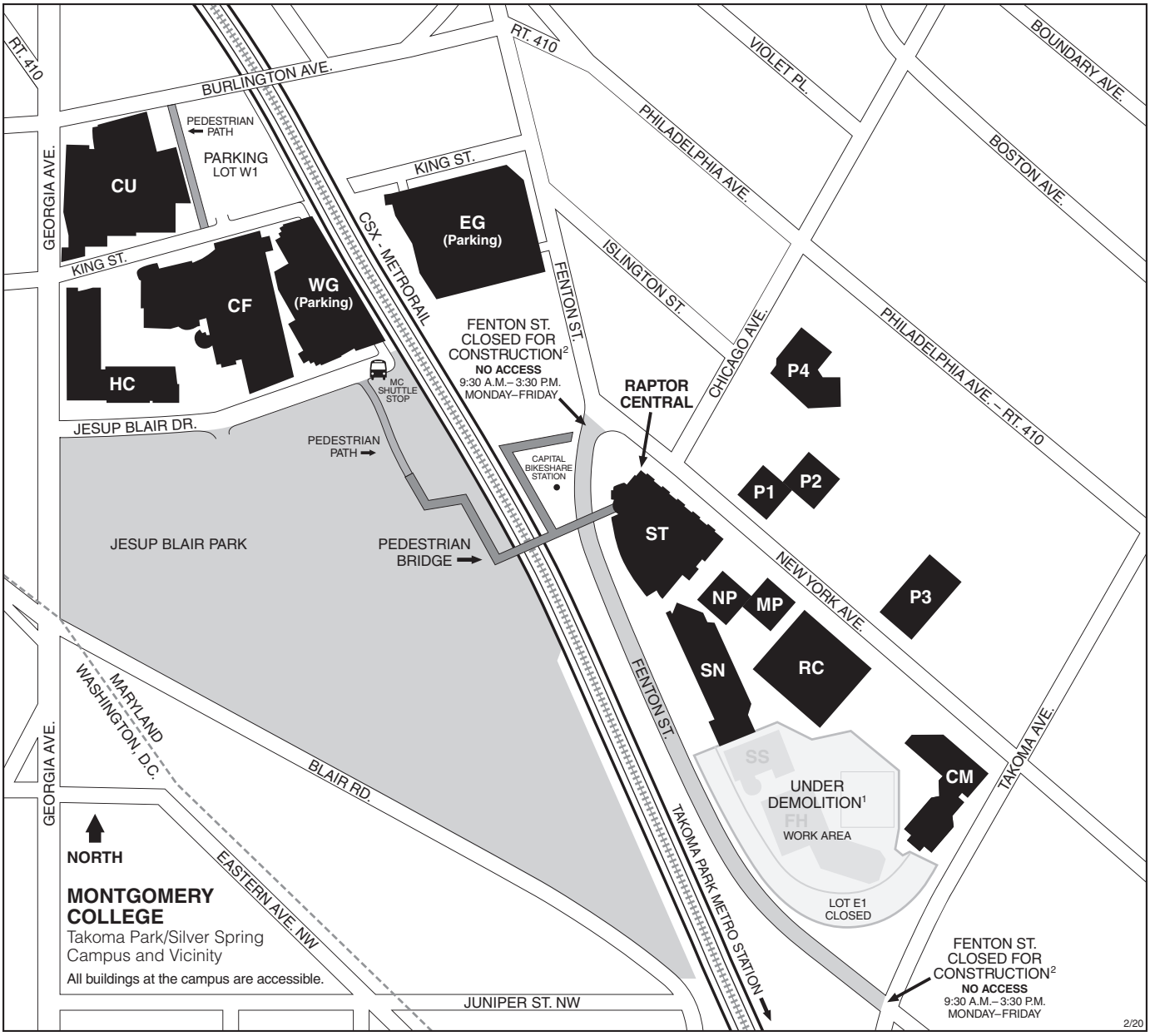
Removal of the existing east campus buildings and the following new construction projects shall be coordinated with PEPCO. Projected load estimates for the new buildings shall be provided to PEPCO in order to determine if the existing PEPCO owned electrical distribution infrastructure has sufficient capacity for the new loads. PEPCO will need to design and approve of campus electrical distribution system modifications. The College would then be responsible for reimbursing construction costs to PEPCO. Since the west campus has no future buildings planned within timeline of this master plan, existing west campus electrical system shall be sufficient to remain as is with planned maintenance and replacement as the equipment reaches the end of its useful life.

Please note that PEPCO has not provided detailed information to date regarding the construction of future buildings as it relates to the impact to existing PEPCO primary feeders and associated infrastructure. Load information on campus load growth has been provided to PEPCO and through the efforts of key College personnel, requests for information from PEPCO are ongoing.

The electrical systems will be further described in a later section of this study along with site plans and one-line diagrams located in Appendix 4 of this study.

MONTGOMERY COLLEGE

Takoma Park/Silver Spring Campus and Vicinity



MONTGOMERY COLLEGE

Takoma Park/Silver Spring Campus

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Public Safety: 240-567-3333 (24/7)
montgomerycollege.edu/safety

montgomerycollege.edu/maps

Legend of Campus Buildings

(as of February 2020)

- **CF** The Morris and Gwendolyn Cafritz Foundation Arts Center
  - *Refugee Training Center*
  - *Workforce Development and Continuing Education (WDCE)*
- **CM** Catherine F. Scott Commons
- **CU** Cultural Arts Center
- **EG** East Garage (parking)
- **HC** Health Sciences Center
- **MP** Mathematics Pavilion
- **NP** North Pavilion
- **P1** Pavilion One
- **P2** Pavilion Two
- **P3** Pavilion Three
- **P4** Pavilion Four
- **RC** Resource Center
  - *Library*
- **SN** Science North Building
- **ST** Charlene R. Nunley Student Services Center
  - *Bookstore*
  - *Cafeteria*
  - *Counseling and Advising*
  - *Records and Registration Office*
  - *Financial Aid Office*
  - *Public Safety Office*
  - *Raptor Central (Admissions, Enrollment, Visitor Services)*
  - *Student Life Office*
- **WG** West Garage (parking)

[1] Falcon Hall (FH), Science South Building (SS), the tennis courts, and parking lot E1 are closed for demolition as of June 2019; site is slated for construction of the Catherine and Isiah Leggett Math and Science Building. For details, visit montgomerycollege.edu/tpss-design.

[2] Fenton Street will be closed for construction from 9:30 a.m. to 3:30 p.m., Monday through Friday. The sidewalk will remain open.

DOMESTIC/FIRE WATER SYSTEM

Scope

The Takoma Park/Silver Spring (TP/SS) campus utilities master plan provides an evaluation of the existing and future water system capacities based on the Facilities Master Plan 2013-2023. The campus receives domestic and fire protection water from the Washington Suburban Sanitary Commission (WSSC). The TP/SS campus buildings are individually metered by WSSC. Montgomery College owns, maintains and operates the domestic water system downstream of the WSSC meters. Drawing P1.01 in Appendix 2 shows a site plan of the existing domestic water distribution piping.

Existing Conditions

Each building is served by combination incoming underground domestic water piping. All of the sprinklered buildings on campus have a branch of the incoming water piping with a backflow preventor and in several buildings a fire pump for fire protection distribution. Domestic water is individually metered in each building for billing usage. The WSSC distribution system is currently able to meet the east and west campus required capacities. The existing WSSC water system serving the east campus is distributed from a 10" pipe on New York Avenue, 6" pipe on Takoma Avenue and a 10" pipe on Chicago Avenue. The WSSC system serving the west campus is distributed from a 10" pipe on Georgia Avenue.

Previous Master Plan

The 2013 UMP by Wiley|Wilson provided an explanation that previous utilities master plan had analyzed the peak day, hour and fire flow demands for the present and future campus. The analysis indicated that the WSSC distribution system would provide enough water for existing and future peak domestic water demands of the TP/SS campus. The report did indicate that the existing and future domestic water requirements appear to be sufficiently met by the existing system. The previous master plan provides a recommendation that all renovations include sprinkler systems and fire pumps as soon as possible, which would require modified fire flow demand calculation but would reduce the fire flow requirements from WSSC.

Future System Requirements

Montgomery College will install sprinklers in all new buildings and existing buildings as they are renovated. The existing water distribution system shall be evaluated and identify the required flow for the planned new buildings on campus and piping will be modified from the distribution piping located under the public roads adjacent to campus. Prior to any major renovation or new building flow tests should be completed to identify impacts and need for a fire pump or other modification to the WSSC utility. As renovations are completed within existing buildings and new buildings are built new incoming water meters are to be installed including sub-meters within future or existing heating or cooling plants to monitor make-up water usage. Drawing P1.02 & P1.03 in Appendix 2 shows the future site plans with the existing domestic water distribution piping.

Summary and Recommendations

The existing WSSC system is capable of providing adequate domestic water capacity to the existing and future buildings listed in the facilities master plan. As previously noted in this study and previous UMPs, the existing WSSC distribution system should be evaluated prior to any major renovation or new construction to provide the required fire flow. All new buildings shall be provided with sprinklers and assumed to be provided with a fire pump as required by flow testing.

As new buildings are constructed, domestic water branch piping shall be modified, or new branch piping shall be routed from the WSSC domestic water piping mains located adjacent to campus. All building should be sub-metered, including cooling tower make-up and other HVAC make-up connection which are connected to campus monitoring systems, if not already in place. This metering will be an important metric to track in the future as MC works to conserve this commodity from a cost and most importantly sustainability perspective.

SANITARY SEWER SYSTEM

Scope

The 2022 UMP provides documentation of the existing and future sanitary sewer system at the Takoma Park/Silver Spring campus based on the Facilities Master Plan 2013-2023. Montgomery College owns and maintains its campus collection system and discharges to the Washington Suburban Sanitary Commission (WSSC) sewer system. Drawing P1.11 in Appendix 2 shows a site plan of the existing sanitary collection piping.

Existing Conditions

The existing sanitary sewer system consists of sanitary collector pipes that receive discharge from the building collection lines. These collection pipes then flow into the WSSC collection system along the adjacent roadways to campus. The existing sanitary lines can be found on Drawing P1.11. The existing sewer collection system is believed to be adequate for campus flows per the previous utilities master plan.

Previous Master Plan

Per the previous utilities master plan the existing sanitary sewer system has adequate capacity for the existing campus discharge as well as for the future campus flows.

Future System Requirements

As previously mentioned, the existing WSSC sewer system is believed to be adequate to serve the future campus buildings. Modifications to the on-campus collection lines will be required to new campus buildings. This may include new collection lines or modification of existing collection line that drain into the WSSC sewer system located in the adjacent roadways to campus. Drawing P1.12 & P1.13 in Appendix 2 shows the future site plans with the existing sanitary piping.

Summary and Recommendations

The campus sanitary system discharges into the WSSC sewer system through collector pipes through campus. The existing collector lines are adequately sized for the current building capacity. New collector lines will be installed or replaced as existing buildings are replaced with future buildings with new footprints. It is expected that existing WSSC sewer system will be adequate for the future buildings on the Takoma Park/Silver Spring campus.

STORM DRAINAGE SYSTEM

Scope

The 2022 UMP provides documentation of the existing and future storm water system at the Takoma Park/Silver Spring campus based on the Facilities Master Plan 2013-2023. Drawing P1.21 in Appendix 2 shows a site plan of the existing stormwater drainage system.

Existing Conditions

The east campus consists of leaching structures, which drain from buildings, including P1, P2, P3, NP, MP, RC, SN & CM and discharge stormwater into the ground. Many of these structures are believed to be failing due to poor soil drainage. There are a pair of buildings that are connected to the city stormwater system, including P4 and ST.

The west campus stormwater system consists of yard drains and lateral pipes to the city stormwater system. The existing stormwater system is believed to be adequate to serve the campus.

Previous Master Plan

The 2006 utilities master plan completed a comprehensive analysis of the stormwater drainage system. The report indicated that the drainage facilities on the east campus would need to be corrected due to the low permeability rates of the surrounding soils. The 2006 report indicated that no flooding issues were found on the west campus. The report does recommend that future stormwater management facilities may be required to meet state stormwater management requirements.

Future System Requirements

On the east campus, many of the existing leaching basins are failing. These structures should be replaced as required. As new buildings are constructed in place of the older buildings on campus, it is expected as required by code that on-site stormwater management facilities would be provided. These new bioretention areas, raingardens or green roofs would then include new stormwater drainage piping which would be routed to the city stormwater system at Fenton St. and the southeast end of campus at New York Avenue. Drawing P1.22 & P1.23 in Appendix 2 shows the future site plans with the existing stormwater piping.

Summary and Recommendations

The stormwater drainage is currently managed differently on the east and west sides of campus. On the east campus leaching basins are utilized, but they do not provide adequate stormwater drainage. It is recommended that as they continue to fail, these structures be replaced, and new high permeable surrounding soils added to encourage good drainage. It is also recommended that as the existing buildings are replaced, they be tied to the existing city stormwater drainage system. This will include new campus stormwater drainage piping to stormwater mains located off-campus within the roadways adjacent to campus. The west campus is not expected to experience any major campus renovation or additions in the future, so it is expected that the stormwater systems are adequate for the future. Although the previous UMP indicated that the stormwater system is adequate to serve the campus stormwater runoff, climate change continues to impact local weather and, therefore, system sizing and capacity should be evaluated with each new construction project. If climate change continues in this fashion, stormwater drainage system resiliency will be vital to

protecting to existing and future buildings, infrastructure, and people. Future projects should consider green roofs and additional bio-retention areas to increase campus stormwater drainage system capacity and resiliency. Storm water drainage pipe infrastructure should be evaluated with each new construction project to ensure the sizing remains adequate for changing campus layout and local weather patterns.

NATURAL GAS SYSTEM (NG)

Scope

The 2022 UMP provides documentation of the existing and future natural gas system at the Takoma Park/Silver Spring campus based on the Facilities Master Plan 2013-2023. Drawing P1.31 in Appendix 2 shows a site plan of the existing natural gas distribution system.

Existing Conditions

Natural gas is currently only distributed to ST on the east campus by Washington Gas (WGL). A 6" high pressure underground pipe is routed underneath Fenton Street to distribute gas to the ST central plant and food service. The piping is distributed from the main to the building with an individual meter at the building. Natural gas piping previously served SS and SN, but was disconnected prior to the SS demolition. The SN labs are currently provided with portable propane devices for laboratory experiments until these labs are relocated into the completed LB building. An existing 2" natural gas pipe is capped along New York Avenue, which previously delivered natural gas to buildings along the northeast of the east campus.

The west campus receives natural gas from an 8" main routed along Georgia Avenue. A 6" branch is routed into the west campus to supply the HC and CF buildings. A 4" branch taps off the 6" underground line at King Street and routes back out to Georgia Avenue in front of CU.

Previous Master Plan

The 2013 utilities master plan completed an analysis of the existing natural gas distribution piping and determined that the existing piping is adequately sized for the existing and future conditions of campus.

Future System Requirements

The recommendations from 2013 UMP still apply for future construction including additions, renovation and new construction. Natural gas piping is currently extended to the LB building which is under construction. As buildings are replaced on campus the existing natural gas piping will need to be adjusted and new branches will be installed to accommodate the new building or renovations. The current footprints of future buildings do not conflict with the current routing of the gas mains, but this should be re-evaluated if the footprint of a building or renovation changes. Drawing P1.32 & P1.33 in Appendix 2 shows the future site plans with the existing natural gas piping. It is expected natural gas will continue to be Montgomery College's heat generating source for future satellite plants and existing central plants due to the cost of conversions and utility rates. Additionally, this conversion would require upgrades to the electrical infrastructure. As future buildings are constructed this decision should be reviewed to meet MC's sustainability goals.

Summary and Recommendations

Based on previous UMP's the natural gas distribution is believed to be adequately sized to accommodate planned campus construction including new buildings and building additions. As buildings are built or renovated on campus the existing natural gas piping will need to be extended to connect to the new building if needed.

While Montgomery County Government's current climate action plan recommends future building electrification and elimination of natural gas, this recommendation conflicts with the overall recommendations of the UMP, as a main utility source for all current and future heating plants. Due to the current cost benefits of natural gas usage over electricity and the capital cost to convert current infrastructure for use of electric it is expected that the Takoma Park/Silver Spring Campus continues to use natural gas into the near-term future.

MECHANICAL SYSTEMS – CHILLED WATER

Scope

The 2022 UMP provides documentation, analysis and recommendations of the existing and future chilled water systems at the Takoma Park/Silver Spring campus based on the Facilities Master Plan 2013-2023. This study documents the existing equipment and capacities of the installed mechanical equipment in the central plants as well as the demand load for cooling of each building. The study also provides recommendations to improve performance of the existing systems and distribution piping along with modifications that are required as buildings are constructed or renovated. Drawing M1.01 in Appendix 3 shows a site plan of the existing chilled water system. Drawing M1.02 in Appendix 3 shows a site plan of the near-term chilled water system. Drawing M1.03 in Appendix 3 shows a site plan of the long-term chilled water system. Additionally, part plan schematics are referenced to indicate the central plant piping configurations.

Existing Conditions

The Takoma Park/Silver Spring campus is separated into an East and West campus. Each campus is supported by its own central cooling plant. Both central plants, however, are constructed in a very similar fashion with matching capacities, equipment manufacturers and piping configuration. The west campus is served by a central plant located in the basement of the Cafritz building (CF) and the east campus central plant is located in the basement of the Student Services Building (ST). Both central plants consist of two (2) Frick 230 ton ammonia chillers and a single 150 ton Tecochill by Tecogen natural gas-fired chiller. The natural gas chiller includes a plate and frame heat recovery heat exchanger capable of 750 MBH of heat rejection that is described further in the heating section of this report. The Tecogen chiller is a co-process machine used for electrical demand management and high efficiency energy conversion. The primary chilled water distribution pumps then deliver the 41°F water to the satellite buildings by a high performance underground piping system. A 17°F chilled water temperature differential is utilized across the campus distribution. At each of the connected buildings a bridge piping assembly then decouples the primary loop from the building or secondary loop, where building distribution pumps deliver chilled water to the building based on cooling demand. As cooling demand increases or decreases throughout the day, the building pumps are able to decrease/increase water flows by use of variable frequency drives (VFD) and target an optimal operating setpoint. By calculating a differential pressure at each building due to water usage, the central plant primary pumps ramp up or down by VFD control to meet the campus cooling demand. The detail included in Appendix 3, Drawing M5.01 indicates the typical piping installation and valve arrangement for each satellite building connection. Both central plants were constructed between 2006-2007, while the base building was under construction on each respective campus. The attached Table 3-1 provides a summary of the "Existing Cooling Loads" for the buildings on each campus.

The west campus which consists of three buildings, CF, CU and HC, are all connected to the central plant in the CF building. The central plant primary chilled water system utilizes a glycol mixture and ice storage tanks in the adjacent West Campus Garage to increase the plants cooling capacity and take advantage of off-peak electric rates. Six (6) Baltimore Air Coil (BAC) ice storage modules are "ice on coil" configured modules which circulate a glycol through their coils while treated water freezes or thaws on the outside of the coils. This operation is utilized to provide approximately one half of the CF plant capacity which reduces electrical demand on the plant throughout the day in lieu of running the chillers for cooling. The glycol water is routed through two (2) plate and frame heat exchangers to cool the campus chilled water and provide cooling to the west campus. The central plant chillers are connected to a common condenser water piping loop that rejects heat by use of a BAC induced draft two-cell cooling tower mounted on structural steel on the CF building roof.

The west campus also has two satellite chillers which are currently connected to the campus chilled water system. An Motivair air-cooled chiller is installed on structural steel on the roof of the CF building. This air-cooled chiller was installed to provide cooling to the Information Technology Operations Center (ITOC) space of the CF building. Glycol chilled water is pumped through the chiller to a small plate and frame heat exchanger and connected back into the campus chilled water piping to allow the ITOC space to receive cooling from the central plant or the dedicated rooftop chiller. A stand-alone chiller is also installed in the Health Science Center (HC). This chiller has recently only operated on a limited basis as the building mainly receives cooling from the central plant. The chilled water piping associated with the HC chiller is connected to the building as well as the campus distribution piping. It is planned to add controls and valves to allow the HC chiller to backfeed chilled water into the campus piping to provide redundancy and excess capacity to the west campus. The existing cooling configuration provides adequate cooling capacity to meeting the west campus cooling load demands.

As previously mentioned, the east campus central plant, which is located in the Student Service Center (ST) operates nearly identical to the Cafritz central plant. The ST central plant is located in the basement of the building which was constructed in 2007. All the equipment installed within the plant is original to construction. The three chillers are connected to a glycol loop that circulates within the basement of the CF building and connects four (4) BAC ice storage modules to the plant, providing additional cooling capacity and electrical demand management capabilities. The glycol chilled water piping is connected to two (2) plate and frame heat exchangers and primary chilled water pumps which distribute cooling to the east campus through 10" high performance underground supply and return piping. The central plant chillers are connected to a common condenser water piping loop that rejects heat by use of a four (4) BAC cooling towers mounted on structural steel on the ST building roof.

The underground chilled water piping is routed out of the ST central plant to the adjacent New York Avenue and continues underneath the road to the southeast limits of campus. Along New York Avenue. piping branches off the mains to HVAC vaults within the grounds of the campus. The vaults are installed with shutoff valves and either connect to an adjacent building or provide a future connection point.

Currently, several buildings (MP, NP & SN) operate as stand-alone buildings for cooling. These buildings operate with direct expansion (DX) HVAC equipment and do not utilize chilled water at this time. It is expected that as these buildings are renovated or replaced, they will be connected to the existing chilled water system or additional satellite cooling plant by use of the existing HVAC vaults. P1 & P2 which are currently under construction are set to receive campus chilled water by Fall of 2022.

The remaining buildings (ST, RC, CM, P3 & P4) are connected to the existing central chilled water distribution system. These buildings utilize the same incoming piping detail mentioned earlier and included for reference in Drawing M5.01. The ST central plant provides adequate cooling capacity to the connected buildings on the east campus to meet their cooling demands.

Previous Master Plan

Since the previous master plan additional buildings have been connected to the east campus central cooling system. The ST central plant currently serves five (5) buildings, ST, RC, CM, P3 & P4, with two additional buildings (P1 & P2) to be connected by Fall 2022. The remaining buildings operate as stand-alone systems with DX cooling equipment. The previous master plan indicated that much of the existing DX equipment on campus was original to the building and past its useful life. It is understood that this equipment is still installed and will likely remain until a renovation is

completed on the building or the building is replaced. The 2013 study also recommended that the building automation systems (BAS) should be updated for each building at they are renovated or require replacement. Since the previous report all buildings that are currently connected to the central plants have been installed with BTU metering capabilities. These meters should be used for energy benchmarking to inform facilities of energy reduction opportunities and maintenance. At the time of this report, another study and project are being completed to document the existing pneumatic controls associated with each buildings BAS.

Future System Requirements

The future campus cooling requirements have been separated into two timelines to approach the near-term and long-term cooling demands of the Takoma Park/Silver Spring campus. Refer to Table 3-2 and Table 3-3 for the expected building loads. As there are several existing buildings served by DX equipment that will be replaced as a part of the near-term facilities master plan, new cooling demand is expected to be added to the east campus central cooling plant. The current connected load is estimated to be 739 tons of cooling and the central plant is capable of providing 700 tons of cooling. The existing cooling demand leaves the east campus with an approximate cooling shortage of 39 tons. This shortage does not currently affect the campus due to a 75% diversity throughout the system created by building occupancy. The diversity provides approximately 150 tons or 21% of excess cooling. With the additional 96 tons to be added when P1 & P2 are connected to the east campus cooling distribution in Fall 2022, the peak excess capacity will be reduced to 70 tons or 10%. The new Leggett Math and Science (LB) building is expected to be completed by fall term 2023 which will increase the campus chilled water demand to 1,335 tons, which exceeds the ST central plants capacity. The LB building is currently in construction to include a 500 tons chilled water standalone plant which will allow the LB building to produce enough cooling to sustain its own demand requirements. The standalone plant is also expected to be extended to the existing campus chilled water distribution piping in the future to provide a redundant cooling source to the campus, and become a campus satellite plant. Site piping changes will be required to the existing undersized piping at the former site of Falcon Hall, due to increased cooling demand of the new LB building and to provide future extension to the ST central plant. New chilled water piping will be extended from the existing underground distribution at New York Avenue and connect the campus piping to the LB building in the long term. The underground distribution will then be routed along through the future Health and Fitness building back to the ST cooling plant to provide a complete distribution loop throughout the east campus. A new Math Building is expected to be built by 2036 to replace NP & MP. The new math building will be connected to the campus chilled water piping utilizing an existing utility vault adjacent to the current site of NP or MP. The estimated 152 tons of cooling load required by the new math building will be supplied by the existing ST cooling plant. The additional cooling load on the ST plant will exceed the plant capacity by 287 tons of cooling, but no longer meets campus cooling load when including a 75% campus diversity. The firm capacity of the ST plant would remain as a concern as the chilled water connected load increases. Due to these shortages in capacity within the ST plant it is recommended that a new satellite chiller plant be constructed in the Math Building. An additional 400 tons of cooling capacity is anticipated for the proposed plant to support the Math building as well as the future Health & Fitness building. Similar to the recommendations provided in the heating section in lieu of a satellite plant, upgrades to the ST central plant could be evaluated to increase capacity. At the time of the new Math Buildings anticipated completion the ST plant would be approximately 30 years old, at which time most of the original equipment will have reached the end of its useful life. As the LB building satellite plant is only expected to provide enough capacity to support itself and initially not be connected to the site chilled water piping, the LB cooling plant should be connected to the campus distribution piping prior to the completion of the new math building to provide redundancy to the ST plant during part load conditions for the entire east campus. Completing the chilled water loop back to ST in conjunction with the future Health and Fitness building would allow for future maintenance on portions of the distribution piping without causing major utility outages to campus buildings.

If any of the existing buildings currently served by DX equipment are renovated prior to their expected demolition and connected to the campus chilled water system additional cooling capacity may be required from the ST or new LB building to support these buildings. Due to space limitations in the existing buildings a new satellite plant would likely not be feasible and will be planned within the future Math building. A second satellite plant was previously planned for the future Health and Fitness building to provide 300 tons of additional cooling to adequately support the campus into the long-term future construction as described in the 2013 facilities master plan, but due to the renovations of P1 & P2 this satellite plant will be pushed up to the Math Building. An alternative option to a new satellite cooling plant, would be the upgrade of the existing ST plant as the cooling plant equipment would be approaching 30 years of service life and reaching the end of its useful life. This option would include an upgrade of chillers, cooling towers, pumps and piping to support the increased cooling capacity of the proposed plant expansion and should be compared to the costs associated with a new satellite plant. The additional cooling capacity would support the long-term needs of the campus as well as provide additional redundancy or firm capacity for the east campus.

There is currently no near-term or long-term construction planned for the west campus at the Takoma Park/Silver Spring campus. As the existing central plant meets the capacity of the existing chilled water demand there is no need for additional capacity or major changes to the west campus chilled water systems. As previously mentioned, the HC building chiller piping is expected to be modified to allow for additional redundancy to the campus chilled water system.

The existing central plants are now approaching 15 years of operation, but with regular maintenance to the existing equipment it is expected that the major components can remain operational for another 10-15 years. As the equipment begins to reach the end of its useful life similar style equipment can replace the existing equipment. Capacities of replacement should be evaluated at time of replacement to ensure current and future load requirements are met. High efficiency equipment as well as in energy saving measure should be considered as equipment is replaced to maximum energy savings. Sub-metering can be added to new equipment or retrofitted on existing systems to provide increase transparency of energy consumption to identify equipment operating properly through trending.

Summary and Recommendations

The Takoma Park/Silver Spring campus is segregated into an east and west campus, each of which have their own dedicated central cooling plant. The two plants are nearly identical, as they have matching chillers, capacities and piping configuration. The two plants which consist of ammonia chillers, a natural gas chiller, cooling towers and ice thermal storage were installed between 2006-2007 and have been well-maintained.

The west campus chilled water system includes two (2) remote chillers which are currently connected to the west campus underground piping distribution. A future project to modify the Health Science Center chiller piping to allow it to backfeed the campus piping will add redundancy to the system. The ITOC chiller that was installed to provide dedicated cooling to the ITOC space in CF has already been connected to the central system which provides redundancy to these spaces and allows the ITOC chiller to be turned off during part load chilled water demand and operate from the central plant. Future recommendations for the west campus chilled water system include replacement of existing equipment as it reaches the end of its useful life. As equipment is replaced, high efficiency options should be considered as well as new energy saving technologies that may be available. Capacities should also be re-evaluated at the time of equipment replacement to confirm there have been no changes in chilled water demand or any overall changes to the facilities master plan for the west campus.

The east campus central plant configuration matches the west campus central chilled water plant. The east campus plant distributes chilled water to the campus through high-performance underground piping as well as HVAC vaults with shutoff valves. The HVAC vaults either connect the building to the central plant or are capped for a point of future connection. Due to the age of numerous existing buildings that are still served by original DX equipment, it is expected most of these buildings will be replaced prior to the building being renovated and connected to the central chilled water system. The central plant is adequate to provide cooling to the buildings that are currently connected, with two additional buildings, P1 & P2, being added in Fall of 2022. A new satellite plant is under construction for the LB building. The new math and science building, LB, will be built with stand-alone chilled water capacity, but will include provisions for connection to the campus piping in the future. Due to the current configuration of the chilled water distribution piping and location of the new LB building, the existing underground chilled water piping will require modification to allow for the additional campus distribution. This may include replacement of existing pipe and a new chilled water piping main to be extended back to the ST plant through the future Health and Fitness building. The next building constructed on the east side of campus, Math Building, should be connected to the ST cooling plant, but will exceed the diversified cooling load of the campus. A new 400 ton satellite plant should be included in the footprint of the building to meet peak loads of the campus, future capacity for the Health & Fitness building, and increase firm capacity in case of outages in the ST & LB plants. At the time of design, the cooling loads should be evaluated in coordination with the equipment operation in the ST central plant to determine if additional capacity could be provided as ST central plant equipment is replaced. As previous UMPs have recommended, the east campus buildings that currently receive cooling from DX cooling equipment are expected to be renovated or removed to make way for new buildings. These buildings should be considered for renovation, and connected to the existing chilled water system if their demolition is pushed back as they are already in need of replacement equipment. Future recommendations for the east campus chilled water system include replacement of existing equipment as it reaches the end of its useful life. As equipment is replaced high efficiency options should be considered as well as new energy saving technologies that may be available. Capacities should also be re-evaluated at the time of equipment replacement to confirm there have been no changes in chilled water demand or any overall changes to the facilities master plan for the east campus. When the equipment is replaced within the central plant additional capacity could be added to the new chillers to support the campus in lieu of a satellite plant in the proposed Math building on campus. If this alternative is considered, all the existing chilled water equipment within the central plant should require replacement as it should be undersized including much of the existing distribution piping. While this alternate would require extensive work on campus and within the central plant the other option for a satellite cooling plant would require its own costs, maintenance and footprint.

An additional consideration when evaluating cooling loads in the future is the impacts of climate change, and its impact on peak cooling loads. It is recommended that current ASHRAE design temperatures be reviewed periodically to evaluate existing buildings cooling loads and future buildings impact to the campus distribution.

All future buildings should include the incoming decoupler piping that has been installed in elsewhere on campus to continue the primary and secondary pumping configuration. Meters and sub-meters should be included on all renovations and new construction to allow Montgomery College to monitor energy usage of the buildings HVAC systems and individual system usage.

MECHANICAL SYSTEMS – HEATING WATER

Scope

The 2022 UMP provides documentation, analysis and recommendations of the existing and future heating water systems at the Takoma Park/Silver Spring campus based on the Facilities Master Plan 2013-2023. This study documents the existing equipment and capacities of the installed mechanical equipment in the central plants as well as the demand load for heating of each building. The study also provides recommendations to improve performance of the existing systems and distribution piping along with modifications that are required as buildings are constructed or renovated. Drawing M1.11 in Appendix 3 shows a site plan of the existing heating water system. Drawing M1.12 in Appendix 3 shows a site plan of the near-term heating water system. Drawing M1.13 in Appendix 3 shows a site plan of the long-term heating water system. Additionally, part plan schematics are referenced to indicate the central plant piping configurations.

Existing Conditions

The Takoma Park/Silver Spring campus is separated into an East and West campus. Each campus is supported by its own central heating plant. Both central plants, however, are constructed in a very similar fashion with matching capacities, equipment manufacturers and piping configuration. The west campus is served by a central plant located in the basement of the Cafritz building (CF) and the east campus central plant is located in the basement of the Student Services Building (ST). Both central plants consist of six (6) condensing boilers. The original boilers in each building were Aerco Benchmark boilers, but three (3) have been replaced in the CF central plant with Fulton Endura boilers in 2016. Three of the original Aerco boilers were replaced in 2022 in the ST plant with Fulton as well. A natural gas Tecochill by Tecogen chiller includes a plate and frame heat recovery heat exchanger which injects 750 MBH of heat into the heating water loop during the chillers cooling operation. This is utilized as an energy savings measure in lieu of discharging the heat to the condenser water loop and then to atmosphere. Primary heating water distribution pumps then deliver the 190°F water to the satellite buildings by a high performance underground piping system. The campus heating water system operates at a 40°F temperature differential across the distribution piping. At each of the connected buildings a bridge piping assembly then decouples the primary loop from the building or secondary loop, where building distribution pumps deliver heating water to the building based on heating demand. As heating demand increases or decreases throughout the day, the building pumps are able to decrease/increase water flows by use of variable frequency drives (VFD) and target an optimal operating setpoint. By calculating a differential pressure at each building due to water usage, the central plant primary pumps ramp up or down by VFD control to meet the campus heating demand. The detail included in Appendix 3 Drawing M5.01 indicates the typical piping installation and valve arrangement for each satellite building connection. Both central plants were constructed between 2006-2007, while the base building was under construction on each respective campus. The attached Table 3-1 provides a summary of the "Existing Heating Loads" for the buildings on each campus.

The west campus which consists of three buildings, but only two of the three buildings, CF and CU, are connected to the central plant in the CF building. The central plant primary heating water system utilizes six (6) condensing high efficiency gas-fired boilers to meet the heating demands of the west campus buildings. The west campus also has two stand-alone gas-fired boilers, located in the HC building, which are currently not connected to the campus heating water system. The two (2) condensing boilers supply heat to Health Science Center, (HC), as the campus heating water piping is not connected to the central plant. These boilers were also replaced in 2022 with Fulton Endura condensing boilers.

As previously mentioned, the east campus central plant, which is located in the Student Service Center (ST) operates nearly identical to the Cafrtiz central plant. The ST central plant is located in the basement of the building which was constructed in 2007. All of the equipment installed within the plant is original to construction. The six (6) gas-fired high efficiency condensing boilers are connected to the primary heating water loop that circulates heating water throughout the through 6" high performance underground supply and return piping.

The underground heating water piping is routed out of the ST central plant to the adjacent New York Avenue and continues underneath the road to the southeast limits of campus. Along New York Avenue. piping branches off the mains to HVAC vaults within the grounds of the campus. The vaults are installed with shutoff valves and either connect to an adjacent building or provide a future connection point. Currently under construction and anticipated to be completed in Fall 2022, P1 & P2 will be connected to one of the existing HVAC vaults. New underground Perma-Pipe heating water piping will be extended from the HVAC vault to P2. From P2 the piping will transition to heat-traced steel piping with insulation and be extended through an exterior walkway to serve P1.

Currently, several buildings (SN, MP & NP) operate as stand-alone buildings for heating. These buildings operate with a combination of exterior baseboard heating, electric re-heat duct mounted coils and electric heating coils located in multizone rooftop air handling units. It is expected that the remaining buildings are planned for replacement and will not be connected to the central plant before their respective demolition.

The remaining buildings (ST, RC, CM, P3 & P4) are connected to the existing central heating water distribution system. These buildings utilize the same incoming piping detail mentioned earlier and included for reference in Drawing M5.01. The ST central plant provides adequate heating capacity to the connected buildings on the east campus to meet their heating demands.

Previous Master Plan

Since the previous master plan additional buildings have been connected and removed from the east campus central heating system. The ST central plant currently serves five (5) buildings, ST, RC, CM, P3 & P4, with P1 & P2 pending completion of their renovations. The remaining buildings operate as stand-alone systems with electric heating equipment. The previous master plan indicated that much of the existing heating equipment on campus was original to the building and past its useful life. It is understood that this equipment is still installed, and has been recommended for replacement, but will likely remain until a renovation is completed on the building or the building is replaced. The 2013 study also recommended that the building automation systems (BAS) should be updated for each building at they are renovated or require replacement. Since the previous report all buildings that are currently connected to the central plants have been installed with BTU metering capabilities. These meters should be used for energy benchmarking to inform facilities of energy reduction opportunities and maintenance. At the time of this report, another study and project are being completed to document the existing pneumatic controls associated with each buildings BAS.

Future System Requirements

The future campus heating requirements have been separated into two timelines to approach the near-term and long-term heating demands of the Takoma Park/Silver Spring campus. Refer to Table 3-2 and Table 3-3 for the expected building loads. As there are several existing buildings served by electric heating equipment that are under construction and connected to the ST central plant, new heating demand is expected to be added to the east campus central heating plant. The current connected load is estimated to be 9,917 MBH of heating and the central plant is capable of providing 10,200 MBH. The existing connected heating demand leaves the east campus with an approximate heating excess of

283 MBH. This excess is below the firm capacity of the system assuming the loss of a boiler, but is not expected to affect the campus due to diversity throughout the system created by building occupancy of an estimated 80%. Considering the 80% diversity of the campus, the heating plant has an excess 7% of heating capacity. When P1 & P2 are connected to ST and occupied by Fall term 2022 the connected heating load will increase significantly as these buildings previously utilized electric heat. The new estimated connected heat load will be 12,917 MBH with a plant total capacity of 10,200 MBH. When including diversity, the ST central plant is still at a 130 MBH shortage of 1.2% of capacity. The new Leggett Math and Science (LB) building is expected to be completed by Fall term 2023 which will increase the campus heating water demand further, but the construction includes a 5,622 MBH heating water satellite plant which will allow the LB building to produce enough heating water to sustain its own demand requirements. The satellite plant is also expected to be extended to the existing campus heating water distribution piping in the future to provide redundant heating to the campus, but at peak demand, no backfeeding capacity. Site piping changes will be required to replace the undersized piping that previously served Falcon Hall. The new 6" heating water piping would be extended to the LB building piping and to extend north to complete a loop back to the ST plant in the future. An additional building is expected to be built within this studies definition of near-term. The proposed Math Building is expected to be built by 2036. The new Math Building will be constructed on campus in the current footprint of MP & NP. Due to the timelines of the HVAC systematic renovations of P1 & P2, the ST plant has reached its capacity and the new Math Building will be required to provide supplemental heating generation.

As a part of the long-term facilities masterplan a new Health & Fitness building is expected to replace the existing SN building in 2041. The estimated 1,477 MBH from the new building, will further exceed the boiler capacity of the ST plant. At the time of construction of the new Math building it should be evaluated whether a new satellite heating plant should be included within the building, or if the existing central heating plant could be expanded to support the entire east campus. The new satellite plant should provide approximately 4,000 MBH of heating capacity to support the new building, future campus renovations and increase the campus' heating water firm capacity.

Future recommendations for the east campus heating water system include replacement of existing equipment as it reaches the end of its useful life and requires replacement. As equipment is replaced high efficiency options should be considered as well as new energy saving technologies that may be available. Capacities should also be re-evaluated at the time of equipment replacement to confirm there have been no changes in heating water demand or any overall changes to the facilities master plan for the east campus. When the equipment is replaced within the central plant additional capacity could be added to the new boilers to support the campus in lieu of a satellite plant in the proposed Math building on campus. If this alternative is considered, all the existing heating water equipment within the central plant should require replacement as it would be undersized including much of the existing distribution piping. While this alternate would require extensive work on campus and within the central plant the other option for a satellite heating plant would require its own costs, maintenance and footprint. An additional option would be to include a combination of both a new satellite plant and expansion of the existing ST plant to eliminate the campus' future capacity deficit and match the peak heating load with the campus firm capacity.

There is currently no near-term or long-term construction planned for the west campus at the Takoma Park/Silver Spring campus. As the existing central plant meets the capacity of the existing heating water demand there is no need for additional capacity. The one change to the west campus heating water systems should include the connection of the HC building to the central heating system. While the HC building currently is capable of meeting its own heating requirements, connecting to the central plant will allow the local boilers to be removed from HC or to utilized as redundancy to the central plant. This connection of HC to the CF plant would require additional underground piping to be compatible with the existing pumping and control sequences.

The existing central plants are now approaching 15 years of operation, but with regular maintenance to the existing equipment it is expected that the major components can remain operational for another 10-15 years. As the equipment begins to reach the end of its useful life similar style and capacity equipment can replace the existing equipment. High efficiency equipment as well as in energy saving measure should be considered as equipment is replaced to maximum energy savings. Sub-metering can be added to new equipment or retrofitted on existing systems to provide increase transparency of energy consumption to identify equipment operating properly through trends.

Summary and Recommendations

The Takoma Park/Silver Spring campus is segregated into an east and west campus, each of which have their own dedicated central heating plants. The two plants are nearly identical, as they have matching boilers, capacities and piping configuration. The two plants which consist of gas-fired condensing boilers that were installed between 2006-2007, as well as three that were replaced in the CF plant in 2016, and three in ST that were replaced in 2022.

The west campus heating water system includes six (6) condensing heating water boilers which are currently connected to the west campus underground piping distribution. Future recommendations for the west campus heating water system include replacement of existing equipment as it reaches the end of its useful life and requires replacement. As equipment is replaced high efficiency options should be considered as well as new energy saving technologies that may be available. Capacities should also be re-evaluated at the time of equipment replacement to confirm there have been no changes in heating water demand or any overall changes to the facilities master plan for the west campus. The existing central heating water distribution piping should be extended and connected to the HC building and their existing boilers. Connecting the existing boilers to the central system will allow the HC building to operate from the existing central plant, or to utilize the local boilers. Additional pumps and piping could also be installed to allow the boilers to backfeed and distribute heating water into the central heating water system to increase the overall capacity of the campus heating water system.

The east campus central plant configuration matches the west campus central heating water plant. The east campus plant distributes heating water to the campus through high-performance underground piping as well as to HVAC vaults with shutoff valves. The HVAC vaults either connect the building to the central plant or are capped for a point of future connection. Due to the age of numerous existing buildings (MP, NP & SN) that are still served by original electric coils or electrical perimeter heat, it is expected most of these buildings will be replaced prior to the building being renovated and connected to the central heating water system. The central plant is currently adequate to provide heating to the buildings that are currently connected, but by fall 2022 when P1 & P2 are connected to the distribution all the of spare capacity will be utilized. When including a 80% diversity the total plant capacity is exceeded by 130 MBH. A new satellite plant is under construction within the upcoming LB building. The new math and science building, LB, will be built with stand-alone heating water capacity, but will include provisions for connection to the campus piping in the future. Due to the current configuration of the heating water distribution piping and location of the new LB building, the existing underground heating water piping will require modification to allow for the additional campus distribution. This may include replacement of existing pipe and a new heating water piping main be extended north through the future Health and Fitness Building. An additional satellite plant was anticipated for the future Library Learning Commons building which was to be the next replacement building. Since this building has been removed from the FMP a satellite plant should be considered for the Math Building in 2026. The timing of this building construction and the age of the central plant should be evaluated to determine if a 4,000 MBH satellite heating plant or central plant expansion would be the most cost effective solution for the campus. If a new satellite heating plant is considered this building should include sufficient building square footage for a new satellite plant which will support itself as well as the future campus construction. As previous UMPs have recommended, the east campus buildings that currently receive heating from

electric equipment are expected to be removed to make way for new buildings. These buildings should be considered for renovation, and connected to the existing heating water system if their demolition is pushed back as they are already in need of replacement equipment. Future recommendations for the east campus heating water system include replacement of existing equipment as it reaches the end of its useful life. As equipment is replaced high efficiency options should be considered as well as new energy saving technologies that may be available. Capacities should also be re-evaluated at the time of equipment replacement to confirm there have been no changes in heating water demand or any overall changes to the facilities master plan for the east campus. When the equipment is replaced within the central plant additional boilers or boiler capacity could be added to support the campus in lieu of a satellite plant. If this alternative is considered, all the existing heating water equipment within the central plant should require replacement as it would be undersized including much of the existing distribution piping. While this alternate would require extensive work on campus and within the central plant it provides an option for another satellite heating plant which would require its own costs, maintenance and footprint.

An additional consideration when evaluating heating loads in the future is the impacts of climate change, and it's impact on peak heating loads. It is recommended that current ASHRAE design temperatures be reviewed periodically to evaluate existing buildings heating loads and future buildings impact to the campus distribution.

All future buildings should include the incoming decoupler piping that has been installed in elsewhere on campus to continue the primary and secondary pumping configuration. Meters and sub-meters should be included on all renovations and new construction to allow Montgomery College to monitor energy usage of the buildings HVAC systems and individual system usage.

ELECTRICAL SYSTEMS – POWER

Scope

The 2022 UMP provides documentation, analysis, and recommendations of the existing and future electrical power systems that serve the Takoma Park/Silver Spring campus based on the Facilities Master Plan 2013-2023. This study documents the existing utility and campus owned electrical service entrance equipment, associated demand loads, and capacities. Estimated demand loads for future buildings and building modifications are also included. The study provides basic recommendations for distribution system modifications required to meet the future estimated demand loads. Drawing E1.01 in Appendix 4 shows a site plan of the existing campus power distribution system. Drawing E1.02 in Appendix 4 shows a site plan of the proposed near-term campus power distribution system. Additionally, campus electrical power distribution single-line diagrams are provided in Appendix 4 to show the general configuration of the electrical system.

Existing Conditions

The campus is served by the Potomac Electric Power Company (PEPCO) from a combination of overhead and underground 13.2kV distribution lines owned by the utility. PEPCO owned utility poles are installed along the streets throughout the campus. An overhead line connects the western campus utility distribution to the eastern campus across the railroad near King Street. An additional line is provided from Georgia Avenue to the Morris and Gwendolyn Cafritz Foundation Arts Center (CF).

Most buildings are served by pad-mounted transformers with the following exceptions. Pavilion Three (P3) and Science South (SS) are each served from pole-mounted transformers. Two transformers in an underground vault located on King Street provide power to the two services to the Morris and Gwendolyn Cafritz Foundation Arts Center (CF). The two services are for the West Campus Central Plant and the Arts Center with the service entrance equipment for each located in the CF basement main electrical room. The two services are fed from two separate utility feeders, one originating from the east at King Street and one from the west at Georgia Avenue.

Each building is served through separate feeders and utility meters with the exception of the Math Pavilion (MP) and Pavilion Two (P2) which are served from the North Pavilion (NP) and Pavilion One (P1) respectively. Several of the buildings have multiple services, each with a PEPCO meter, to serve different electrical distribution systems within the building. These buildings consist of NP, RC, SN, and P1. The multiple distribution systems are typically split between General Services loads and Mechanical Systems loads. This system was based upon rate structures for electric heating and general loads, which were separately metered and on different rate structures. The current meters are now combined on the same rate structure. Both the Charlene R. Nunley Student Services Center (ST) and Morris and Gwendolyn Cafritz Foundation Arts Center (CF) are provided with two separate utility transformers which are each metered separately. One of the meters/transformers serves the building and one serves the plant.

The service entrance equipment serving the various buildings are a mix of Eaton and Square D type equipment. The condition of the service entrance equipment generally ranged from fair to good condition. The equipment in buildings P1/P2, NP/MP, SN, and RC seemed to be maintained however much of the equipment appeared to be nearing the end of its expected life cycle and should be replaced within the near future. All other buildings have been upgraded during recent renovations.

The electrical peak demand load for each of the existing service locations is shown in Table 4-1 in Appendix 4. The estimated total campus peak demand load is 6.1MVA and is calculated by summing all of the individual service locations. It is important to note that the estimated total campus peak demand load will be less that the actual total campus peak demand load due to the fact that not all individual peak demand loads at each individual service occur at exactly the same time.

Backup power is provided to various buildings through the use of generators. Buildings with backup generators have been identified in Table 4-1 in Appendix 4. Generator capacity (KW) is also indicated.

Previous Master Plan

Per the previous utilities master plan, the existing PEPCO feeders were shown as having adequate capacity to accommodate future loads associated with the College's planned growth. See below for a description of ongoing efforts to verify if PEPCO's feeders and associated infrastructure are adequate to support the College's planned growth.

Future System Requirements

As previously mentioned, the existing PEPCO distribution system is believed to be adequate to serve the future campus buildings. PEPCO will remain the owner and operator of the 13.2kV voltage electrical distribution system, so any desired modifications to this system will need to be coordinated with PEPCO. Removal of the existing east campus buildings and the following new construction projects shall be coordinated with PEPCO.

The near-term and long-term future campus projects include several demolition and new construction projects throughout the campus. These projects and the anticipated year of completion are listed in Table 4-2.

Projected load estimates for the new buildings shall be provided to PEPCO in order to determine if the existing PEPCO owned electrical distribution infrastructure has sufficient capacity for the new loads. A PEPCO service application will need to be submitted to begin this process. The College design is to be reviewed and approved by PEPCO as part of the service application process. The infrastructure is installed by College contractors after which PEPCO installs cabling in the infrastructure from the poles to the transformer pads, set the transformer and feeders from the transformer pad to the building service entrance. PEPCO is paid a fee for their work.

Please note that PEPCO has not provided detailed information to date regarding the construction of future buildings as it relates to the impact to existing PEPCO primary feeders and associated infrastructure. Load information on campus load growth has been provided to PEPCO and through the efforts of key College personnel, requests for information from PEPCO are ongoing.

Since the west campus has no future buildings planned within timeline of this master plan, existing west campus electrical system shall be sufficient to remain as is with planned maintenance and replacement as the equipment reaches the end of its useful life.

Be aware that in October 2019 Schneider Electric approached the College to discuss the possibility of implementing a Power Purchase Agreement (PPA) for the Takoma Park/Silver Spring Campus. The concept presented to the College was based on Schneider Electric purchasing and maintaining all of the PEPCO owned primary distribution and pad mounted transformers currently supporting the Takoma Park/Silver Spring Campus, then selling power back to the

College for a term of 20 years. The discussions concluded with the general consensus that this PPA concept was not viable for the TP/SS campus. No further action is being considered.

Montgomery County requires that all projects that receive county funding be provided with PV at a rate of 1kW/1,000 SF renovated or newly constructed for projects larger than 10,000 SF. Identification of possible locations for future PV is included in this report. See Table 4-3 and Site Plan E1.04. Proposed PV locations are displayed for rooftop, parking lot, and ground mounted PV systems. Locations have been determined by evaluating the available physical space within the Campus to accommodate the panel arrays. Montgomery College will need to evaluate these potential locations for additional criteria such as feasibility, cost, and environmental impact.

Summary and Recommendations

The existing 13.2kV electrical distribution system owned by PEPCO will need to be extended to the new buildings. It is recommended that the 13.2kV distribution system is upgraded to provide loops to all buildings on the campus to provide redundancy should one of the loops experience an outage. Coordination of all electrical distribution system upgrades shall be coordinated with PEPCO.

It is recommended that the existing campus metering be expanded to include major uses of electrical power. These meters should be implemented in a manner that complies with MC's new Building Energy Performance Standards. This expanded metering will help facilities staff identify and diagnose maintenance issues as they arise on these systems. It will also help MC be prepared when Montgomery County enforces it's new benchmarking law.

Efforts to pursue PEPCO (in association with key College personnel) for definitive information related to the impact of new building load growth must be continued. The recommendations section cannot be completed until the required coordination and results have been obtained from PEPCO.

Identification of possible locations for future PV is noted on Table 4-3 and Site Plan E1.04. These possible locations are considered for the near-term future. Montgomery College will need to evaluate these potential locations for additional criteria such as feasibility, cost, and environmental impact.

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Appendix 1
General Information

Burdette, Koehler, Murphy and Associates, Inc.
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TABLE 1-1 - Building Abbreviations List

Official Abbreviation	Building Number	Building Name	Gross Square Feet (GSF)**	Net Assignable Square Feet (NASF)**	Comments
Takoma Park / Silver Spring Campus					
CF	313	The Morris & Gwendolyn Cafrtiz Foundation Arts Center	134,748	90,721	
CM	310	The Catherine F. Scott Commons	30,354	16,606	
CU	315	Cultural Arts Center	57,243	28,389	
EG	314	East Garage	224,310	1,815	
HC	311	Health Sciences Center	98,038	63,689	
MP	305	Mathematics Pavilion	6,942	4,255	*2036 Expected Demolition*
NP	318	North Pavilion	6,942	4,337	*2036 Expected Demolition*
P1	304	Pavilion One	7,386	4,468	
P2	309	Pavilion Two	7,385	4,767	
P3	317	Pavilion Three	15,013	10,901	
P4	302	Pavilion Four	15,873	8,549	
RC	306	Resource Center	44,906	34,650	
SN	307	Science North	39,950	26,484	*2042 Expected Demolition*
LB*	319	Catherine and Isiah Leggett Math & Science Building	108,238	68,318	*2023 Expected Opening*
ST	312	Charlene R. Nunley Student Services Center	110,504	65,497	
WG	316	West Garage (Jesup Blair Drive)	159,795	1,369	
TBD*	-	Math Building	45,600	27,360	*2036 Expected Opening*
TBD*	-	Health and Fitness Center	49,230	32,900	*2042 Expected Opening*

*Building Proposed per 2016 Facilities Masterplan

**From MC Resource Conservation Plan FY 2023 and from the Facilities Master Plan 2013 - 2023

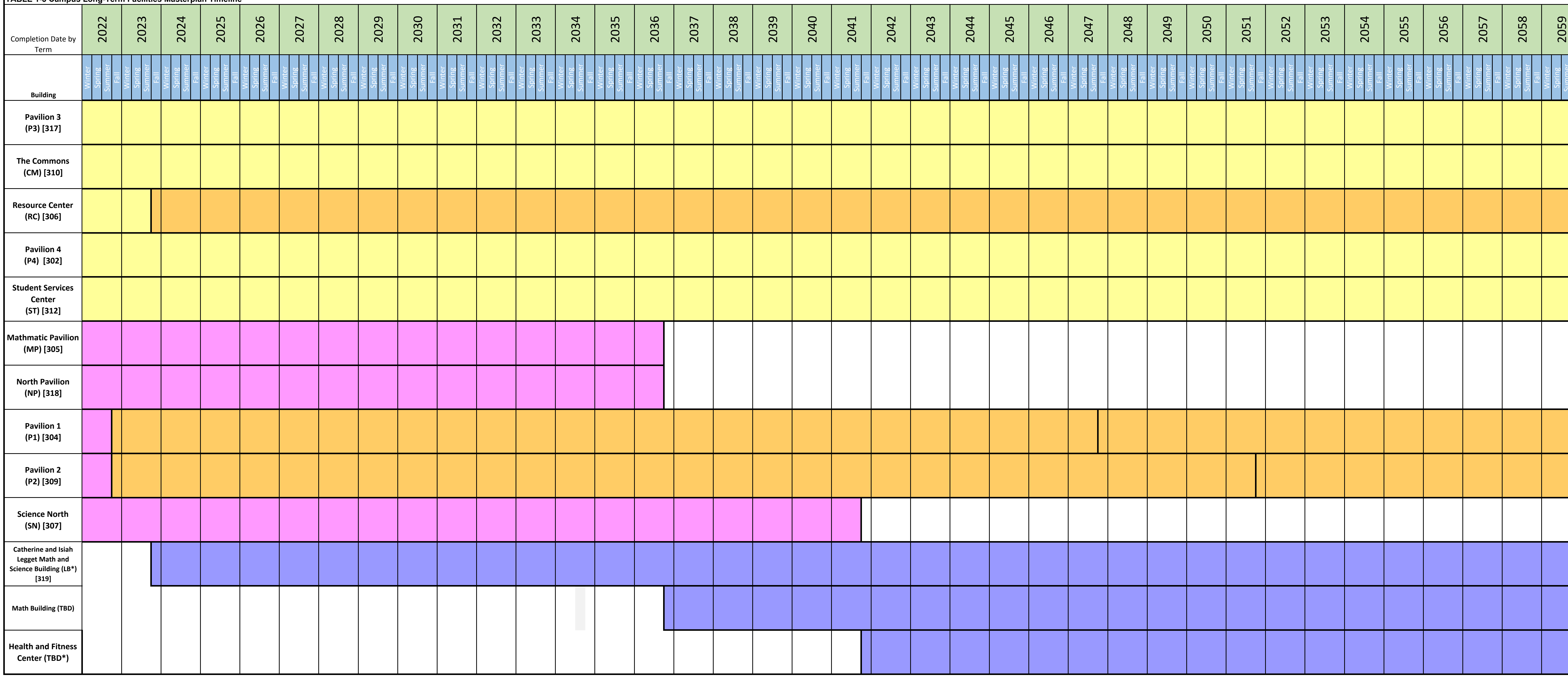
Table 1-2 – LIST OF ABBREVIATIONS

BTU	BRITISH THERMAL UNIT
W	COLD WATER
CW	CHILLED WATER
GSF	GROSS SQUARE FEET
GPM	GALLONS PER MINUTE
FMP	FACILTIES MASTERPLAN
HP	HORSEPOWER
HR	HOUR
HW	HEATING WATER
KVA	KILOVOLT-AMPERES
KW	KILOWATTS
G	NATURAL GAS
SF	SQUARE FOOT
S	SANITARY SEWER
UMP	UTILITY MASTERPLAN
VFD	VARIABLE FREQUENCY DRIVE

Montgomery College - Takoma Park / Silver Spring Campus
Utility Master Plan Study
BKM Project Number: 19021.03

June 2022

TABLE 1-3 Campus Long-Term Facilities Masterplan Timeline



KEY	
(yellow)	Existing Building
(orange)	Renovated Building
(pink)	Stand-Alone Building
(purple)	Future Building

LEGEND:

- CHILLED WATER — CW
- HEATING WATER
- DOMESTIC COLD WATER
- SANITARY
- STORM WATER
- NATURAL GAS — G
- CONDENSER WATER SUPPLY
- CONDENSER WATER RETURN
- GLYCOL WATER SUPPLY
- GLYCOL WATER RETURN
- ELECTRIC

1 **COMPOSITE SITE PLAN - EXISTING CONDITIONS**
SCALE: 1" = 80'-0"

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'
SCALE: 1" = 80'-0"

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Montgomery College

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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

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DATE:	DESCRIPTION:
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PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

COMPOSITE SITE PLAN EXISTING CONDITIONS

DRAWING NO:

C1.01

BKM# 19021.03

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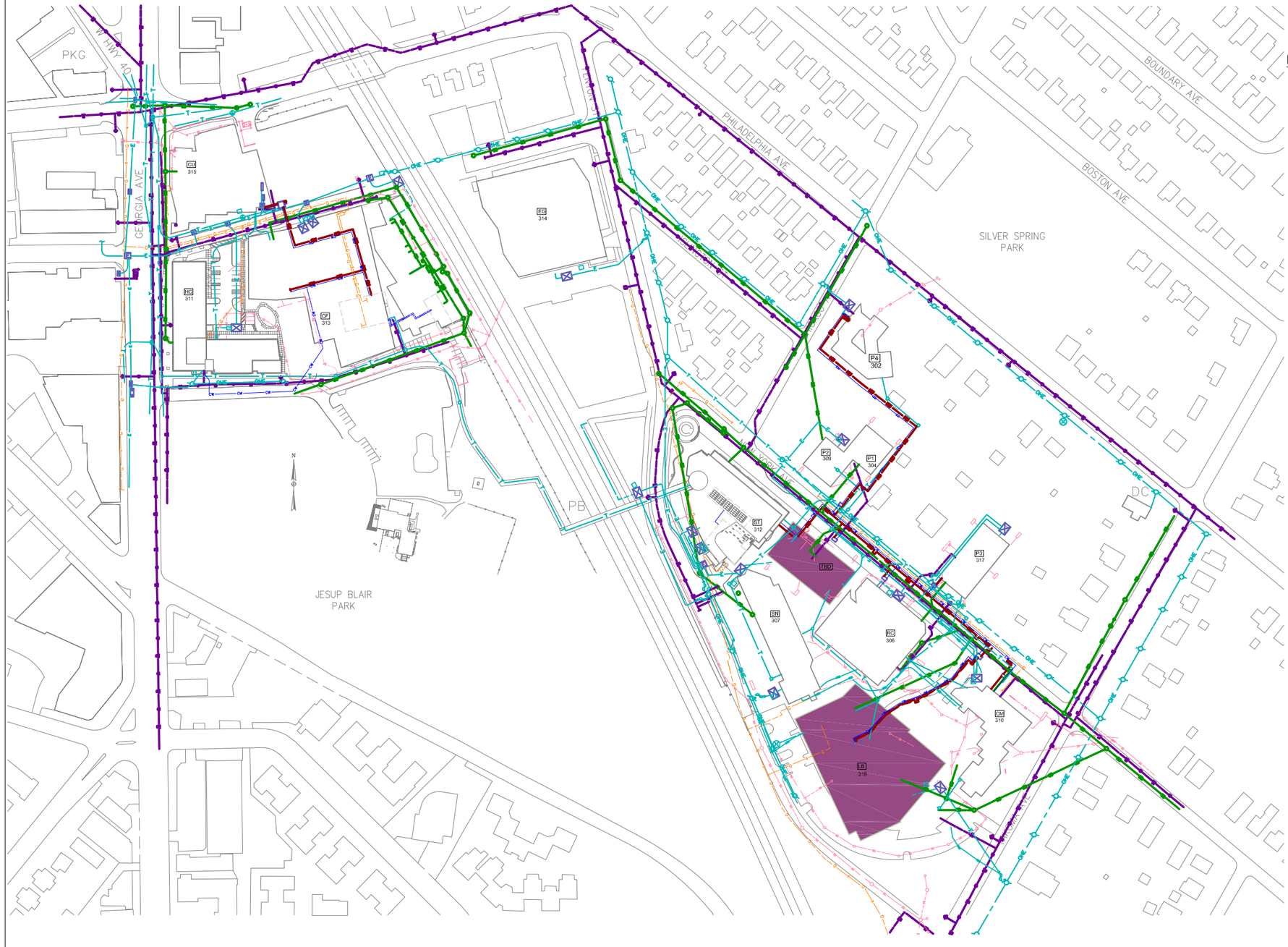

LEGEND:

- CHILLED WATER
- HEATING WATER
- DOMESTIC COLD WATER
- SANITARY
- STORM WATER
- NATURAL GAS
- CONDENSER WATER SUPPLY
- CONDENSER WATER RETURN
- GLYCOL WATER SUPPLY
- GLYCOL WATER RETURN
- ELECTRIC

1 **COMPOSITE SITE PLAN - NEAR-TERM FUTURE CONDITIONS (2022-2036)**
SCALE: 1" = 80'-0"

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DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

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COMPOSITE SITE PLAN NEAR TERM FUTURE CONDITIONS (2022-2036)

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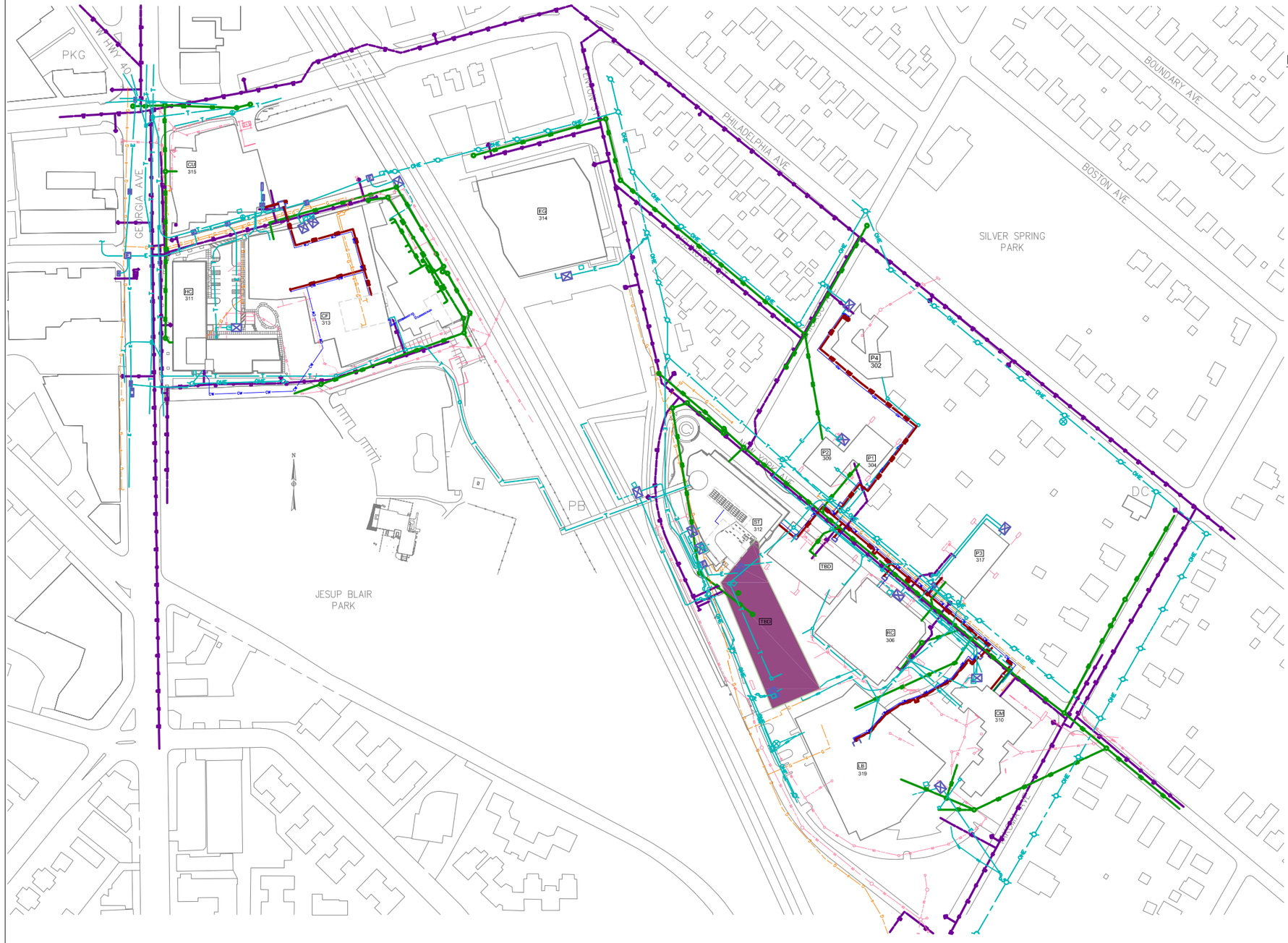

1 **COMPOSITE SITE PLAN - LONG-TERM FUTURE CONDITIONS (2037-BEYOND)**
SCALE: 1" = 80'-0"

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SHEET TITLE:

COMPOSITE SITE PLAN LT FUTURE CONDITIONS (2037-BEYOND)

DRAWING NO:

C1.03

BKM# 19021.03

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Appendix 2
Plumbing Systems

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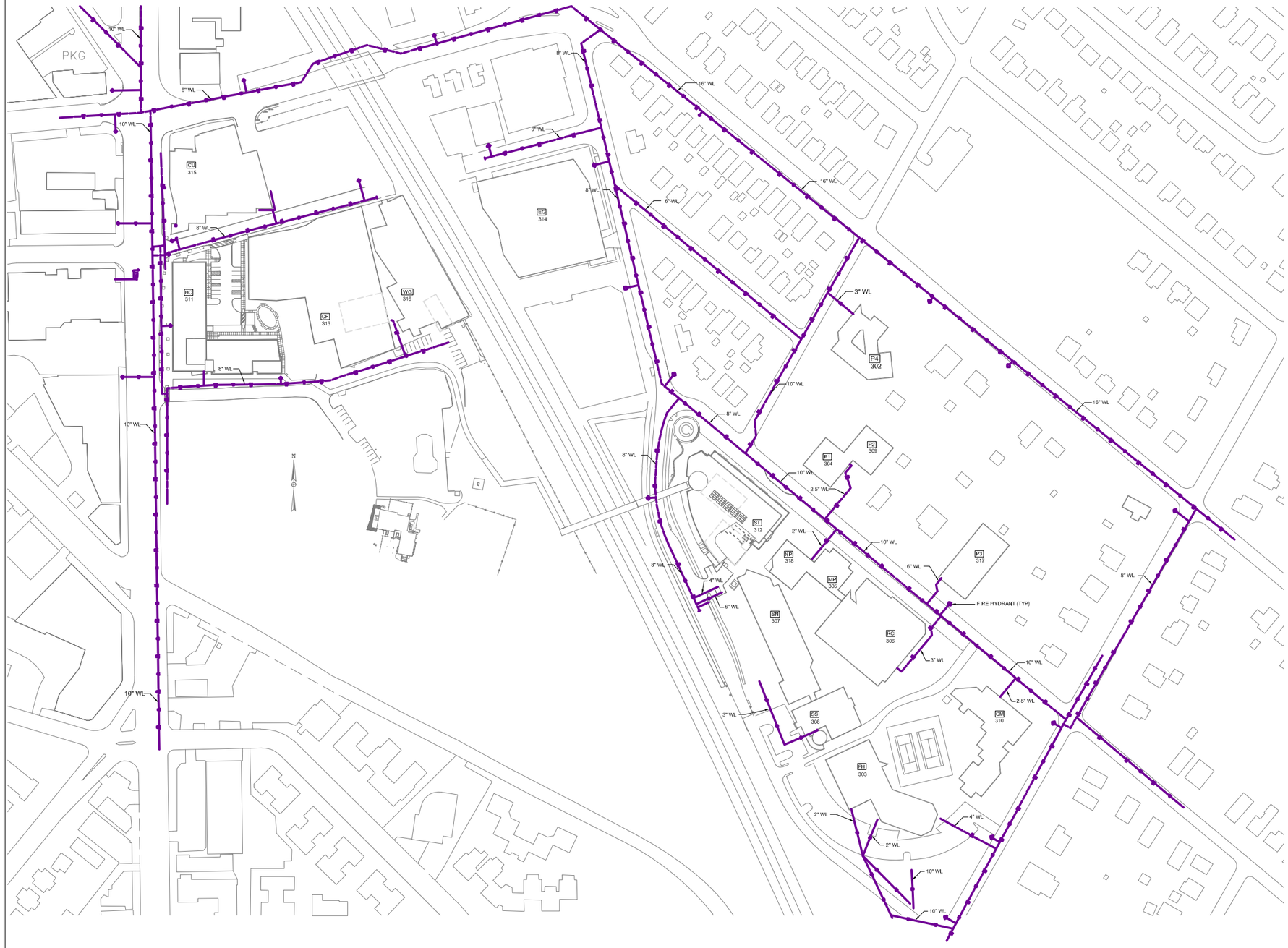

1 **SITE PLAN - WATER SYSTEM - EXISTING CONDITIONS**
SCALE: 1" = 80'-0"

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DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

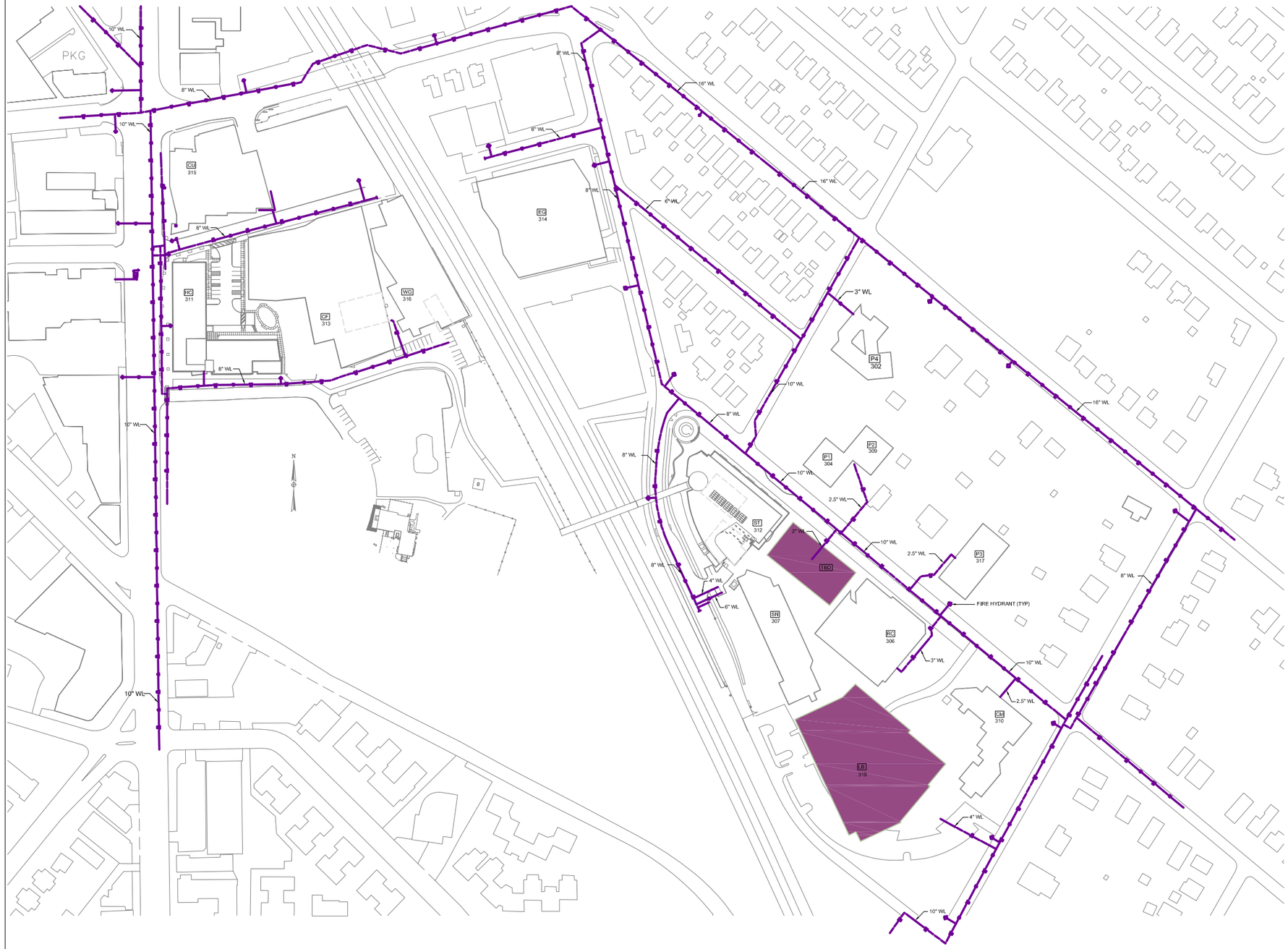
SHEET TITLE:

SITE PLAN WATER SYSTEM EXISTING CONDITIONS

DRAWING NO:

P1.01

BKM# 19021.03



1 **SITE PLAN - WATER SYSTEM - NEAR TERM FUTURE (2022-2036)**
SCALE: 1" = 80'-0"

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SITE PLAN - WATER SYSTEM NEAR TERM FUTURE (2022-2036)

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P1.02

BKM# 19021.03

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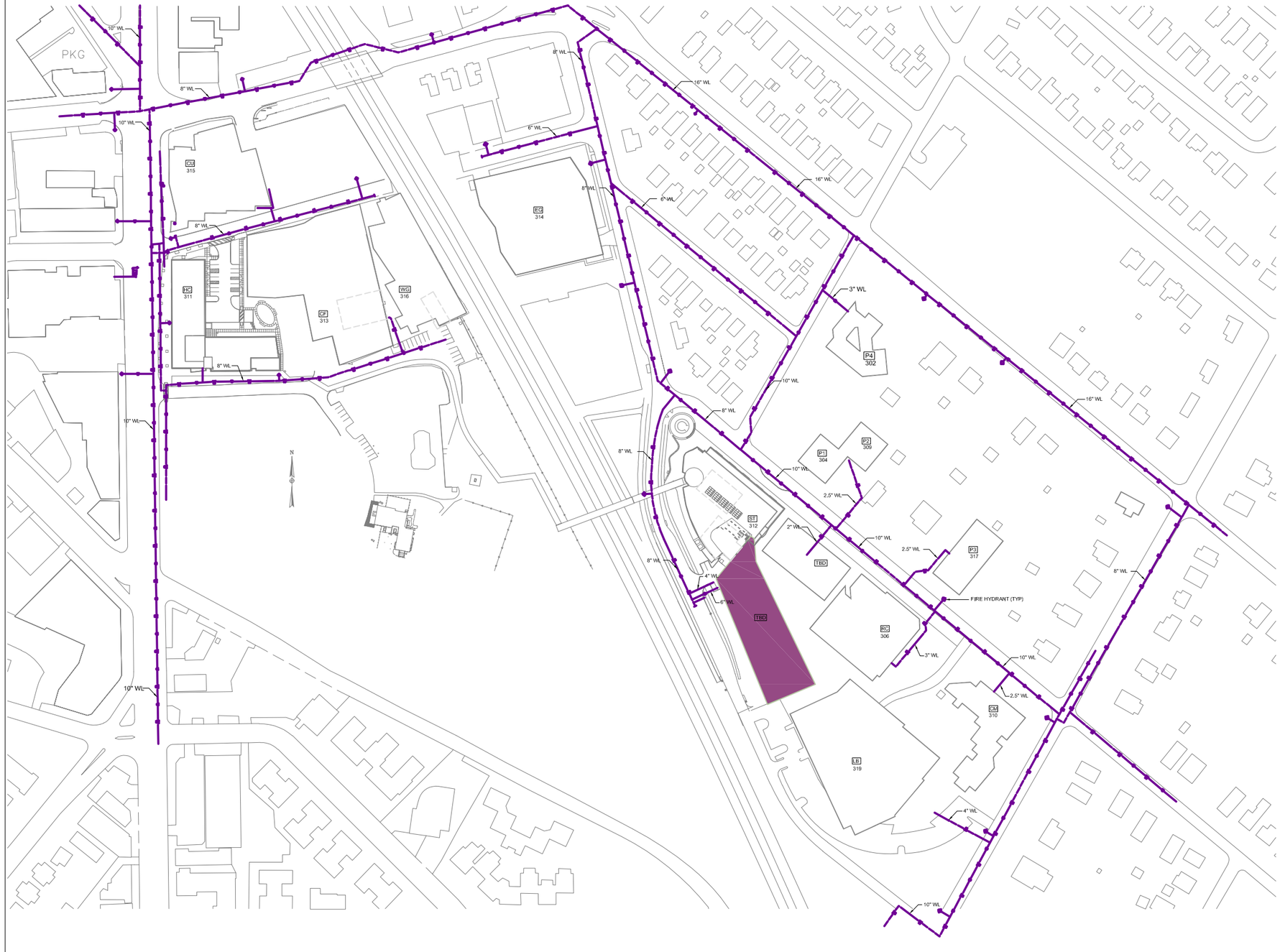

1 **SITE PLAN - WATER SYSTEM - LONG TERM FUTURE (2037-BEYOND)**
SCALE: 1" = 80'-0"

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SCALE: AS NOTED

DRAWN BY: BKM

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DATE: JUNE 2022

SHEET TITLE:

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BKM# 19021.03

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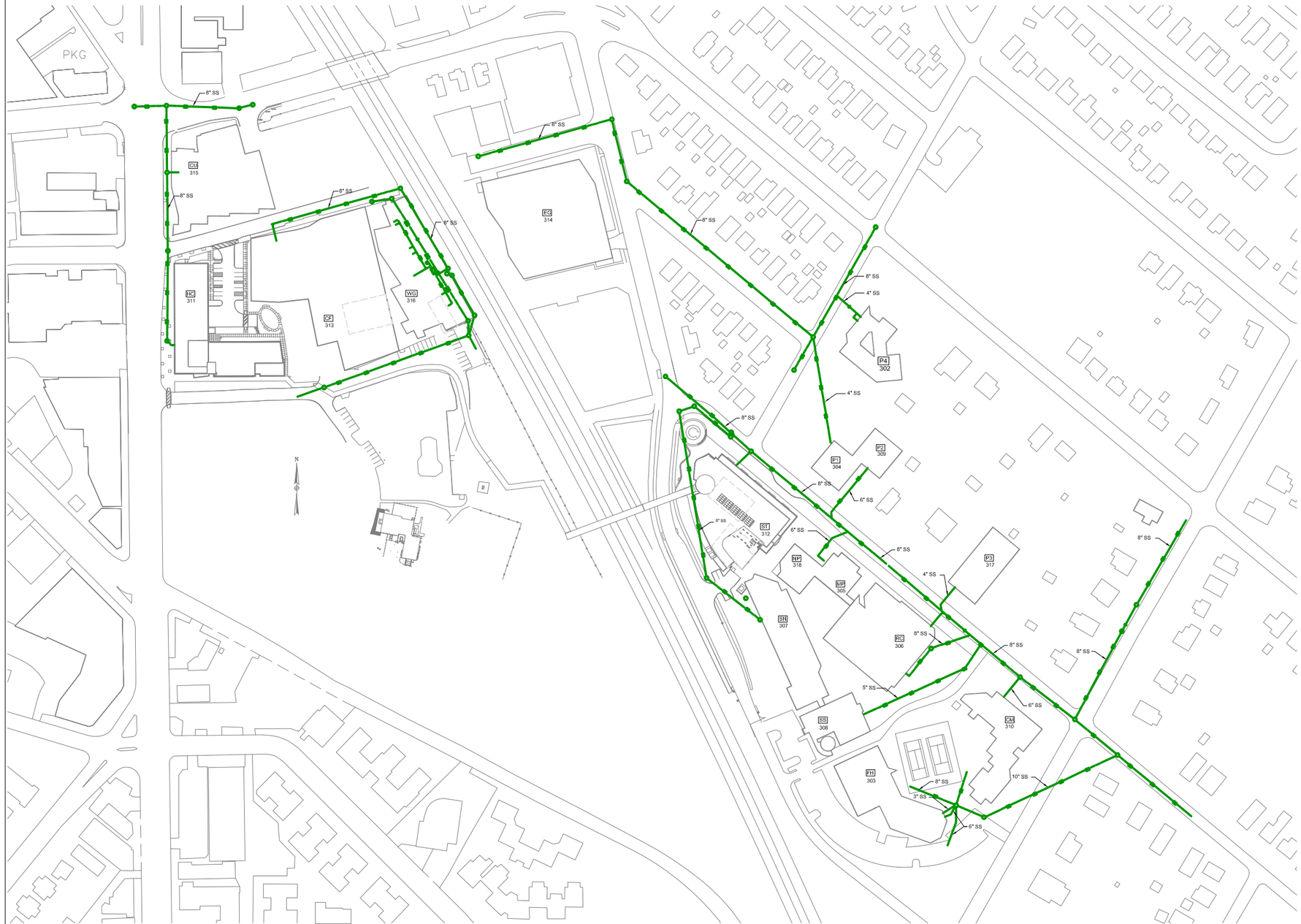

1 **SITE PLAN - SANITARY SYSTEM - EXISTING CONDITIONS**
SCALE: 1" = 80'-0"

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'
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PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

SITE PLAN
SANITARY SYSTEM
EXISTING CONDITIONS

DRAWING NO:

P1.11

BKM# 19021.03

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1 **SITE PLAN - SANITARY SYSTEM - NEAR TERM FUTURE (2022 - 2036)**
SCALE: 1" = 80'-0"

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

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DATE: JUNE 2022

SHEET TITLE:

SITE PLAN - SANITARY SYSTEM NEAR TERM FUTURE (2022-2036)

DRAWING NO:

P1.12

BKM# 19021.03

1 **SITE PLAN - SANITARY SYSTEM - LONG TERM FUTURE (2037 - BEYOND)**
SCALE: 1" = 80'-0"

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SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

SITE PLAN - SANITARY SYSTEM LONG TERM FUTURE (2037-BEYOND)

DRAWING NO:

P1.13

BKM# 19021.03

1 SITE PLAN - STORM SYSTEM - EXISTING CONDITIONS

SCALE: 1" = 80'-0"

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SCALE: 1" = 80'-0"

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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

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SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

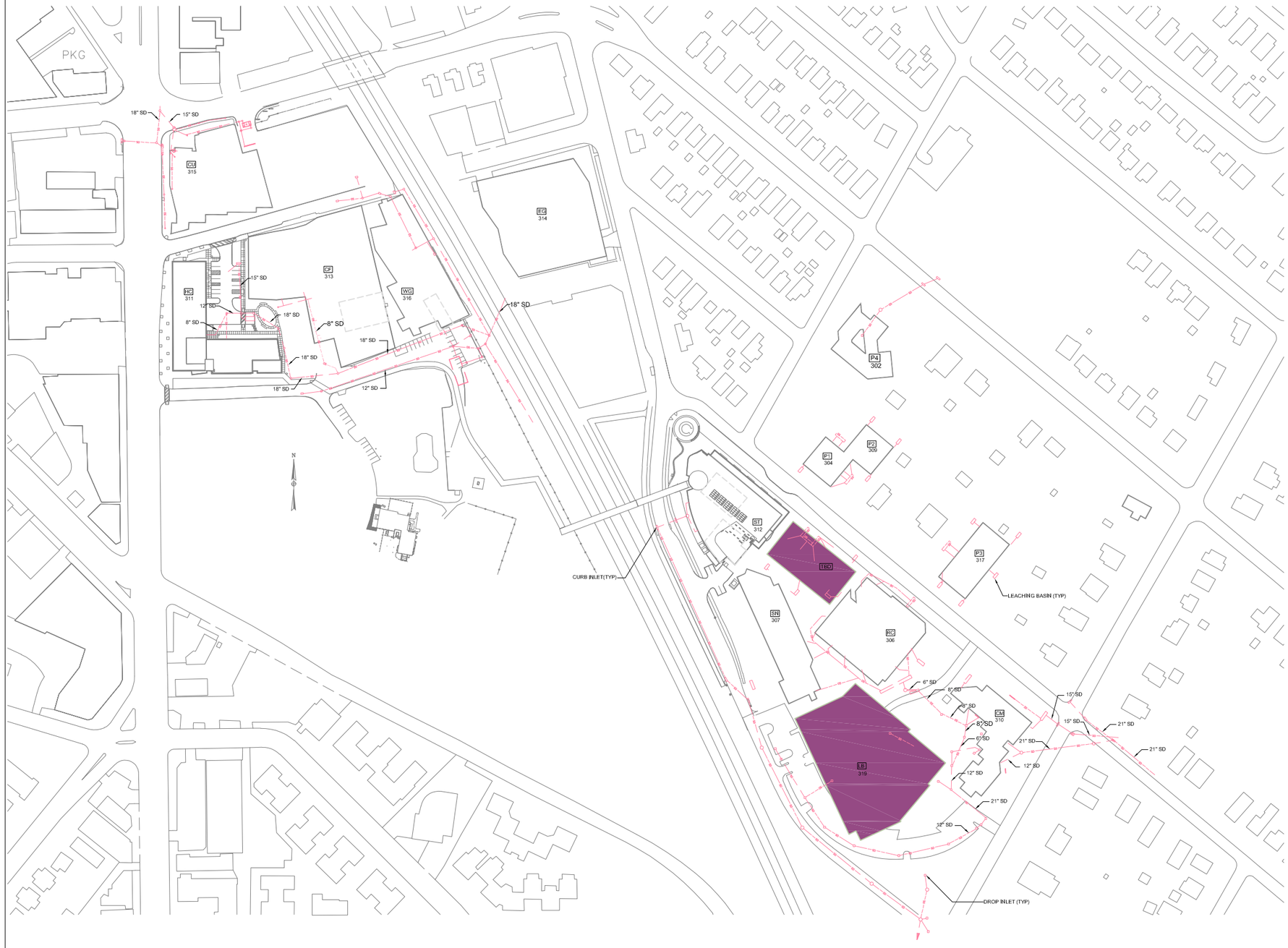
SHEET TITLE:

SITE PLAN STORM SYSTEM EXISTING CONDITIONS

DRAWING NO:

P1.21

BKM# 19021.03



1 **SITE PLAN - STORM SYSTEM - NEAR TERM FUTURE (2022 -2036)**
SCALE: 1" = 80'-0"

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DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

SITE PLAN - STORM SYSTEM NEAR TERM FUTURE (2022-2036)

DRAWING NO:

P1.22

BKM# 19021.03

1 SITE PLAN - STORM SYSTEM - LONG TERM FUTURE (2037 - BEYOND)

SCALE: 1" = 80'-0"

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CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

SITE PLAN - STORM SYSTEM LONG TERM FUTURE (2037-BEYOND)

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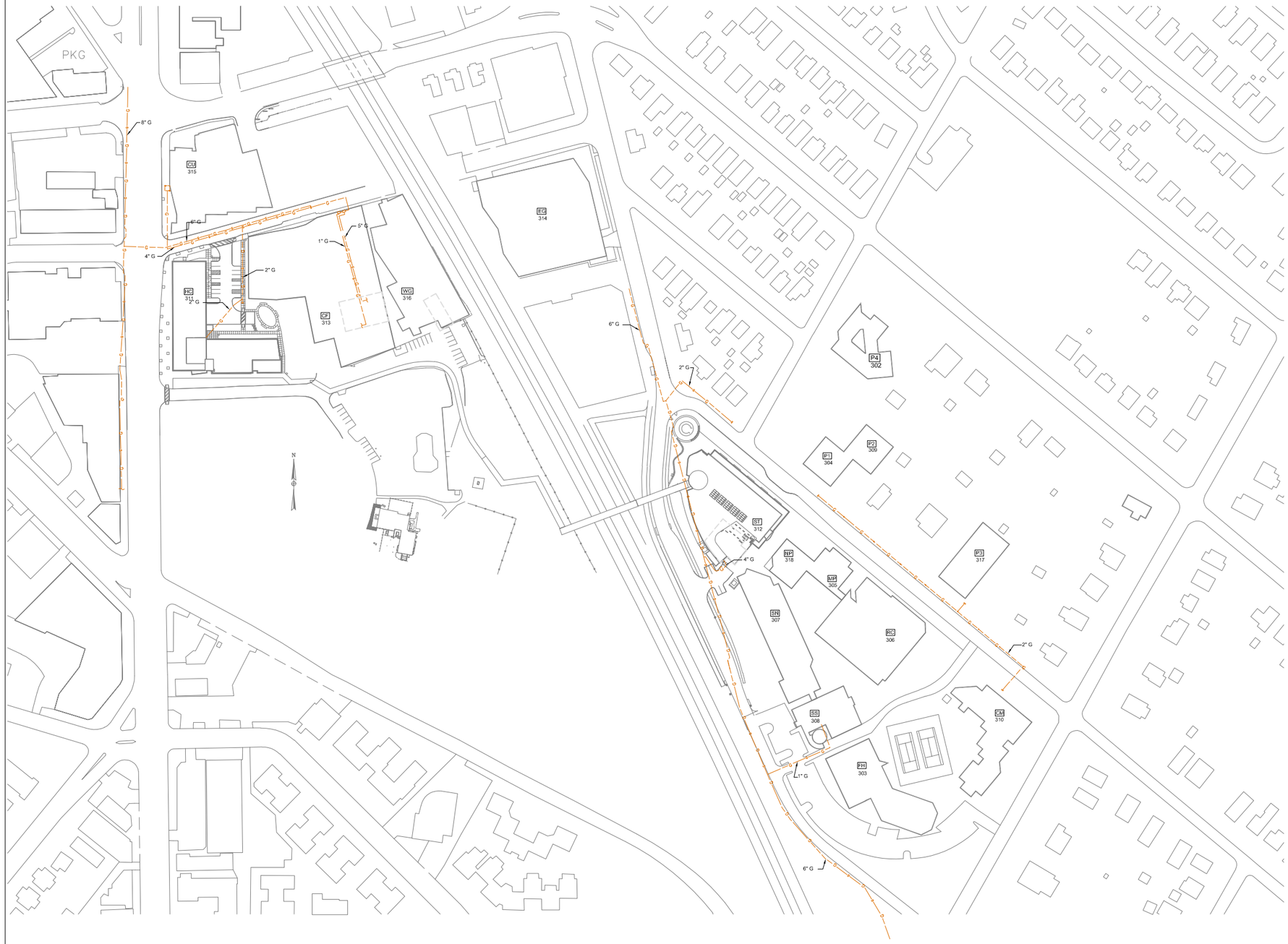

1 **SITE PLAN - NATURAL GAS - EXISTING CONDITIONS**
SCALE: 1" = 80'-0"

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SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

SITE PLAN NATURAL GAS EXISTING CONDITIONS

DRAWING NO:

P1.31

BKM# 19021.03

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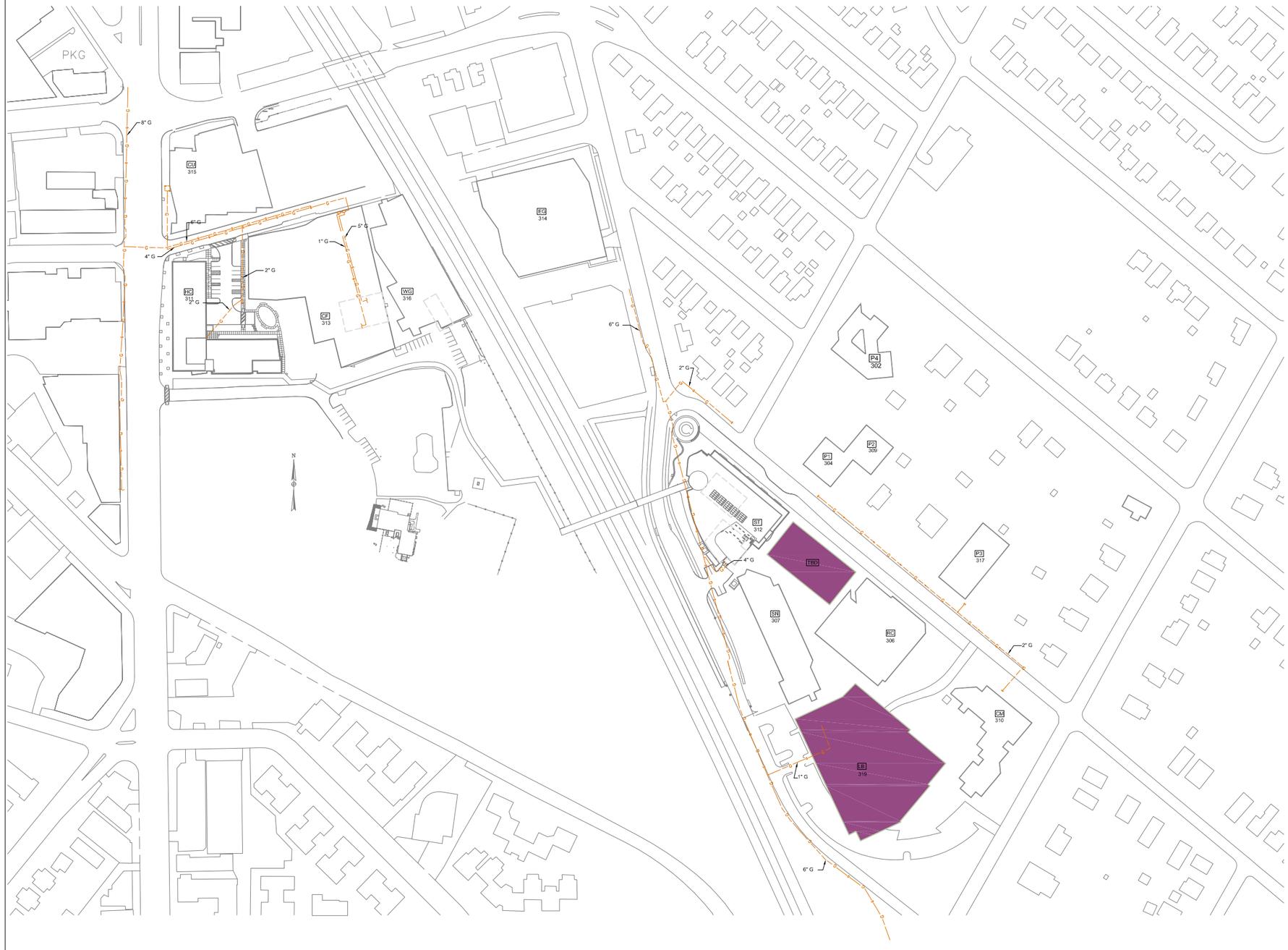

1 **SITE PLAN - NATURAL GAS - NEAR TERM FUTURE (2022 - 2036)**
SCALE: 1" = 80'-0"

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SCALE: 1" = 80'-0"

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Burdette, Koehler, Murphy & Associates, Inc.
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6300 Blair Hill Lane Suite 400 | Baltimore, Maryland 21209
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PROJECT NAME:

Montgomery College

MONTGOMERY COLLEGE
Central Administration
Office of Facilities
9221 Corporate Boulevard
Rockville, MD 20850
Telephone: 240-567-7363

TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

SEAL:

ISSUED FOR:

DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

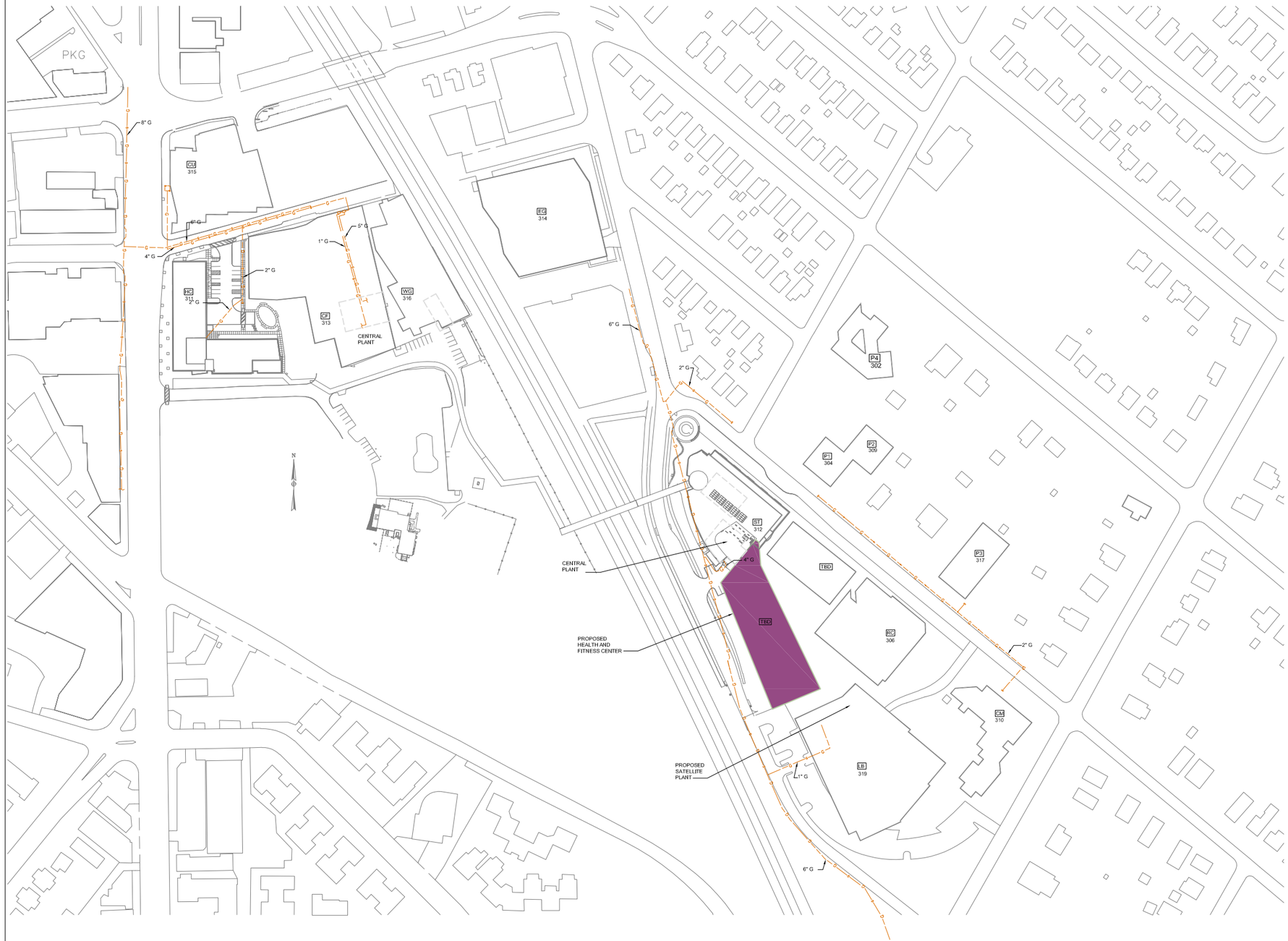
SHEET TITLE:

SITE PLAN - NATURAL GAS NEAR TERM FUTURE (2022-2036)

DRAWING NO:

P1.32

BKM# 19021.03



1 **SITE PLAN - NATURAL GAS - LONG TERM FUTURE (2037 - BEYOND)**
SCALE: 1" = 80'-0"

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'
SCALE: 1" = 80'-0"

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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

SEAL:

ISSUED FOR:

DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

SITE PLAN - NATURAL GAS LONG TERM FUTURE (2037-BEYOND)

DRAWING NO:

P1.33

BKM# 19021.03

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Appendix 3
Mechanical Systems

Burdette, Koehler, Murphy and Associates, Inc.
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TABLE 3-1 - Cooling/Heating Loads - Existing Buildings

Year Built	Bldg Abbrev	Bldg Number	Building Name	Bldg Area (GSF)	Cooling Estimated Load (Tons)	Cooling Load Factor (GSF/Ton)	Chiller Plant Capacity (Tons)	Heating Estimated Load (MBH)	Heating Load Factor (BTUH/GSF)	Boiler Plant Capacity (MBH)	Notes
East Central Plant (CP) Connected Loads											
1975	P3	317	Pavilion Three	15,700	88	178	--	1,050	67	--	
~~1978~~	~~FH~~	~~303~~	~~Falcon Hall~~	~~45,363~~	--	--	--	--	--		Demolished 2020
1978	CM	310	The Commons	30,354	85	357	--	752	25	--	
1978	RC	306	Resource Center	44,906	195	230	--	3,675	82	--	
1980	P4	302	Pavilion Four	20,000	76	263	--	1,125	56	--	
2007	ST	312	Student Services Center	110,504	295	375	700	3,315	30	10,200	Central Plant
			Total Connected Load/Capacity	266,827	739	--	700	9,917	--	10,200	
			Plant Capacity Surplus/(Shortage)	--	--	--	-39	--	--	283	
West Central Plant (CP) Connected Loads											
2004	HC	311	Health Science Center	98,038	200	490	--	2,400	24	1,900	Chiller/Boiler Local
2007	CF	313	Cafrtiz Foundation Arts Center	134,748	350	385	700	4,042	30	10,000	Central Plant, ITOC Chiller
2010	CU	315	Cultural Arts Center	57,243	160	358	--	1,717	30	--	
			Total Connected Load/Capacity	290,029	710	--	700	8,159	--	11,900	
			Plant Capacity Surplus/(Shortage)	--	--	--	-10	--	--	3,741	
Stand-Alone											
~~1924~~	~~DC~~	~~-~~	~~Child Care~~	~~3,310~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	**Vacated**
~~1962~~	~~SS~~	~~308~~	~~Science South~~	~~23,757~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	Demolished 2020
1975	MP	305	Mathematics Pavilion	6,942	61	114	--	729	105	--	
1975	NP	318	North Pavilion	6,942	61	114	--	729	105	--	
1975	P1	304	Pavilion One	7,386	55	134	--	443	60	--	
1975	P2	309	Pavilion Two	7,385	55	134	--	443	60	--	
1978	SN	307	Pavilion Two	39,950	150	266	--	1,598	40	--	
			Total Load/Capacity	63,707	382	--	0	3,942	--	0	
			Plant Capacity Surplus/(Shortage)	--	--	--	--	--	--	--	
			Total Campus Connected Load/Capacity	**620,563**	**1,831**	**--**	**1,400**	**22,018**	**--**	**22,100**	
			Total Campus Capacity Surplus/(Shortage)	**--**	**--**	**--**	**-431**	**--**	**--**	**82**	

TABLE 3-2 - Cooling/Heating Loads - Near-Term Future Buildings (2022-2036

Year Built	Year Renovated	Bldg Abbrev	Bldg Number	Building Name	Bldg Area (GSF)	Cooling Estimated Load (Tons)	Cooling Load Factor (GSF/Ton)	Chiller Plant Capacity (Tons)	Heating Estimated Load (MBH)	Heating Load Factor (BTUH/GSF)	Boiler Plant Capacity (MBH)	Notes
East Central Plant (CP) Connected Loads												
1975	2016	P3	317	Pavilion Three	15,700	88	178	--	1,050	67	--	
~~1978~~		~~FH~~	~~303~~	~~Falcon Hall~~	--	--	--	--	--	--	--	**Demolished 2020 (1)**
1978		CM	310	The Commons	30,354	85	357	--	752	25	--	
1978	**2022**	RC	306	Resource Center	44,906	195	230	--	3,675	82	--	
1980	2016	P4	302	Pavilion Four	20,000	76	263	--	1,125	56	--	
2007		ST	312	Student Services Center	110,504	295	375	700	3,315	30	10,200	*Central Plant
1975	**2022**	**P1**	**304**	**Pavilion One**	**7,386**	**48**	**154**	**--**	**1,500**	**203**	**--**	**Connected to ST Fall 2022**
1975		**P2**	**309**	**Pavilion Two**	**7,385**	**48**	**--**	**--**	**1,500**	**--**	**--**	**Connected to ST Fall 2022**
2022 (1)		**LB**	**319**	**Catherine and Isiah Legget Math and Science Building**	**108,238**	**500**	**216**	**500**	**5,622**	**52**	**5,622**	
2036 (3)		**TBD**	**-**	**Math Building**	**45,600**	**152**	**300**	**400**	**1,824**	**40**	**4,000**	
				Total Connected Load/Capacity	390,073	1,487	--	1,600	20,363	--	19,822	
				Plant Capacity Surplus/(Shortage)	--	--	--	113	--	--	-541	
West Central Plant (CP) Connected Loads												
2004		HC	311	Health Science Center	98,038	200	490	--	2,400	24	1,900	Chiller/Boiler Local
2007		CF	313	Cafrtiz Foundation Arts Center	134,748	350	385	700	4,042	30	10,000	Central Plant, ITOC Chiller
2010		CU	315	Cultural Arts Center	57,243	160	358	--	1,717	30	--	
				Total Connected Load/Capacity	290,029	710	--	700	8,159	--	11,900	
				Plant Capacity Surplus/(Shortage)	--	--	--	-10	--	--	3,741	
Stand-Alone												
~~1924~~		~~DC~~	~~-~~	~~Child Care~~	~~3,310~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	**Vacated (6)**
~~1962~~		~~SS~~	~~308~~	~~Science South~~	~~23,757~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	**Demolished 2020 (1)**
~~1975~~		~~MP~~	~~305~~	~~Mathematics Pavilion~~	~~6,942~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	**Demolished 2036 (1)**
~~1975~~		~~NP~~	~~318~~	~~North Pavilion~~	~~6,942~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	**Demolished 2036 (3)**
1978		SN	307	Science North	39,950	150	266	--	1,598	40	--	
				Total Connected Load/Capacity	63,707	150	--	0	1,598	--	0	
				Plant Capacity Surplus/(Shortage)	--	--	--	-150	--	--	-1,598	
				Total Campus Connected Load/Capacity	**743,809**	**2,347**	**--**	**2,300**	**30,120**	**--**	**31,722**	
				Total Campus Capacity Surplus/(Shortage)	**--**	**--**	**--**	**-47**	**--**	**--**	**1,602**	

(*) Denotes Facilities Master Plan 2013-2023 Projects

TABLE 3-3 - Cooling/Heating Loads - Long Term Future Buildings (2037-Beyond)

Year Built	Year Renovated	Bldg Abbrev	Bldg Number	Building Name	Bldg Area (GSF)	Cooling Estimated Load (Tons)	Cooling Load Factor (GSF/Ton)	Chiller Plant Capacity (Tons)	Heating Estimated Load (MBH)	Heating Load Factor (BTUH/GSF)	Boiler Plant Capacity (MBH)	Notes
East Central Plant (CP) Connected Loads												
1975	2016	P3	317	Pavilion Three	15,700	88	178	--	1,050	67	--	
1975	**2047 (5)**	**P1**	**304**	**Pavilion One**	**7,386**	**48**	**300**	**--**	**1,500**	**30**	**--**	
1975	**2051 (5)**	**P2**	**309**	**Pavilion Two**	**7,385**	**48**	**300**	**--**	**1,500**	**30**	**--**	
~~1978~~		~~FH~~	~~303~~	~~Falcon Hall~~	--	--	--	--	--	--	--	Demolished 2020 (1)
1978		CM	310	The Commons	30,354	85	357	--	752	25	--	
1978	2022	RC	306	Resource Center	44,906	195	230	--	3,675	82	--	
1980	2016	P4	302	Pavilion Four	20,000	76	263	--	1,125	56	--	
2007		ST	312	Student Services Center	110,504	295	375	700	3,315	30	10,200	*Central Plant
2022 (1)		LB	319	Catherine and Isiah Legget Math and Science Building	108,238	500	216	500	5,622	52	5,622	
2036 (3)		TBD	-	Math Building	45,600	152	300	400	1,824	40	**4,000**	
2041 (4)		**TBD**	**-**	**Health and Fitness Center**	**49,230**	**164**	**300**		**1,477**	**30**		
				Total Connected Load/Capacity	439,303	1,651	--	1,600	21,840	--	19,822	
				Plant Capacity Surplus/(Shortage)	--	--	--	-51	--	--	-2,018	
West Central Plant (CP) Connected Loads												
2004		HC	311	Health Science Center	98,038	200	490	--	2,400	24	--	Local Boilers/Chiller Removed
2007		CF	313	Cafritz Foundation Arts Center	134,748	350	385	510	4,042	30	10,000	*Central Plant
2010		CU	315	Cultural Arts Center	57,243	160	358	--	1,480	26	--	
				Total Connected Load/Capacity	290,029	710	--	510	7,922	--	10,000	
				Plant Capacity Surplus/(Shortage)	--	--	--	-200	--	--	2,078	
Stand-Alone												
~~1924~~		~~DC~~	~~-~~	~~Child Care~~	~~3,310~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	Vacated (6)
~~1962~~		~~SS~~	~~308~~	~~Science South~~	~~23,757~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	Demolished 2020 (1)
~~1975~~		~~MP~~	~~305~~	~~Mathmatic Pavilion~~	~~6,942~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	Demolished 2036 (3)
~~1975~~		~~NP~~	~~318~~	~~Nursing (North) Pavilion~~	~~6,942~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	Demolished 2036 (3)
~~1978~~		**~~SN~~**	**~~307~~**	**~~Science North~~**	**~~39,950~~**	**~~--~~**	**~~--~~**	**~~--~~**	**~~--~~**	**~~--~~**	**~~--~~**	**Demolished 2041 (4)**
				Total Connected Load/Capacity	0	0	--	0	0	--	0	
				Plant Capacity Surplus/(Shortage)	--	--	--	0	--	--	0	
				Total Campus Connected Load/Capacity	**729,332**	**2,361**	**--**	**2,110**	**29,762**	**--**	**29,822**	
				Total Campus Capacity Surplus/(Shortage)	**--**	**--**	**--**	**-251**	**--**	**--**	**60**	

(*) Denotes Facilities Master Plan 2013-2023 Projects

TABLE 3-4 - Coolings Plants - Existing Equipment

Tag	Unit	Manufacturer	Year Installed	Entering Water Temp (F°)	Leaving Water Temp (F°)	Pump Motor (HP)	Flow Rate (GPM)	Pressure (FT HD)	Cooling Tower Capacity (Tons)	Chiller Capacity (Tons)	Chiller Ice-Build Capacity (Tons)	Ice Storage Latent Capacity (Tons-Hrs)	Heat Exchanger Capacity (Tons)
Student Services Center (ST)													
CT-1	Cooling Tower		2007	95	85	--	600	--	250	--	--	--	--
CT-2	Cooling Tower		2007	95	85	--	600	--	250	--	--	--	--
CT-3	Cooling Tower		2007	95	85	--	600	--	250	--	--	--	--
CT-4	Cooling Tower		2007	95	85	--	600	--	250	--	--	--	--
CH-1	Ammonia Chiller	Frick	2007	30	22	--	800	--	--	250	230	--	--
CH-2	Ammonia Chiller	Frick	2007	30	22	--	800	--	--	250	230	--	--
CH-3	Nat Gas Chiller	Tecogen	2007	58	41	--	450	--	--	150	--	--	--
ISM-1	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	761	--
ISM-2	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	761	--
ISM-3	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	761	--
ISM-4	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	761	--
P-1A	Glycol Pump, VFD	Bell & Gossett	2007	--	--	100	1575	145	--	--	--	--	--
P-1B	Glycol Pump, VFD	Bell & Gossett	2007	--	--	100	1575	145	--	--	--	--	--
P-2A	Chilled Water Pump, VFD	Bell & Gossett	2007	--	--	50	1100	110	--	--	--	--	--
P-2B	Chilled Water Pump, VFD	Bell & Gossett	2007	--	--	50	1100	110	--	--	--	--	--
P-3A	Condenser Pump	Bell & Gossett	2007	--	--	100	2400	110	--	--	--	--	--
P-3B	Condenser Pump	Bell & Gossett	2007	--	--	100	2400	110	--	--	--	--	--
P-4	Chiller Pump	Bell & Gossett	2007	--	--	3	225	25	--	--	--	--	--
HEX-1	Heat Exchanger		2007	--	--	--	--	--	--	--	--	--	350
HEX-2	Heat Exchanger		2007	--	--	--	--	--	--	--	--	--	350
	Total ST Central Plant Equipment Capacity:								**1,000**	**650**		**3,044**	**700**
Cafritz (CF) Satellite Plant:													
CT-1	Cooling Tower	BAC	2007	--	--	--	--	--	900	--	--	--	--
CH-1	Ammonia Chiller	Frick	2007	30	22	--	750	--	--	250	230	--	--
CH-2	Ammonia Chiller	Frick	2007	30	22	--	--	--	--	250	230	--	--
CH-3	Nat Gas Chiller	Tecogen	2007	58	41	--	--	--	--	150	--	--	--
CH-4	Air Cooled Chiller	Motivair	2007	--	--	--	--	--	--	(1)	--	--	--
ISM-1	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	570	--
ISM-2	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	570	--
ISM-3	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	570	--
ISM-4	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	570	--
ISM-5	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	570	--
ISM-6	Ice Storage	BAC	2007	--	--	--	--	--	--	--	--	570	--
P-1A	Glycol Pump	Bell & Gossett	2007	--	--	100	1500	145	--	--	--	--	--
P-1B	Glycol Pump	Bell & Gossett	2007	--	--	100	1500	145	--	--	--	--	--
P-2A	CHW Pump	Bell & Gossett	2007	--	--	50	1400	100	--	--	--	--	--
P-2B	CHW Pump	Bell & Gossett	2007	--	--	50	1400	100	--	--	--	--	--
P-3A	Condenser Pump	Bell & Gossett	2007	--	--	75	2700	70	--	--	--	--	--
P-3B	Condenser Pump	Bell & Gossett	2007	--	--	75	2700	70	--	--	--	--	--
P-4	Chiller Pump	Bell & Gossett	2007	--	--	3	210	25	--	--	--	--	--
HEX-1	Heat Exchanger		2007	--	--	--	--	--	--	--	--	--	350
HEX-1	Heat Exchanger		2007	--	--	--	--	--	--	--	--	--	350
	Total CF Satellite Plant Equipment Capacity:								**900**	**650**		**3,420**	**700**
Health Science Center (HC) Satellite Plant:													
CT-1	Cooling Tower	BAC	2004	--	--	--	--	--	200	--	--	--	--
CH-1	Chiller	Carrier	2004	--	--	--	--	--	--	200	--	--	--
P-1	Chilled Water Pump	Bell & Gossett	2004	--	--	5	400	35	--	--	--	--	--
P-2	Chilled Water Pump	Bell & Gossett	2004	--	--	5	400	35	--	--	--	--	--
P-5	Condenser Water Pump	Bell & Gossett	2004	--	--	10	600	50	--	--	--	--	--
P-6	Condenser Water Pump	Bell & Gossett	2004	--	--	10	600	50	--	--	--	--	--
	Total HC Satellite Plant Equipment Capacity:								**0**	**200**		**0**	**0**

Total ST Central Plant Cooling Capacity:	**700**	**Note 2**
Total CF Central Plant Cooling Capacity:	**700**	**Note 2 & 3**
Total HC Satellite Plant Cooling Capacity:	**200**	
Total Campus Chilled Water System Capacity:	**1,600**	

Notes:
(1) Dedicated Cooling for IT located in CF
(2) Based on HEX-1 & HEX-2 capacity, with 240 tons from ice melt
(3) Cooling Capacity excludes chiller for dedicated IT

TABLE 3-5 - Heating Plants - Existing Equipment

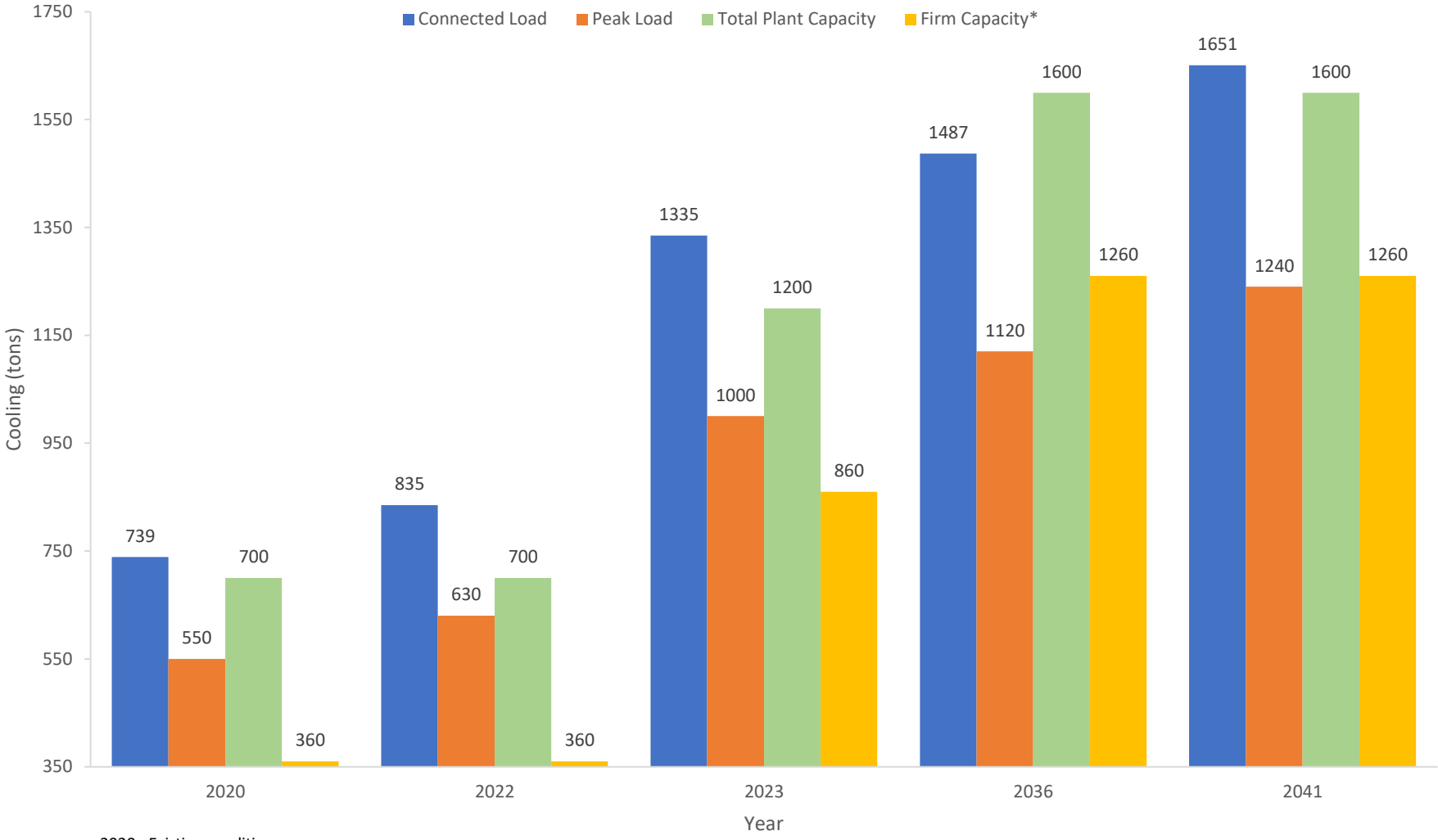
Tag	Unit	Manufacturer	Year Installed	Entering Water Temp (F°)	Leaving Water Temp (F°)	Pump Motor (HP)	Flow (GPM)	Pressure (FT HD)	ΔT (F°)	Boiler Capacity (MBH Output)
Student Services Center (ST) Central Plant:										
B-1	Boiler	Fulton	2022	150	190		150	10	40	1,874
B-2	Boiler	Fulton	2022	150	190		150	10	40	1,874
B-3	Boiler	Fulton	2022	150	190		150	10	40	1,874
B-4	Boiler	Aerco	2007	150	190		120	10	40	1,720
B-5	Boiler	Aerco	2007	150	190		120	10	40	1,720
B-6	Boiler	Aerco	2007	150	190		120	10	40	1,720
P-5A	Heating Water Pump, VFD	Bell & Gossett	2007				510 (1)	100		
P-5B	Heating Water Pump, VFD	Bell & Gossett	2007				510 (1)	100		
P-6	Heating Recovery Pump, VFD	Bell & Gossett	2007				50	40		
P-7	HW Heating Pump, VFD	Bell & Gossett	2007				20	40		
HEX-3	Heat Recovery HX									750
Total ST Central Plant Equipment Capacity:										**11,532**
Cafritz (CF) Central Plant:										
B-1	Boiler	Aerco	2005	160	200		120	10		1,720
B-2	Boiler	Aerco	2005	160	200		120	10		1,720
B-3	Boiler	Aerco	2005	160	200		120	10		1,720
B-4	Boiler	Fulton	2016	160	200		120	10		1,874
B-5	Boiler	Fulton	2016	160	200		120	10		1,874
B-6	Boiler	Fulton	2016	160	200		120	10		1,874
P-5A	Heating Water Pump, VFD	Bell & Gossett	2005			20	500 (1)	100		
P-5B	Heating Water Pump, VFD	Bell & Gossett	2005			20	500 (1)	100		
P-6	Heating Recovery Pump	Bell & Gossett					50	40		
HEX-3	Heat Recovery HX									750
Total CF Central Plant Equipment Capacity:										**11,532**
Health Sciences Center (HC) Satellite Plant:										
B-1	Boiler	Fulton	2022	150	190		75			950
B-2	Boiler	Fulton	2022	150	190		75			950
P-7	Heating Water Pump	Bell & Gossett	2005			2	125	30		
P-8	Heating Water Pump	Bell & Gossett	2005			2	125	30		
Total CF Central Plant Equipment Capacity:										**1,900**

Total ST Central Plant Heating Capacity:	**10,200**	**Note 1**
Total CF Central Plant Heating Capacity:	**10,000**	**Note 1**
Total HC Satellite Plant Heating Capacity:	**1,900**	
Total Campus Hot Water Heating System Boiler Capacity:	**22,100**	

Notes:
(1) Heating Water pump(s) are limiting factor of plant capacity.

Chart 3-1 - Campus Cooling Load vs Cooling Capacity

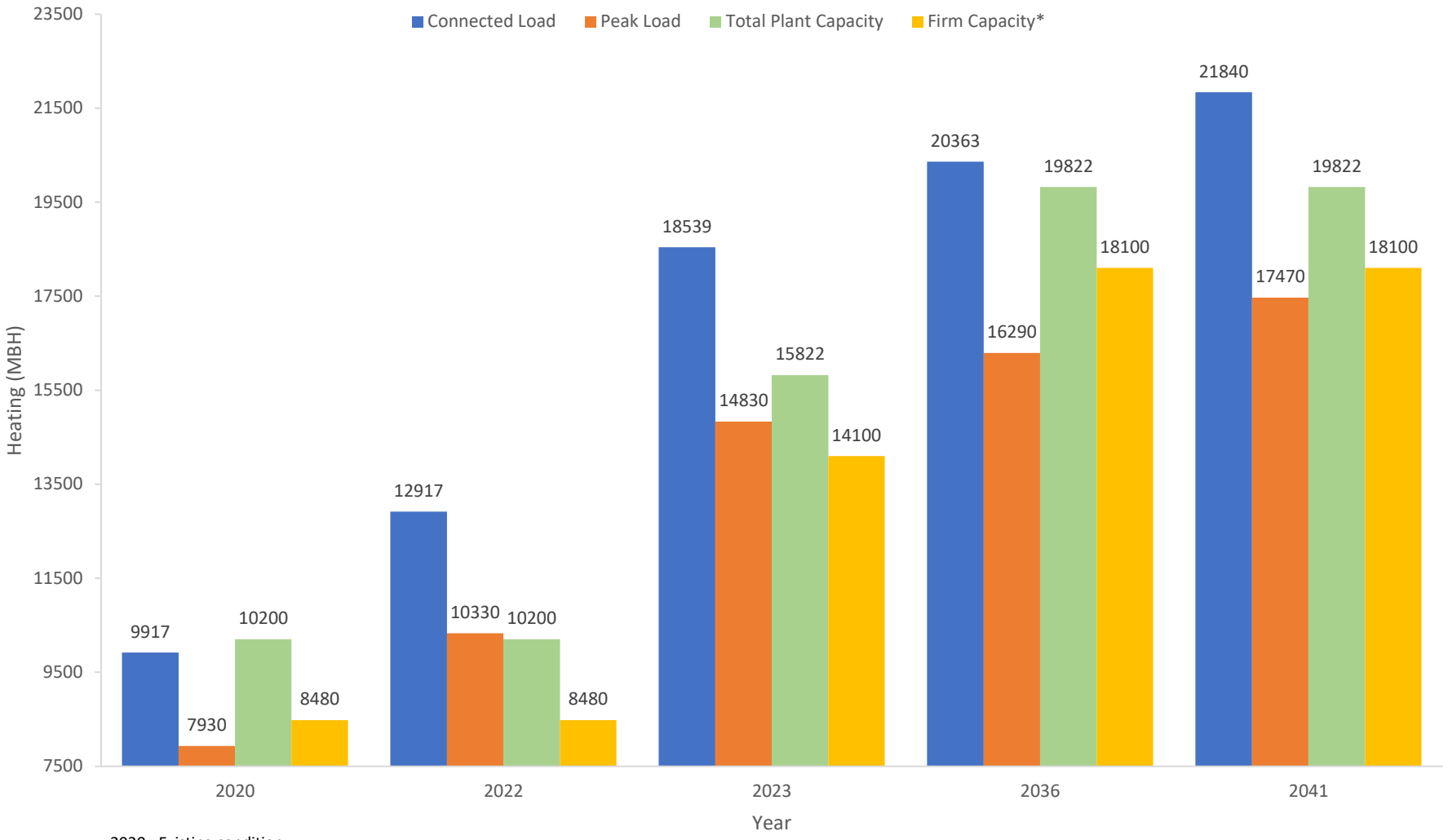
June 2022



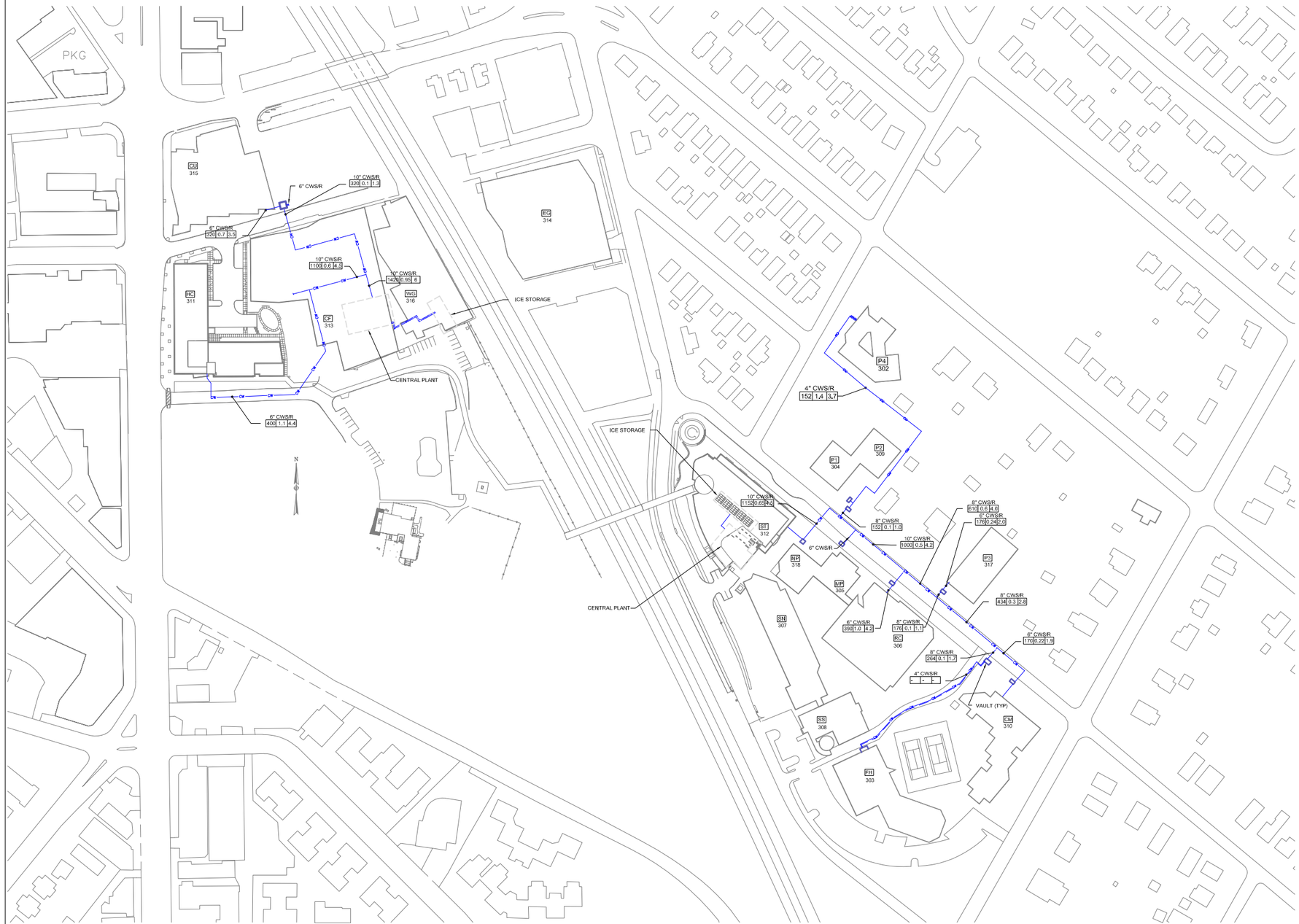
2020 - Existing condition
2022 - Connection of P1 & P2 to Distribution Piping
2023 - Completion of the new Legget Math and Science Buidling
2036 - Completion of the new Math Building
2041 - Completion of the new Health & Fitness Building
*Firm capacity assumes the loss of the 250-ton ammonia chiller at ST, which results in the subsequent loss of 340 tons of cooling via ice melt

Chart 3-2 - Campus Heating Load vs Heating Capacity

June 2022



2020 - Existing condition
2022 - Connection of P1 & P2 to Distribution Piping
2023 - Completion of the new Legget Math and Science Buidling
2036 - Completion of the new Math Building
2041 - Completion of the new Health & Fitness Building
*Firm capacity assumes the loss of a 1,270 MBH boiler at ST



1 **SITE PLAN - CHILLED WATER - EXISTING CONDITIONS**
SCALE: 1" = 80'-0"

LEGEND:

FLOW RATE	WATER PRESSURE	VELOCITY
GPM	FT HD/100 LF	FPS

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'
SCALE: 1" = 80'-0"

bkm
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PROJECT NAME:

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MONTGOMERY COLLEGE

Central Administration
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9221 Corporate Boulevard
Rockville, MD 20850
Telephone: 240-567-7363

TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

SEAL:

ISSUED FOR:

DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

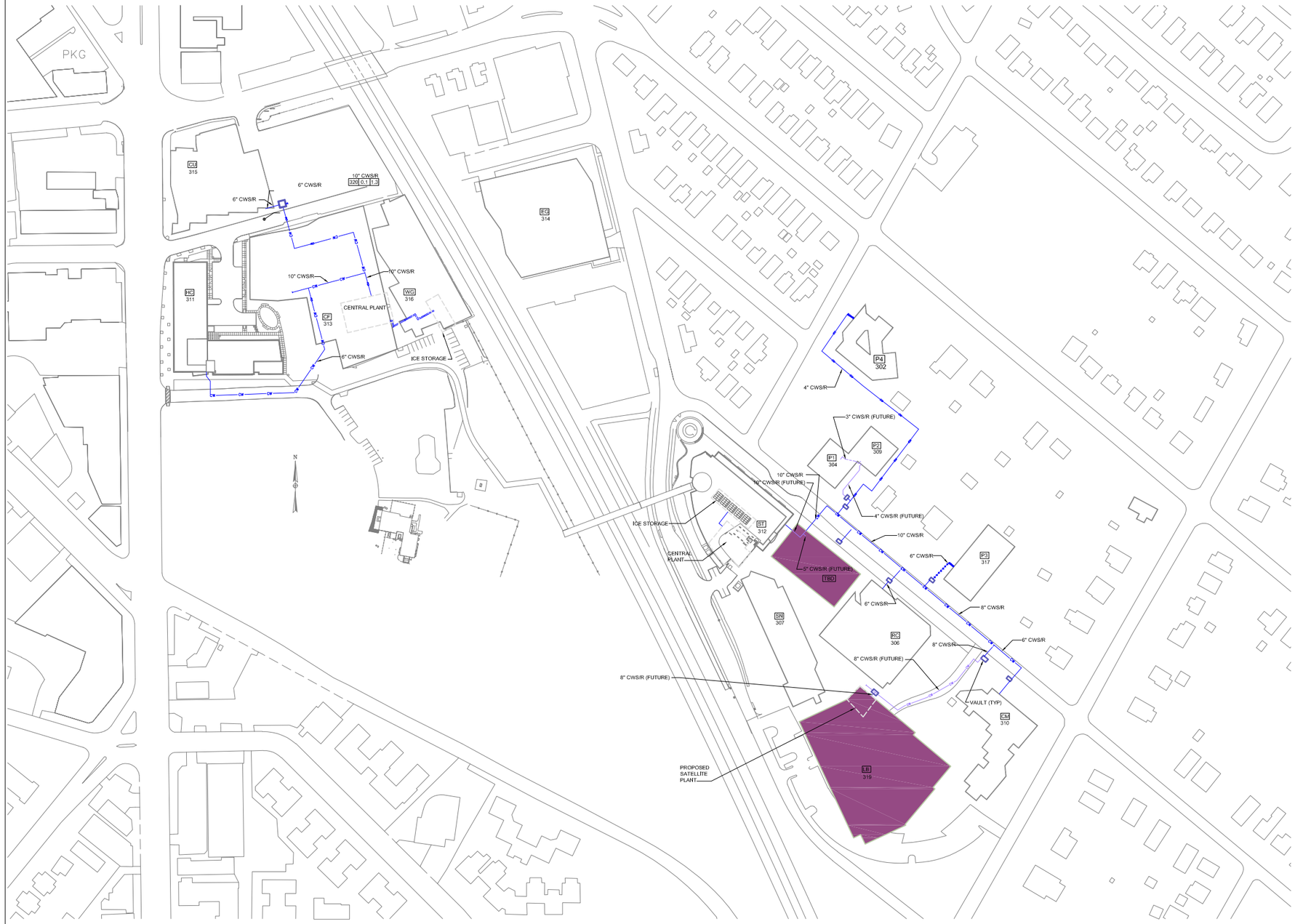
SHEET TITLE:

SITE PLAN CHILLED WATER EXISTING CONDITIONS

DRAWING NO:

M1.01

BKM# 19021.03



1 SITE PLAN - CHILLED WATER - NEAR-TERM FUTURE (2022-2036)

SCALE: 1" = 80'-0"

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'

SCALE: 1" = 80'-0"

bkm

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JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

SITE PLAN - CHILLED WATER NEAR TERM FUTURE (2022-2036)

DRAWING NO:

M1.02

BKM# 19021.03

1 **SITE PLAN - CHILLED WATER - LONG-TERM FUTURE (2037-BEYOND)**
SCALE: 1" = 80'-0"

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'
SCALE: 1" = 80'-0"

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PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

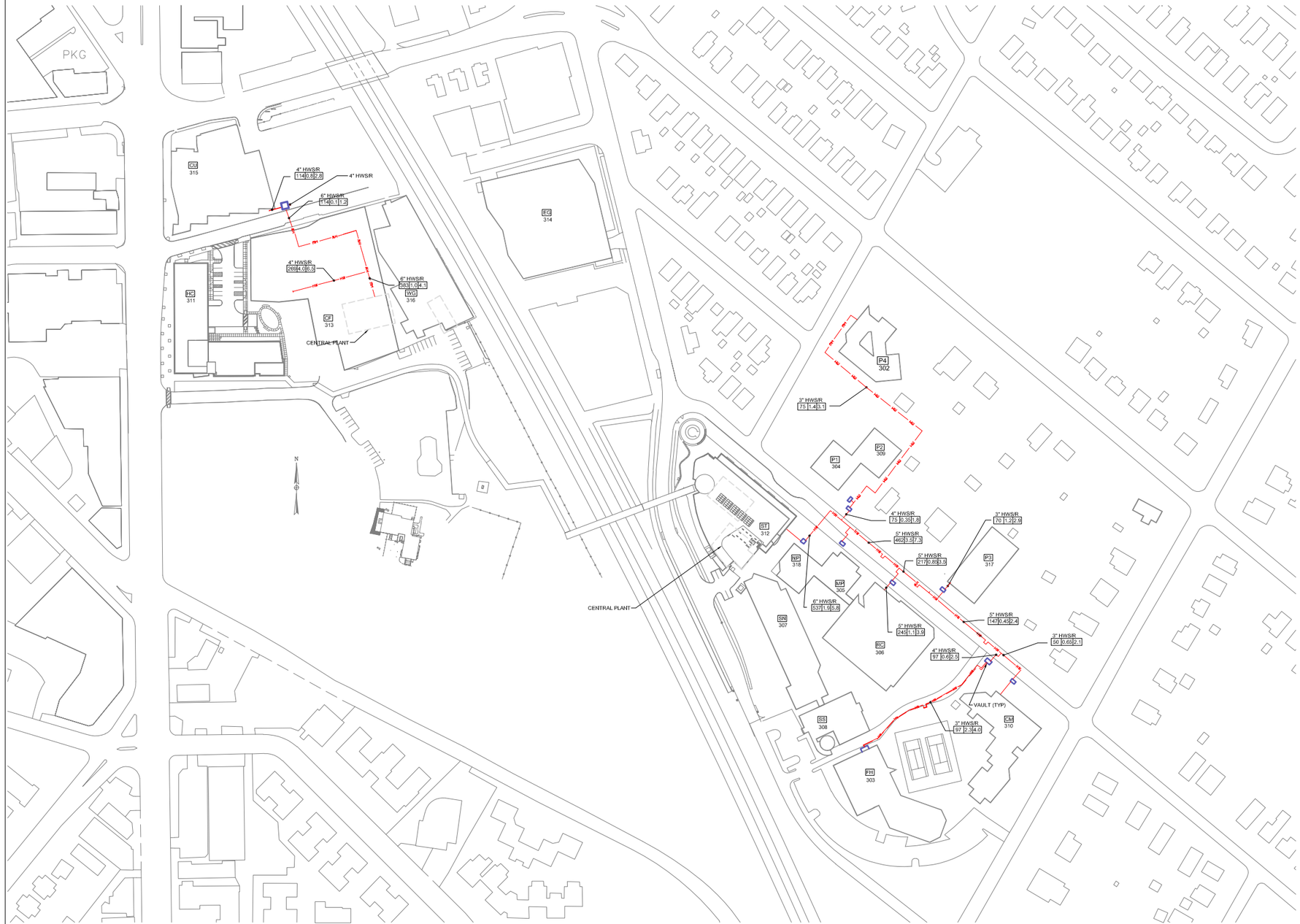
SHEET TITLE:

SITE PLAN - CHILLED WATER LONG-TERM FUTURE (2037-BEYOND)

DRAWING NO:

M1.03

BKM# 19021.03



1 **SITE PLAN - HEATING WATER - EXISTING CONDITIONS**
SCALE: 1" = 80'-0"

LEGEND:

FLOW RATE	WATER PRESSURE	VELOCITY
GPM	FT HD/100 LF	FPS

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'
SCALE: 1" = 80'-0"

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PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

SITE PLAN
HEATING WATER
EXISTING CONDITIONS

DRAWING NO:

M1.11

BKM# 19021.03

XRL: C:\19021.03\Drawings\Acad\M\M1.11 - Site Plan - Heating Water - Existing Conditions
Plotted By: Tyler Knott | 6/23/2022 4:55 AM

1 SITE PLAN - HEATING WATER - NEAR-TERM FUTURE (2022-2036)

SCALE: 1" = 80'-0"

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'

SCALE: 1" = 80'-0"

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DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

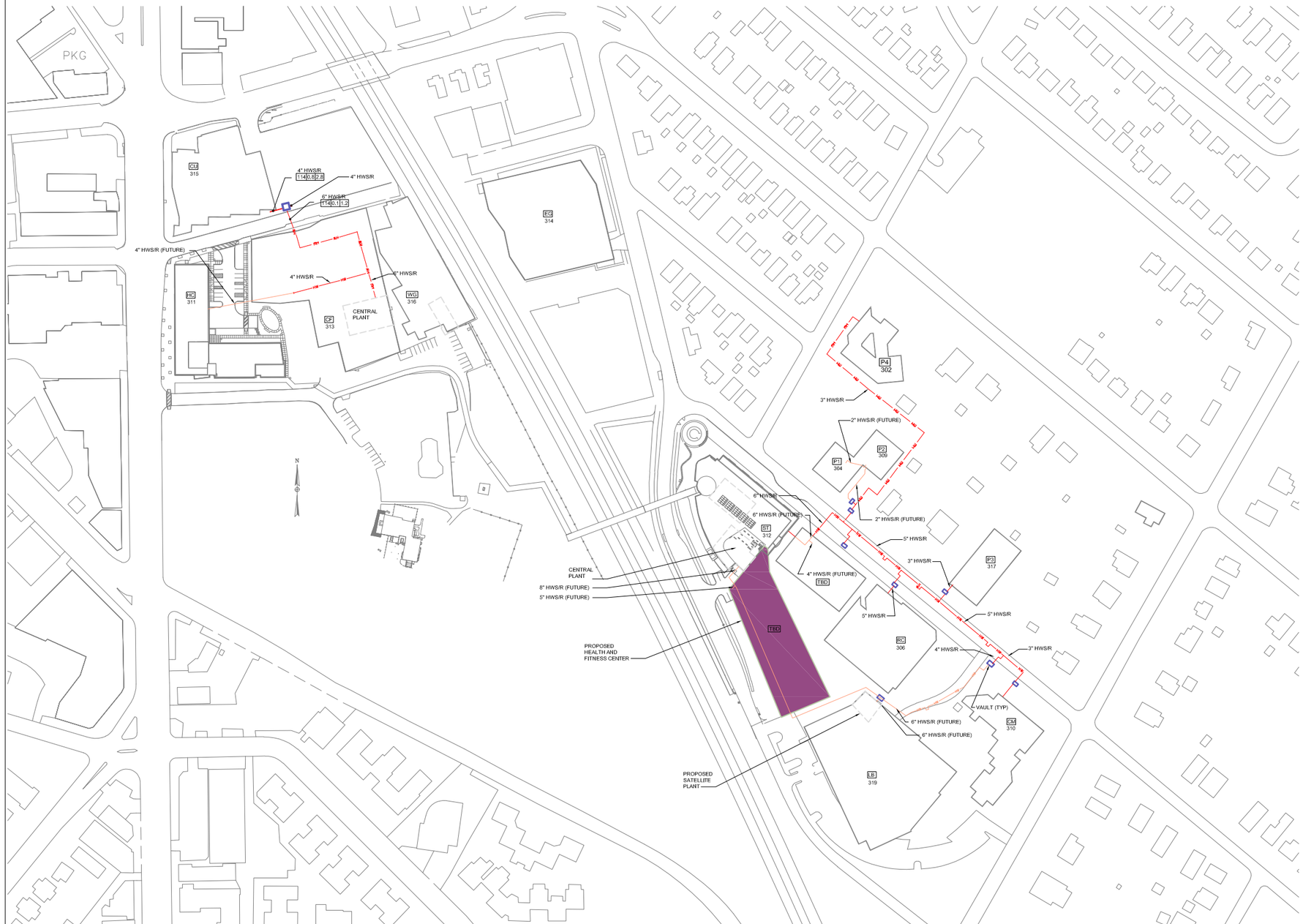
SITE PLAN - HEATING WATER NEAR-TERM FUTURE (2022-2036)

DRAWING NO:

M1.12

BKM# 19021.03

ARL: C:\19021.03\Drawings\Acad\M\M112 - Site Plan - Heating Water - Near Term Future
Plotted By: Tyler Kovit | 6/23/2022 4:58 AM



1 **SITE PLAN - HEATING WATER - LONG TERM FUTURE (2037-BEYOND)**
SCALE: 1" = 80'-0"

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'
SCALE: 1" = 80'-0"

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SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

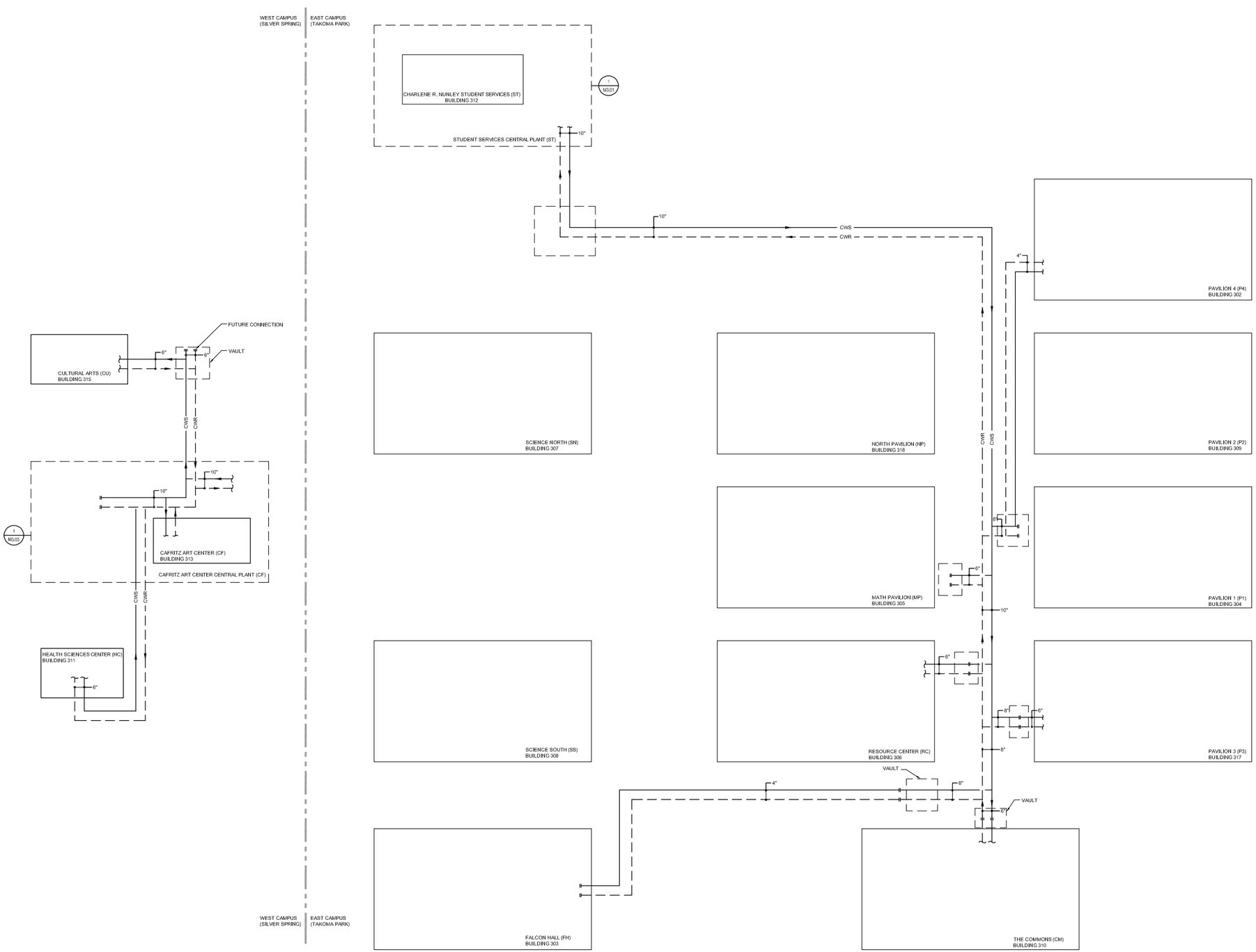
SHEET TITLE:

SITE PLAN - HEATING WATER LONG TERM FUTURE (2037-BEYOND)

DRAWING NO:

M1.13

BKM# 19021.03



1 SCHEMATIC- CAMPUS CHILLED WATER SYSTEM - EXISTING CONDITIONS

NOT TO SCALE

bkm
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Mechanical / Electrical Engineers
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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

SEAL:

ISSUED FOR:

DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

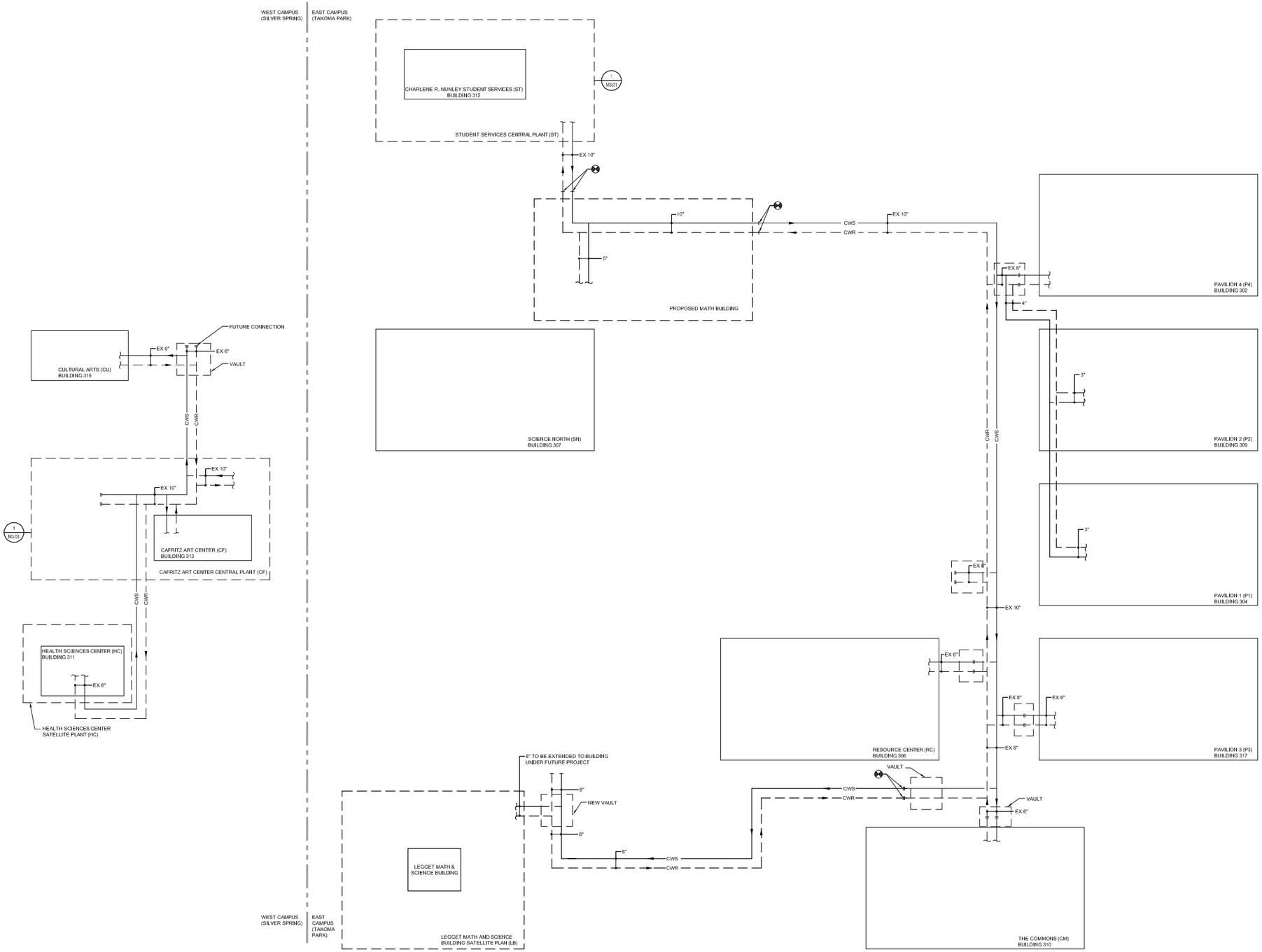
SHEET TITLE:

SCHEMATIC - CAMPUS CHILLED WATER SYSTEM EXISTING CONDITIONS

DRAWING NO:

M2.01

BKM# 19021.03



1 SCHEMATIC - CAMPUS CHILLED WATER SYSTEM - NEAR-TERM FUTURE (2022-2036)

NOT TO SCALE

bkm
Burdette, Koehler, Murphy & Associates, Inc.
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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

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PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

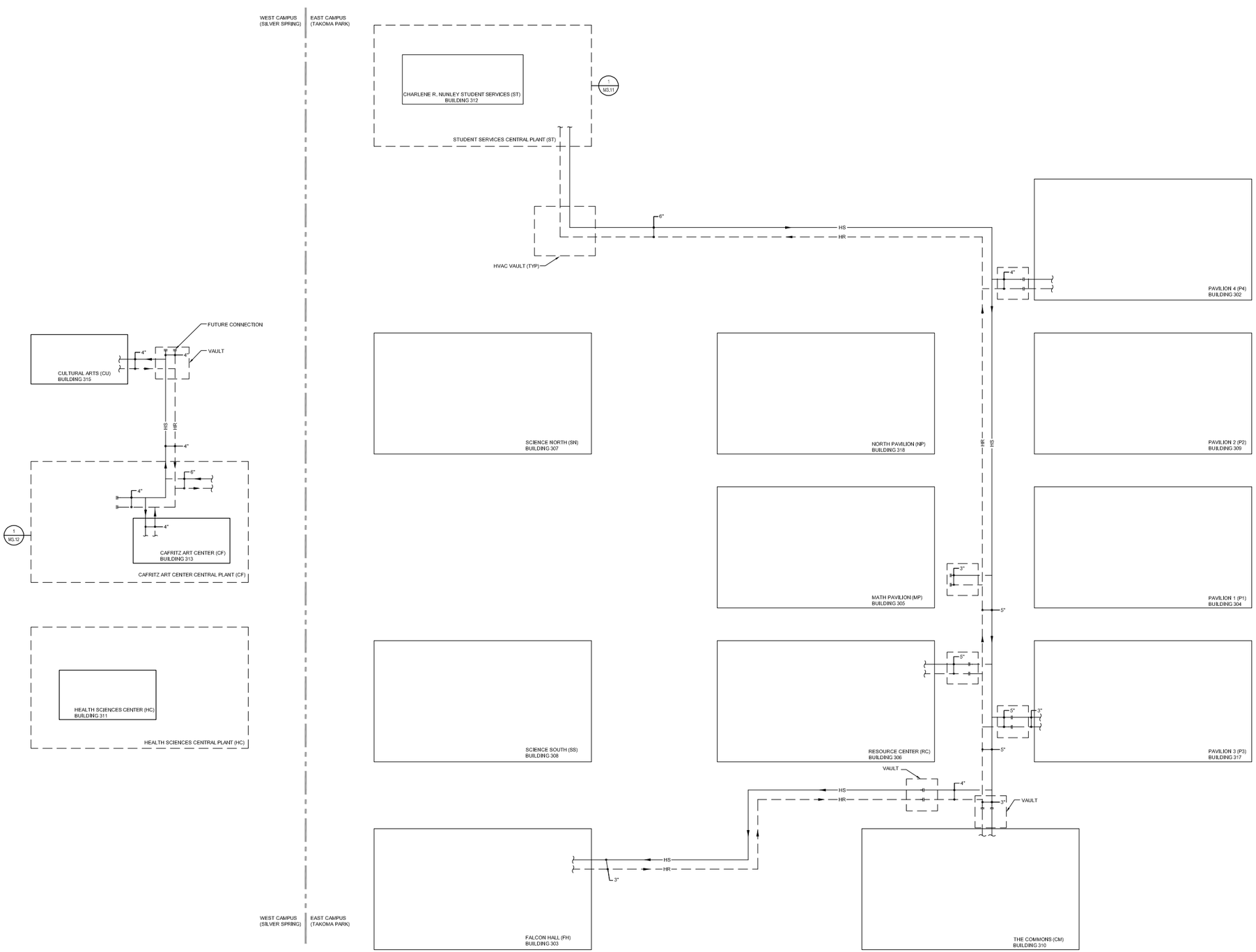
SHEET TITLE:

SCHEMATIC - CAMPUS CHILLED WATER SYSTEM NEAR TERM FUTURE (2022-2036)

DRAWING NO:

M2.02

BKM# 19021.03



1 SCHEMATIC - CAMPUS HEATING WATER SYSTEM - EXISTING CONDITIONS

NOT TO SCALE

bkm
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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

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JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

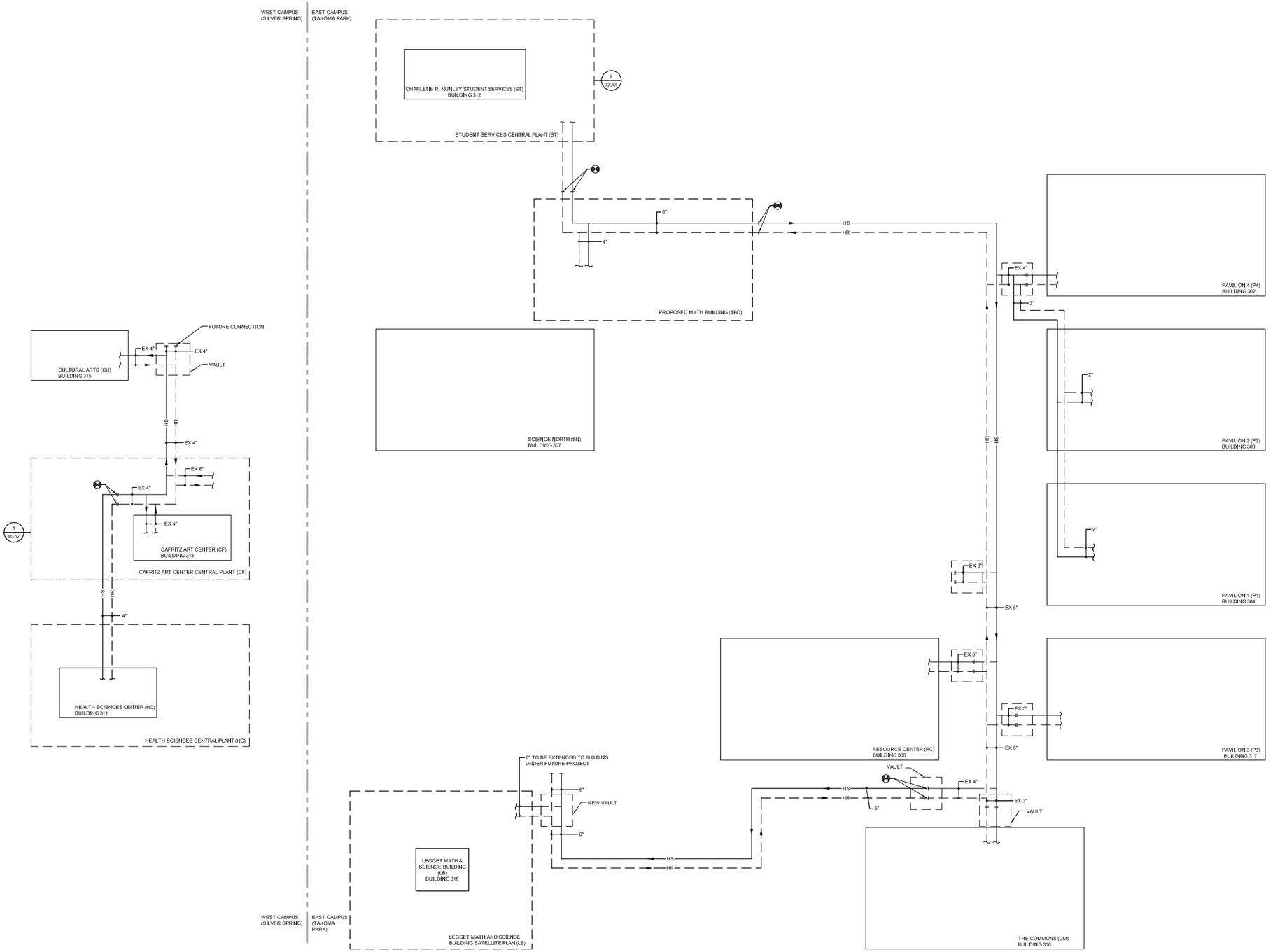
SHEET TITLE:

SCHEMATIC - CAMPUS HEATING WATER SYSTEM EXISTING CONDITIONS

DRAWING NO:

M2.11

BKM# 19021.03



1 **SCHEMATIC - CAMPUS HEATING WATER SYSTEM - NEAR-TERM FUTURE (2022-2036)**
NOT TO SCALE

bkm
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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

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JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

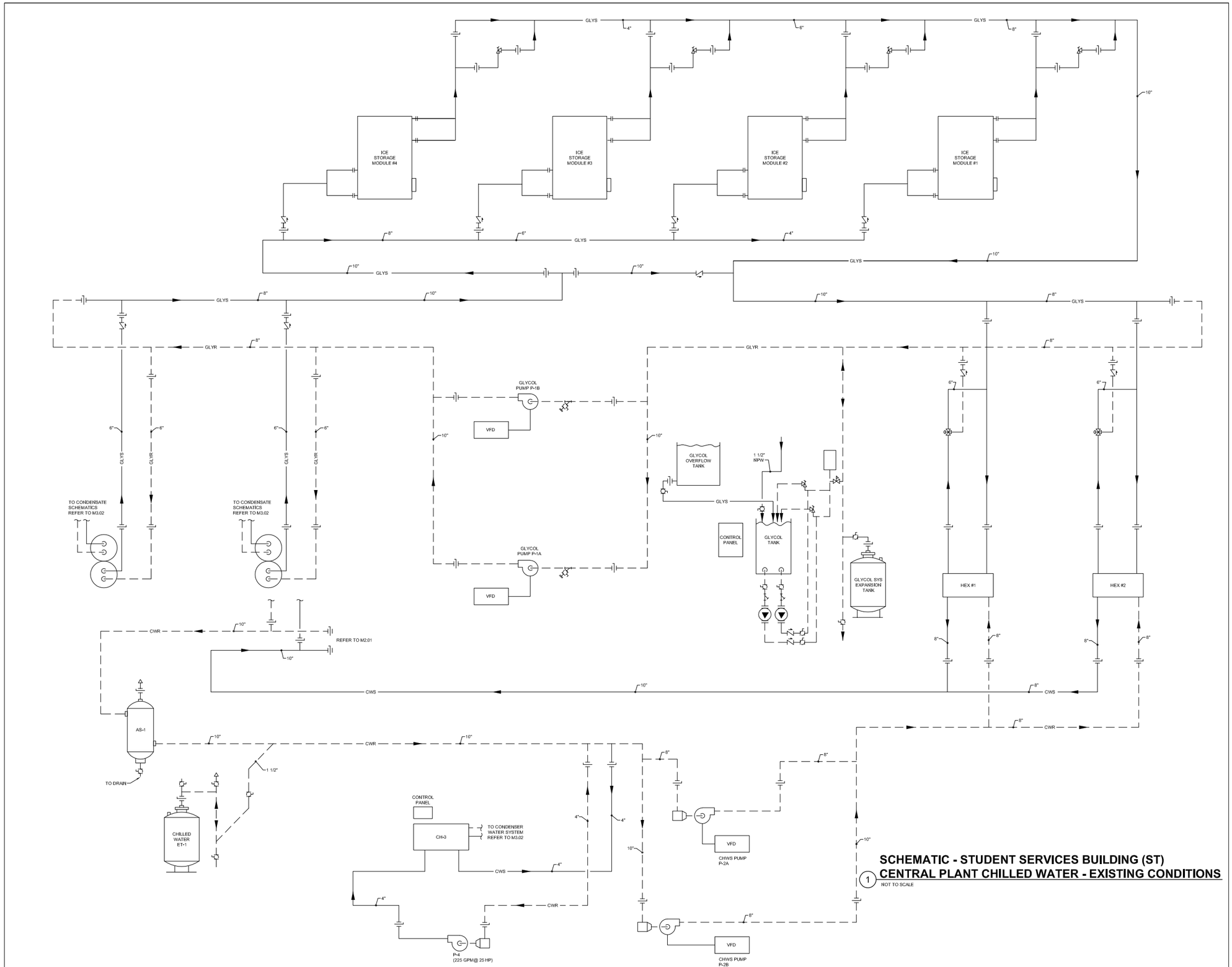
SHEET TITLE:

SCHEMATIC - CAMPUS HEATING WATER SYSTEM NEAR-TERM FUTURE (2022-2036)

DRAWING NO:

M2.12

BKM# 19021.03



SCHEMATIC - STUDENT SERVICES BUILDING (ST) CENTRAL PLANT CHILLED WATER - EXISTING CONDITIONS

1 NOT TO SCALE

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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

SEAL:

ISSUED FOR:

DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

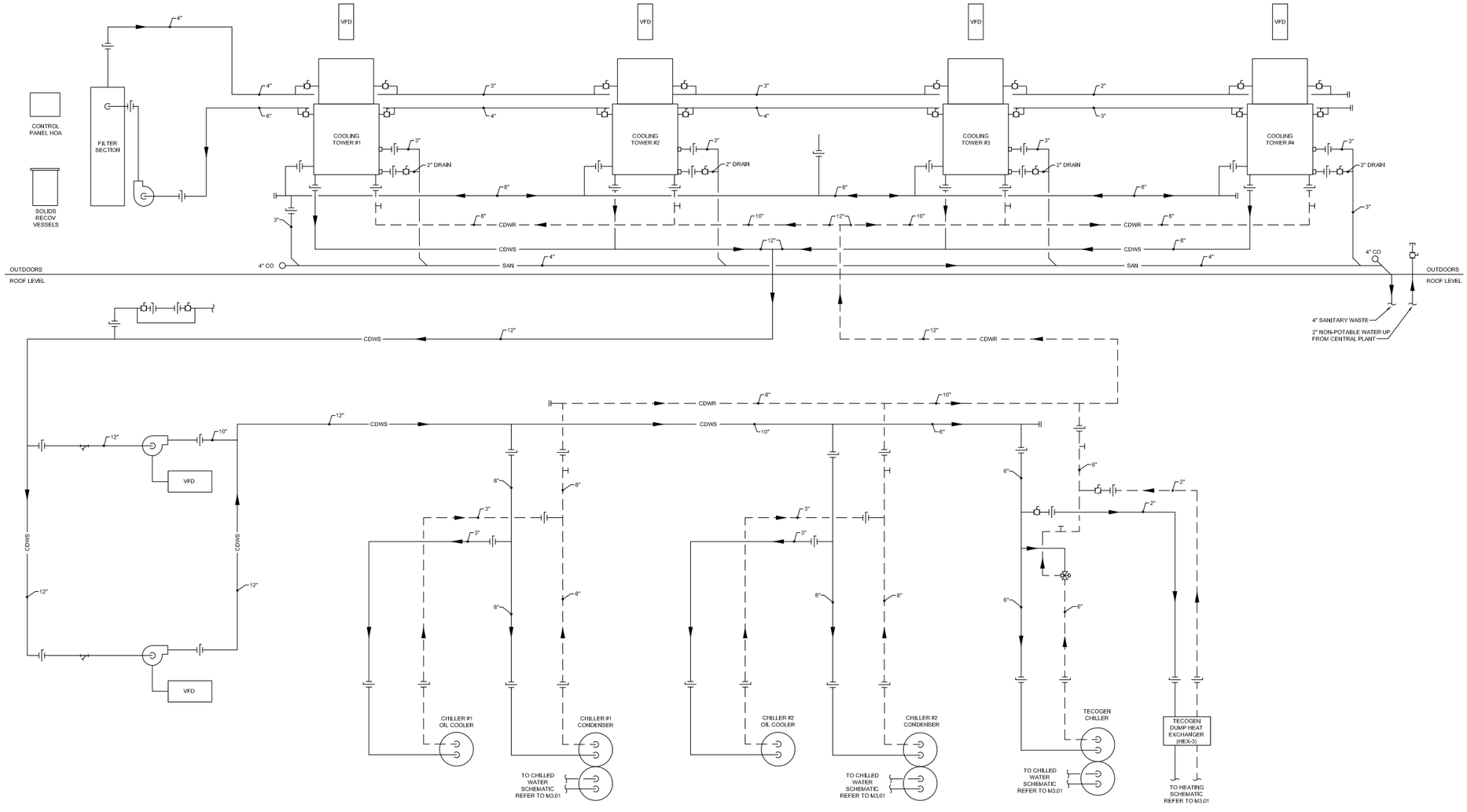
SHEET TITLE:

SCHEMATIC - (ST) CENTRAL PLANT CHILLED WATER EXISTING CONDITIONS

DRAWING NO:

M3.01

BKM# 19021.03



SCHEMATIC - STUDENT SERVICES BUILDING (ST)
CENTRAL PLANT - CONDENSER WATER - EXISTING CONDITIONS

1 NOT TO SCALE

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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

SEAL:

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DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

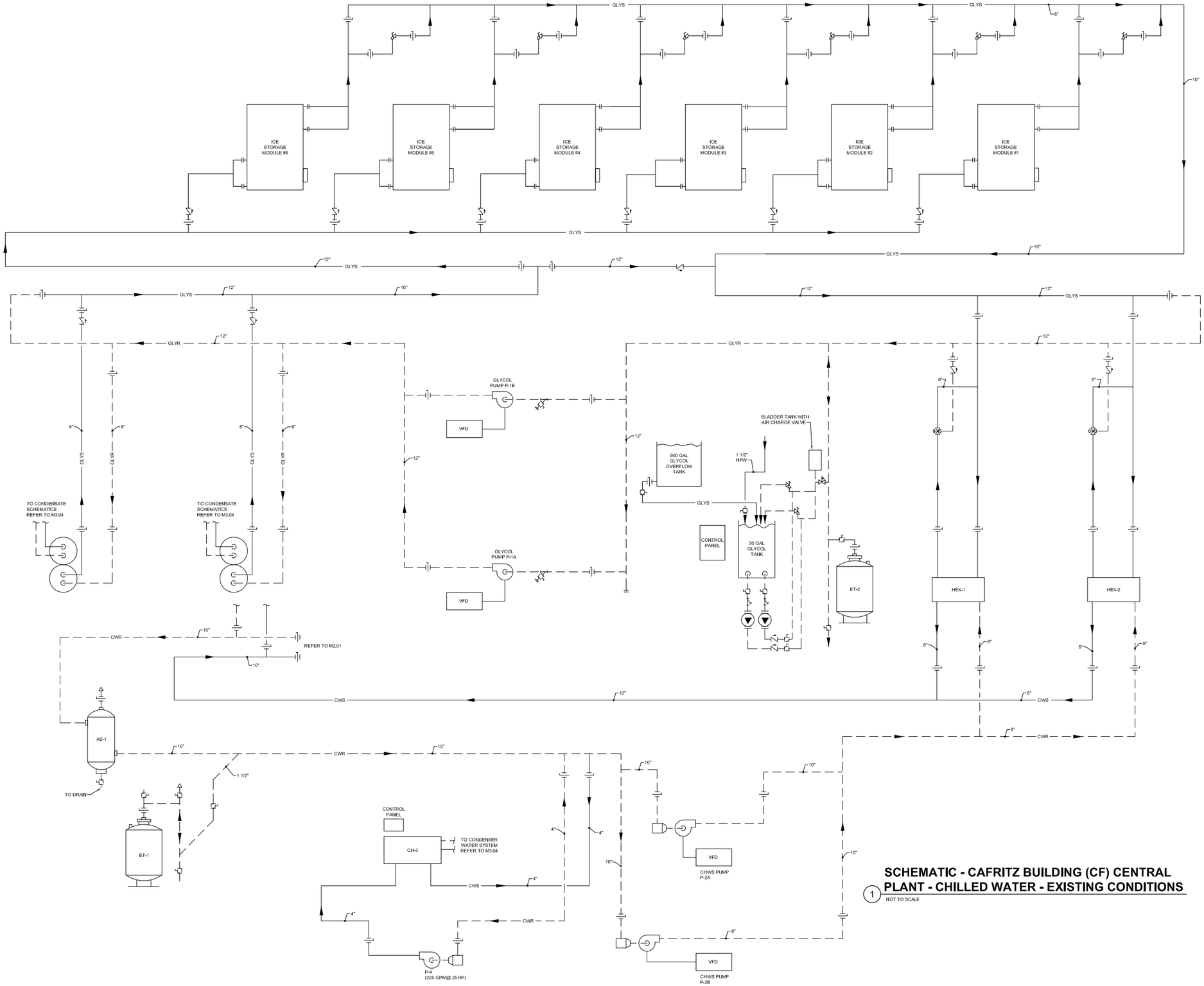
SHEET TITLE:

SCHEMATIC - (ST) CENTRAL PLANT - CONDENSER WATER EXISTING CONDITIONS

DRAWING NO:

M3.02

BKM# 19021.03



SCHEMATIC - CAFRITZ BUILDING (CF) CENTRAL PLANT - CHILLED WATER - EXISTING CONDITIONS

1 NOT TO SCALE

bkm
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SEAL:

ISSUED FOR:

DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

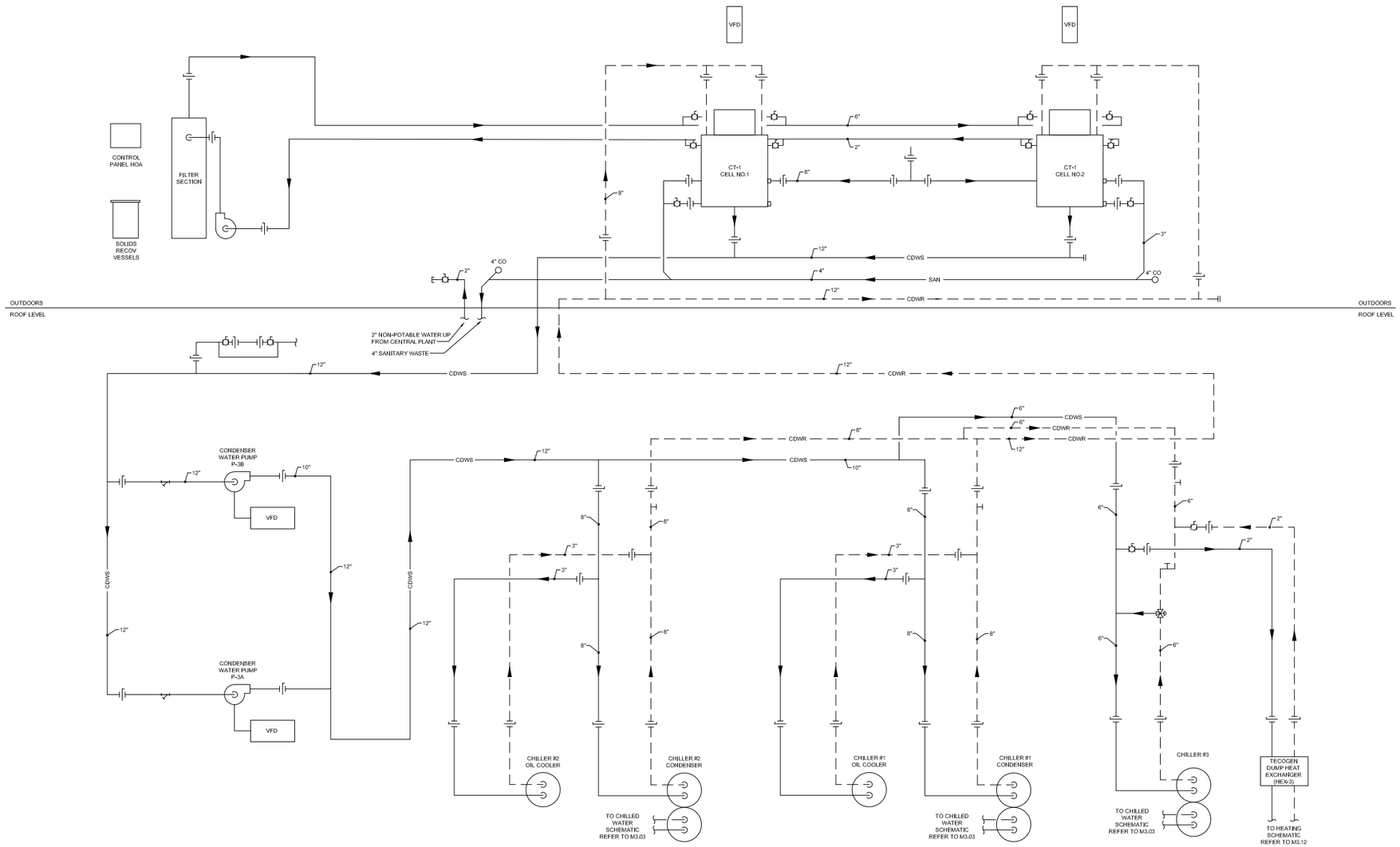
SHEET TITLE:

SCHEMATICS - CAFRITZ BUILDING - CHILLED WATER EXISTING CONDITIONS

DRAWING NO:

M3.03

BKM# 19021.03



1 SCHEMATIC - CAFRITZ BUILDING (CF) CENTRAL PLANT - CONDENSER WATER - EXITING CONDITIONS

NOT TO SCALE

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JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

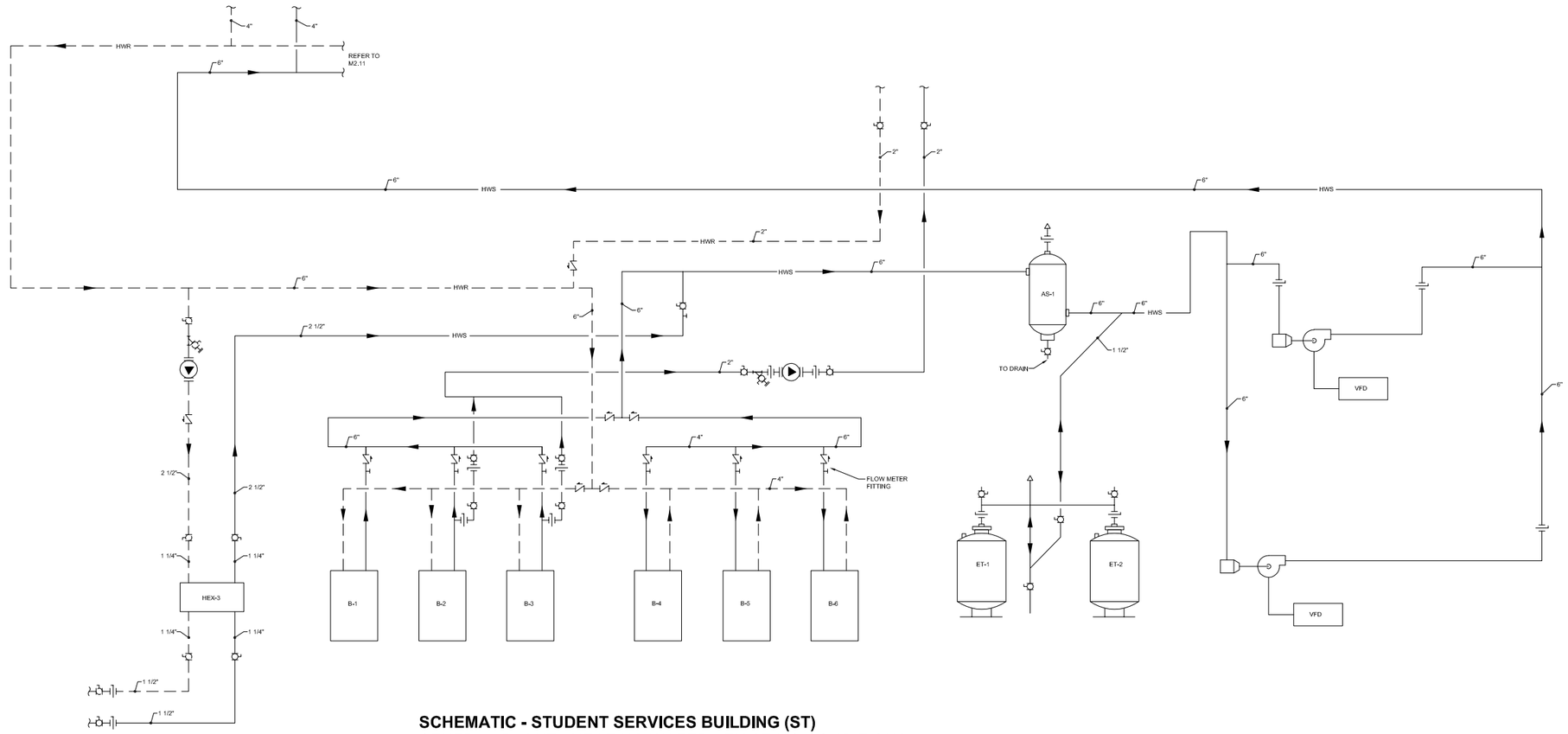
SHEET TITLE:

SCHEMATIC - CAFRITZ BUILDING CONDENSER WATER EXISTING CONDITIONS

DRAWING NO:

M3.04

BKM# 19021.03



SCHEMATIC - STUDENT SERVICES BUILDING (ST)
CENTRAL PLANT - HEATING WATER - EXISTING CONDITIONS

1 NOT TO SCALE

bkm
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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

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DATE:	DESCRIPTION:
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PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

SHEET TITLE:

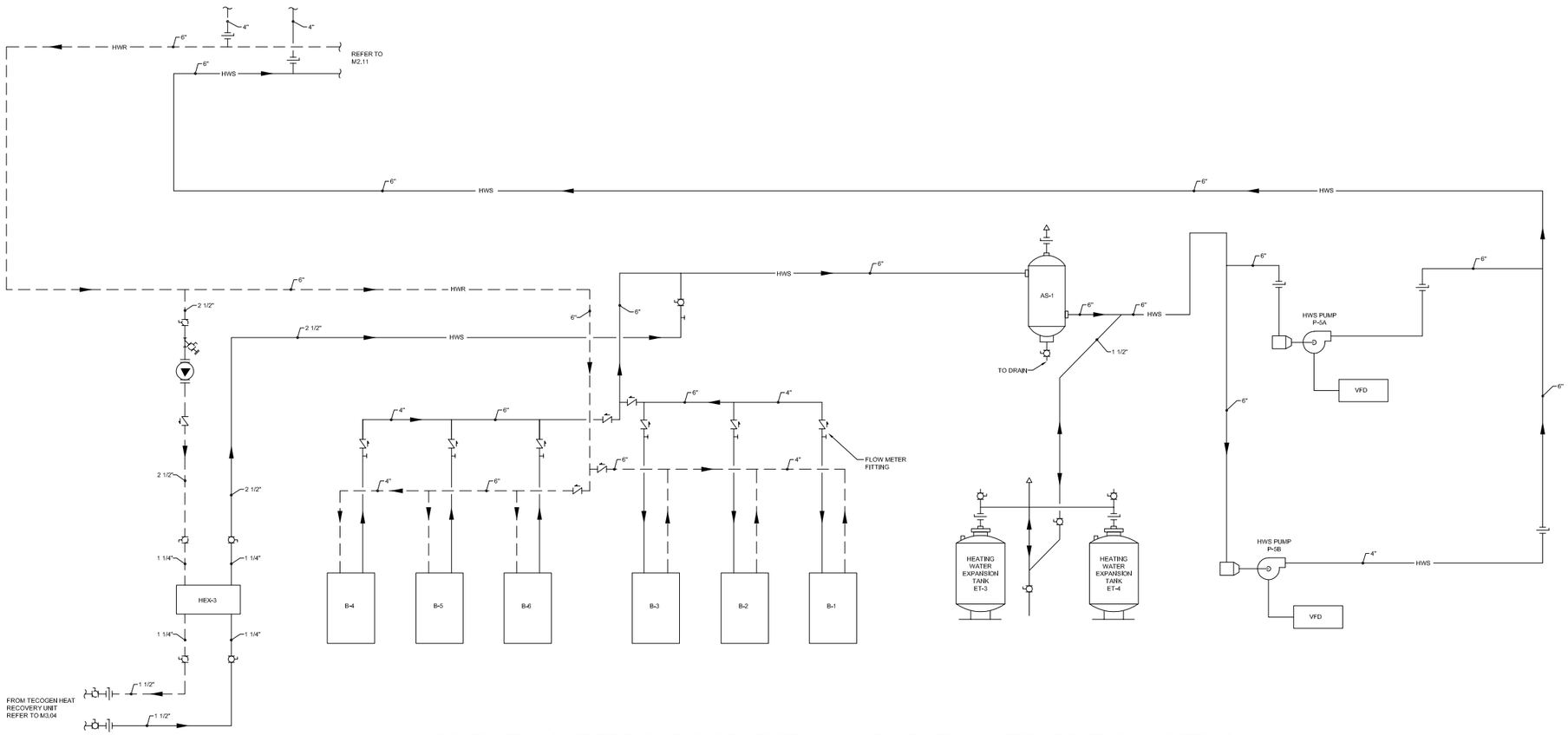
SCHEMATICS - STUDENT SERVICES BUILDING - HEATING WATER - EXISTING CONDITIONS

DRAWING NO:

M3.11

BKM# 19021.03

Plotted By: Tyler Knott | 6/10/2022 9:50 AM
ARL:\Cc\19021.03\Drawings\Acad\M\M311 - Schematic - Student Services Building (ST) Heating Water - Existing Conditions



1 SCHEMATIC - CAFRITZ BUILDING (CF) CENTRAL PLANT - HEATING WATER - EXISTING CONDITIONS

NOT TO SCALE

bkm
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SCALE: AS NOTED

DRAWN BY: CS

CHECKED BY: JMM

DATE: JUNE 2022

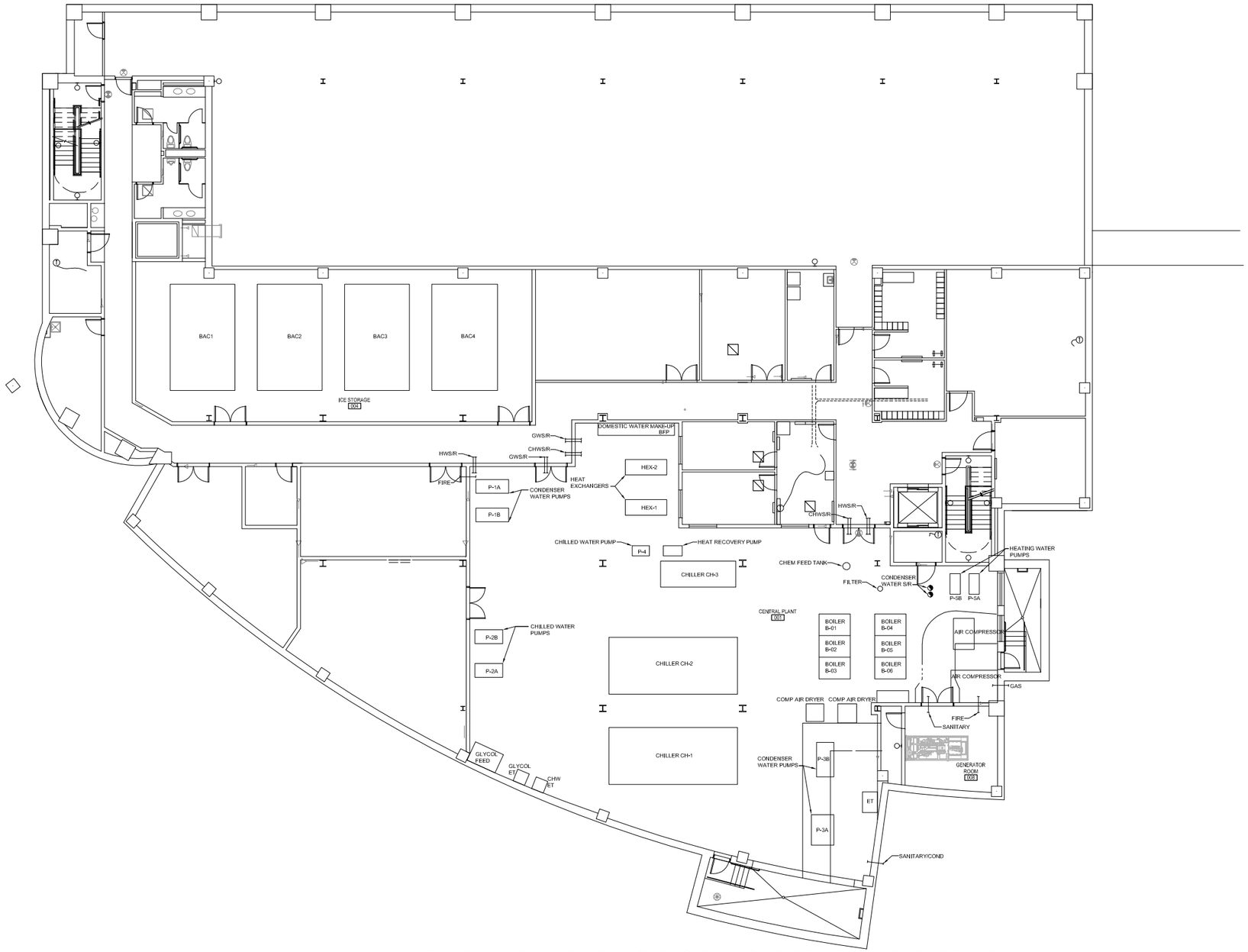
SHEET TITLE:

SCHEMATIC - CAFRITZ BUILDING HEATING WATER EXITING CONDITIONS

DRAWING NO:

M3.12

BKM# 19021.03



1 **EQUIPMENT PLAN - STUDENT SERVICES BUILDING (ST) - EXISTING CONDITIONS**
SCALE: 1/4" = 1'-0"

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 4" 8" 16" 24"
SCALE: 1/8"=1'-0"

bkm
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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

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SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

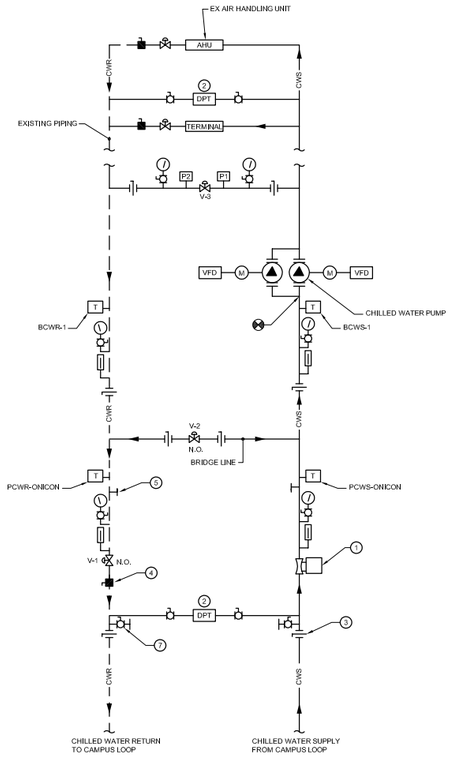
SHEET TITLE:

EQUIPMENT PLAN - STUDENT SERVICES BUILDING EXISTING CONDITIONS

DRAWING NO:

M4.01

BKM# 19021.03

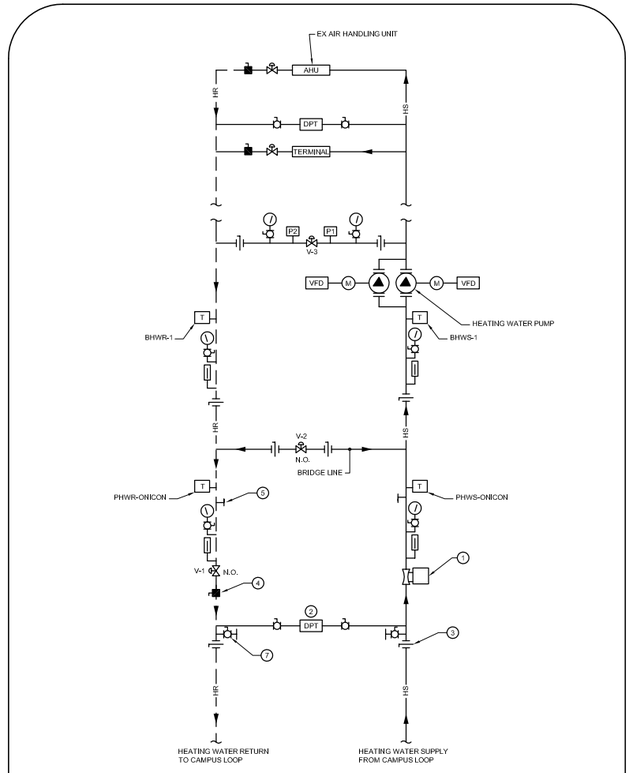


TYPICAL CHILLED WATER PIPING - CENTRAL PLANT TO BUILDING CONNECTION DETAIL

1 NO SCALE

DRAWING NOTES:

1. ONICON SYSTEM 10 BTU METER.
2. DIFFERENTIAL PRESSURE TRANSMITTER.
3. HIGH PERFORMANCE BUTTERFLY VALVE (TYPICAL FOR ALL BUTTERFLY VALVES).
4. FLOW METER FITTING (VENTURI TYPE), TYPICAL.
5. TEMPERATURE/PRESSURE TEST PORT.
6. 2-WAY MODULATING DIFFERENTIAL PRESSURE CONTROL VALVE.
7. LOW POINT DRAIN (TYPICAL).



TYPICAL HEATING WATER PIPING - CENTRAL PLANT TO BUILDING CONNECTION DETAIL

1 NO SCALE

DRAWING NOTES:

1. ONICON SYSTEM 10 BTU METER.
2. DIFFERENTIAL PRESSURE TRANSMITTER.
3. HIGH PERFORMANCE BUTTERFLY VALVE (TYPICAL FOR ALL BUTTERFLY VALVES).
4. FLOW METER FITTING (VENTURI TYPE), TYPICAL.
5. TEMPERATURE/PRESSURE TEST PORT.
6. 2-WAY MODULATING DIFFERENTIAL PRESSURE CONTROL VALVE.
7. LOW POINT DRAIN (TYPICAL).

GENERAL NOTES:

1. ST, HC, AND CF INCLUDE CONNECTIONS FOR CHILLERS LOCATED IN THOSE BUILDINGS.
2. SOME BUILDINGS INCLUDE CONNECTIONS DOMESTIC HOT WATER HEAT EXCHANGER AND POOL HEATING EQUIPMENT.

bkm
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Rockville, MD 20850
Telephone: 240-567-7363

TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

SEAL:

ISSUED FOR:

DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

TYPICAL BUILDING CONNECTION DETAILS

DRAWING NO:

M5.01

BKM# 19021.03

bkm

Appendix 4
Electrical Systems

Burdette, Koehler, Murphy and Associates, Inc.
6300 Blair Hill Lane, Suite 400 | Baltimore, MD 21209 | 410.323.0600 | bkma.com

TABLE 4-1 - Electrical Loads - Existing Buildings

Year Built	Bldg Abbrev	Building Name	Bldg No	Area (GSF)	Pepco Account Number	Pepco Meter Number	Service Transformer (kVA) (1)	Service Voltage	Service Entrance Ampacity	Service Entrance Equipment Type	Service Entrance Equipment Manufacturer	Measured Peak Demand Load (kW) (2)	Calculated Peak Demand Load (kVA) (3)	Calculated VA per Square Foot (VA/SF)	Existing Building Generator	Notes
2007	CF	Morris & Gwendolyn Cafritz Foundation Arts Center	313	134,748	5501 3521 632	KZD351048038		480/277	2500A	Switchboard	Eaton Pow-R-Line C	342	475	3.53	600kW diesel generator	Building is fed from underground transformer vault. Generator serves life safety loads, fire pump, and standby loads.
2007	CF	Morris & Gwendolyn Cafritz Foundation Arts Center (Central Plant)	313	134,748	5501 3521 145	KZD351047889		480/277	3000A	Switchboard	Eaton Pow-R-Line C	774	1,075	7.98	600kW diesel generator	Building is fed from underground transformer vault. Generator serves life safety loads, fire pump, and standby loads.
1978	CM	Catherine F. Scott Commons	310	30,354	5502 4321 352	KZD350867950		480/277	800A	Switchboard	Square D I-Line E1	57	79	2.61		
2010	CU	Cultural Arts Center	315	57,243	5501 3929 587	KZD350867988		480/277	3000A	Switchboard	Square D QED2	267	371	6.48	250kW diesel generator	Generator serves life safety and standby loads.
1980	EG	East Garage	314	224,310	5501 9742 125	793419-2391		208/120	(3) 100A (1) 60A	Disconnect Switch	General Electric	39	54	0.24		Meter taps to (4) service entrance rated disconnect switches.
1978	FH	Falcon Hall	303	45,363	5501 4171 676	KZD351642149		480/277	(2) 400A	Disconnect Switch	Westinghouse	112	156	3.43		Meter taps to (2) 400A service entrance rated disconnect switches.
2004	HC	Health Sciences Center	311	98,038	5501 4408 417	KZD363533489		480/277	2500A	Switchboard	Eaton Pow-R-Line C	304	422	4.31		
1975	MP	Mathematics Pavilion	305	6,942	5502 1212 042	Hot Water: TED341188905 General: KZD350867978 Mechanical: KZD350867951		480/277	800A	Panelboard	Square D QMB	190	264	38.01		
1975	NP	North Pavilion	318	6,942	-	-		-	-	-	-	-	-	-		Building is fed from MP.
1975	P1	Pavilion One	304	7,386	5502 1212 422	Hot Water: TED341189191 General: KZD351642894 Mechanical: KZD351642058		480/277	Hot Water: 200A General: 400A Mechanical: 1000A	Disconnect Switch	Square D	226	314	42.50		
1975	P2	Pavilion Two	309	7,385	-	-		-	-	-	-	-	-	-		Building is fed from P1.
1975	P3	Pavilion Three	317	15,700	5000 2957 442	KZD363217867		480/277	800A	Switchboard	Eaton Pow-R-Line PRL4	43	60	3.80		
1980	P4	Pavilion Four	302	20,000	5502 2902 237	X8D341181097		480/277	400A	Panelboard	Square D QMB	34	47	2.36		
1978	RC	Resource Center	306	44,906	5501 6552 824	General: KZD351642059 Mechanical: KZD351642057		480/277	General: 800A Mechanical: 1200A	Switchboard	Square D Power-Style	137	190	4.24		
1978	SN	Science North	307	39,950	5501 6503 348	Hot Water: TED353379775 General: KZD341192143 Mechanical: KZD350867668		480/277	Hot Water: 200A General: 1200A Mechanical: 2000A	Switchboard	Square D Power-Style	717	996	24.93		
1962	SS	Science South	308	23,757	5502 2160 281	X8D341207337		208/120	800A	Disconnect Switch	General Electric	136	189	7.95	60kW diesel generator	Generator serves life safety loads in SS, SN, and CM.
2007	ST	Charlene R. Nunley Student Services Center	312	110,504	5501 4459 758	X8D353380442		480/277	2000A	Switchboard	Eaton Pow-R-Line C	298	414	3.75	350kW diesel generator	Generators serves life safety loads, fire pump.
2007	ST	Charlene R. Nunley Student Services Center (Central Plant)	312	110,504	5501 4460 046	X8D353380392		480/277	2500A	Switchboard	Eaton Pow-R-Line C	827	1,149	10.39		
2010	WG	West Garage	316	151,490	5502 0883 843	KZD351641785		480/277	600A	Switchboard	Square D I-Line E1	97	135	0.89		
	PB	Pedestrian Bridge	320		5502 0350 926	-		-	-	-	-	-	-	-		

(1) Information obtained from previous master plan (2013).
(2) Maximum monthly peak demand value based on Pepco historical data (2017-2021).
(3) Measured peak demand kW divided by 0.9 (power factor conversion from kW to kVA) and multiplied by 1.25 (in accordance with NEC Article 220.87).

Estimated Total Campus Peak Demand Load (kVA):	6,389

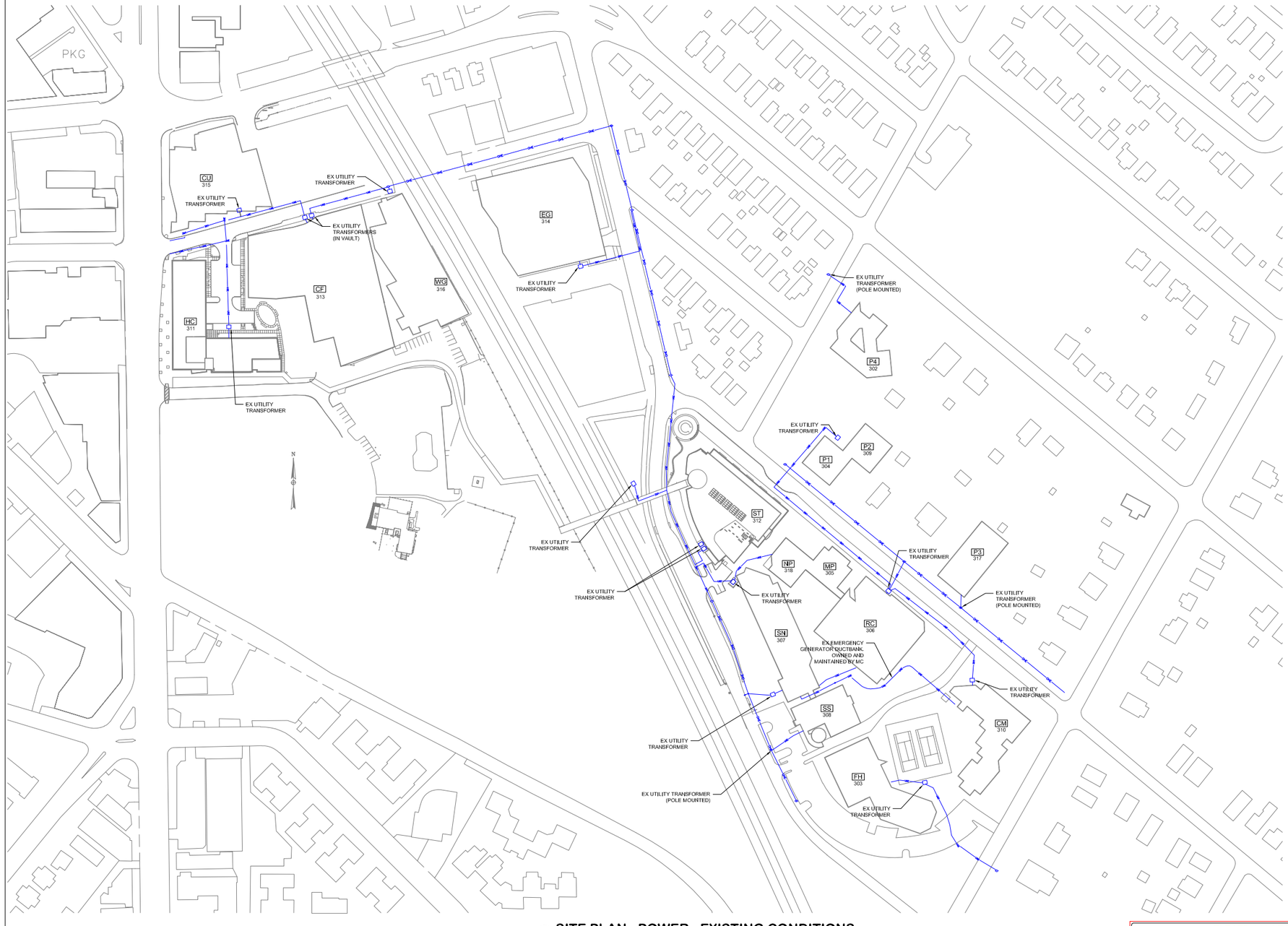
TABLE 4-2 - Electrical Loads - Future Buildings

Year Built	Bldg Abbrev	Building Name	Bldg No	Bldg Area (GSF)	Total Existing Load (kVA)	Total Removed Load (kVA)	Total Added Load (kVA)	Total Campus Load (kVA)	Notes
								6,389	Estimated Total Campus Peak Demand Load from Table 1
2020	RC	Resource Center - Renovation	306	44,906	178	0	0	6,389	Assume no change in electrical loads.
2022	SS	Science South - Demolition	308	23,757	189	175	0	6,214	
2022	FH	Falcon Hall - Demolition	303	39,063	156	156	0	6,058	
2022	LB	Math and Science Leggett Center - New Building	319	134,600	-	0	2,019	8,077	
2033	MP	Mathematic Pavilion - Demolition	305	6,942	264	264	0	7,813	
2033	NP	North Pavilion - Demolition	318	6,942	-	0	0	7,813	
2033	TBD	Library Learning Commons - New Building	TBD	62,374	-	0	936	8,748	
2042	RC	Resource Center - Demolition	306	44,906	190	190	0	8,558	
2042	TBD	Math Building - New Building	TBD	45,600	-	0	684	9,242	
2051	SN	Science North - Demolition	307	39,950	996	996	0	8,246	
2051	TBD	Health and Fitness Center - New Building	TBD	49,230	-	0	738	8,985	
2051	TBD	Parking Structure - New Building	TBD	29,400	-	0	147	9,132	
2056	P1	Pavilion 1 - Renovation	304	7,386	314	0	0	9,132	Assume no change in electrical loads.
2056	P2	Pavilion 2 - Renovation	309	7,385	-	0	0	9,132	Assume no change in electrical loads.

TABLE 4-3 - Photovoltaic System - Near-Future Buildings

Campus Area	Bldg Abbreviation	Bldg No	Surface Type	Existing Solar? (Y/N)	Age of Roof (yrs)	Potential PV Surface Area (ft^2)	Estimated power from PV (in kW)*	Estimated Annual (kWh/Year)**	Notes
Morris & Gwendolyn Cafritz Foundation Arts Center	CF	313	Roof	N	-	17,700	177	242,313	
Catherine F. Scott Commons	CM	310	Roof	N	-	2,500	25	34,225	
Cultural Arts Center	CU	315	Roof	N	-	27,100	271	370,999	
East Garage	EG	314	Parking Lot Canopy	N	-	20,600	206	282,014	
Health Sciences Center	HC	311	Roof	Y	-	5,300	53	72,557	
Pavilion One	P1	304	Roof	N	-	1,700	17	23,273	
Pavilion Two	P2	309	Roof	N	-	1,700	17	23,273	
Pavilion Three	P3	317	Roof	N	-	0	0	0	
Pavilion Four	P4	302	Roof	N	-	3,900	39	53,391	
Resource Center	RC	306	Roof	N	-	6,000	60	82,140	
Science North	SN	307	Roof	N	-	0	0	0	
Charlene R. Nunley Student Services Center	ST	312	Roof	N	-	3,800	38	52,022	
West Garage	WG	316	Parking Lot Canopy	N	-	8,900	89	121,841	
Math and Science Center	LB	TBD	Roof	N	-	37,700	377	516,113	
Library Learning Commons	TBD	TBD	Roof	N	-	8,500	85	116,365	
Parking Lots	-	-	Parking Lot Canopy	-	-	7,500	75	102,675	
Grounds	-	-	Ground	-	-	18,500	185	256,926	

*Assumes 10W/SF
**Estimated values obtained from PVWatts by National Renewable Energy Laboratory (NREL)
Refer to drawing E-1.04 for additional information.



1 **SITE PLAN - POWER - EXISTING CONDITIONS**
SCALE: 1" = 100'-0"

ELECTRICAL LEGEND

—OHE— OHE —	OVERHEAD ELECTRIC
—UGE— UGE —	UNDERGROUND ELECTRIC
E	ELECTRIC MANHOLE

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 20' 60' 100' 150' 200' 300'
SCALE: 1" = 100'

bkm
Burdette, Koehler, Murphy & Associates, Inc.
Mechanical / Electrical Engineers
6300 Blair Hill Lane Suite 400 | Baltimore, Maryland 21209
P: 410.323.0600 | www.bkma.com

PROJECT NAME:

Montgomery College

MONTGOMERY COLLEGE

Central Administration
Office of Facilities
9221 Corporate Boulevard
Rockville, MD 20850
Telephone: 240-567-7363

TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

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JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

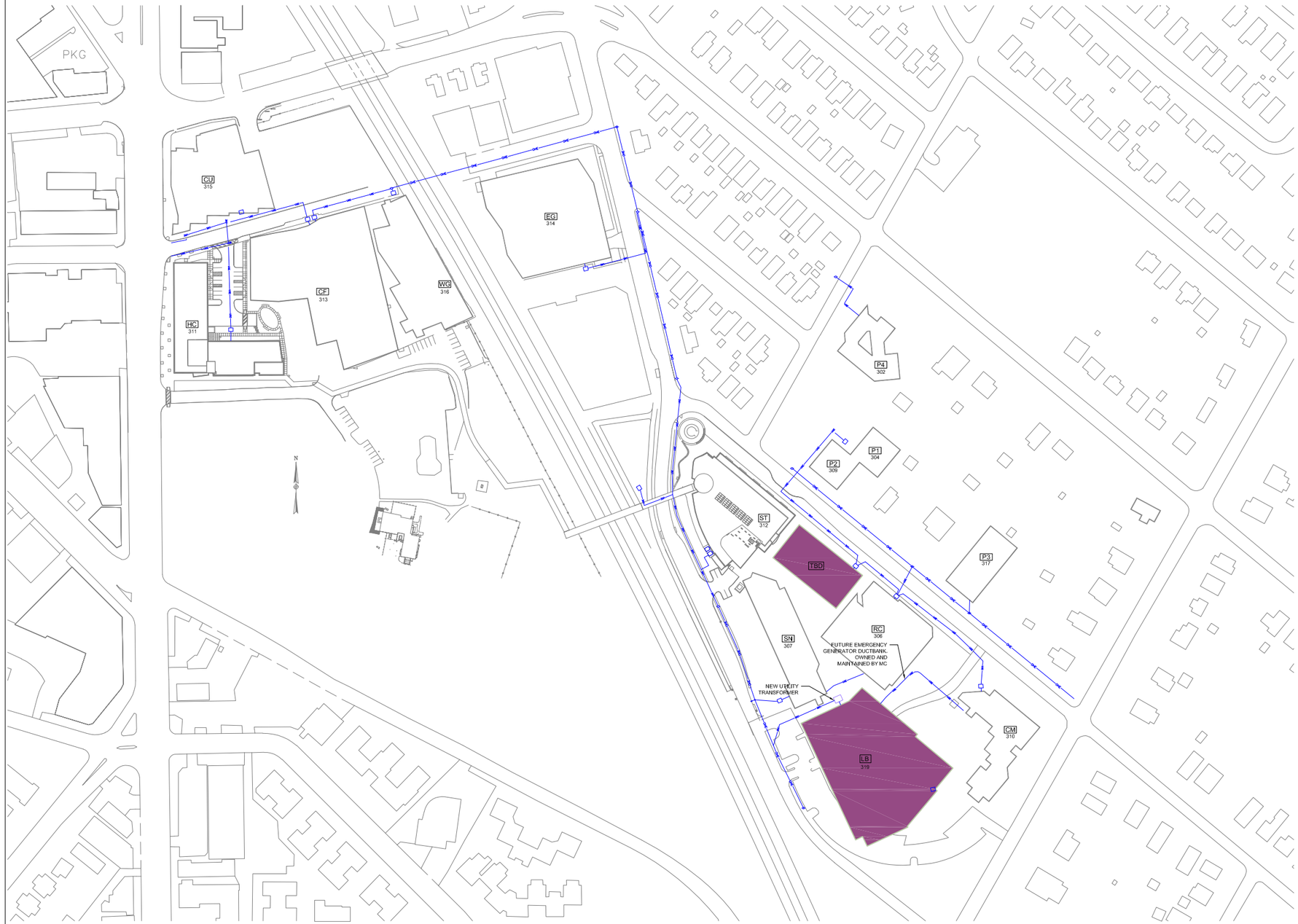
SHEET TITLE:

TAKOMA PARK SILVER SPRING CAMPUS POWER - EXISTING CONDITIONS

DRAWING NO:

E1.01

BKM# 19021.03



1 **SITE PLAN - POWER - NEAR-TERM FUTURE CONDITIONS (2022-2036)**
SCALE: 1" = 100'-0"

ELECTRICAL LEGEND

—OHE— OHE—	OVERHEAD ELECTRIC
—UGE— UGE—	UNDERGROUND ELECTRIC
E	ELECTRIC MANHOLE

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 20' 60' 100' 150' 200' 300'
SCALE: 1" = 100'

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SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

TAKOMA PARK SILVER SPRING CAMPUS POWER - NEAR-TERM FUTURE

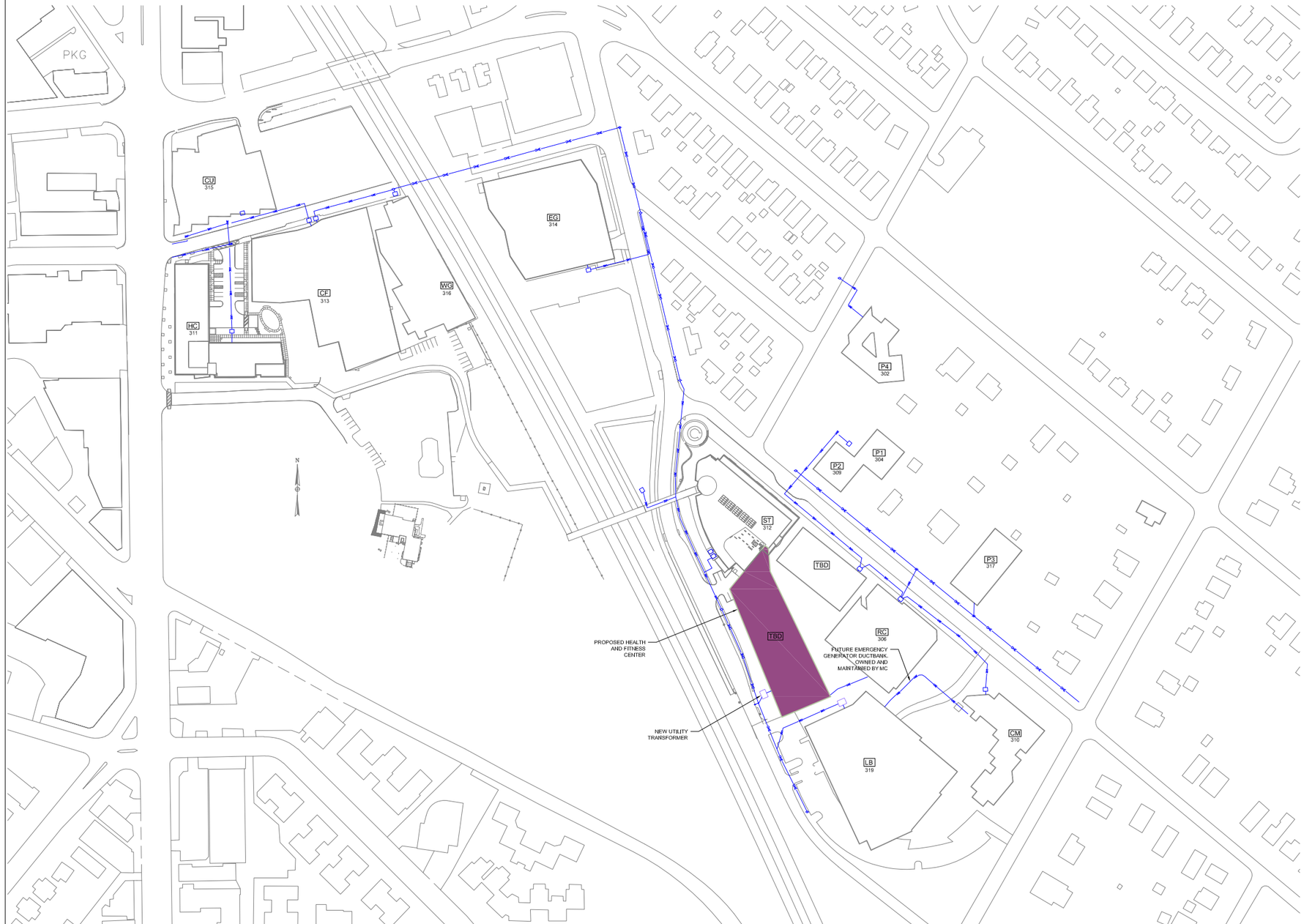
DRAWING NO:

E1.02

BKM# 19021.03

ABS: G:\19021.03\Drawings\Acad\E1\E102 Site Plan Near Future

Plotted By: Tyler Knott | 6/14/2022 2:22 PM



1 **SITE PLAN - POWER - LONG-TERM FUTURE CONDITIONS (2036-BEYOND)**
SCALE: 1" = 100'-0"

ELECTRICAL LEGEND

—OHE— OHE—	OVERHEAD ELECTRIC
—UGE— UGE—	UNDERGROUND ELECTRIC
E	ELECTRIC MANHOLE

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 20' 60' 100' 150' 200' 300'
SCALE: 1" = 100'

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TAKOMA PARK / SILVER SPRING CAMPUS UTILITY MASTER PLAN

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DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

TAKOMA PARK SILVER SPRING CAMPUS POWER - LONG-TERM FUTURE

DRAWING NO:

E1.03

BKM# 19021.03

ARL: C:\19021.03\Drawings\Acad\E\E103 Site Plan Long Future
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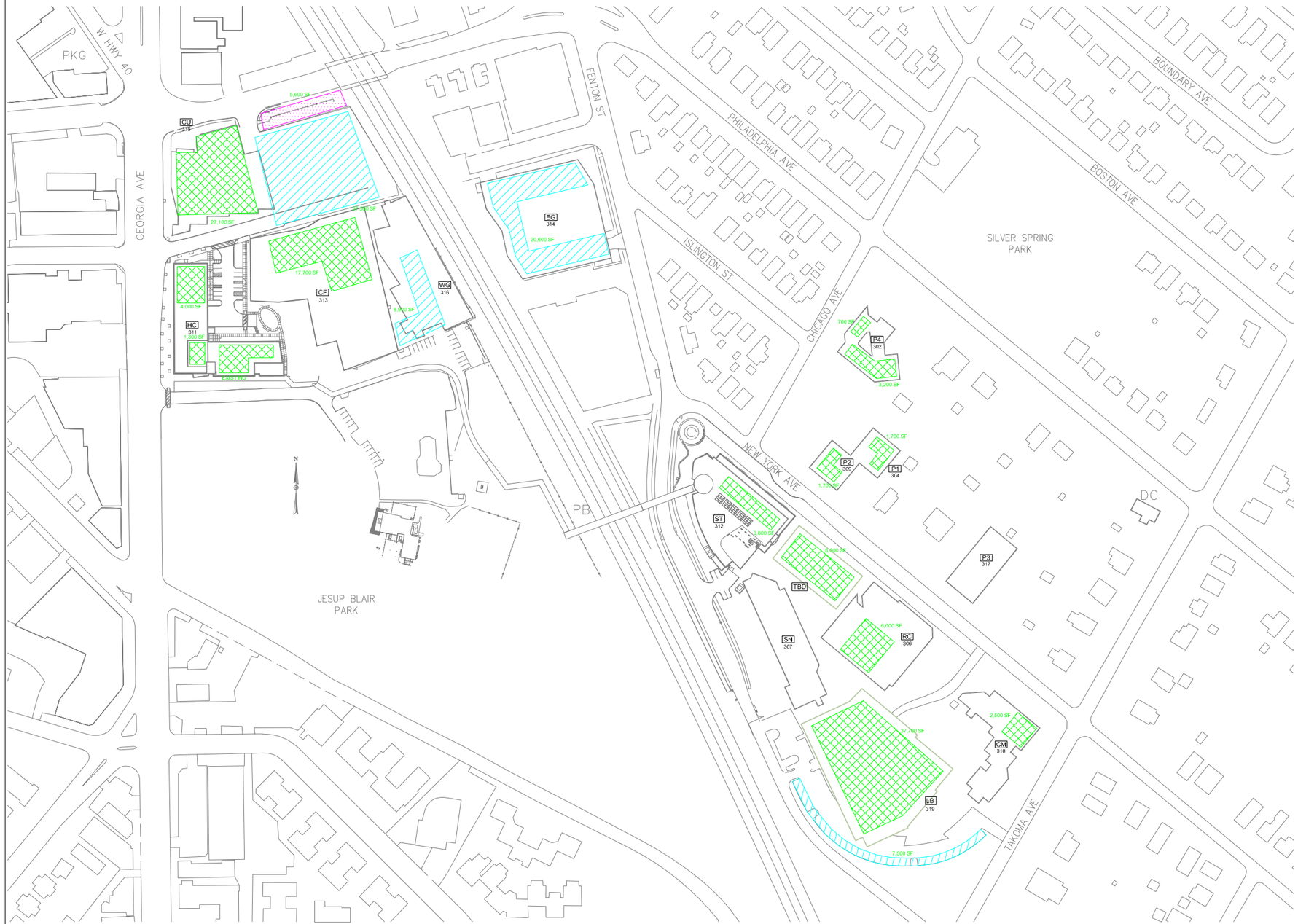

1 **SITE PLAN - POTENTIAL PHOTOVOLTAIC LOCATIONS**
SCALE: 1" = 80'-0"

LEGEND:

- TYPE 1
- TYPE 2
- TYPE 3

ELECTRICAL LEGEND

- TYPE 1 - ROOFTOP
- TYPE 2 - PARKING LOT (CANOPY MOUNTED)
- TYPE 3 - GROUND

IF THIS DRAWING IS A REDUCTION. GRAPHIC SCALE MUST BE USED.

0 40' 80' 120' 160' 240'
SCALE: 1" = 80'-0"

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SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

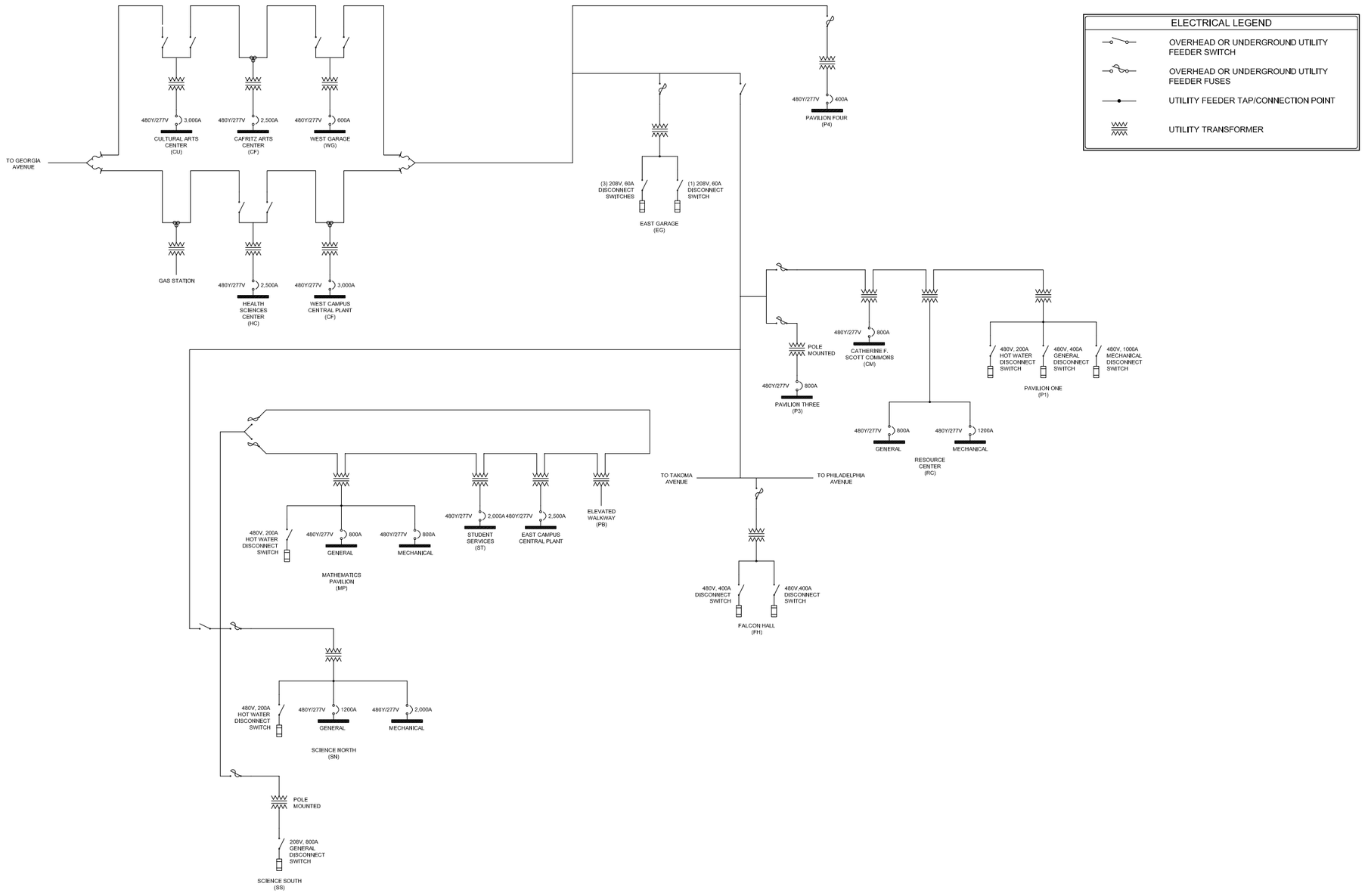
SHEET TITLE:

SITE PLAN - POTENTIAL PHOTOVOLTAIC LOCATIONS

DRAWING NO:

E1.04

BKM# 19021.03



1 SINGLE LINE DIAGRAM - POWER - EXISTING CONDITIONS

SCALE: NONE

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DATE:	DESCRIPTION:
JUNE 2022	FINAL

PROJECT NO: BKM # 19021.03

SCALE: AS NOTED

DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

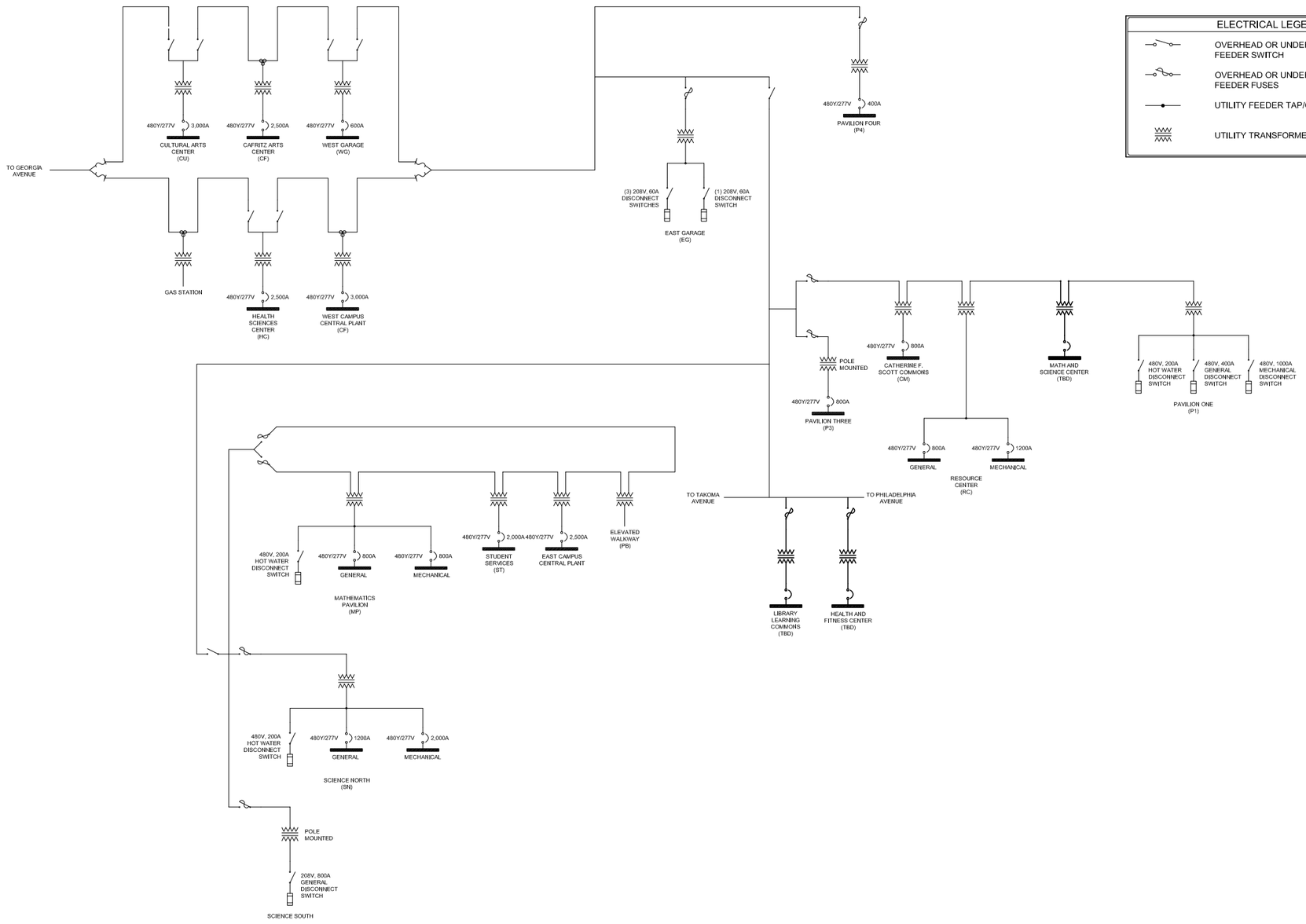
SHEET TITLE:

SINGLE LINE DIAGRAM - POWER - EXISTING CONDITIONS

DRAWING NO:

E2.01

BKM# 19021.03



1 SINGLE LINE DIAGRAM - POWER - LONG-TERM FUTURE CONDITIONS

SCALE: NONE

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DRAWN BY: BKM

CHECKED BY: BKM

DATE: JUNE 2022

SHEET TITLE:

SINGLE LINE DIAGRAM - POWER - LONG-TERM FUTURE CONDITIONS

DRAWING NO:

E2.02

BKM# 19021.03

bkm

Appendix 5
MC Provided Information

Burdette, Koehler, Murphy and Associates, Inc.
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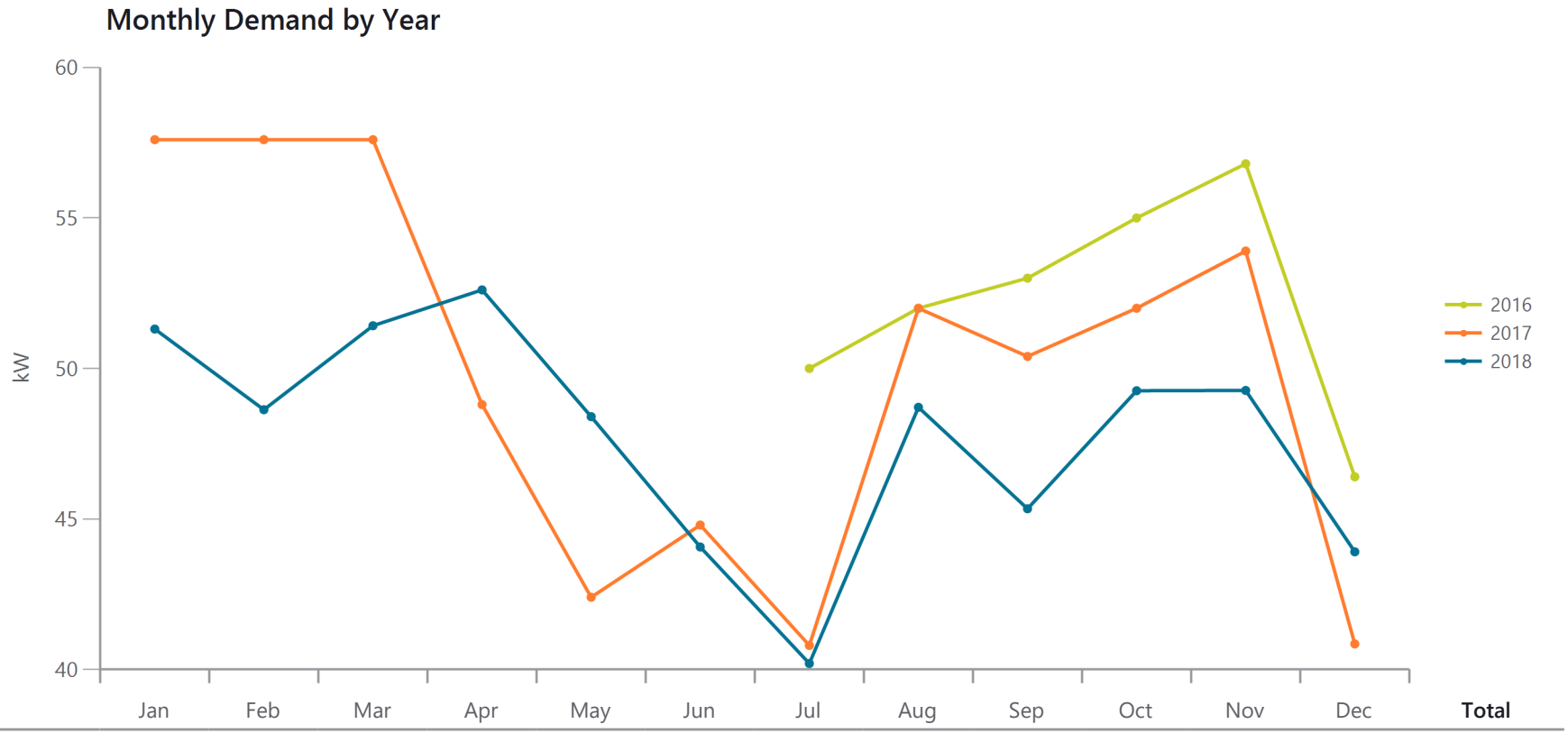
TP Campus - CATHERINE F. SCOTT COMMONS - CM FY17 - FY18,

Monthly Demand by Year

Executive Summary (kW)

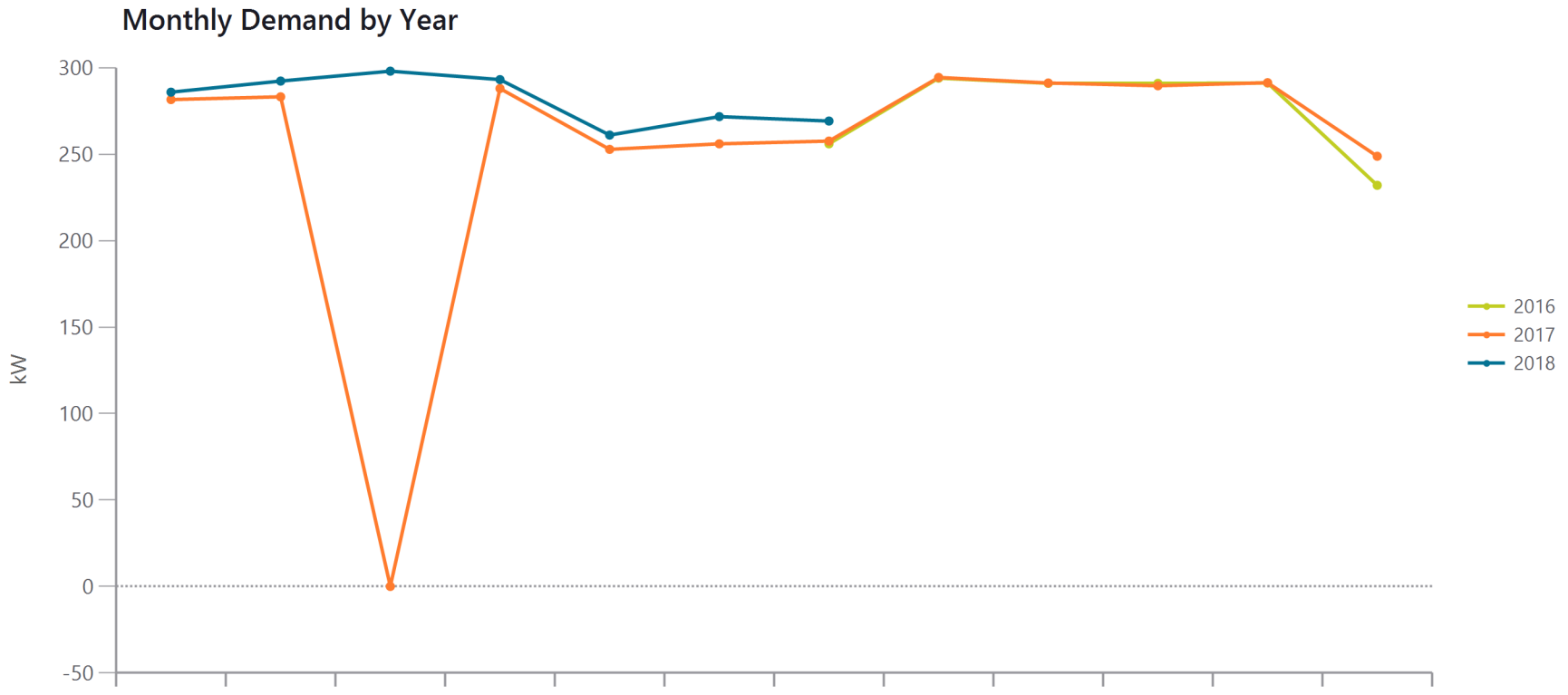


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							50	52	53	55	57	46	313
2017	58	58	58	49	42	45	41	52	50	52	54	41	599
2018	51	49	51	53	48	44	40	49	45	49	49	44	573

TP Campus - CHARLENE R. NUNLEY STUDENT SERVICES CENTER not plant - ST2 FY17 - FY18,

Monthly Demand by Year

Executive Summary (kW)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							256	294	291	291	291	232	1,655
2017	282	283	0	288	253	256	258	294	291	290	291	249	3,035
2018	286	292	298	293	261	272	269						1,971

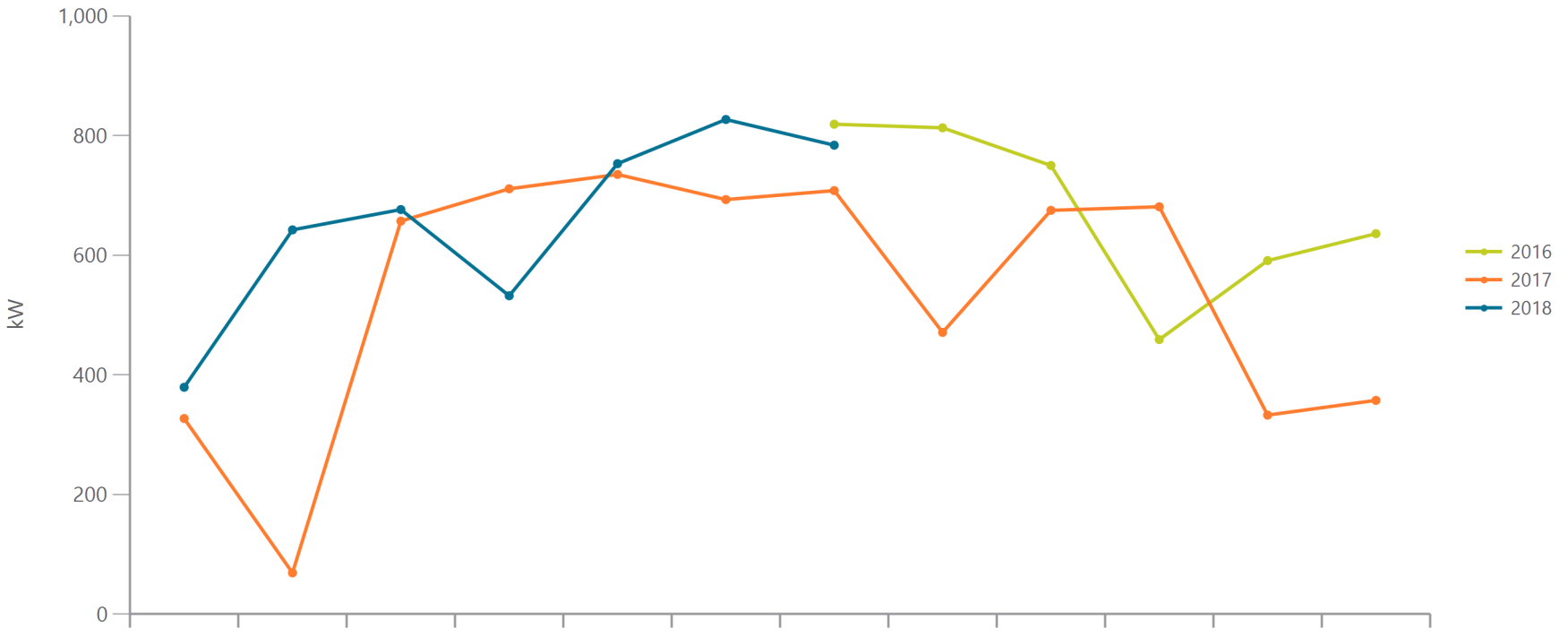
March was not 0 kW. There was a two month bill: 3/18/17 to 5/17/17 with max kw of 288.

TP Campus - CHARLENE R. NUNLEY STUDENT SERVICES CENTER PLANT - ST1 FY17 - FY18,
serves chill water to itself, CM, P3, P4 & RC

Monthly Demand by Year

Executive Summary (kW)

Monthly Demand by Year

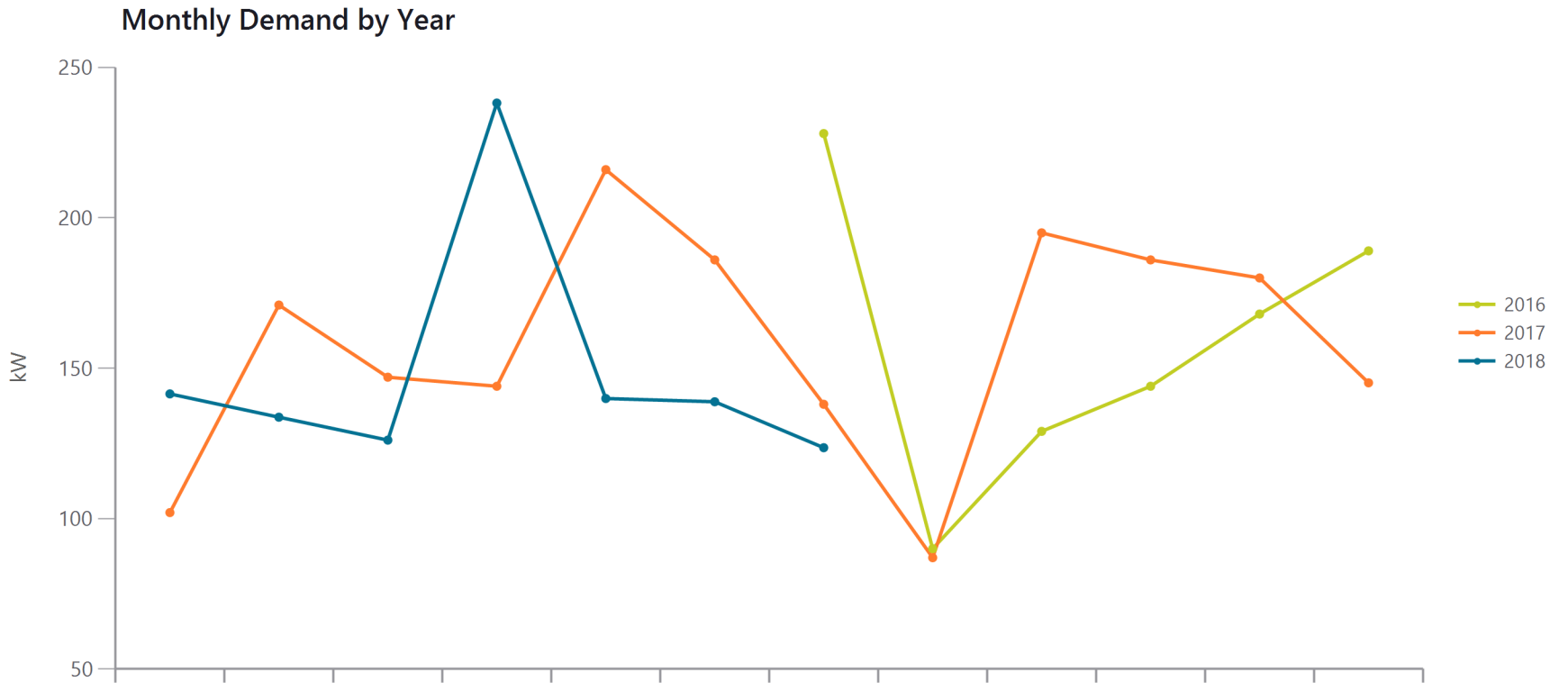


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							819	813	750	459	591	636	4,068
2017	327	69	657	711	735	693	708	471	675	681	333	357	6,417
2018	379	642	676	532	753	827	784						4,594

The February 2017 bill was actually 69 kWh. This account serves chill water to itself ST, CM, P3, P4 & RC.

Monthly Demand by Year

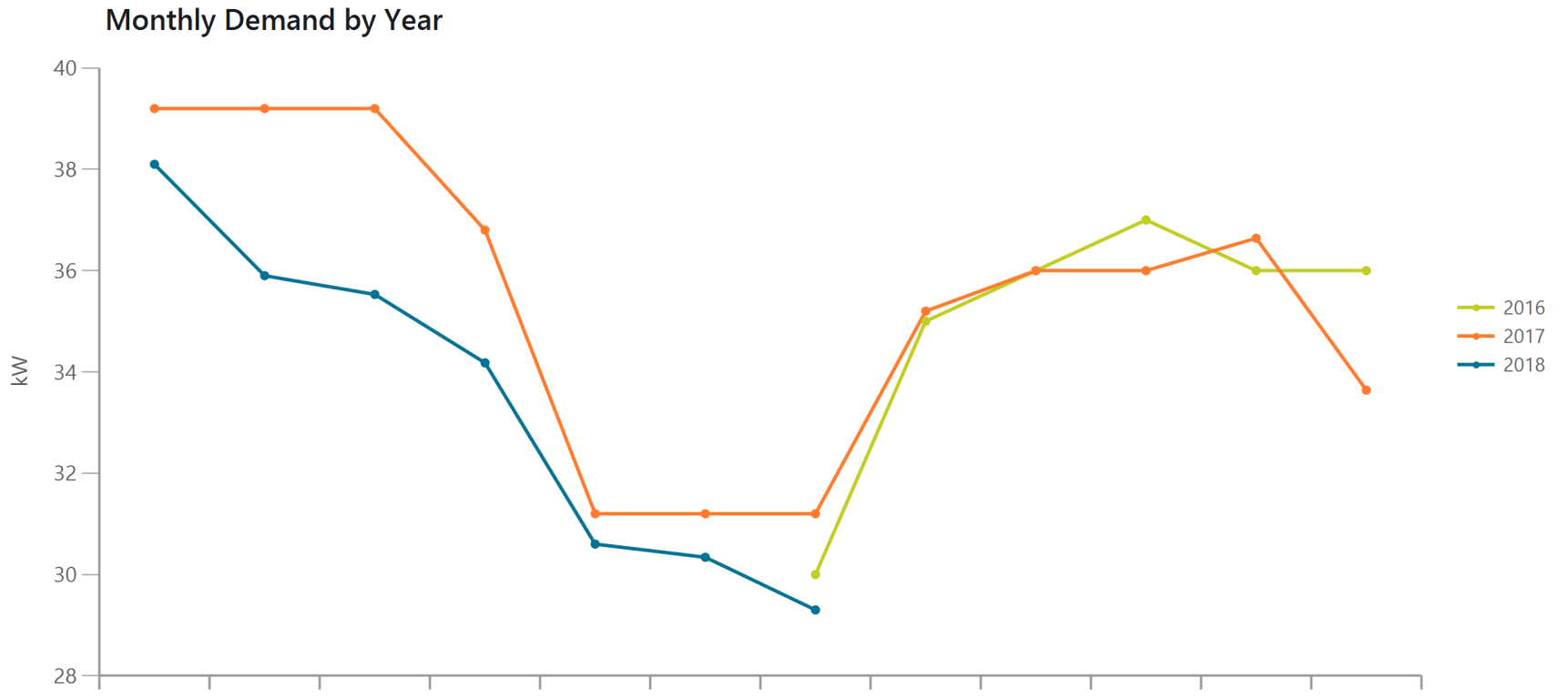
Executive Summary (kW)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							228	90	129	144	168	189	948
2017	102	171	147	144	216	186	138	87	195	186	180	145	1,897
2018	141	134	126	238	140	139	124						1,042

Monthly Demand by Year

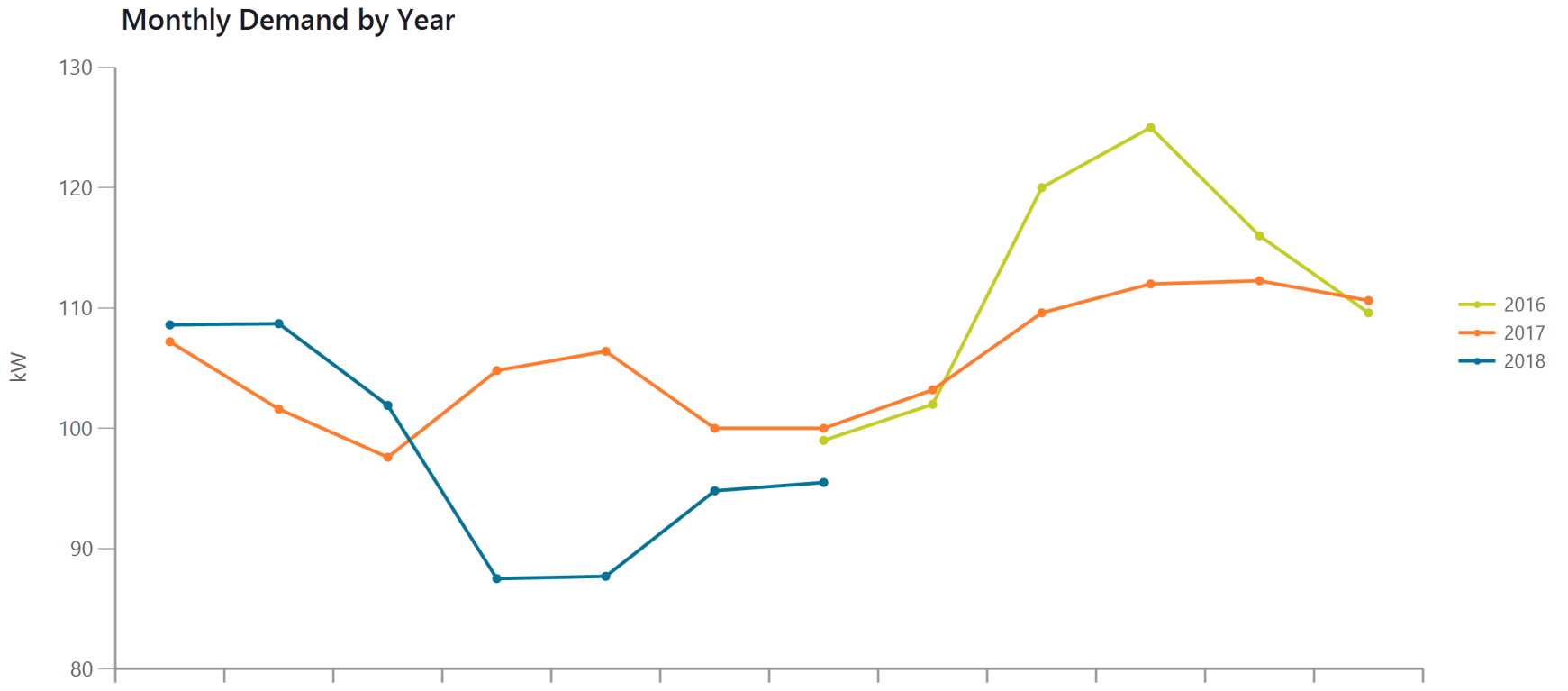
Executive Summary (kW)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							30	35	36	37	36	36	210
2017	39	39	39	37	31	31	31	35	36	36	37	34	425
2018	38	36	36	34	31	30	29						234

Monthly Demand by Year

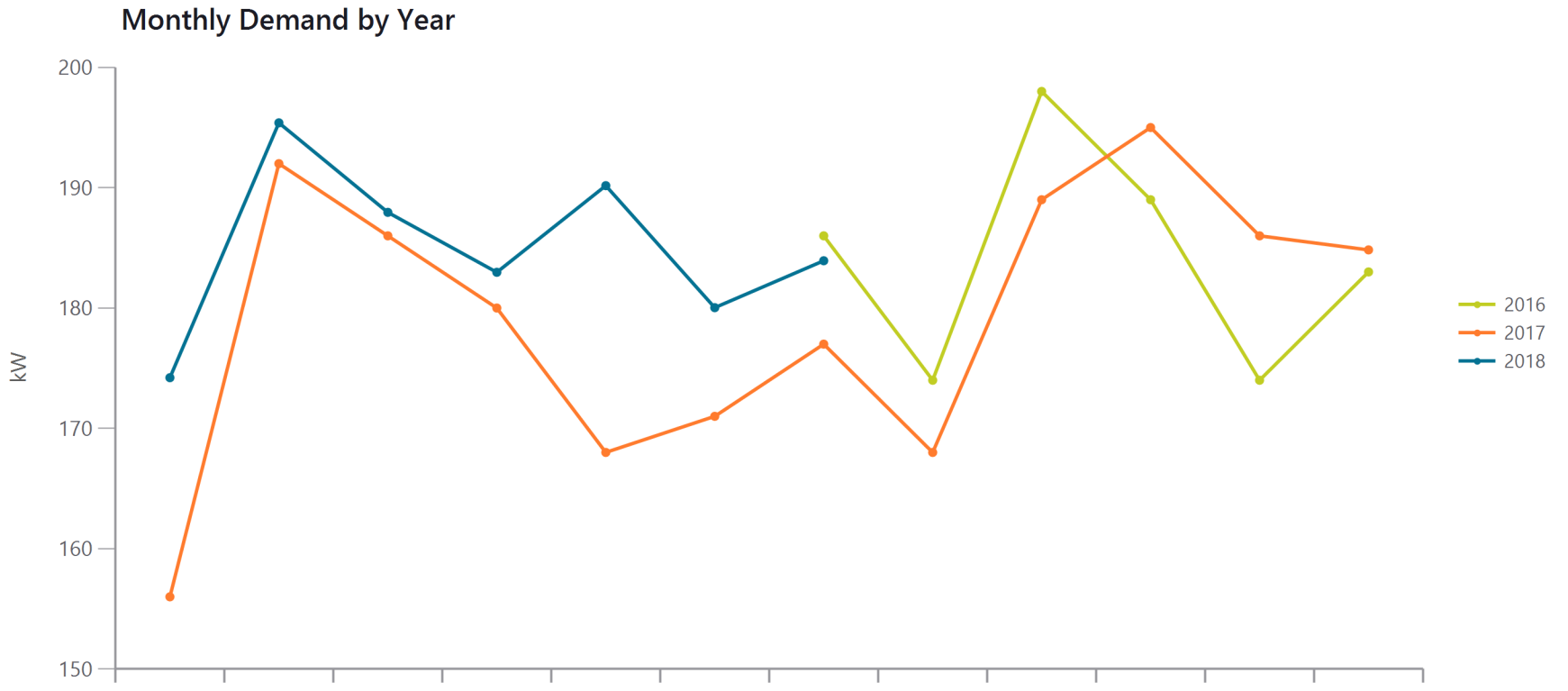
Executive Summary (kW)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							99	102	120	125	116	110	672
2017	107	102	98	105	106	100	100	103	110	112	112	111	1,265
2018	109	109	102	88	88	95	96						685

Monthly Demand by Year

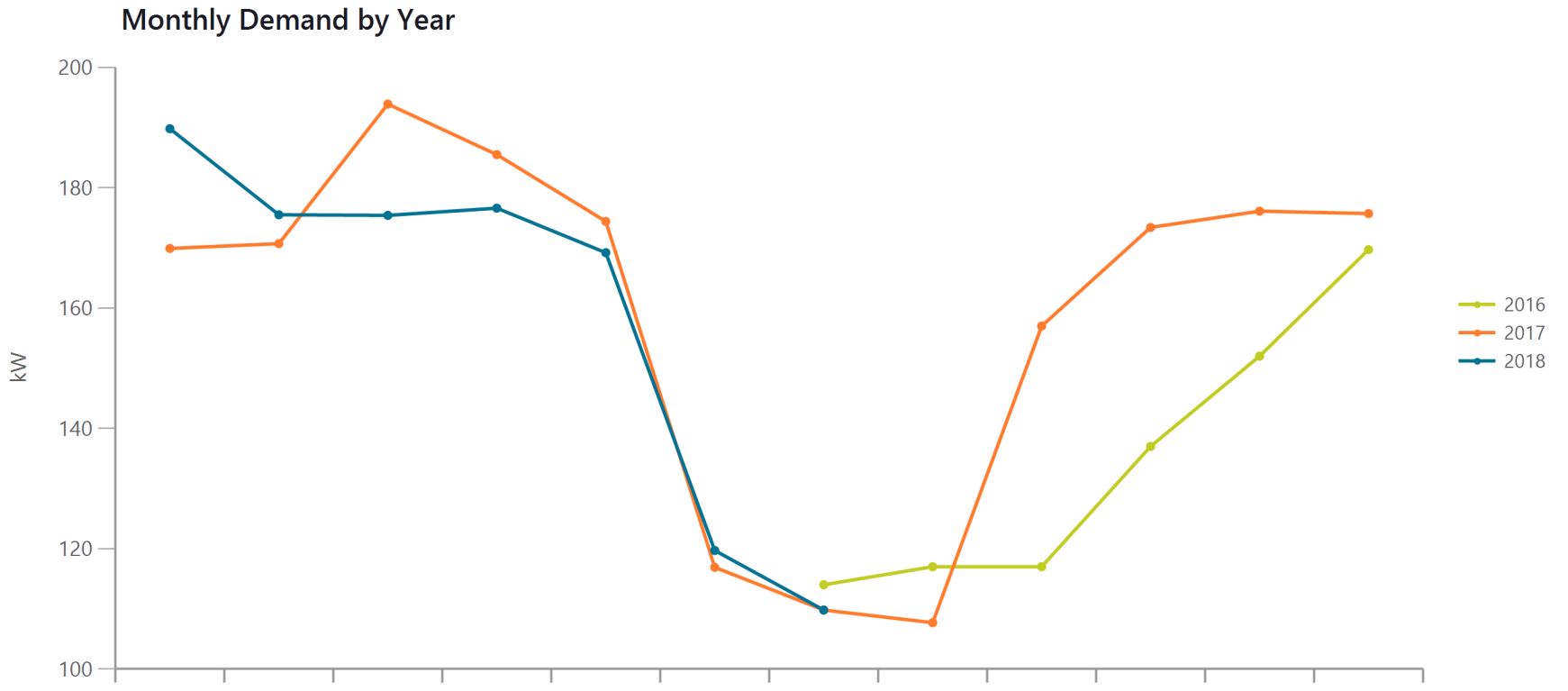
Executive Summary (kW)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							186	174	198	189	174	183	1,104
2017	156	192	186	180	168	171	177	168	189	195	186	185	2,153
2018	174	195	188	183	190	180	184						1,295

Monthly Demand by Year

Executive Summary (kW)



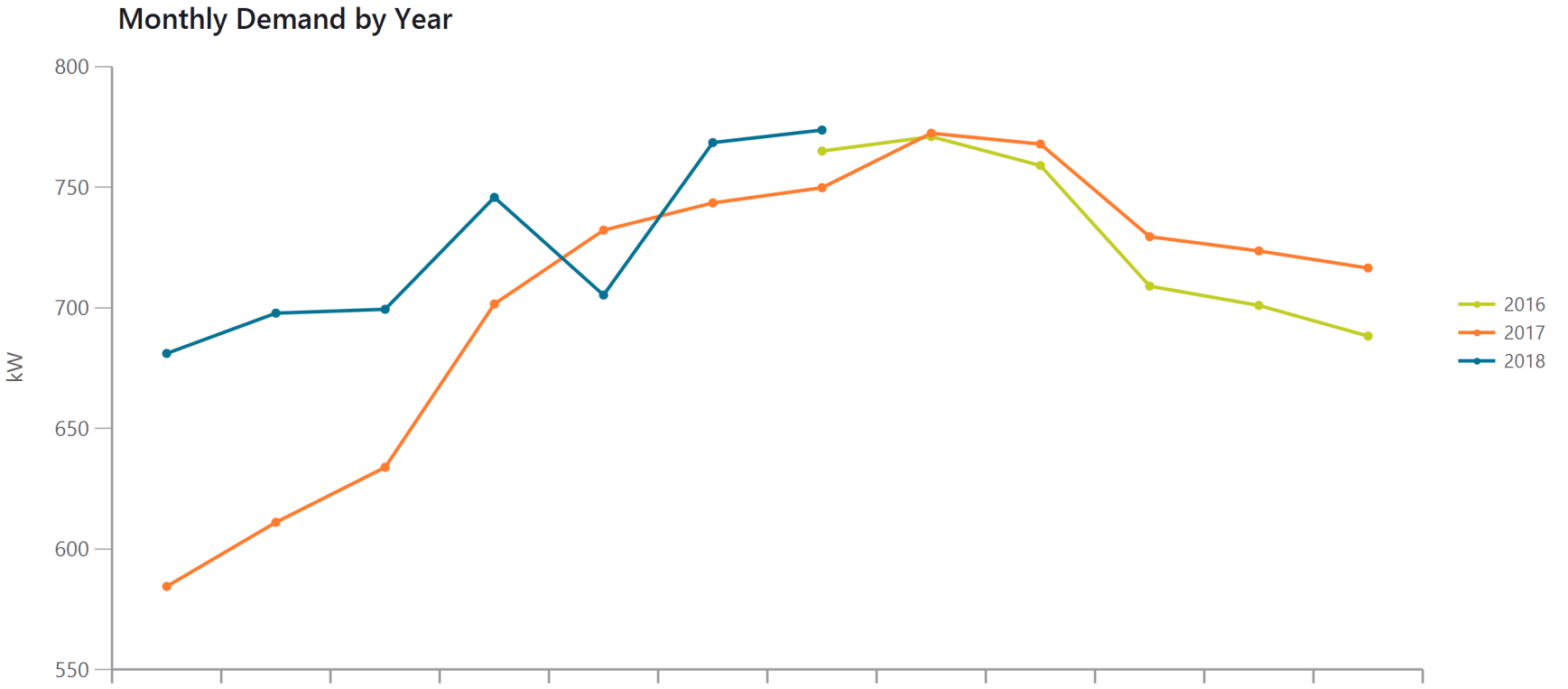
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							114	117	117	137	152	170	807
2017	170	171	194	186	174	117	110	108	157	173	176	176	1,911
2018	190	176	175	177	169	120	110						1,116

This one Pepco account serves two buildings- MP & NP.

TP Campus - MORRIS & GWENDOLYN CAFRITZ FOUNDATION ARTS CENTER - CF Plant FY 17 - FY 18,
Plant chill water bill serving itself, CU & HC.

Monthly Demand by Year

Executive Summary (kW)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							765	771	759	709	701	688	4,393
2017	585	611	634	702	732	744	750	772	768	730	724	717	8,467
2018	681	698	699	746	705	769	774						5,072

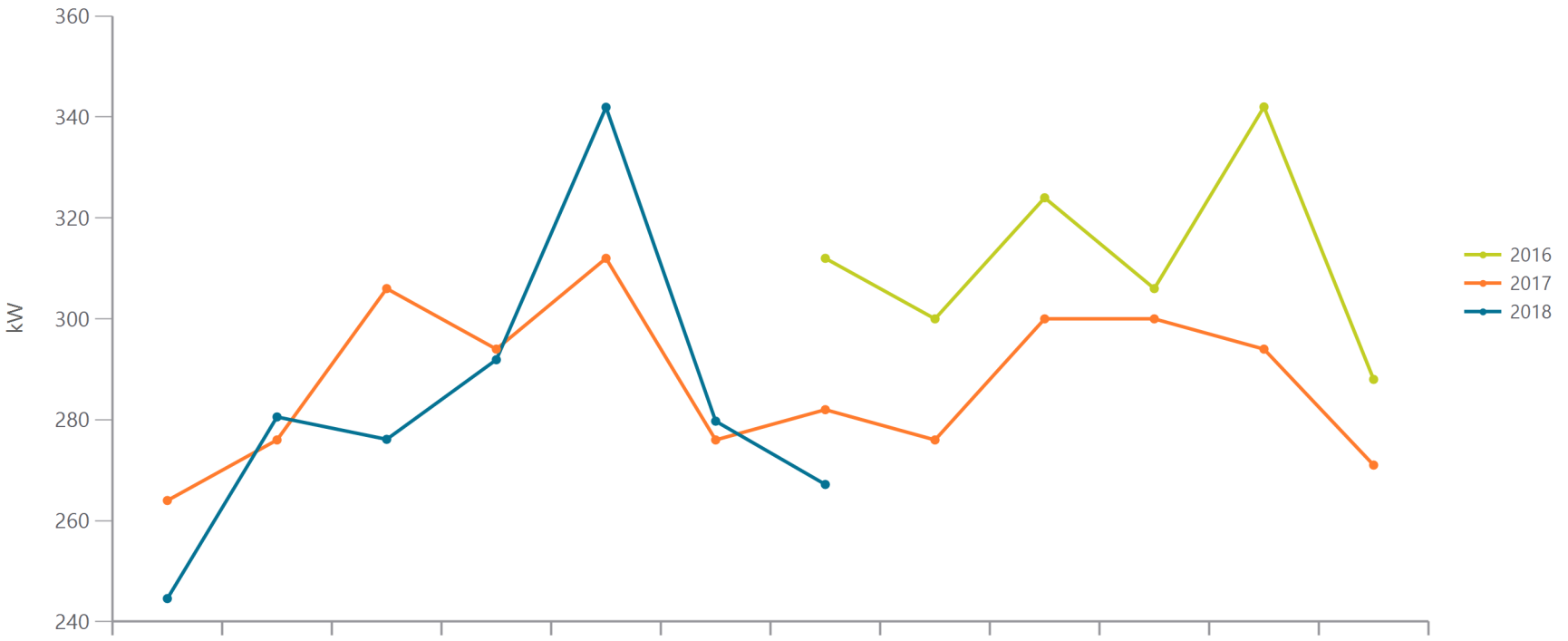
This account is a plant bill serving chill water to itself, CU & HC.

TP Campus - MORRIS & GWENDOLYN CAFRITZ FOUNDATION ARTS CENTER AUXILIARY- CF Aux FY 17 - FY 18,
serving electricity to the building.

Monthly Demand by Year

Executive Summary (kW)

Monthly Demand by Year

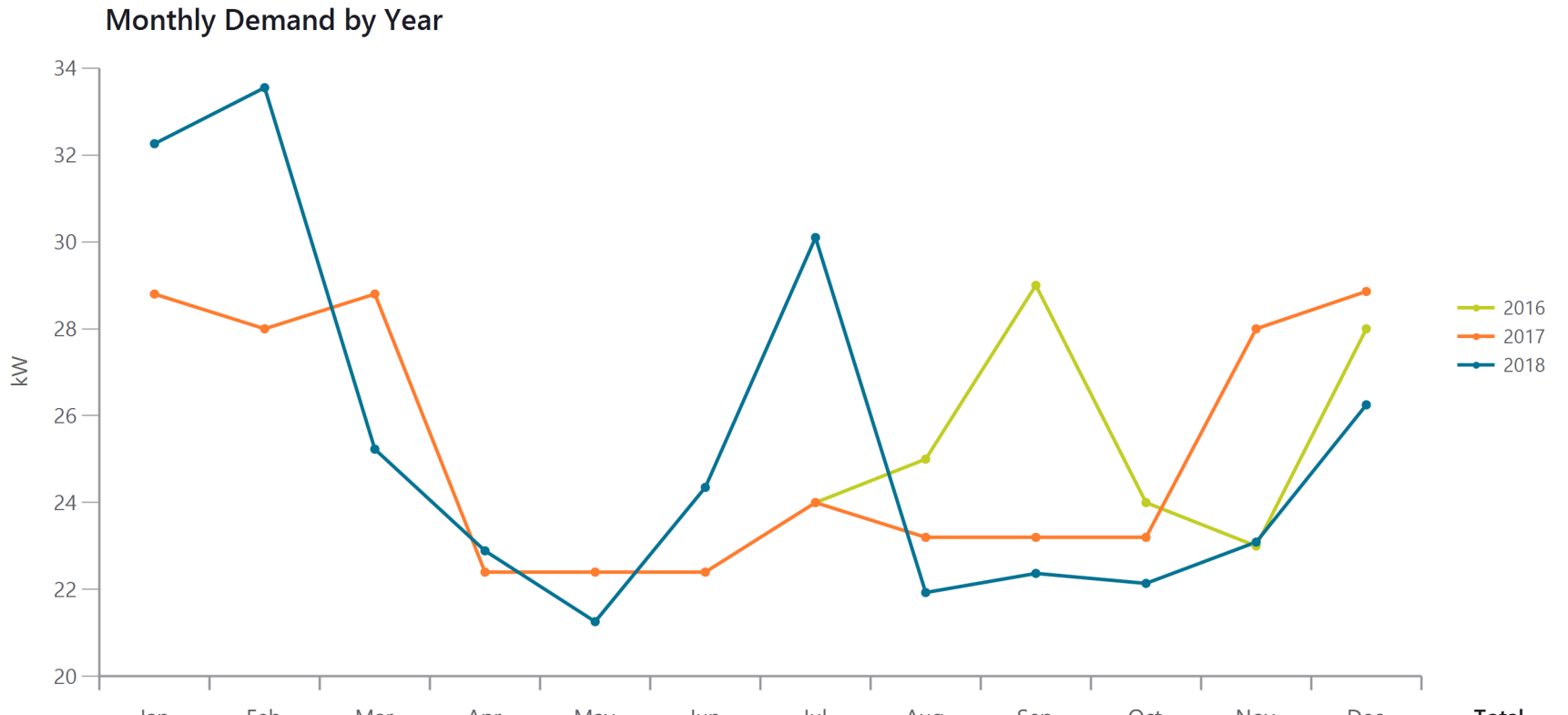


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							312	300	324	306	342	288	1,872
2017	264	276	306	294	312	276	282	276	300	300	294	271	3,451
2018	245	281	276	292	342	280	267						1,982

This is the electricity account to the building. CF Auxiliary.

Monthly Demand by Year

Executive Summary (kW)

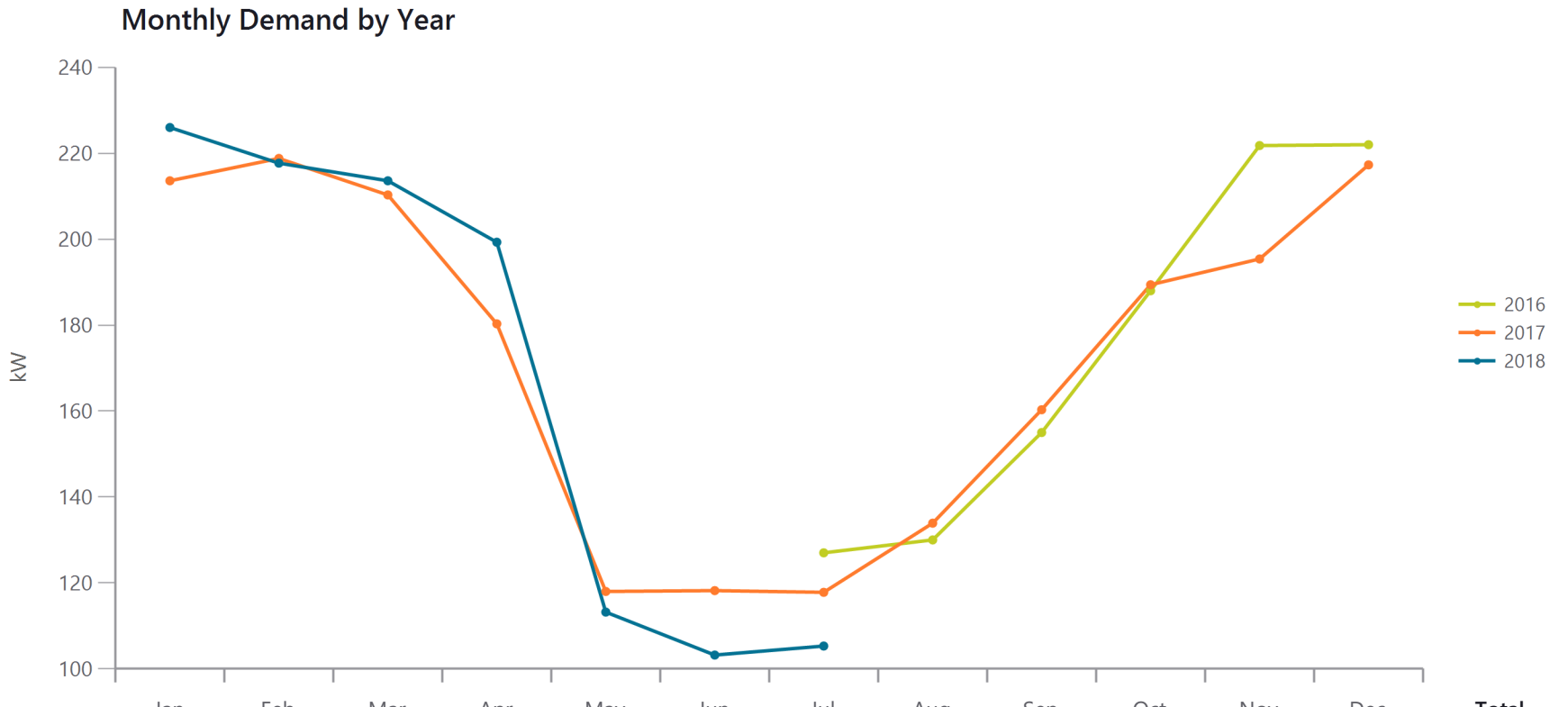


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							24	25	29	24	23	28	153
2017	29	28	29	22	22	22	24	23	23	23	28	29	303
2018	32	34	25	23	21	24	30	22	22	22	23	26	305

TP Campus - PAVILION ONE & PAVILION TWO - P1P2 FY17 - FY18,

Monthly Demand by Year

Executive Summary (kW)

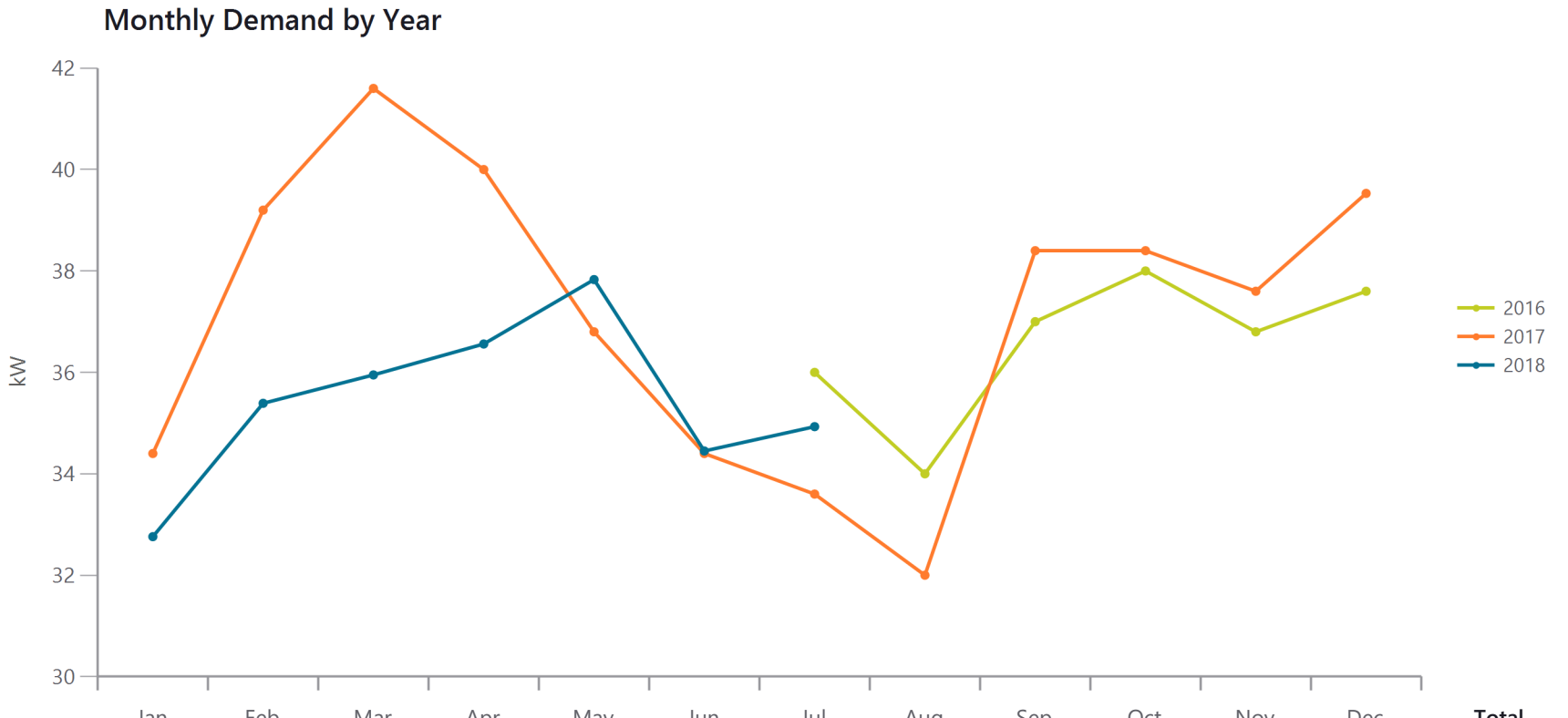


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							127	130	155	188	222	222	1,044
2017	214	219	210	180	118	118	118	134	160	189	195	217	2,073
2018	226	218	214	199	113	103	105						1,178

This one Pepco account serves two buildings,
P1 & P2.

Monthly Demand by Year

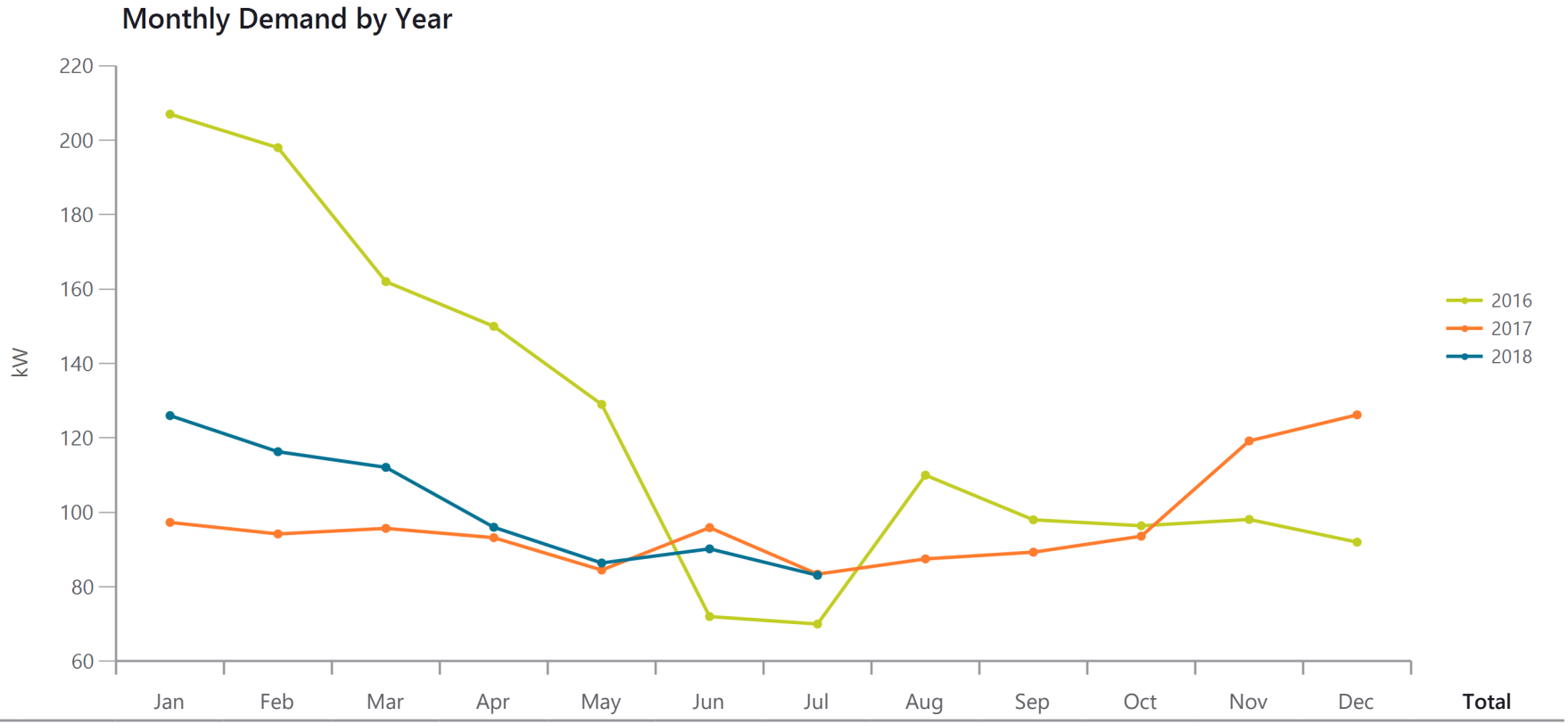
Executive Summary (kW)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							36	34	37	38	37	38	219
2017	34	39	42	40	37	34	34	32	38	38	38	40	446
2018	33	35	36	37	38	34	35						248

Monthly Demand by Year

Executive Summary (kW)

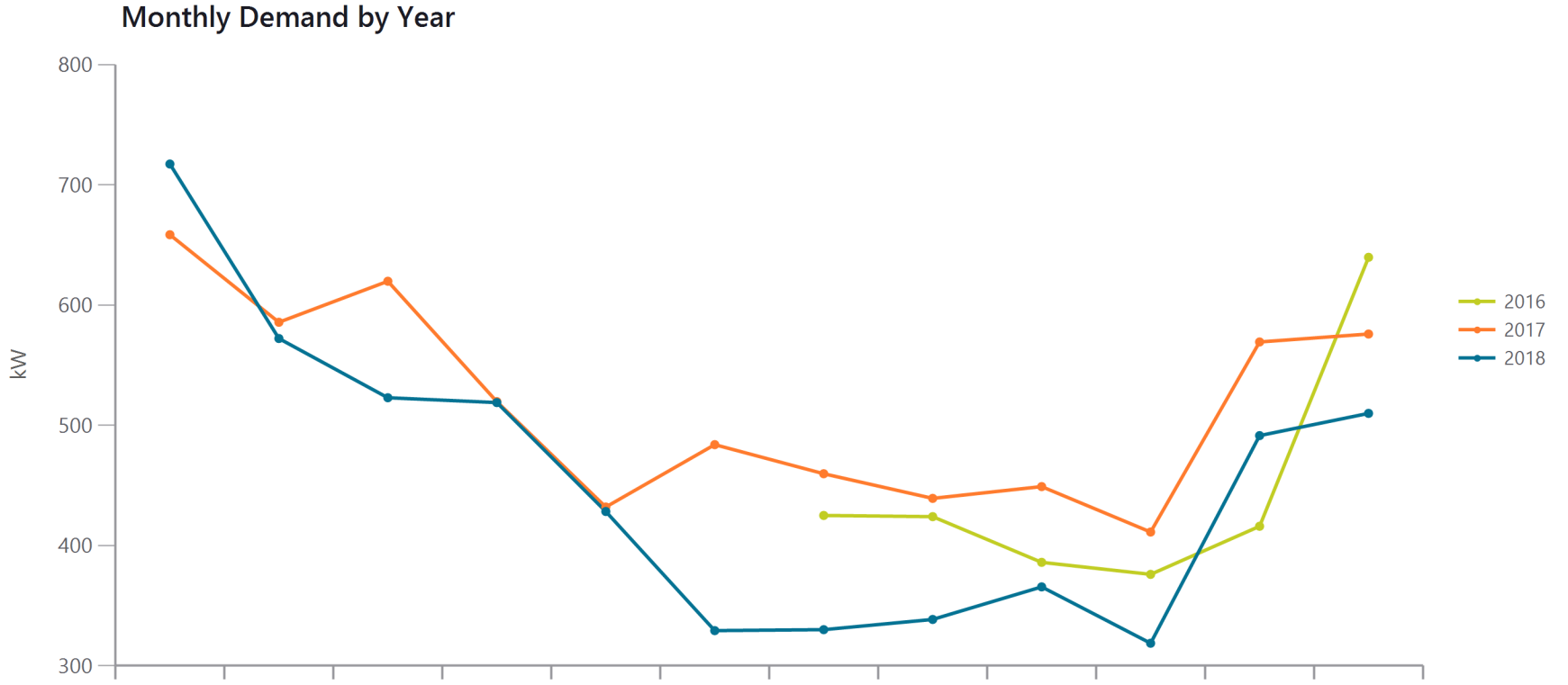


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016	207	198	162	150	129	72	70	110	98	96	98	92	**1,483**
2017	97	94	96	93	85	96	83	88	89	94	119	126	**1,160**
2018	126	116	112	96	86	90	83						**710**

DX units were replaced by RTUs and RC receives its cooling from ST Plant.

Monthly Demand by Year

Executive Summary (kW)

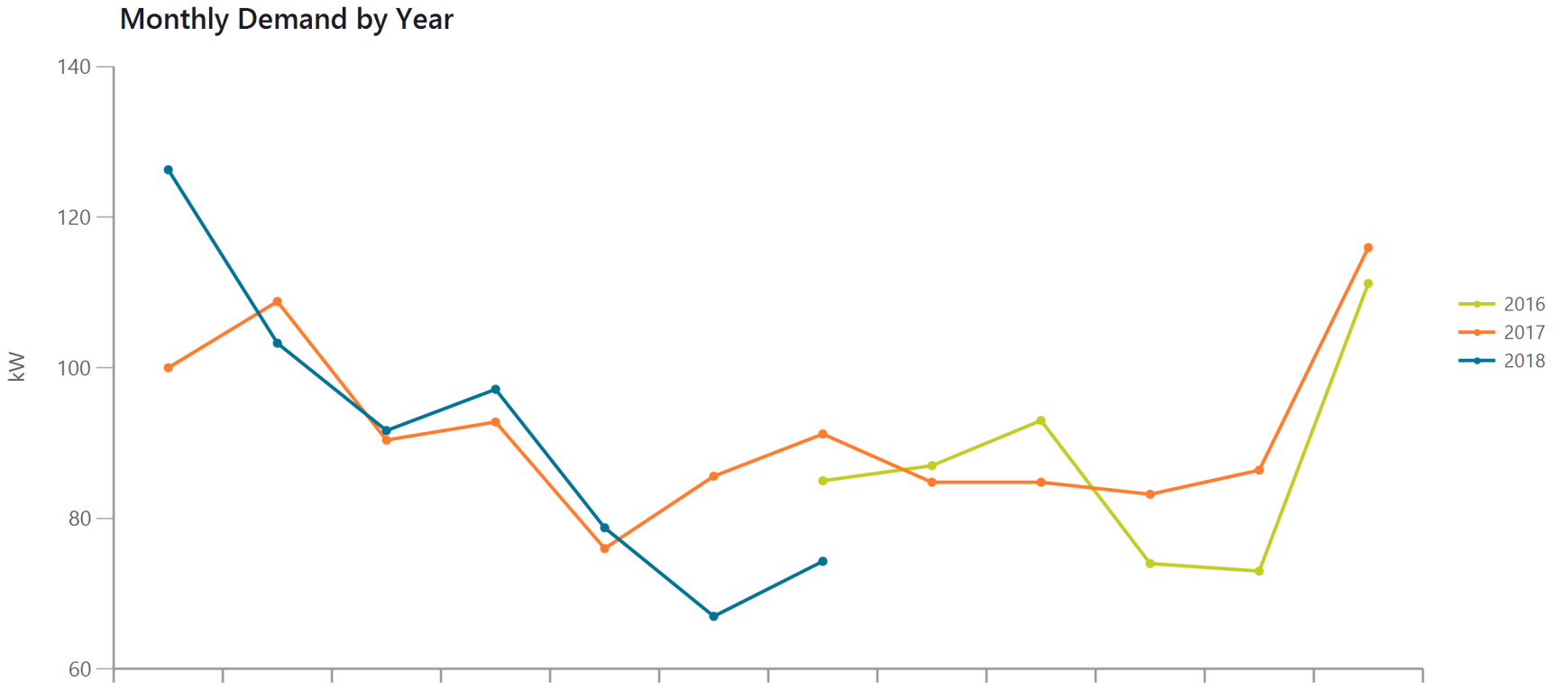


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							425	424	386	376	416	640	2,667
2017	659	586	620	520	432	484	460	439	449	411	569	576	6,204
2018	717	572	523	519	428	329	330	339	366	319	491	510	5,443

The trend seemed to drop so I am showing kW through December 2018.

Monthly Demand by Year

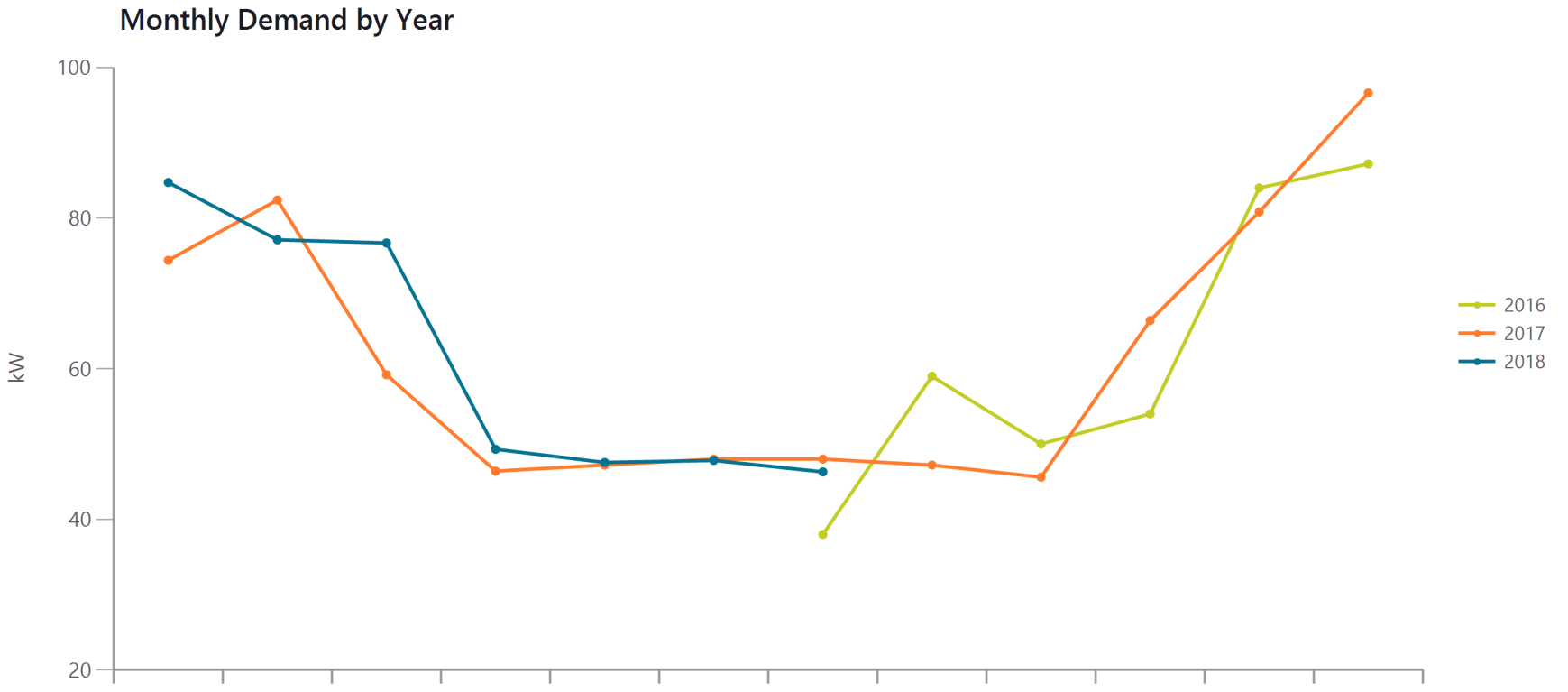
Executive Summary (kW)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							85	87	93	74	73	111	523
2017	100	109	90	93	76	86	91	85	85	83	86	116	1,100
2018	126	103	92	97	79	67	74						638

Monthly Demand by Year

Executive Summary (kW)

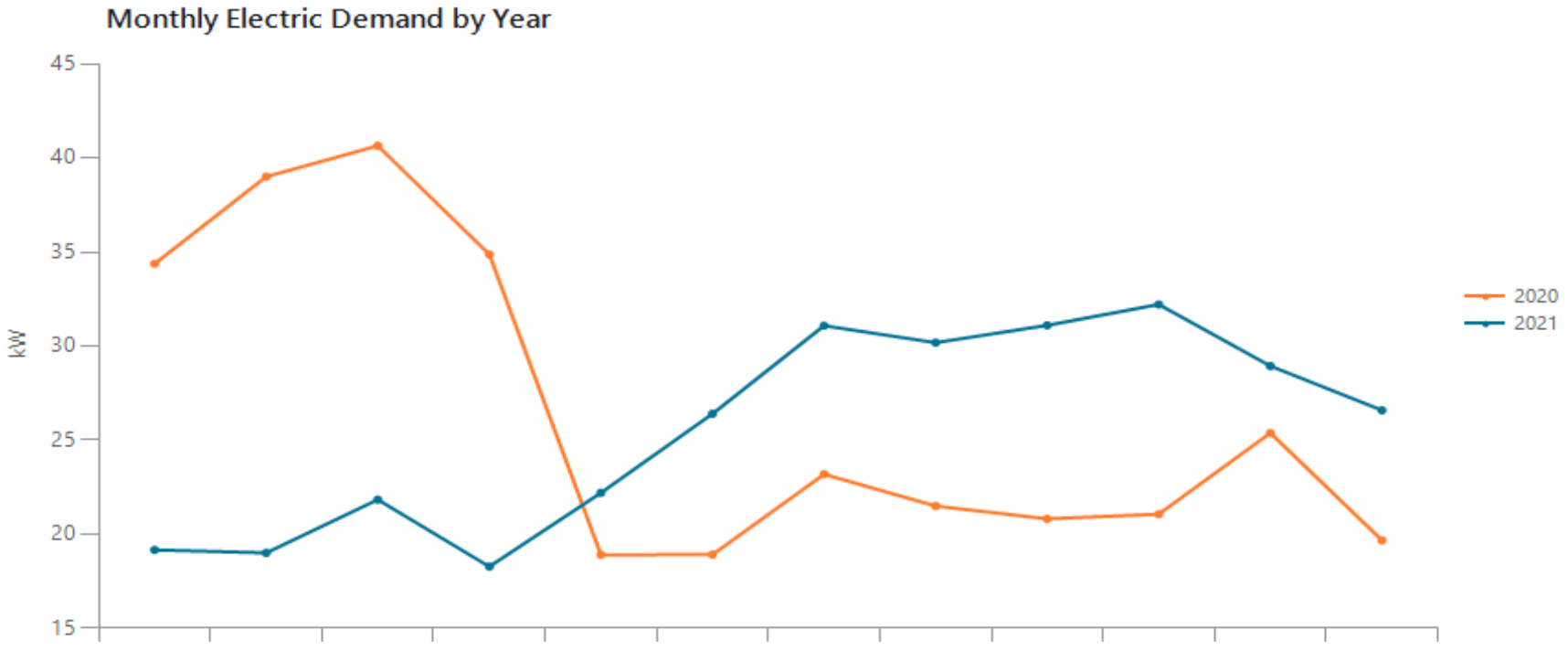


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016							38	59	50	54	84	87	372
2017	74	82	59	46	47	48	48	47	46	66	81	97	742
2018	85	77	77	49	48	48	46						430

Monthly Electric Demand by Year

[P3 (317) - ELEC]

Active (kW)	PEPCO	609 New York Avenue
Status	Vendor	Takoma Park, MD, US 20912
		Address



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	34	39	41	35	19	19	23	22	21	21	25	20	318
2021	19	19	22	18	22	26	31	30	31	32	29	27	307

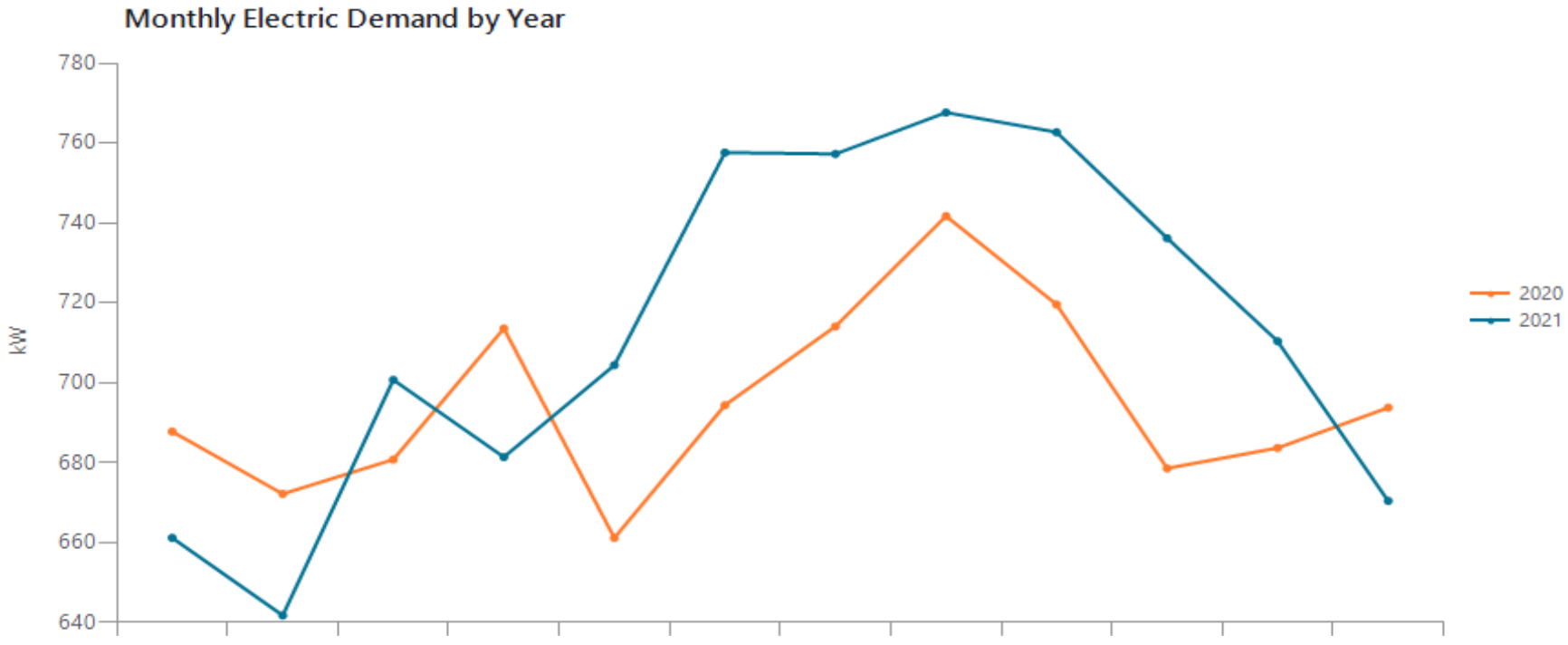
Monthly Electric Demand by Year

[CF (313) - ELEC_PLANT]

Active (kW)
Status

PEPCO
Vendor

Takoma Park, MD, US 20912
Address



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	688	672	681	714	661	694	714	742	720	679	684	694	8,342
2021	661	642	701	681	704	758	757	768	763	736	710	670	8,552

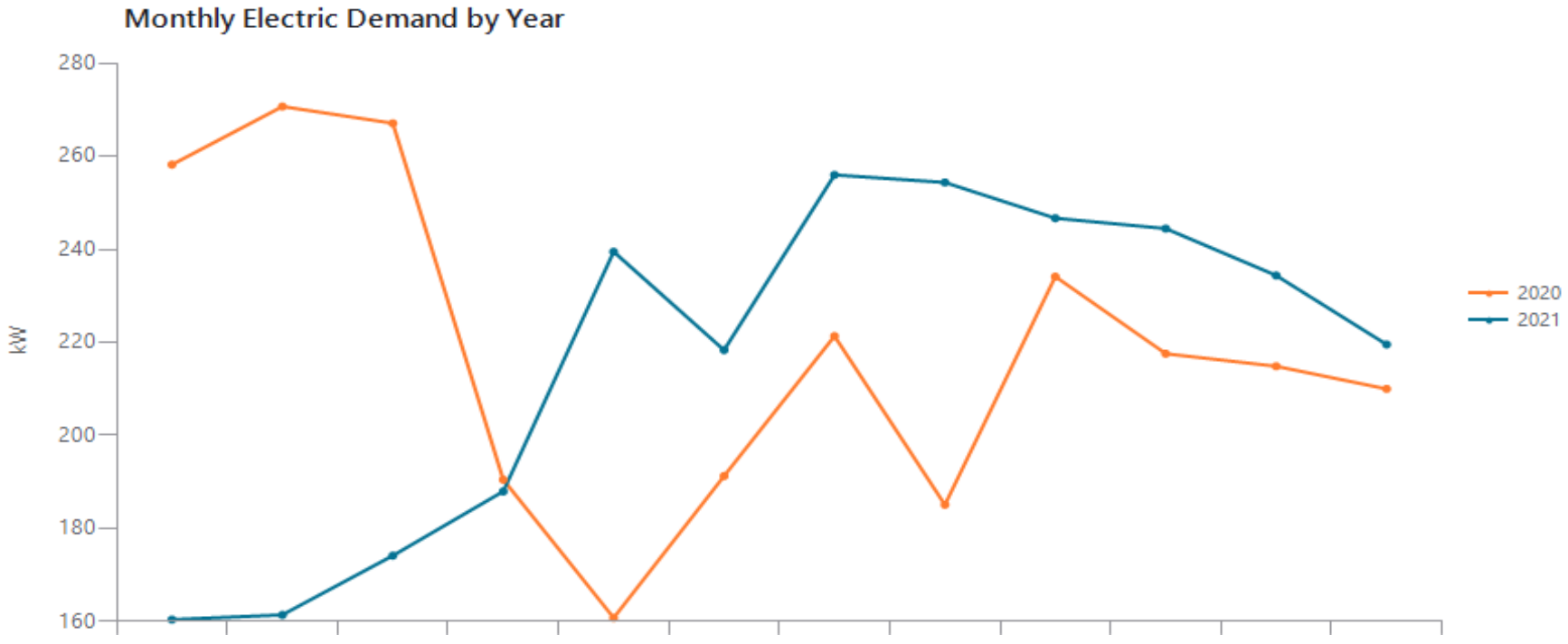
Monthly Electric Demand by Year

[CF (313) - ELEC_BUILDING]

Active (kW)
Status

PEPCO
Vendor

Takoma Park, MD, US 20912
Address



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	258	271	267	191	161	191	221	185	234	218	215	210	2,621
2021	160	161	174	188	239	218	256	254	247	244	234	220	2,597

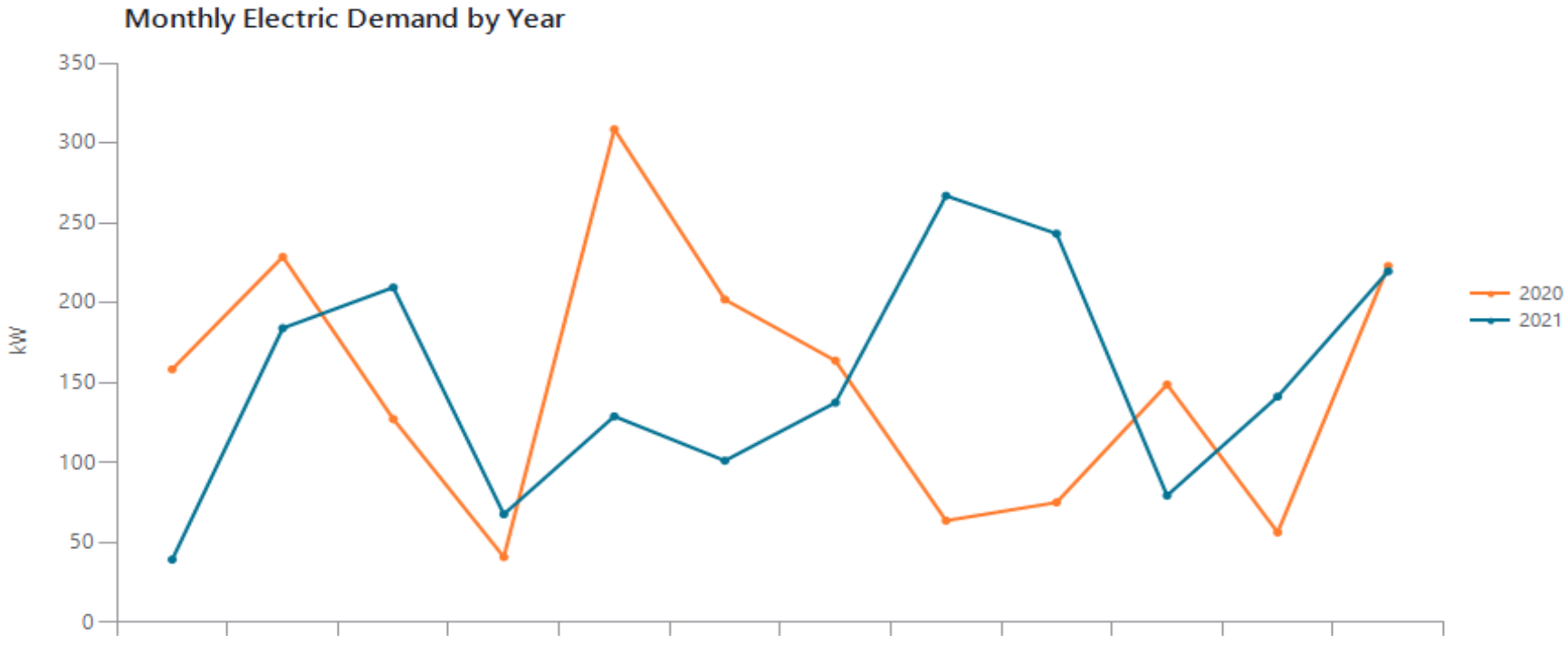
Monthly Electric Demand by Year

[CU (315) - ELEC]

Active (kW)
Status

PEPCO
Vendor

Takoma Park, MD, US 20912
Address

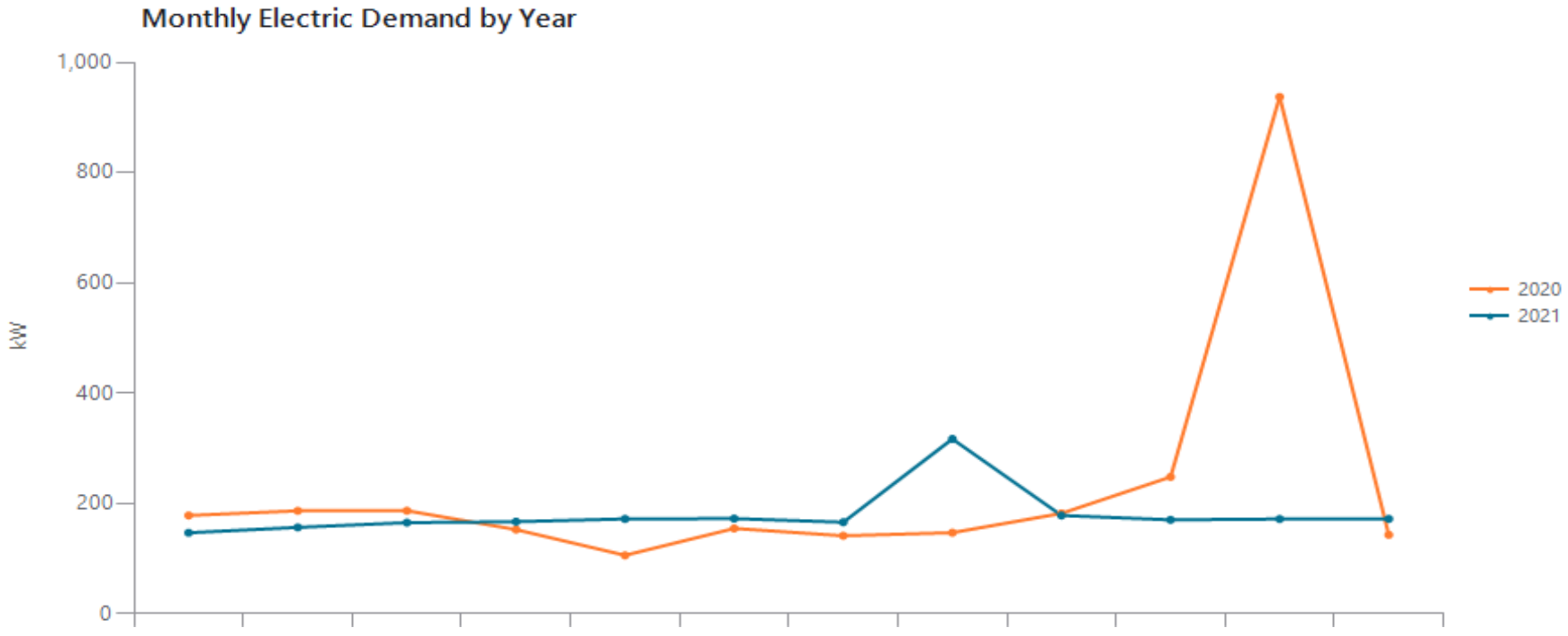


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	158	229	127	41	309	202	164	64	75	149	56	223	1,798
2021	39	184	210	68	129	101	138	267	243	80	141	220	1,820

Monthly Electric Demand by Year

[HC (311) - ELEC]

Active (kW)	PEPCO	7977 Georgia Ave HEALTH SCIENCES
Status	Vendor	Takoma Park, MD, US 20912
		Address



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	178	187	187	153	106	155	142	147	182	248	937	143	2,766
2021	147	157	165	167	172	173	166	317	179	171	172	172	2,158

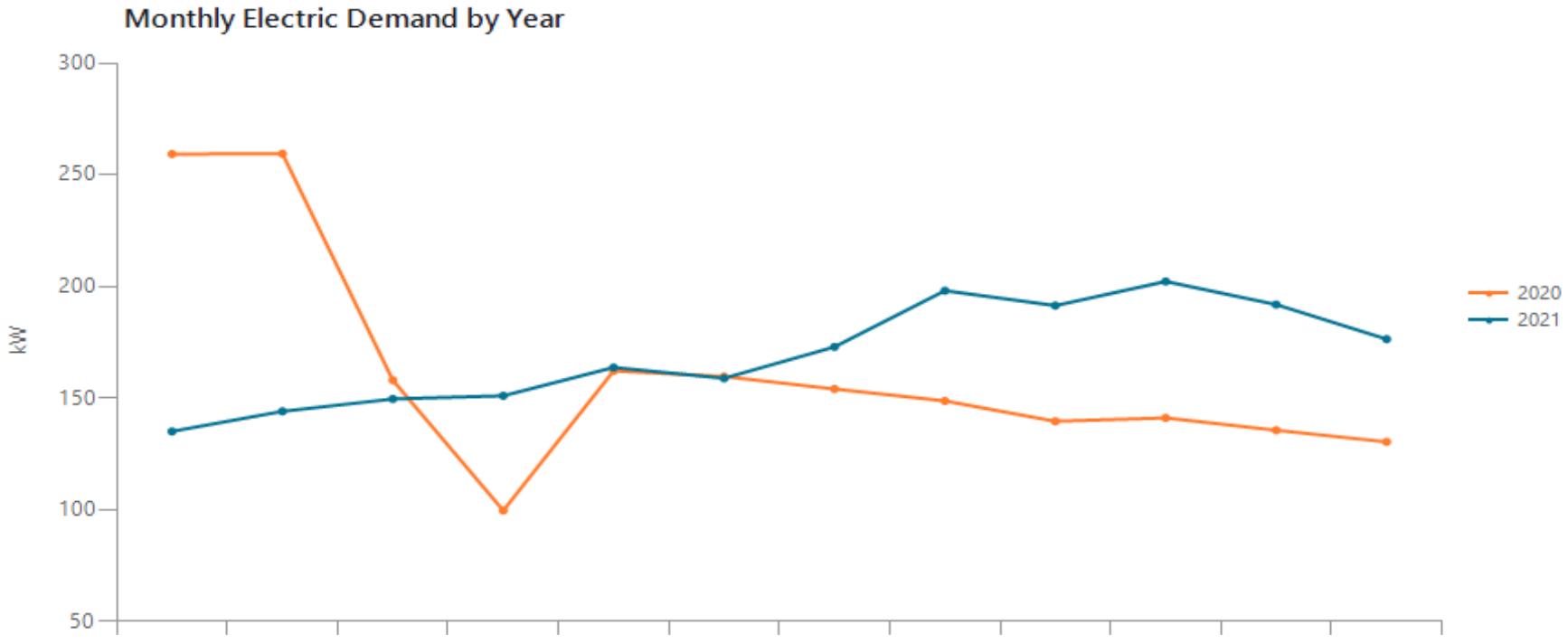
Monthly Electric Demand by Year

[ST (312) - ELEC_BUILDING]

Active (kW)
Status

PEPCO
Vendor

Takoma Park, MD, US 20912
Address



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	259	259	158	100	162	160	154	149	140	141	136	130	1,948
2021	135	144	150	151	164	159	173	198	191	202	192	176	2,036

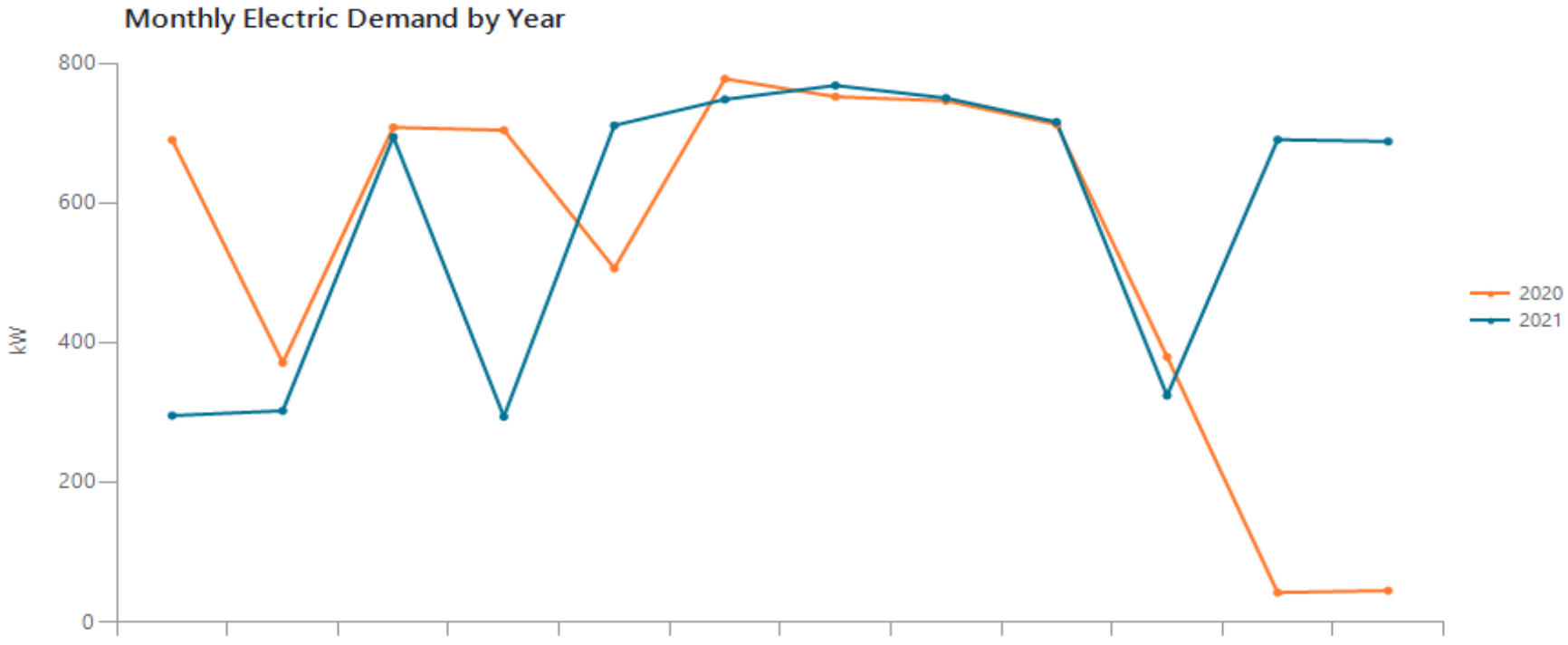
Monthly Electric Demand by Year

[ST (312) - ELEC_PLANT]

Active (kW)
Status

PEPCO
Vendor

Takoma Park, MD, US 20912
Address



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	690	371	708	704	507	777	752	746	712	380	43	46	**6,437**
2021	296	303	694	294	711	748	768	750	716	325	691	688	**6,984**

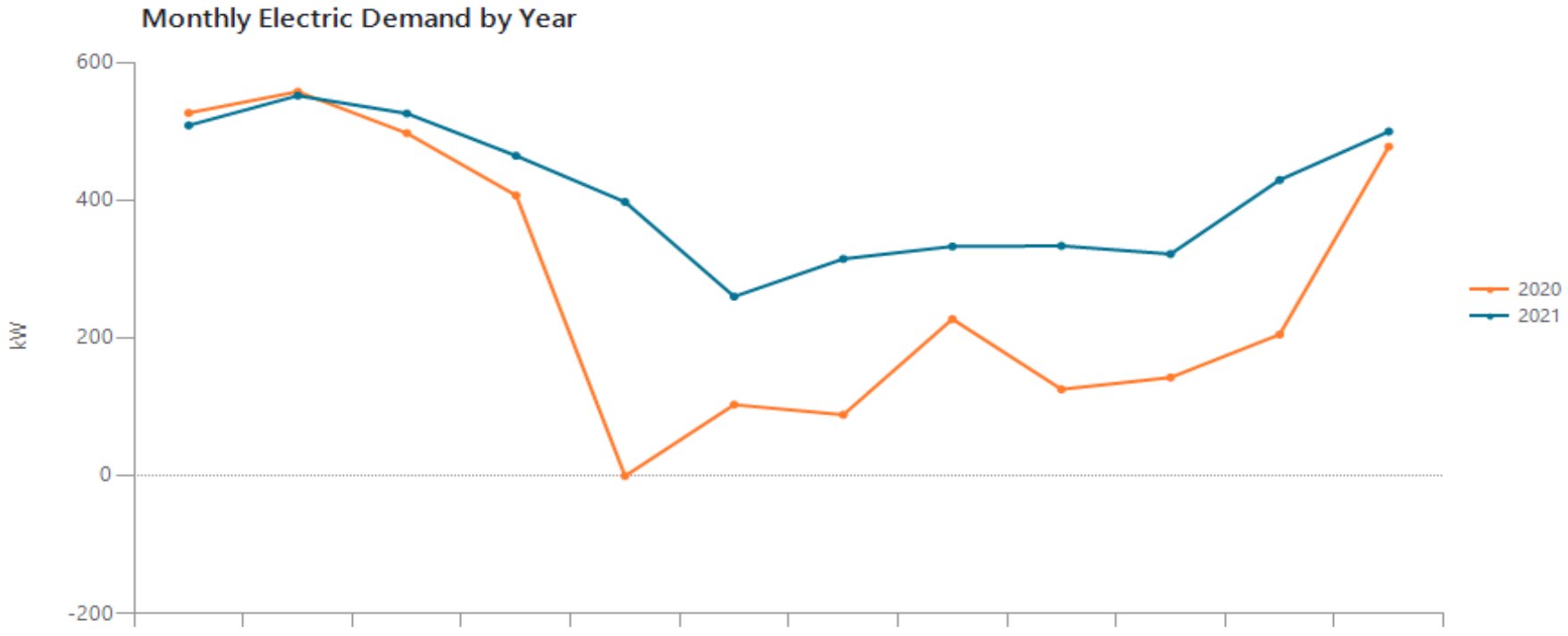
Monthly Electric Demand by Year

[SN (307) - ELEC]

Active (kW)
Status

PEPCO
Vendor

Takoma Park, MD, US 20912
Address



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	527	557	497	407	0	103	89	228	126	143	205	478	3,359
2021	508	552	526	464	397	260	315	333	334	322	429	500	4,940

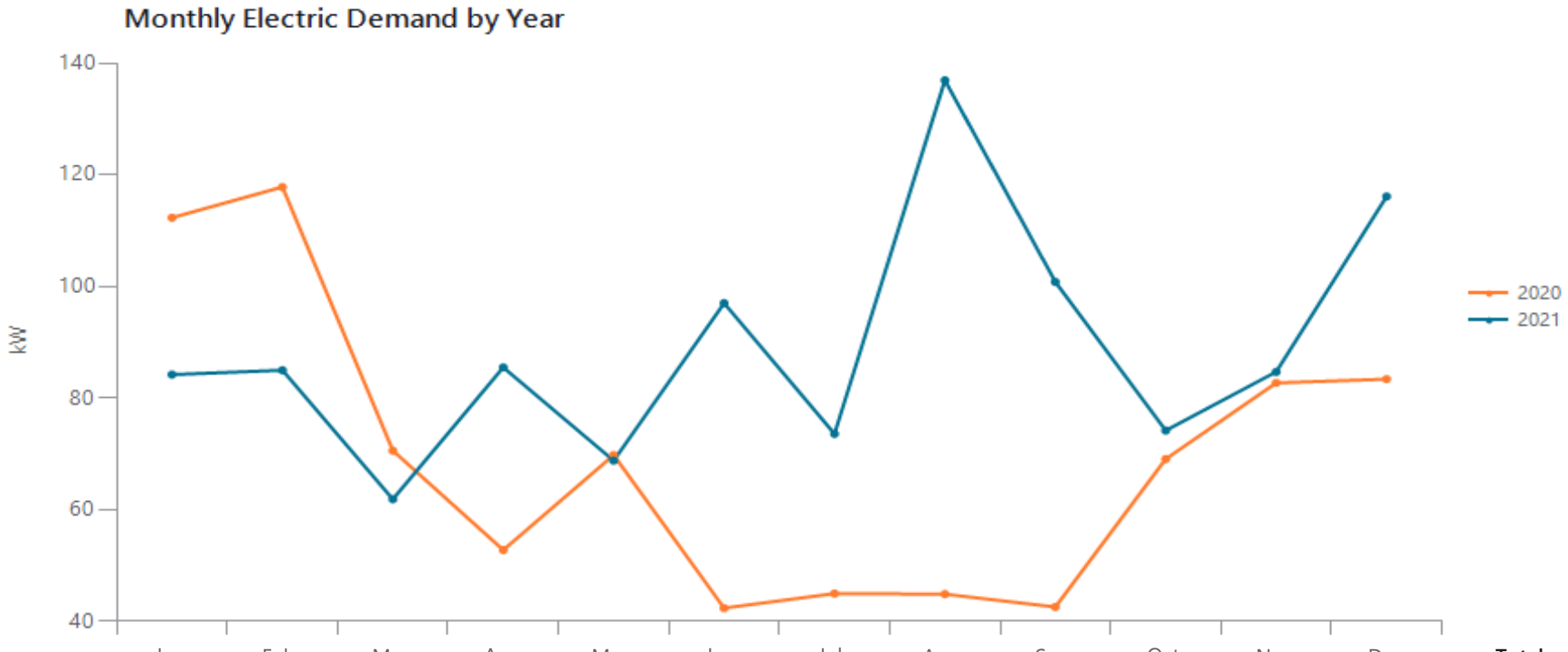
Monthly Electric Demand by Year

[RC (306) - ELEC]

Active (kW)
Status

PEPCO
Vendor

US 20912
Address

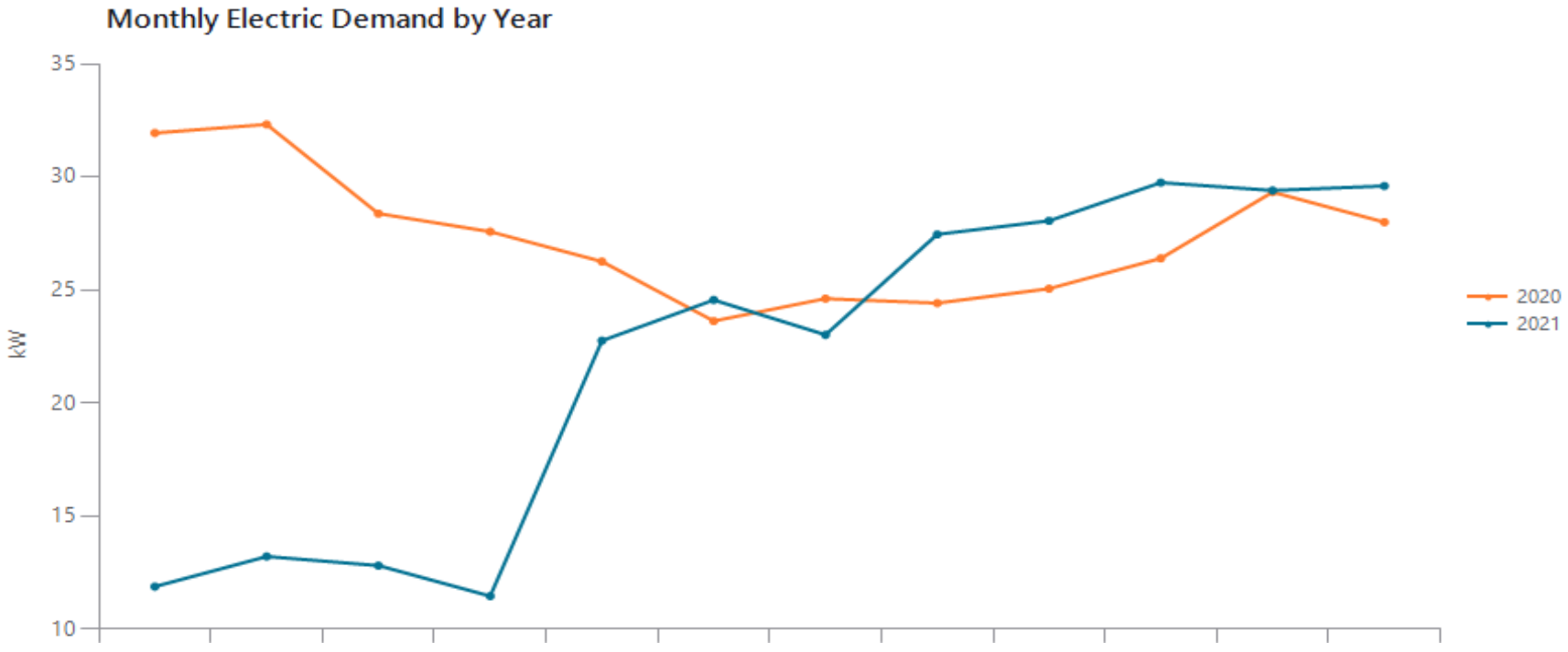


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	112	118	71	53	70	42	45	45	43	69	83	83	833
2021	84	85	62	86	69	97	74	137	101	74	85	116	1,069

Monthly Electric Demand by Year

[EG (314) - ELEC]

Active (kW)	PEPCO	TAKOMA PARK CAMPUS
Status	Vendor	Takoma Park, MD, US 20912
		Address

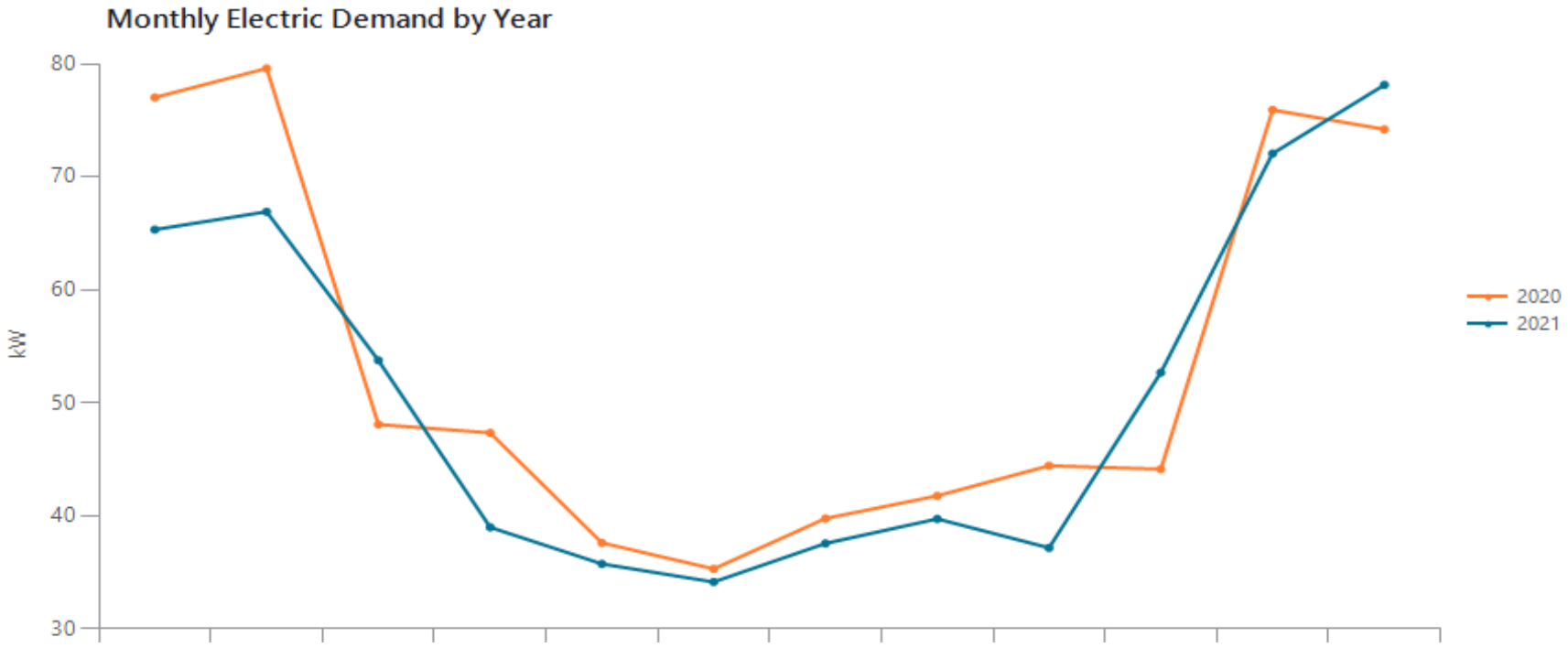


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	32	32	28	28	26	24	25	24	25	26	29	28	328
2021	12	13	13	11	23	25	23	27	28	30	29	30	264

Monthly Electric Demand by Year

[WG (316) - ELEC]

Active (kW)	PEPCO	901 Jesup Blair Drive
Status	Vendor	Silver Spring, MD, US 20910
		Address

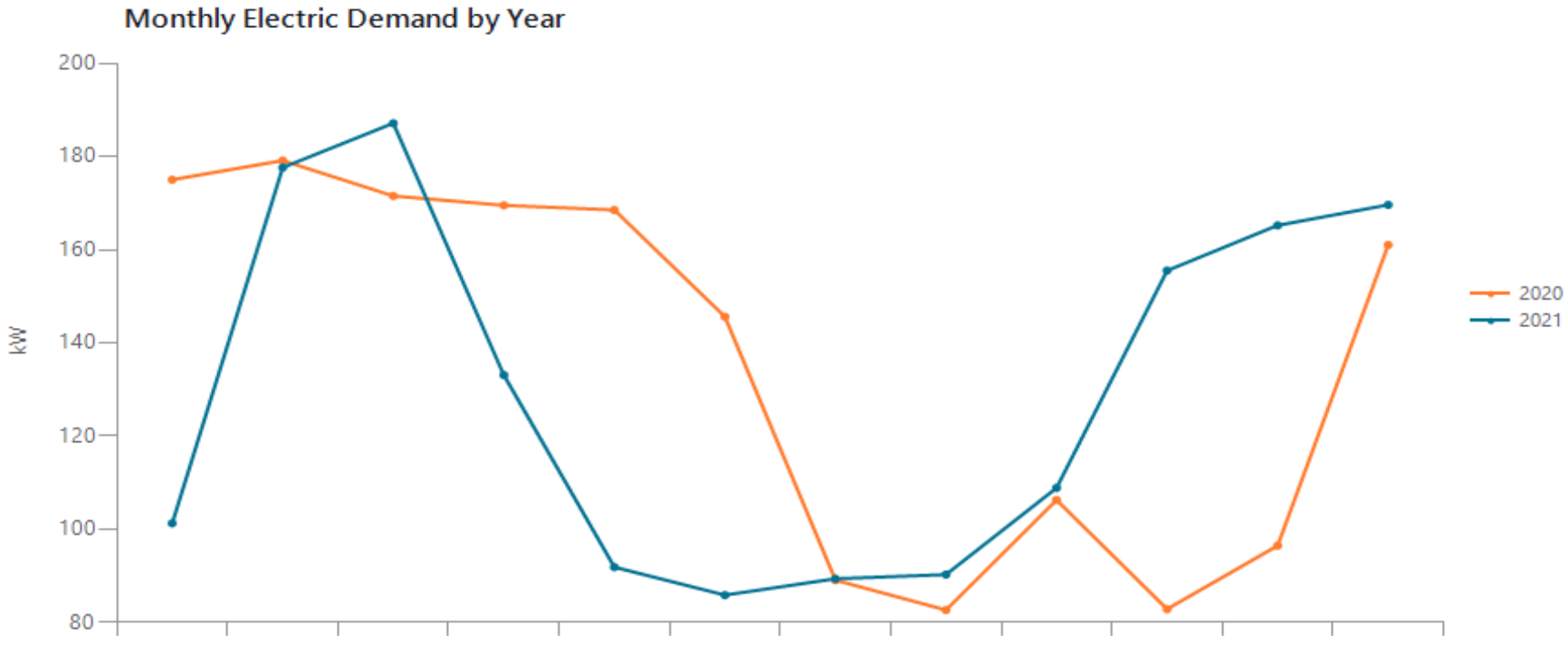


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	77	80	48	47	38	35	40	42	44	44	76	74	645
2021	65	67	54	39	36	34	38	40	37	53	72	78	612

Monthly Electric Demand by Year

[MP/NP (305/318) - ELEC]

Active (kW)	PEPCO	TAKOMA PARK CAMPUS
Status	Vendor	Takoma Park, MD, US 20912
		Address

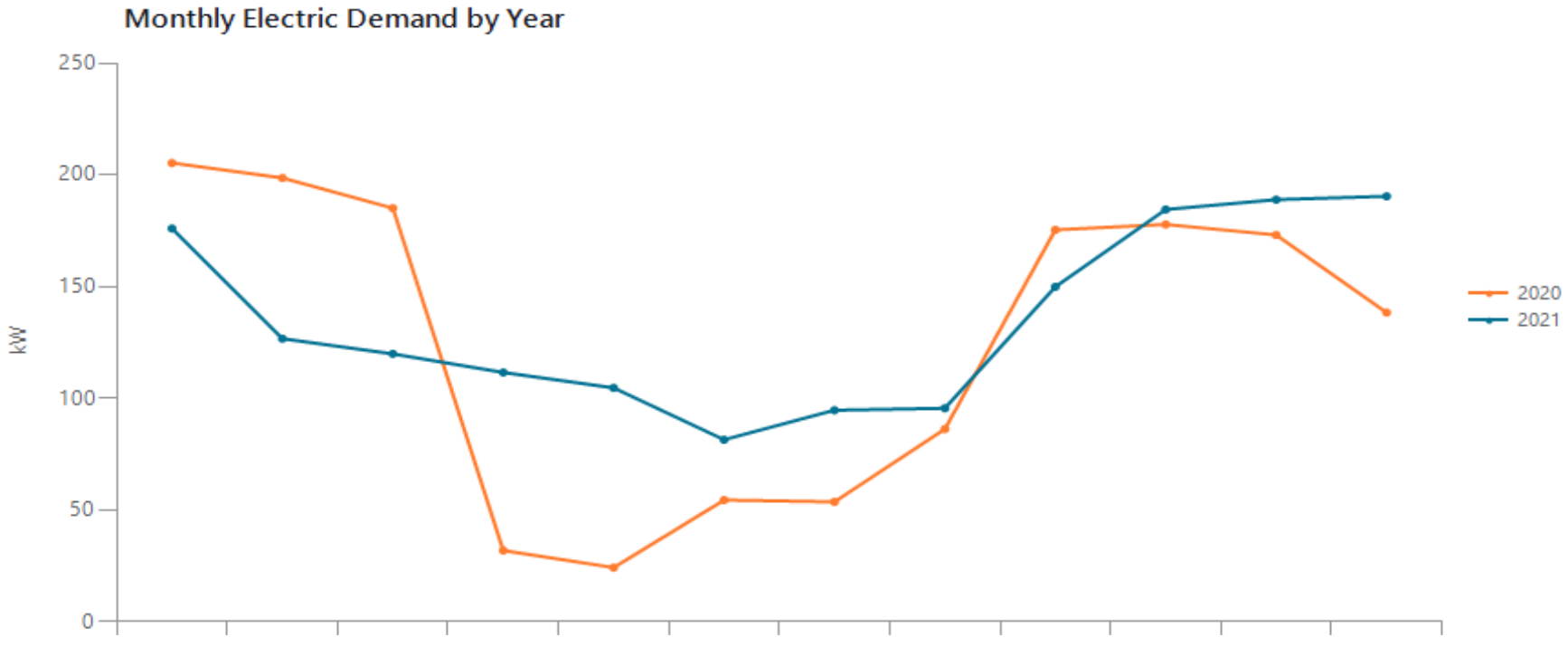


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	175	179	172	170	169	146	89	83	106	83	97	161	1,628
2021	101	178	187	133	92	86	89	90	109	156	165	170	1,556

Monthly Electric Demand by Year

[P1/P2 (304/309) - ELEC]

Active (kW)	PEPCO	TAKOMA PARK CAMPUS
Status	Vendor	Takoma Park, MD, US 20912
		Address

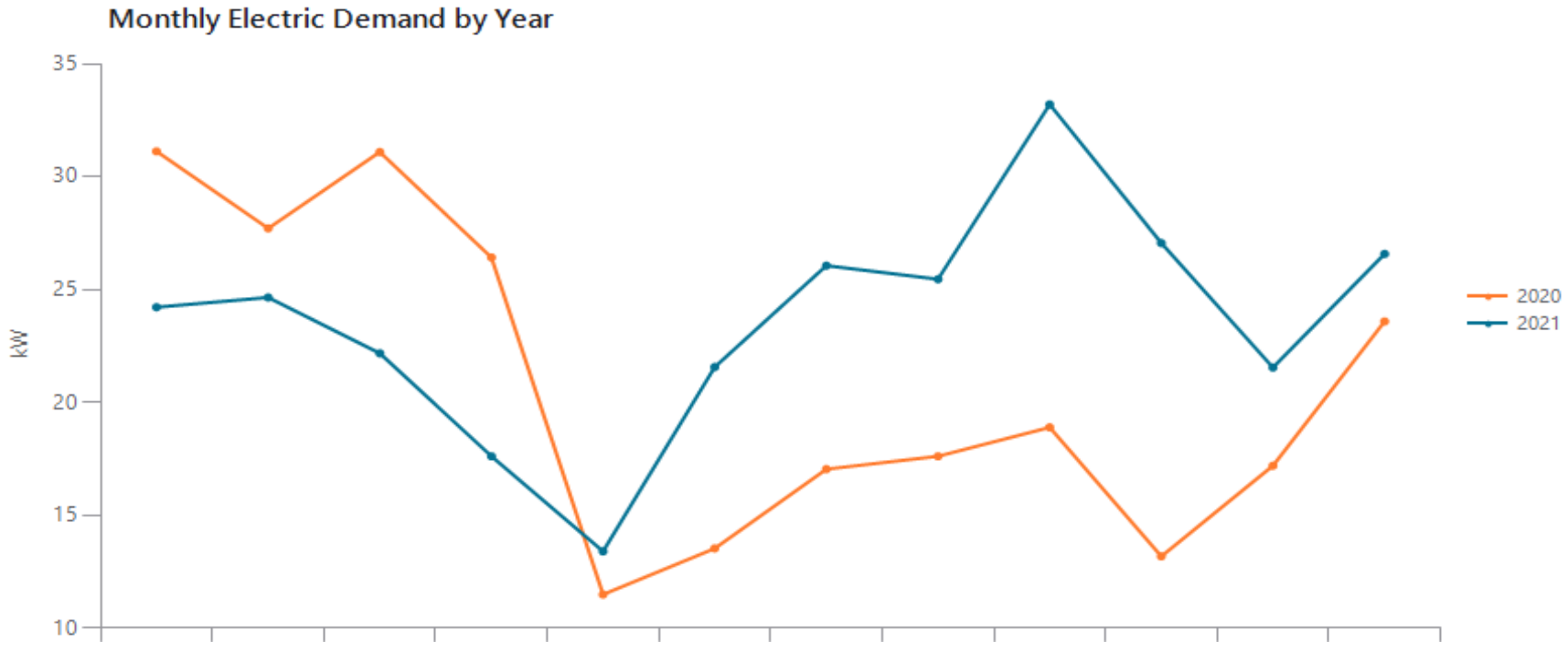


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	205	199	185	32	24	55	54	86	175	178	173	138	1,504
2021	176	127	120	112	105	82	95	96	150	185	189	190	1,624

Monthly Electric Demand by Year

[P4 (302) - ELEC]

Active (kW)	PEPCO	TAKOMA PARK
Status	Vendor	Takoma Park, MD, US 20912
		Address

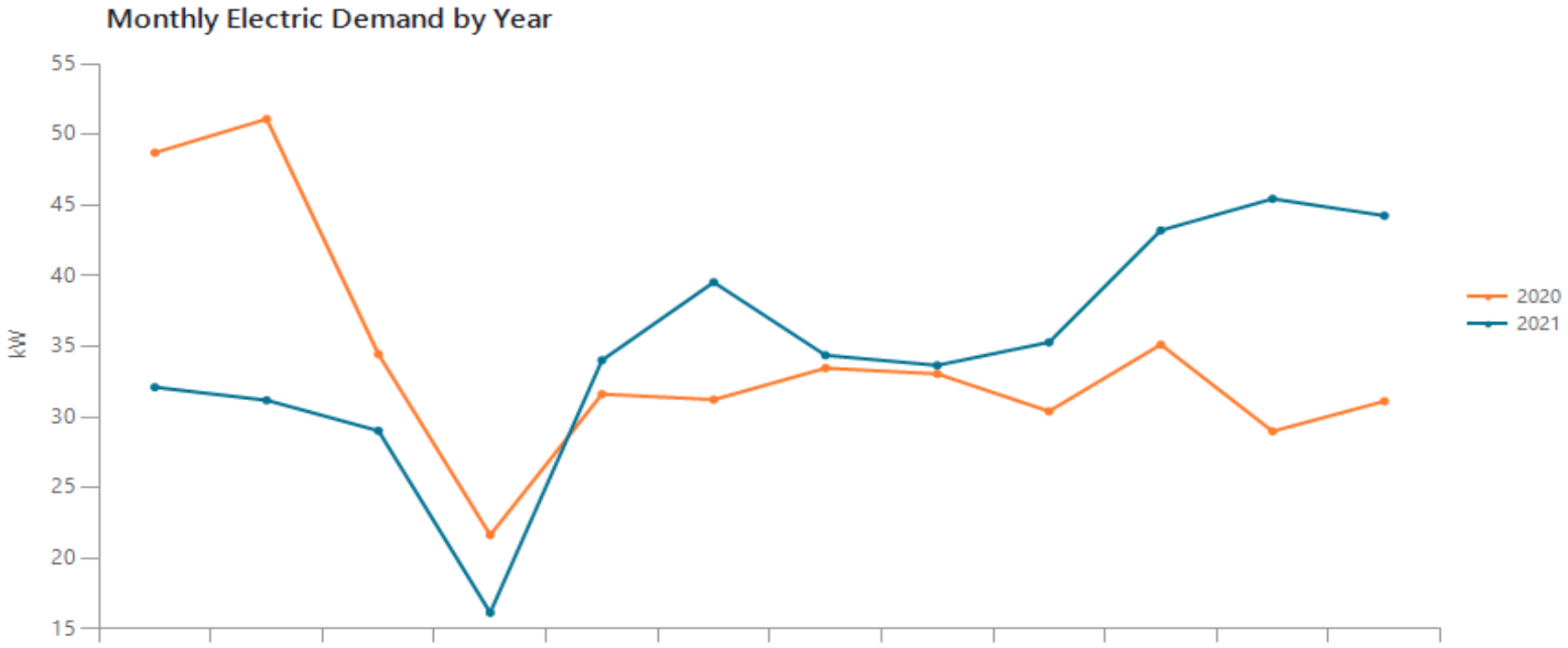


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	31	28	31	26	12	14	17	18	19	13	17	24	**249**
2021	24	25	22	18	13	22	26	25	33	27	22	27	**284**

Monthly Electric Demand by Year

[CM (310) - ELEC]

Active (kW)	PEPCO	TAKOMA PARK CAMPUS
Status	Vendor	US 20912
		Address



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2020	49	51	34	22	32	31	33	33	30	35	29	31	411
2021	32	31	29	16	34	40	34	34	35	43	45	44	418

Monthly Electric Demand by Year

Monthly Trends - Comparing Year-to-Year
Report-01

Wednesday, June 1, 2022 10:37 AM (Eastern Standard Time)

A line chart (with data table) showing monthly data for multiple years and is helpful to compare values across years. Variance filters can be added to highlight exceptions.

Filters Used

- Data Displayed equals Actual
- First Month (1-12) equals 1
- Include Account Charges equals False
- Value Displayed equals Demand
- Account is Active equals True
- Bill is Void equals False
- Billing Period between 202001 and 202112
- Group Data By equals Account
- Topmost Cost Center Code equals TAKOMAPARKPU
- Vendor Name equals PEPCO