



MONTGOMERY COLLEGE

Takoma Park-Silver Spring Campus

Utilities Master Plan Update

Final Report

Wiley|Wilson Commission #211130.03

March 14, 2013



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Contact:
S. M. (Steve) Terry, P.E., LEED AP
Project Manager
434.455.3206 .direct
434.947.1613 .fax
sterry@wileywilson.com

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This report was prepared solely for the use of the Montgomery College for this project. It is a statement of professional opinion based on information available at the time of preparation. It represents conditions at a specific time which is identified in the report and these conditions may change. To develop this report, the standard of care applicable to professional services was used.

EXECUTIVE SUMMARY

INTRODUCTION

Wiley|Wilson was commissioned by Montgomery College to provide Utility Master Plans for all three campuses in 2006. These were based upon buildings included in the 2004 Facilities Master Plan. After completion of the 2006-2016 Facilities Master Plan, Montgomery College engaged Cho Benn Holback + Associates and Wiley|Wilson to update the 2006 UMP to reflect the latest FMP. The 2006 UMP should be consulted for additional background information such as modeling of utilities which was not part of this update and which contains information which is still valid for all three campuses.

The Appendices contain charts and drawings developed as part of this plan.

Changes in existing buildings and proposed buildings contained in the 2006-2016 FMP which are addressed in this UMP update are as follows:

<u>Building</u>	<u>Previous Plan</u>	<u>Current Plan</u>
Cafritz Arts Center	96,050 GSF	Actual 134,748 GSF
West Garage	93,620 GSF	Actual 159,795 GSF
Cultural Arts Center	60,525 GSF	Actual 57,243 GSF
Library Resource Center	99,127 GSF	84,500 GSF
Future High Rise	200,000 GSF	Future Site *
Science/Math Center Ph I	49,000 GSF	51,000 GSF
Science/Math Center Ph II	79,900 GSF	83,600 GSF

*The previous Facilities Master Plan included a future high rise classroom/office building of 200,000 GSF. This site is shown as a potential future expansion site in the 2006-2016 FMP. The allowances for this building made in the 2006 UMP have been included in this update.

This UMP update covers changes in the projected requirements for domestic/fire water, sanitary sewer, storm drainage, heating, cooling, natural gas, compressed air, building automation, and electrical distribution systems. In addition, sections have been added to document existing building fire alarm systems and exterior emergency phones.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This UMP update follows a similar format as the 2006 UMP. It is in six sections with Section 1 containing the Executive Summary and following sections providing detailed discussions of each major utility. The Appendix includes reference materials developed as part of the UMP update. Much of the data in this UMP update was developed during the 2006 UMP and remains accurate. The 2006 UMP contains background information such as computer modeling which was not repeated as part of this update.

Montgomery College has completed four major building projects on campus since 2006, the Student Services Center, Cafritz Arts Center, Cultural Arts Center, and West Garage. The Student Services Center and the Cafritz Arts Center included central heating and cooling plants to serve the East and West Campuses respectively. The utility changes made to accommodate these buildings are documented in this UMP.

A number of recommendations from the 2006 UMP have yet to be implemented and are still valid.

An overview of the most significant findings and recommendations for each utility studied are discussed below. More detailed information is contained in each main report section. Opinions of Probable Cost for recommendations are not in the scope of this Master Plan.

A summary of the building square footages and utility requirements for buildings existing in 2011, and for the proposed future Campus are shown in Tables 1-1 and 1-2 in Appendix Section A. Drawing C-1 also in Appendix Section A shows all of the underground utilities on campus.

WATER SYSTEM

A combined domestic/fire water system on Campus is supplied from the Washington Suburban Sanitary Commission (WSSC) through individual meters to each building. The City system is capable of providing the existing and future volumes of water required for domestic uses. However, the WSSC system does not presently provide the recommended water flow rates needed for fire protection for the un-sprinklered campus buildings. Montgomery College plans to install sprinklers in all new buildings and in existing buildings as they are renovated. After all buildings have sprinklers installed the fire protection flow requirements will be lower and the City system will be capable of meeting fireflow requirements for classroom and office buildings. Insurance Services Organization (ISO) recommended flow rates for fireflows for the parking garages are higher than what can be provided by the City system. Installing sprinkler systems or water storage for the garages would reduce the recommended flow rates within the capability of the City system. The existing water distribution system is adequate to provide for the planned expansions at the Takoma Park/Silver Spring Campus, with the only requirements being connections of new buildings.

EXECUTIVE SUMMARY

SANITARY SEWER SYSTEM

Campus buildings discharge into the Washington Suburban Sanitary Commission (WSSC) sewer system through collector lines on Campus. New collector lines will be installed from the building to the sewer at the street when the future Library Resource Center, Math/Science Center, and high-rise classroom/office buildings are constructed. Otherwise, the existing collector lines have adequate capacity to serve existing and proposed future buildings.

STORMWATER DRAINAGE SYSTEM

Stormwater on the East Campus is partly directed into leaching basins which have failed to provide adequate stormwater drainage. Recommendations are that stormwater be addressed as building construction or renovation projects are implemented. Two alternatives are presented, and combinations of these alternatives should be incorporated into renovations and other building projects. One is to investigate soil conditions and space availability to replace leaching basins in more suitable soils. The other option is to install manufactured stormwater quality structures consisting of underground vaults containing appropriate filters and settling chambers to meet current standards. Unless stormwater issues demand earlier improvements, recommendations are to make these changes as part of building construction or renovation projects.

Stormwater on the West Campus discharges directly into the city system. The areas proposed for future construction are currently impervious paving or existing buildings and the quantity of stormwater is not expected to increase with further development on this campus. Stormwater quality will have to be addressed however, and recommendations are to continue to utilize manufactured stormwater quality structures as recommended above for the East Campus and similar to what was done for recent new construction.

HEATING SYSTEM

The East Campus central heating and cooling plant located in ST serves this building and the recently renovated Commons. Distribution lines have been installed down New York Avenue for connection as part of future renovations of additional existing buildings. Building HVAC systems will also be replaced with units optimized for operation on the central heating and cooling system as part of renovation projects.

The West Campus central heating and cooling plant in CF provides heating hot water to the building and to Cultural Arts. The office in the West Garage is heated using a heat pump and baseboard electric heaters. Capacity and provisions have been provided to serve a future high rise building on West Campus.

EXECUTIVE SUMMARY

Options for application of cogeneration and renewable energy sources such as solar heating and photovoltaic are difficult to justify strictly on economics but costs are decreasing particularly for PV, and we recommend that these technologies be reviewed and considered for future buildings and renovations. Other technologies such as fuel cells are evolving also. It may be practical to design the electrical distribution systems for new buildings to facilitate incorporation of a micro-turbine in the West Campus central plant to provide some generation of electricity and heating. Additional natural gas driven chillers with heat recovery may prove advantageous especially with current and forecast low gas prices.

COOLING SYSTEM

Central heating and cooling plants were constructed in the basements of the Student Services Building (ST) and Cafritz Arts Building (CF) since 2006, and serve the East and West Campuses respectively. Thermal (ice) storage was installed in the ST central plant and modules were installed in the West Garage and connected to the Cafritz central plant. Distribution lines from the ST central plant were installed down New York Avenue and the newly renovated Commons Building has been connected to the central plant. During renovation of other existing buildings and construction of future buildings on the East Campus, they will also be connected to the central plant. Existing rooftop DX HVAC equipment is being replaced as part of building renovations with more efficient systems designed to operate optimally connected to the central plant.

The central chilled water plant in Cafritz was connected to Health Sciences (HS) to provide a backup to the building chillers. Chilled water is also provided from the CF central plant to the new Cultural Arts Building. Provision has been made to connect the CF central plant to a planned future high rise building which is the final new construction contemplated on the West Campus.

The cooling capacities of the central plant are adequate to serve the anticipated future campus loads.

NATURAL GAS

Natural gas usage for both East and West Campus has increased with new buildings and a shift to the central plants. Washington Gas and Light gas system services are adequate for the current and future needs anticipated for the both of the campuses.

EXECUTIVE SUMMARY

COMPRESSED AIR

Air compressors are installed in the Science South Building and in both East and West Campus central plants. A central compressed air distribution system is not provided for either campus. New HVAC systems typically use electrical actuators and require small amounts of compressed air which can be provided by small compressed air systems located in the buildings. Recommendations are to continue to install small compressors and dryers in individual buildings as needed.

BUILDING AUTOMATION

BAS systems exist in some of the campus buildings including HC, CU, WG, CF, ST, CM, SN, and limited in FH as well as the two central plants with modern networked BAS systems. As existing buildings are renovated and new buildings are constructed, Montgomery College plans to replace outdated controls with state-of-the-art, networked BAS systems which can be monitored in the central plants or other remote locations. The new BAS systems should be compliant with the ASHRAE BACnet standards to provide interoperability between equipment provided by different control vendors. The systems will enable more accurate and reliable control of Campus buildings and will provide reductions in energy costs through more optimal equipment operation and monitoring. Expedited replacements in certain buildings may be justified if the present controls become difficult to maintain due to age and parts availability.

ELECTRICAL SYSTEM

The Campus is served by the Potomac Electric Power Company from a combination of overhead and underground distribution lines owned by the utility. Each building is served through separate feeders and meters with the exception of the Student Services Pavilion and the Mathematics Pavilions which are served from other buildings.

Conversations with PEPCO during the 2006 UMP project determined that their system was capable of providing service to meet requirements for planned expansions of the Campus. Their system capabilities as discussed at that time are still adequate to meet currently anticipated future campus requirements.

Some existing building electrical equipment was recommended for replacement during the 2006 UMP due to age and condition, and this recommendation is still valid. Equipment under consideration is in the Electrical Section (Section 6) of this UMP.

In addition to extending the 13.2 kV distribution system and connecting to future buildings, the distribution system should be upgraded to provide loops which can allow buildings to be fed from two directions, minimizing duration of outages.

Metering should be provided in campus buildings where this is not currently installed.

EXECUTIVE SUMMARY

The cost of photovoltaic generation continues to decrease and Montgomery College should periodically monitor the economics of additional capacity as utility rates increase and PV costs decline. Similarly, cogeneration opportunities should be considered such as use of small combustion turbines to generate electricity and heating, and load shifting using natural gas engine driven chillers. The economics of such systems are improved with current low natural gas pricing and with increases in electrical.

Building fire alarm systems will be replaced in existing buildings as part of renovations, using addressable systems connected to a remote UL/NFPA monitoring facility and networked with other Campus fire alarm devices in accordance with Montgomery College's design standards for new and renovated buildings. A number of buildings still have old hard wired systems and these are listed in the Fire Alarm Systems section of this UMP.

This Master Plan includes updated IT infrastructure drawings but a detailed study of the system was not in the scope.

DOMESTIC/FIRE WATER SYSTEM

INTRODUCTION

This Master Plan provides an evaluation of the existing and future water system at the Takoma Park/Silver Spring Campus based on the colleges updated Facilities Master Plan. The Takoma Park/Silver Spring Campus of Montgomery College currently receives all water from the Washington Suburban Sanitary Commission (WSSC) through eleven meters. Meters are placed on water lines to the following buildings: The Commons “CM”; Science South “SS”; Falcon Hall “FH”; Pavilion One “P1” and Pavilion Two “P2”; Mathematics Pavilion “MP”, North Pavilion “NP”; Pavilion Three “P3”; Resource Center “RC”; Pavilion Four P4”; Science North “SN”; and Day Care Center “DC”. The existing Day Care Center “DC” is considered detached from the system and is not included in this analysis. Drawing C-2 shows the existing water lines at the Takoma Park/Silver Spring Campus.

PREVIOUS MASTER PLAN

The 1991 Utilities Master Plan for Takoma Park/Silver Spring, prepared by Wiley|Wilson, analyzed the peak day, peak hour, and fire flow demands for the present and future Campus and WSSC water distribution system through the use of a KYPIPE computer model. The 1991 simulated water distribution system provided enough water for the present and predicted future peak domestic needs of the College. Existing and predicted future fire flow requirements, however, were not met by the existing system. Analysis of several options to increase fire flows to all buildings determined that the Campus would have problems meeting the Insurance Services Organization (ISO) fire flow requirements for buildings without sprinklers.

The 1991 Utilities Master Plan made several recommendations as follows:

1. Relocate existing 8-inch line between Fenton and New York Avenue to allow the construction of the future Student Services Pavilion. This line has been constructed.
2. To remedy the fire flow problem, it was recommended that renovation of the existing buildings include sprinkler systems and booster pumps as soon as possible. Provision of sprinklers during renovation was recommended over a standpipe tank on-site due to space restraints and planned renovations.
3. Installation of a sub meter on the water line to the pool in Falcon Hall, the Physical Education Building was recommended in order to reduce the sewer charges to the College.

An update to the 1991 Utilities Master Plan was performed in 2006. The 2006 Utilities Master Plan provided a comprehensive evaluation of the existing, proposed, and future water system at the Takoma Park/Silver Spring Campus. The plan identified peak domestic and fire flow system demands, reviewed current and future capacity of the Campus and WSSC mains, determined fire flow requirements for all existing and proposed buildings, evaluated the ability of the distribution system, including fire hydrants, to meet existing and future requirements. The 2006 study confirmed the findings of the 1991 plan through discussions with WSSC regarding maximum fire flow delivery capacity for their system.

DOMESTIC/FIRE WATER SYSTEM

EXISTING DOMESTIC/FIRE WATER SYSTEM

The existing distribution system is shown on Drawing C-2. The Campus is served by North Woodside Tank, a 7.5 mg standpipe tank on Georgia Avenue approximately 2 miles northwest of Campus. From the tank, the water travels through an 8-inch line in Takoma Avenue, a 10-inch line in New York Avenue, and a 10-inch line in Chicago Avenue to deliver water through Campus water meters to the respective buildings. The distribution system is owned by WSSC. The College owns, operates, and maintains the system downstream of the meters. The routings for new service lines must be adjusted to accommodate planned building additions with the updated Facilities Master Plan. These improvements will be discussed in subsequent sections of this report.

FUTURE DOMESTIC/FIRE WATER SYSTEM

Based on the 1991 computer model and the 2006 update, the water distribution system provided enough water for the present and predicted future peak domestic needs of the College. All alternatives to increase fire flows produced low available fire flows ranging from approximately 1,000 GPM to 1,400 GPM. These low flows were due to large head losses in the 20-inch and 16-inch lines between the tank and College system. The College system itself experienced only small head losses. Therefore it was concluded that the only way to increase fire flows to the existing Campus was by building an elevated storage tank on site. However, the addition of sprinkler systems to new and renovated buildings could reduce fire flow requirements and is planned for future improvements. Future water system improvements are shown on drawing C-3 and include service connections for new and renovated buildings as well as sprinkler systems for all building improvements.

SUMMARY AND RECOMMENDATIONS

The conclusions and recommendations from the 1991 study remained applicable in 2006 and are still applicable. The 2006 study further recommended the installation of sprinklers in all new and renovated buildings which Montgomery College intends to do. The only building existing in 2006 not planned to be renovated or replaced was the East Parking Garage. On-site storage would be required to meet the garage design fire flow of 3,500 GPM for 3 hours. ISO recommendations for providing a sprinkler system or on-site fire water storage to protect the Parking Garage are just that, a recommendation and not a code requirement. Compliance with ISO recommendations could normally affect insurance premiums, but since Montgomery College is self-insured this does not apply. Our recommended compliance with this recommendation as a good engineering practice remains valid.

SANITARY SEWER SYSTEM

INTRODUCTION

This Master Plan provides an evaluation of the existing and future sanitary sewer system at the Takoma Park/Silver Spring Campus based on the colleges updated Facilities Master Plan. The College owns and maintains its own sanitary sewer collection system as shown on drawing C-4. The current Day Care Center is considered detached from the Campus and is not included in this analysis.

PREVIOUS MASTER PLAN

The 1991 Utilities Master Plan for the Takoma Park/Silver Spring Campus, done by Wiley|Wilson, concluded the following:

1. Under present and future peak flow conditions, the overall College owned sewer collection system is adequate.
2. The Washington Suburban Sanitary Commission (WSSC) owned sewer collection system can adequately convey existing peak flows, and only one pipe section of the WSSC owned system was under capacity for future peak flows. The plan recommended that the WSSC be notified so that they could plan improvements to their sewer collection system for the future expansion of the College. This recommendation for WSSC improvements has been completed.

The 2006 Utilities Master Plan provided an extensive evaluation of the sanitary sewer system. Sewer modeling software was used to estimate the flows for each pipe section in the sanitary sewer collection system. Sewer data regarding line size and slope was obtained from field survey and available plans. The 2006 study offered the following summary and recommendations. The Campus lines provided for the existing, proposed, and future Campus connections are adequate for Campus flows. The downstream WSSC lines have sufficient capacity to carry existing, proposed and future Campus flows, without affecting the Campus capacity.

EXISTING SANITARY SEWER SYSTEM

The existing sanitary sewer system consists of several small collector systems that collect flows from many building collection lines. These collector systems convey flows into the Washington Suburban Sanitary Commission (WSSC) collection system at various locations along New York, Chicago, and Georgia Avenues. The lines which service the eastern Campus buildings, with the exception of the Day Care and Pavilions 1 & 4, flow to the WSSC collection system along New York Avenue and ultimately pass the Takoma Avenue and New York Avenue intersection. The collection line that serves Pavilions 1 & 4 flows into the WSSC collection system along Chicago Avenue and eventually into the WSSC sewer line in Boston Avenue. The New York Avenue line and Boston Avenue line join at the intersection of Piney Branch Road, Boston Avenue and Baltimore Avenue and from there continue to the WSSC system. Additional service lines will

SANITARY SEWER SYSTEM

need to be installed to serve future building improvements. These improvements will be discussed in subsequent sections of this report.

FUTURE SANITARY SEWER

Previous analysis of the sanitary sewer system indicated that both Campus lines and the WSSC system are adequate for all future Campus improvements. Therefore, future system improvements, as shown on Drawing C-5 included in Appendix B, consist of providing new service connections for new and renovated buildings to coincide with planned improvements.

SUMMARY AND RECOMMENDATIONS

The Campus lines provide for the existing and future Campus connections are adequate for Campus flows. The downstream WSSC lines have sufficient capacity to carry existing and future Campus flows, without affecting Campus capacity.

STORM DRAINAGE SYSTEM

INTRODUCTION

This Master Plan provides an evaluation of the existing and future storm sewer system at the Takoma Park/Silver Spring Campus based on the colleges 2006-2016 Facilities Master Plan. The Campus consists of two areas, divided by railroad tracks, identified in this study as the East Campus and West Campus. The East Campus is east of the railroad tracks and within the area encompassed by Chicago Avenue, Philadelphia Avenue, Fenton Street, and New York Avenue as shown on the existing storm system Drawing C-6. The West Campus is west of the railroad tracks and within the area encompassed by Jessup Blair Avenue, Georgia Avenue, Burlington Avenue, and King Street also shown on Drawing C-6.

PREVIOUS STUDY

A comprehensive analysis of the existing storm drainage system was performed for the 2006 Utilities Master Plan prepared by Wiley|Wilson. The criterion used in this study to evaluate the storm drainage system was taken from the 2000 Maryland Stormwater Design Manual. The evaluation criteria included the following items:

1. Stormwater conveyance structure capacity of pipes, inlets, and culverts are analyzed with the 10-year flood event.
2. Statewide Stormwater Sizing Criteria
 - a. Water Quality Volume (WQv)
 - b. Recharge Volume (Rev)
 - c. Channel Protection Storage Volume (Cpv)
 - d. Overbank Flood Protection Volume (Qp)
 - e. Extreme Flood Volume (Qf)

Summary and recommendations from the 2006 Utilities Master Plan are listed below.

East Campus

Correction of failing leaching galleries is the primary upgrade recommended to the East Campus drainage system. These infiltration type devices typically fail due to low permeability rates of the surrounding soils. It is recommended that this issue be studied further to determine adequate solutions to resolve this issue.

West Campus

Although there are no flooding issues, stormwater quality will be a necessary component of the proposed storm water system in order to meet the state stormwater management requirements. Since the West Campus is densely occupied with structures, there is no available space for vegetative measures to accommodate stormwater quality treatment. It is likely that a manufactured structure will be required to meet the stormwater quality requirements for the proposed construction on the West Campus.

STORM DRAINAGE SYSTEM

DRAINAGE AREA CHARACTERISTICS

East Campus

The existing East Campus drainage area is highly impervious, with a large percentage of the ground cover condition consisting of buildings and structures. Stormwater runoff from this area drains in a southeasterly direction towards the intersection of New York Avenue and Takoma Avenue.

West Campus

The existing West Campus drainage area is also highly impervious, with a large percentage of the ground cover condition consisting of buildings and structures. The building previously located at the southeast corner of Georgia Avenue and Burlington Avenue was demolished in preparation for the construction of the Cultural Arts Center (CU).

EXISTING STORM DRAINAGE SYSTEM

East Campus

The East Campus storm drainage system consists of leeching galleries, inlets and pipes. Several buildings drain into leeching galleries, including Pavilion One “P1” and Pavilion Two “P2”, Pavilion Three “P3”, North Pavilion “NP” and Mathematics Pavilion “MP”, Resource Center “RC”, Science North “SN”, and The Commons “CM”. Several buildings drain into storm sewers that connect to the city system, including Pavilion Four “P4”, Science South “SS”, Falcon Hall “FH”, and Student Services “ST”.

West Campus

There is not a major storm drainage system on the West Campus. Runoff primarily drains into the existing city system from yard drains, lateral pipes, and roof drains within the West Campus site. Recent construction projects utilized manufactured storm water quality structures.

FUTURE STORM SEWER SYSTEM

Drawing C-7 included in Appendix B shows the future campus storm water system.

East Campus

The East Campus future improvements consist of replacing and renovating existing buildings. Based on information provided by Montgomery College personnel during the 2006 study, the leeching galleries around the buildings in the East Campus are failing. This issue should be studied further to determine the adequacy of the soils surrounding the leeching galleries and the availability of suitable soils on-site. Unless this drainage issue is uncontrollable or is the source of other problems on-site, it would be more cost effective to include stormwater quality measures during future building improvements. A combination of infiltration basins and underground detention/filtration would aid in resolving the issue of the failing leeching galleries.

STORM DRAINAGE SYSTEM

West Campus

The routings for existing storm lines were adjusted during the construction of the new Cultural Arts Center “CU” and the West Garage “WG”. The future site improvements are not considered to contribute additional stormwater volume since the future building is located within an impervious area. Other future improvements consist of renovations to existing buildings and therefore will not increase stormwater volumes. Future adjustments will be necessary and new systems installed to address stormwater quality requirements for the planned building additions/renovations with the 2006-2016 Facilities Master Plan.

SUMMARY AND RECOMMENDATIONS

East Campus

The East Campus storm drainage system consists of leeching galleries, inlets, and pipes. Based on information provided by Montgomery College personnel during the 2006 study, the leeching galleries are failing. The storm system model performed during the 2006 study indicated that the existing inlets and pipe systems are inadequate assuming the leeching galleries have failed. Therefore, planned improvements on the East Campus should include correction of the failing leeching galleries. Diagnosing the exact nature of the problem is beyond the scope of this study; however, these infiltration type devices typically fail due to low permeability rates of the surrounding soils.

West Campus

The West Campus is a highly impervious area that is densely occupied with structures. Although planned improvements are within existing impervious areas stormwater quality will be a necessary component of the proposed storm water system. Because of the limited space in the West Campus, stormwater quality requirements will most likely be met with the use of manufactured stormwater quality structures.

MECHANICAL SYSTEMS

SCOPE

This portion of the Montgomery College, Takoma Park/Silver Spring Campus - Utility Master Plan (UMP) addresses the following Campus mechanical systems:

- Heating Water Systems
- Chilled Water System
- Natural Gas System
- Compressed Air/Instrument Air Systems
- Building Automation System

This Mechanical Systems Master Plan meets the following objectives:

1. Updates additions and modifications to the existing mechanical systems for the existing Campus.
2. Documents the current configuration and capacity of the existing heating and cooling systems for the existing Campus.
3. Provides recommendations to improve the performance of the existing central plant and distribution systems to meet heating hot water, chilled water-cooling, natural gas, compressed air demands, and new building automation.
4. Identifies modifications needed to the existing central plant and mechanical distribution systems to serve future building projects including renovations and/or additions to existing buildings and new building construction.

INTRODUCTION

This section of the updated UMP describes the existing heating systems for both the East and West Takoma Park/Silver Spring Campuses and updates the available heating and cooling data related to the major portions of both areas. A “snapshot” of the existing conditions within the central plants and each distribution system is defined to establish a benchmark for system performance and necessary modifications to serve future needs. The current mechanical systems are updated from the previous 2006 UMP, reviewed for distribution impacts, and recommendations developed for modifications to accommodate planned future Campus requirements.

Based on the existing system conditions, present Campus loads, and the anticipated construction projects outlined in the Cho Benn Holback + Associates (CBH+A) 2006 Facility Master Plan (FMP), improvements and/or new construction items are determined for the 2006-2016 timeframe to correct deficiencies and provide for sufficient system capacity for pending Campus expansion. Future Campus expansion requirements are provided from the CBH+A FMP document and suggested mechanical system construction projects are outlined to address the Campus expansion that could occur in the 2006-2016 timeframe.

MECHANICAL SYSTEMS

Wiley|Wilson provided the 2006 UMP for the Tacoma Park/Silver Spring Campus as an update from the original 1991 document. As of 2006, the Campus buildings HVAC consisted of decentralized systems with most buildings using packaged rooftop units and electric heating coils or oil-fired heaters. The HC pulse combustion boilers were replaced with Aerco module high efficiency modulating boilers in November 2011. Cooling requirements were also met with the central air handling units.

In 2007, a high performance East Campus heating and cooling central plant was installed in the basement level of the ST. The plant includes rotary screw chillers, a natural gas engine driven chiller, ice storage, and natural gas-fired condensing boilers. In 2008, an identical central plant for the West Campus was installed as part of the redevelopment of the King Street Arts Center which is now the CF. This central plant provides heating and chilled water for both CF and the CU. HC has a satellite chiller which is connected through an underground distribution system to the central plant in CF. Since HC has its own hot water boilers, it is not tied-in to the central plant hot water distribution system.

HEATING SYSTEMS (HWS/R)

PREVIOUS STUDY

When the 2006 UMP was performed by Wiley|Wilson for Montgomery College, 12 of the 13 East Campus buildings had packaged, rooftop-mounted, air-conditioning units or split-system heat pumps with electric heat. At the time, the existing HVAC units were all original equipment and installed when each building was constructed at the site. The first set of buildings was constructed in the 1974-1975 timeframe. The second set, around 1978, the former Communication Arts Center Building (now P4) and EG were constructed in 1980, and then the HC in 2004. During that 2006 UMP period, Wiley|Wilson focused primarily on centralizing the heating and cooling systems and removal of the unitary, rooftop air-conditioners/heat pumps. At that time, the installation of an East Campus heating and cooling central plant in ST was under construction and included the use of thermal storage. Following this was the construction of a West Campus heating and cooling central plant in the CF. Wiley|Wilson's final recommendation was to install updated BAS controls in all buildings as part of building renovations or when existing controls can no longer be maintained due to age and parts availability.

EXISTING HEATING SYSTEMS

Table 1 below is a summary of the "Existing Heating Loads" for the Tacoma Park/Silver Spring East and West Campuses. The information contained in the chart is based partly on previous estimates, field data from the 2006 UMP and updates from new construction. The information includes the renovated CF and the new CU.

MECHANICAL SYSTEMS

Table 1							
Montgomery College - Takoma Park/Silver Spring Campus							
2012 "Existing" Heating Loads / Factors							
Building Number	Building Code	Current Building Name	Building Function	Year Built	Size (GSF)	Heating Load Factor (Btu/GSF)	Design Heating Load (MBH)
Existing Utility Conditions (2011)							
301	DC	Child Care Center	Child Care	1924	3,310	35	116
302	P4	Pavilion 4	Classrooms, Labs, Offices, Theater	1980	15,873	35	556
303	FH	Falcon Hall	Classrooms, Offices, Gym, Pool, Fitness Center	1978	39,063	45	1,758
304	P1	Pavilion 1	Computer Labs, Offices	1975	7,386	30	222
305	MP	Mathematics Pavilion	Classrooms, Labs, Offices	1975	6,942	35	243
306	RC	Resource Center	Library, Classrooms, IT Center, Offices	1978	44,906	30	1,347
307	SN	Science North	Classrooms, Labs, Offices, Facilities Maint. Shops	1978	39,950	40	1,598
308	SS	Science South	Classrooms, Labs, Planetarium, Offices	1962	23,757	35	831
309	P2	Pavilion 2	Physical Plant Offices	1975	7,385	30	222
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	25,070	30	752
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	98,038	25	2,451
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	110,504	30	3,315
312	-	ST - East Campus Central Plant	East Campus Central Heating and Cooling Plant	2007	-	---	---
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	134,748	21	2,880
313	-	CF - West Campus Central Plant	West Campus Central Heating and Cooling Plant	2007	-	---	---
314	EG	East Garage	Parking, 665 spaces	1980	224,310	---	---
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	57,243	26	1,480
316	WG	West Garage	Parking, 357 spaces, Ice Storage Units	2010	151,490	---	---
317	P3	Pavilion 3 (Humanities)	Classrooms, Offices	1975	15,013	30	450
318	NP	North Pavilion	Classrooms, Labs, Offices, Construction PM Office	1975	6,942	35	243
					Total Connected Bldg Loads	636,130	18,463
					Total ST-Central Plant Load	135,574	4,067
					Total CF-Central Plant Load	191,991	4,359
					Campus Block Loads		13,847

Most of the existing equipment that was recommended to be replaced in the previous UMP is still in operation. All of the East Campus, except for two buildings, is heated by a combination of exterior baseboard heat, electric re-heat coils, and primary electric heater coils located within the unitary, multi-zone, rooftop HVAC units.

The East Campus central plant, located in the ST basement, has six, high efficiency, condensing natural gas-fired boilers. Each boiler is nominally rated at 2,000 MBH and net heating output of approximately 1,800 MBH. The natural gas engine driven chiller can be used for co-generation and produce chilled water and capture waste heat for heating hot water. The plant has sufficient capacity to serve all of the buildings on the East Campus. Hot water is currently distributed to ST and the renovated CM.

The West Campus central plant, located in the CF basement, is essentially identical to the East Campus plant. Hot water is distributed to CF and CU. The HC has an independent condensing boiler system.

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Pavilion Four and FH use No. 2 heating oil as their primary heat energy source. Two of the original “Nesbitt RMA” packaged, rooftop units on the RC roof were replaced in 2000/2001.



At the moment, the West Campus is comprised of three buildings plus the West Parking Garage. The HC was completed in late 2004 and has two, highly efficient, condensing, natural gas-fired boilers. The former “Giant Bakery or KSAC Building” has been renovated and is now the CF. The new CU was constructed to the north of CF and HC and was completed in 2009.

HEATING SYSTEMS DEFICIENCIES

The most significant issue that stands out with regard to existing heating systems performance is age. Most of the main HVAC units range in age from 31 to 38 years. ASHRAE guidelines for this type of equipment (multi-zone, rooftop units) indicate that the expected median service life for these units should be 15 years.



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“FUTURE” HEATING REQUIREMENTS

Table 2 below is a summary of the “Future” anticipated heating loads for the existing East Campus and presently growing West Campus. The information included on the chart is based on data gathered from the CBH +A “Overall Facility Master Plan” from 2010, previous discussions with Montgomery College’s Administration regarding envisioned building use, general incorporation of updated code requirements and comparison to the 2006 Utility Master Plan estimates.

Table 2							
Montgomery College - Takoma Park/Silver Spring Campus							
2012 "Future" Heating Loads / Factors							
Building Number	Building Code	Current Building Name	Building Function	Year Built	Size (GSF)	Heating Load Factor (Btu/GSF)	Design Heating Load (MBH)
317	P3	Pavilion 3 (Humanities)	Classrooms, Offices	1975	15,013	30	450
304	P1	Pavilion 1 (Information Sciences), Renov.	Computer Labs, Offices	1975	7,386		443
309	P2	Pavilion 2 (Student Services Pavilion)	Physical Plant Offices	1975	7,385	30	
302	P4	Pavilion 4 (Comm. Arts), Renov./Add.	Classrooms, Labs, Offices, Theater	1980	20,000	35	556
301	DC	Child Care Center, Vacated	Child Care	1924	3,310	-	-
314	EG	East Campus Garage	Parking, 665 spaces	1980	224,310	-	-
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	98,038	24	2,353
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	110,504	30	3,315
312	ST	East Campus Central Plant in ST	East Campus Central Heating and Cooling Plant			-	-
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	3,694	-	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	134,748	30	4,042
313	CF	West Campus Central Plant in CF	West Campus Central Heating and Cooling Plant	2007		-	-
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	57,243	30	1,717
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	159,795	-	-
TBD	TBD	Science and Math Center Phase I	Classrooms and Labs	2020	51,000	30	1,530
TBD	TBD	Science and Math Center Phase II	Classrooms and Labs	TBD	83,600	30	2,508
TBD	TBD	Library Resource Center	Library	TBD	84,500	30	2,535
TBD	TBD	New Child Care Center, size is NASF	Child Care	TBD	4,285	30	129
TBD	TBD	Future High Rise Building	Classrooms and Offices	TBD	200,000	30	6,000
					Total Connected Bldg Loads	1,340,528	28,372
					Total ST-Central Plant Block Load		10,694
					Total CF-Central Plant Block Load		8,820
					Campus Block Loads		21,279

The West Campus building construction and renovation is essentially complete except for one future building site. The central heating plant in CF has adequate capacity for the future building. The HC building will continue to have an independent high efficiency condensing boiler system.

All of the East Campus buildings except the ST and CM will either be renovated or demolished and replaced with new buildings. The central heating plant in ST has adequate capacity for the future building construction projects. An East Campus distribution piping system has been installed along New York Avenue and buildings will be connected to this system as they are

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completed or renovated. The CM building renovation was completed in 2009 and was the first outlying building connected to the ST central plant.

COOLING SYSTEMS (CHWS/R)

INTRODUCTION

This section of the updated UMP describes the existing cooling systems for both the “East” and “West” Takoma Park/Silver Spring Campuses and reviews the available cooling data related to the major portions of both areas.

PREVIOUS STUDY

When the 2006 UMP was performed by Wiley|Wilson for Montgomery College, 12 of the 13 East Campus buildings had packaged, rooftop-mounted, air-conditioning or split-system heat pumps units with direct expansion (DX) refrigerant cooling. At the time, the existing HVAC was all original equipment and installed when each building was constructed at the site. During the 2006 UMP period, Wiley|Wilson primarily recommended centralizing the heating and cooling systems and removal of the unitary, rooftop air-conditioners/heat pumps. At that time, the construction of an East Campus central heating and cooling central plant in ST was in progress and included the use of thermal storage. Wiley|Wilson’s final recommendation was to install updated BAS controls in all buildings as part of building renovations or when existing controls can no longer be maintained due to age and parts availability.

EXISTING COOLING SYSTEMS

Table 3 below is a summary of the “Existing Cooling Loads” for the Takoma Park/Silver Spring East and West Campuses. The information contained in the chart is based partly on previous estimates, field data from the 2006 UMP and updates from new construction. The information includes the renovated CF and the new CU.

Most of the existing equipment that was recommended to be replaced in the previous UMP is still in operation. The rooftop HVAC units installed on the original six buildings in 1974-75 are packaged, Mammoth “Adapta-Zone”, DX cooling units with electric heat.

These units were designed with a range of multiple zones from 6 to 10 depending on the size and configuration of the building and they typically serve the entire structure. During the 1978 Campus expansion, the



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packaged, rooftop units were a mix of Mammoth "RMZ" or Nesbitt "RMA" devices. These too are multi-zone, DX type devices but, instead of serving the entire building, they are typically designed to cool a specific wing or floor of the structure Two of the original "Nesbitt - RMA" packaged rooftop units on the RC were replaced in 2000/2001 with two new "Mammoth - RMZ" type devices.

Table 3							
Montgomery College - Takoma Park/Silver Spring Campus							
2012 "Existing" Cooling Loads / Factors							
Building Number	Building Code	Current Building Name	Building Function	Year Built	Building Size (GSF)	Cooling Load Factor (Btu/SGF)	Design Cooling Load (Tons R)
Existing Utility Conditions (2011)							
301	DC	Child Care Center	Child Care	1924	3,310	36	10
302	P4	Pavilion 4	Classrooms, Labs, Offices, Theater	1980	15,873	42	55
303	FH	Falcon Hall	Classrooms, Offices, Gym, Pool, Fitness Center	1978	39,063	35	115
304	P1	Pavilion 1	Computer Labs, Offices	1975	7,386	37	22
305	MP	Mathematics Pavilion	Classrooms, Labs, Offices	1975	6,942	35	20
306	RC	Resource Center	Library, Classrooms, IT Center, Offices	1978	44,906	40	150
307	SN	Science North	Classrooms, Labs, Offices, Facilities Maint. Shops	1978	39,950	45	150
308	SS	Science South	Classrooms, Labs, Planetarium, Offices	1962	23,757	30	60
309	P2	Pavilion 2	Physical Plant Offices	1975	7,385	37	22
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	25,070	41	85
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	98,038	25	200
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions, *	2007	110,504	34	295
312	-	ST - East Campus Central Plant	East Campus Central Heating and Cooling Plant	2007	-	---	---
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking, **	1947	134,748	32	350
313	-	CF - West Campus Central Plant	West Campus Central Heating and Cooling Plant	2007	-	---	---
314	EG	East Garage	Parking, 665 spaces	1980	224,310	---	---
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	57,243	34	160
316	WG	West Garage	Parking, 357 spaces, Ice Storage Units	2010	151,490	---	---
317	P3	Pavilion 3 (Humanities)	Classrooms, Offices	1975	15,013	36	45
318	NP	North Pavilion	Classrooms, Labs, Offices, Construction PM Office	1975	6,942	35	20
					Total Connected Bldg Loads	636,130	1,760
					Total ST-Central Plant Load	135,574	380
					Total CF-Central Plant Load	191,991	510
					Campus Block Loads		1,320
* Building conditioned space reduced 5,200 SF for CP							
** Building conditioned space reduced 3,300 SF for CP							



The East Campus Central Plant, located in the ST basement, has two high performance electric, rotary screw ammonia refrigeration chillers and one natural gas engine driven chiller. It has six modules for ice thermal storage with a total of 4,565 ton-hours capacity. The cooling tower is a two cell, induced draft, crossflow unit with a total condenser water flow rate of 2,700 GPM. The East Campus central plant has sufficient

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capacity to serve all of the buildings on the East Campus. Chilled water is distributed to ST and the renovated CM.

The West Campus central plant, located in the CF basement, is essentially identical to the East Campus plant. Chilled water is distributed to all three buildings on the West Campus.

At this time, the West Campus is comprised of three buildings. The HC was completed in late 2004 and was constructed with a “state of the art” Variable Air Volume HVAC system. Some of its features are a computerized building automation system (BAS) control network, and a building heating and cooling system that includes a variable-speed chiller and highly efficient, gas-fired condensing boilers.

The “Giant Bakery or KSAC Building” has been renovated and is now the CF which houses the West Campus Central Plant. The new CU was constructed to the north of CF and HC and was completed in 2009. A high performance underground hot water and chilled water distribution system has been installed from the Central Plant, south along New York Avenue. Strategically located concrete vaults along this system have connections for tie-ins to future renovated buildings.



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COOLING SYSTEMS DEFICIENCIES

Since the 2006 UMP the West Campus has undergone major renovation and development. The West Campus Central Plant, located in the CF Building, serves CF and the CU building for cooling purposes. HC has its own chiller, but is connected to the West Central Plant loop for redundancy. Also, an East Campus Central Plant was completed in 2007 and is located in the ST Building. Only two buildings are currently connected to this plant, ST and CM. The three major concerns still related to the East Campus cooling systems are; the age of the HVAC equipment, the antiquated nature of the technologies used to perform space cooling, and the de-centralized arrangement of the cooling systems and its use of electrical energy.



As discussed earlier, in the “Heating” section of this master plan, the most significant issue that stands out with regard to the existing East Campus building air conditioning systems is their age. The packaged, DX rooftop units are well beyond their “useful” mechanical life. The “expected median service life” of the packaged, DX rooftop units, is 15 years. The units predominantly used on the East Campus have been in service for 31 to 38 years.

The second major concern related to the East Campus cooling systems operation is the antiquated technologies used to meet the air conditioning demands of the interior spaces. All of the existing rooftop units on the East Campus, except the 2 “new” RC units, use the concept of constant volume fans with “multi-zone” distribution. Normally, the way most of the older RTU’s are operated, is that they are either on a time of day schedule and being operation at a set hour, or they are tied to an occupancy sensor and begin operations when individuals enter the conditioned space.



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CENTRAL CHILLER PLANT CAPABILITIES

The chilled water distribution system on the West Campus has been completed except for the future building site, which has a future connection point at a utility vault adjacent to CU. The central plant chilled water lines are connected to the CU and HC buildings through underground high performance piping system. The West Campus central plant has ice thermal storage located in the basement of the West Garage, with interconnecting glycol lines between the separate locations.

The chilled water distribution system on the East Campus has completed a main distribution header, extended from the ST central plant along New York Avenue with strategic valve vaults for future tie-ins to renovated and new buildings. The East Campus central plant has ice thermal storage located in the basement of the ST, with interconnecting glycol lines in building basement.

“FUTURE” COOLING REQUIREMENTS

Table 4 on the following page is a summary of the “Future” anticipated cooling loads for the existing West Campus and proposed changes to the East Campus. The information included on the chart is based on data gathered from the CBH +A “Overall Facility Master Plan” from 2010, previous discussions with Montgomery College’s Administration regarding envisioned building use, general incorporation of updated code requirements and comparison to the 2006 Utility Master Plan estimates.

The West Campus building construction and renovation is essentially complete except for one future building site. The central heating plant in CF has adequate capacity for the future building. The HC building will continue to have a satellite chiller as well as a connection to the CF central plant. HC can use chilled water from its own chiller or from the central plant. In the future, HC will be configured to feed chilled water back into the distribution system.

All of the East Campus buildings except the ST and CM will either be renovated or demolished and replaced with new buildings. The central chilled water plant in ST has adequate capacity for the future building construction projects. An East Campus distribution piping system has been installed along New York Avenue and buildings will be connected to this system as they are completed or renovated. The CM building renovation was completed in 2009 and was the first outlying building connected to the ST central plant.

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Table 4							
Montgomery College - Takoma Park/Silver Spring Campus							
2012 "Future" Cooling Loads / Factors							
Building Number	Building Code	Current Building Name	Building Function	Year Built	Size (GSF)	Cooling Load Factor (Btu/GSF)	Design Cooling Load (Tons R)
Future Utility Conditions (Reference 2006-2016 Facility Master Plan Planned Facilities)							
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	30,354	40	84
303	FH	Falcon Hall, Renovation/Addition	Classrooms, Offices, Gym, Pool, Fitness Center	1978	45,363	35	132
308	SS	Science South, Demolished	-	1962	-	-	-
307	SN	Science North, Demolished	-	1978	-	-	-
306	RC	Resource Center, Demolished	-	1978	-	-	-
305	MP	Demolished	-	1975	-	-	-
318	NP	North Pavilion (Nursing), Demolished	-	1975	-	-	-
317	P3	Pavilion 3 (Humanities)	Classrooms, Offices	1975	15,013	35	44
304	P1	Pavilion 1 (Information Sciences), Renov.	Computer Labs, Offices	1975	7,386	35	43
309	P2	Pavilion 2 (Student Services Pavilion)	Physical Plant Offices	1975	7,385	-	-
302	P4	Pavilion 4 (Comm. Arts), Renov./Add.	Classrooms, Labs, Offices, Theater	1980	20,000	40	67
301	DC	Child Care Center, Vacated	Child Care	1924	3,310	-	-
314	EG	East Campus Garage	Parking, 665 spaces	1980	224,310	-	-
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	98,038	24	196
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	110,504	32	267
312	ST	East Campus Central Plant in ST	East Campus Central Heating and Cooling Plant	-	-	-	-
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	3,694	-	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	-	34	351
313	CF	West Campus Central Plant in CF	West Campus Central Heating and Cooling Plant	2007	134,748	-	-
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	57,243	34	162
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	159,795	-	-
TBD	TBD	Science and Math Center Phase I	Classrooms and Labs	2020	51,000	37	157
TBD	TBD	Science and Math Center Phase II	Classrooms and Labs	TBD	83,600	37	258
TBD	TBD	Library Resource Center	Library	TBD	84,500	40	282
TBD	TBD	New Child Care Center, size is NA	Child Care	TBD	4,285	37	13
TBD	TBD	Future High Rise Building	Classrooms and Offices	TBD	200,000	34	567
					Total Connected Bldg Loads	1,340,528	2,622
					Total ST-Central Plant Block Load		1,009
					Total CF-Central Plant Block Load		957
					Campus Block Loads		1,967

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NATURAL GAS SYSTEMS (NG)

SCOPE

Natural gas service is provided to the gas meter at the building by Washington Gas & Light. The College owns the system from the outlet of the meter assembly to the building loads. Gas is provided to both the East and West Campus Central Plants as well as to SS on the East Campus.

INTRODUCTION

Natural gas consumption will increase significantly in the future as the east Campus is connected to the Central Plant. This portion of the UMP will briefly review the natural gas piping systems on site and the historic consumption for natural gas for heating and other uses throughout the Campus.

PREVIOUS STUDY

The previous 2006 Utilities Master Plan recommended central plants with gas-fired boilers for building heating be installed for the east and west Campuses. The proposed central plants were to be supplied with natural gas from the high-pressure gas line along Fenton Street and King Street. The East Campus Central Plant in the new ST has been constructed along with the West Campus Central Plant in the CF.

EXISTING NATURAL GAS SYSTEM AND CONDITION

The existing natural gas system owned by the College is limited to the load side of the gas meter station typically located at the entrance to the building. The present system is meeting the buildings and central plant requirements and is in acceptable condition.

LOCAL NATURAL GAS INFRASTRUCTURE

The Campuses are served from two gas lines owned by Washington Gas & Light. The 6-inch gas service along Fenton Street serves Science South and the East Campus Central Plant in the new ST Building. The gas line along New York Avenue no longer serves Pavilion 3 or The Commons. The West Campus receives natural gas from a 6-inch high-pressure gas line in King Street.

FUTURE NATURAL GAS REQUIREMENTS

The East Campus Central Plant in the Student Services Center already has the gas-fired boilers installed that will provide for future heating hot water requirements. Natural gas usage will increase as the buildings are renovated and connected to the heating hot water distribution system.

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The West Campus Central Plant in the Cafritz Foundation Art Center already has the gas-fired boilers installed that will provide for future heating hot water requirements. A future high-rise classroom building would be an additional heating hot water user.

Washington Gas & Light can meet these demands with the existing infrastructure.

COMPRESSED AIR/INSTRUMENT AIR SYSTEMS

SCOPE

The Takoma Park/Silver Spring Campus still has some individual building air compressors. Building air compressors will still be installed as necessary for building services.

EXISTING CONDITIONS

At present, the Takoma Park/Silver Spring Campus has air compressors in the SS Building, the West Campus Central Plant in the basement of the CF, and the East Campus Chiller Plant in the basement of the ST. Compressed air is used in these buildings for controlling pneumatic actuators and damper controls. HVAC systems in the other buildings utilize packaged rooftop equipment having electric controls.

FUTURE COMPRESSED AIR REQUIREMENTS

There should be no need for any future air compressors since the central plants already have the necessary units.

SUMMARY AND RECOMMENDATIONS

New HVAC controls are predominately electronic and compressed air usage is typically lower than in the past. Recommendations are to continue to maintain any individual air compressors until buildings are renovated or replaced.

BUILDING AUTOMATION SYSTEM (BAS)

SCOPE

The existing BAS system was reviewed to determine the condition and ability to provide the level of automation, monitoring and reliability needed.

INTRODUCTION

This final portion of the Mechanical Systems Section of the Utility Master Plan briefly reviews existing "Building Automation System(s)". We looked at present deficiencies and issues that may be hindering the College in achieving reliable building environmental controls and energy management goals, and suggest a strategy for current and future planning in this engineering sector

MECHANICAL SYSTEMS

EXISTING BAS SYSTEMS AND CONDITIONS

Some of the existing buildings on Campus still have local controls for building HVAC units and are not capable of providing control and monitoring functions as part of a networked Campus system. BAS controls exist in the HC, the new ST, CU, CF, WG, CM, SN, partially FH, and the two central plants and will be networked and provide adequate control and monitoring of conditions and energy usage.

SUMMARY AND RECOMMENDATIONS

The remaining out-dated existing individual building automation systems should be replaced with state-of-the-art systems networked to provide an integrated Campus control and monitoring system when buildings are renovated, replaced, or new construction. Energy monitoring and automatic reporting features should allow staff to see natural gas, fuel oil, and electrical energy usage in the central plant and in individual buildings, as well as energy delivered by the central plant through the Campus chilled water and heating hot water systems. The BAS systems should provide output to a server with the capability of storing data and easily formatting and generating on demand and scheduled reports tailored to user needs. The system should directly control equipment or provide information to allow operators to make timely decisions to minimize energy consumption and cost.

ELECTRICAL SYSTEMS

INTRODUCTION

The Takoma Park/Silver Spring Campus is located in Pepco's service territory and is served by three 13.2-kV overhead distribution feeders. These feeders are routed along city streets and two of the feeders are interconnected at one point, which provides a measure of reliability. A portion of two of the feeders is installed in an underground duct bank and manhole system along King Street between the railroad tracks and Georgia Avenue. Based on conversations with Pepco during the preparation of the 2006 Utility Master Plan, these feeders should have sufficient capacity to support the College's planned growth. See the single line diagram on drawing E-1 in Appendix B for a representation of the present system configuration.

PREVIOUS STUDY

The 2006 Utility Master Plan addressed the fact that two central heating and cooling plants were recommended in the 1991 Utility Master Plan and that these plants, the East Campus plant and the West Campus plant, were under construction.

The 2006 Utility Master Plan also referred to the 1991 Utility Master Plan which had recommended against making a conversion from multi-point metering to single-point metering of utility company electrical energy. Such a conversion would result in the College owning and maintaining the 13.2-kV Campus distribution system. The 1991 Utility Master Plan made the case that there is no economic advantage to the College in making the conversion, and that the Takoma Park/Silver Spring Campus layout made College ownership of the distribution system difficult because of roadways and railroad tracks that divide the Campus. The crossing of these roadways and railroad tracks with electrical distribution lines would be expensive and complicated by regulations.

The 2006 Utility Master Plan also stated that based on the transition to the central heating and cooling concept, the Takoma Park/Silver Spring Campus will definitely see reduced electrical demand at individual buildings, and therefore should see a net reduction in electricity consumption for the entire Campus. This load reduction would work further to erode the potential advantages of a single-point metered system. Also, based on the marginal results of the analysis done for the Rockville Campus, it seemed unlikely a financial analysis for the Takoma Park/Silver Spring Campus would result in a significant energy cost savings for the College. Therefore, single-point metering would be technically difficult to implement and would very likely not be economically justifiable.

There have been no significant changes that would justify reconsideration of the conversion from multi-point to single-point metering at this time, and therefore, such an analysis is not addressed in this update.

However, if multi-point versus single-point metering is reviewed again in the future, one option to consider, as addressed in the previous master plan, is to create a "virtual" single-point

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metering system in lieu of a physical single-point metering system. Essentially, this concept would involve the addition of College-owned metering to each Campus building. This metering should be capable of measuring electrical demand (kW) and energy use (kWh), at a minimum, with utility grade accuracy and have the ability to communicate with a central monitoring system which would record and store data. This data might be analyzed from a historical perspective, or perhaps transmitted real-time to an energy broker who could make recommendations to the College regarding system operation. Possible recommendations might include a change to central plant operations schedules, or perhaps the utilization of on-site generation to minimize energy purchases during times of high utility demand in order to gain price incentives. This is a concept that will certainly require further study and more detailed information. Nevertheless, the plan to begin the installation of building metering should be developed and implemented immediately. This will allow the College to begin collecting historical data for later use.

EXISTING CONDITIONS

Most buildings are served by pad-mounted transformers which are fed by 13.2-kV underground distribution lines that tap off the overhead feeders. Science South is served, via underground service, from a pole-mounted transformer bank. Each building is metered individually, with the exception of Pavilion 2 (Student Services Pavilion) and the Mathematics Pavilion, which are sub-fed from Pavilion 1 (Information Sciences Pavilion) and the Nursing Pavilion services, respectively.

SYSTEM IMPROVEMENTS

As part of the 2006 Utility Master Plan, a field inspection of each building's service entrance equipment was performed. Most of the equipment is in good condition and should provide adequate service for many years to come. Several buildings have two service entrances which are now combined into a single account. Please see Table 6-1 in Appendix A for a list of buildings and their respective equipment. As a general rule, this separate service equipment should be replaced as renovations to these buildings occur. Providing a single service entrance point eliminates any possible confusion over the disconnection of power to different areas of the building during maintenance or emergency situations.

There were concerns with several conditions observed during the field inspection. The following issues identified according to priority levels in the 2006 plan have not been addressed and remain valid recommendations:

ELECTRICAL SYSTEMS

Priority 3: *“Long Term Concerns (3-5 years): Should be corrected in the more distant future to maintain the integrity of the building, including systems that have exceeded their expected useful life, but are still functioning.”*

1. Science North, Nursing Pavilion, Pavilions P1 through P4, Math Pavilion, Resource Center, The Commons, and Falcon Hall all have fused switchboard or fused panelboard service entrance equipment. This equipment is 30-40 years old and is approaching the end of service life. This equipment is operational, but the College should regularly monitor it in order to quickly take note of issues which may arise. Each of these buildings is scheduled for renovation or complete demolition and most of these buildings are also ones which contain separate service entrance equipment as mentioned earlier. For buildings which are to be renovated, this equipment should be replaced with modern circuit breaker service entrance equipment.



2. The fire alarm system in Commons has been replaced with a Simplex 4100U addressable system. Fire alarm systems in Pavilions P1 through P4, Falcon Hall, Math Pavilion, Nursing Pavilion, Resource Center, Science North, Science South, and the East Campus Garage are older line voltage systems and likely have exceeded their useful lives. Based on information from College personnel, some difficulty in finding service repair for these systems is already occurring. Replacement is recommended. Since each of these buildings, with the exception of the East Campus Garage, is scheduled for renovation or complete demolition, the College plans to replace the fire alarm systems during renovations. Until replacement, these systems should be regularly tested and inspected to ensure proper system response in emergencies. The East Campus Garage system should also be scheduled for replacement.

Priority 4: *“Improvements: Required or desirable to bring the facility to perform as it should, including systems upgrades and aesthetic issues.”*

In conjunction with the Facilities Master Plan, consideration should be given to improving the electrical distribution system. This was done at the buildings built since the 2006 Utilities Master Plan including the Student Services Center, and along King Street for the Cafritz Foundation Arts Center remodeling, West Campus Garage, and Cultural Arts Center. New construction and renovations should consider providing underground distribution and loop feeds to all buildings on Campus. This improves aesthetics and allows building transformers to be fed from either end of a loop which can result in shorter outages.

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Please note that the distribution system is utility-owned and any desired improvements will require the approval of Pepco, and actual detailed electrical system design will be performed by them as well. Typical Pepco system design includes manually switched equipment, which is shown on Drawing E-2. Should the College determine that automation of the distribution system is desired to reduce the restoration time of electrical outages, Pepco may be willing to provide this service for an increased design and construction fee. This type of discussion will need to be held with Pepco at the time of detailed project design.

FUTURE ELECTRICAL SYSTEM

Based on the Takoma Park/Silver Spring Campus Facilities Master Plan, there is a moderate amount of growth expected to occur in the near future. This growth will have an impact on the Campus electrical system, and should be considered in planning and budgeting. Based on the determination that single-point metering will not be implemented in the foreseeable future, the following summary of system improvements is based on the assumptions that the electrical distribution system will remain a part of the Pepco grid.

The Campus growth will require improvements to the Pepco electrical distribution system, and it will be important to provide load data to Pepco as it becomes available for each project. These data will allow system improvements to be made so that Pepco can ensure that system capacity exists for each new load that the College adds to the system. In addition, since Pepco will remain the owner and operator of the system, any desired modifications to the electrical distribution system on Campus will need to be designed or approved by Pepco.

Estimated loads have been calculated to determine if existing equipment has sufficient capacity to accept additional loading or if new equipment will be required. Service transformers have also been addressed, even though they will remain the responsibility of Pepco. They have been included since changes to the system, based on College construction, will likely result in construction costs that the College will need to reimburse to Pepco. These costs will also need to be budgeted for, so that specific building projects can be planned appropriately.

The projected electrical load increases have been calculated based on gross square foot values of new construction plus the addition of mechanical loads as shown in the mechanical portion of this Plan. The specific value of electrical load per square foot varies depending on building function. Tabulating mechanical loads separately is helpful since most new or renovated buildings are expected to be provided with heating and cooling by either the East or West Campus central plants.

ELECTRICAL SYSTEMS

Table 1 below includes a list of projects indicated in the 2006-2016 Facilities Master Plan and the expected electrical load growth.

Table 1
Future Electrical Load Increases

Building	Gross Square Footage Increase (GSF)	Total Future Electrical Load (kVA)	Mechanical (kVA)	Total Electrical Load Increase (kVA)
Falcon Hall Renovation and Addition	6,300	136	N/A	19
Pavilion 1 Renovation	0	109	N/A	0
Pavilion 4 Renovation and Addition	4,127	140	N/A	30
Math/Science Center - Phase I	51,000	765	N/A	765
Math/Science Center Phase II	83,600	1,254	N/A	1,254
Library Resource Center	84,500	423	N/A	423
New Child Care Center	4,285	17	N/A	17
Future High Rise Building	200,000	1,200	400	1,600

* Indicates mechanical loads to be served from either of the central plants

Based on the load calculations above, following is a summary of transformer size requirements. For a complete listing of electrical demand data and transformer sizes for the entire Campus, please refer to Table 6-1 in Appendix A.

Falcon Hall Renovation and Addition: Falcon Hall will be renovated and there will be a small addition to the building. The building currently has a demand of 117 kVA. The building is expected to have a demand of 136 kVA after construction. The building is presently served by a 300-kVA transformer. This transformer has the capacity to continue service to the building.

ELECTRICAL SYSTEMS

Pavilion 1 Renovation: Pavilion 1 currently has a demand of 109 kVA. The building will be renovated, but will retain its existing square footage. Therefore, the electrical demand for this building isn't expected to change significantly. Pavilion 1 and Pavilion 2 are served by a common 300-kVA transformer. The total demand for both buildings together will be 218 kVA. Therefore, the existing 300-kVA transformer has sufficient capacity to continue serving these buildings.

Pavilion 4 Renovation and Addition: The existing building will be renovated and expanded in size with a 4,127 GSF addition. The building currently has a demand of 110 kVA. The building is presently served by 300kVA transformer. The new expanded building is expected to have a demand of 140 kVA. Therefore, the existing 300-kVA transformer has sufficient capacity to continue serving this building.

Science/Math Center-Phase I: The existing Science South building will be demolished and replaced by the new Science/Math Center - Phase I building. The Science South building has a demand of 125 kW and is served by a 1500-kVA transformer. The new replacement building will have a larger footprint and is expected to have a demand of 765 kVA. This replacement building will require a new 1000-kVA transformer.

Science/Math Center-Phase II: The existing Science North building will be demolished and replaced by the new Science/Math Center - Phase II building. The Science North building has a demand of 665 kW and is served by a 1500-kVA transformer. The new replacement building will have a larger footprint and is expected to have a demand of 1254 kVA. This replacement building will require a new 1500-kVA transformer or relocation and reuse of the existing transformer.

Library Resource Center: This will be a new building with an expected demand of 423 kVA. This building will require a new 500-kVA transformer.

Future High Rise Building: This will be a new building with an expected demand of 1,600 kVA. This building is anticipated to have a satellite chiller and to not be served by the central plant. This building will require a new 2000-kVA transformer.

THIN CLIENT COMPUTING IMPACTS ON ELECTRICAL DEMAND

Use of personal laptop computers and wireless systems is a growing trend on campuses. For computer labs with installed workstations, other trends such as thin client computing are emerging trends. While an analysis of potential impacts of changes in computing systems was not within the scope of the Utility Master Plan, it should be noted that significant reductions in electrical consumption might be achieved by emerging technologies such as thin client computing where very low power computer workstations utilize servers instead of internal hard drives and software. In modern classrooms with multiple computer terminals, thin client

ELECTRICAL SYSTEMS

computing may reduce power consumption used significantly. As Montgomery College plans new building projects the impacts of the quantities and types of computing systems to be installed needs to be carefully considered in sizing electrical components.

ON-SITE ELECTRICAL GENERATION

This topic is one of growing interest, especially in light of electric utility deregulation, lack of investment in transmission and distribution grids, and the ever-increasing need for more reliable power for power-quality and high technology applications.

Montgomery College is well situated to take advantage of opportunities that may arise in this field. With the College's excellent load profile, the use of thermal storage to maximize off-peak electricity use, and the construction of the heating and cooling central plants, the application of microturbines or fuel cells is certainly possible at the Takoma Park/Silver Spring Campus. This type of equipment would allow the generation of electricity 24 hours a day, while at the same time generating hot water for use in the central system.

At this point, fuel cells are prohibitively expensive, at approximately \$4,000 per kilowatt. However, microturbines may be an economically viable option, at approximately \$1,000 per kilowatt. An impediment to cogeneration would be the fact that PEPCO owns the distribution system and a power purchase agreement would need to be negotiated. More detailed investigation and study would be required to establish the economics and other benefits of cogeneration.

In addition, Montgomery College presently has a 33 kW photovoltaic array on the Health Sciences Center at the Takoma Park/Silver Spring Campus. Photovoltaics are used strictly for electricity generation and do not contribute any energy in the form of heat. Typical annual production from this existing array is in the range of 63,000 kWh. Current pricing for photovoltaic modules is between \$9-10 per watt, or \$9,000-10,000 per kilowatt, but costs are declining significantly. This technology is likely to be prohibitively expensive without substantial subsidies or credits at present, but paybacks are anticipated to be much shorter in the future.

Of course, the advantage of each of these technologies is the ability for the College to generate electricity during normal operations and have a measure of self-reliance should utility outages occur. A second advantage exists in the environmental "friendliness" of each of these options. The microturbine will increase the efficiency of the fuel used and reduce combustion emissions in that regard. The fuel cell goes a step further and does not generate combustion emissions, although it does emit carbon dioxide due to the chemical reaction to convert fossil fuel, typically natural gas, to electricity. Photovoltaics will be the most eco-friendly, with no fuel used for operation and zero emissions of any kind. The College must, of course, determine whether the price paid is equivalent to the value produced, whether that value is in partial independence from the electricity grid, the ability to peak shave, providing a teaching tool for students, or in being an environmental leader.

ELECTRICAL SYSTEMS

In terms of power generation, the Takoma Park/Silver Spring Campus presently has one 45 kW natural gas generator, located in Science North, which provides emergency power to several buildings in the event of a utility failure. Buildings served by this generator are shown on Table 6-1 in Appendix A. The Science North building will be demolished and replaced by the Science/Math Center – Phase 2. It will be necessary to replace this generator system as part of the construction of the new Science/Math Center - Phase I or Phase II buildings. As a point of comparison, natural gas or diesel generators typically cost in the range of \$425 per kilowatt and are used solely for standby service.

Additionally, the Takoma Park/Silver Spring Campus presently has two diesel generators; a 350 kW generator located at the Student Services Center and a 600 kW generator located at the Cafritz Foundation Arts Center. Both of these generators are new and in excellent condition. These generators are indicated in Table 6-1 in Appendix A.

Lastly, several buildings are equipped with battery/inverter systems for the express purpose of providing emergency egress lighting. These systems are also shown on Table 6-1 in Appendix A.

INFORMATION TECHNOLOGY (IT) SYSTEM

The Takoma Park/Silver Spring Campus has an extensive network of communications infrastructure which links most of the buildings. The importance of this infrastructure is increasing rapidly and systems demands are growing. A thorough analysis of this system is not within the scope of this Plan, but existing College records have been reviewed and drawings of the IT site plans has been compiled and included as drawings E-7 and E-8 in Appendix B of this report.

FIRE ALARM SYSTEMS

The East Campus buildings were originally built with legacy fire alarm systems. Modern addressable fire alarm systems have been installed in The Commons Building, the Cafritz Foundation Arts Center, Cultural Arts and the West Campus Garage. New and renovated buildings will all have fire alarm and emergency notification systems included in accordance with College design standards. Fire alarm systems will be addressable, be connected to a remote UL/NFPA monitoring facility capable of emergency notification, have a BACnet interface, and be capable of integrating with other networked Campus fire alarm devices.

The manufacturer and model of the fire alarm systems, by building, on the Takoma Park/Silver Spring Campus are as follows:

ELECTRICAL SYSTEMS

<u>Bldg. No.</u>	<u>Building Name</u>	<u>Manufacturer and Model</u>
310	The Commons (CM)	Simplex 4100U
303	Falcon Hall (FH)	Elenco NV1Z3C
308	Science South (SS)	Elenco NV1Z3C
307	Science North (SN)	Elenco NV1Z3C
306	Resource Center	Elenco NV1Z3C
305/318	Mathematics/North Pavilions (MP/NP)	Elenco NV1Z3C
317	Pavilion 3 (P3)	Elenco NV1Z3C
304/309	Pavilion 1 (P1)/Pavilion 2 (P2)	Elenco NV1Z3C
302	Pavilion 4 (P4) (1 story)	Standard Electric Time Corp.
302	Pavilion 4 (P4) (3 story)	Elenco NV1Z3C
301	Child Care Center (DC)	Elenco NV1Z3C
314	East Campus Garage (EG)	Kidde
311	Health Sciences Center (HC)	Elenco/Siemens
312	Student Services Center (ST)	Simplex 4100U
313	Cafritz Foundation Arts Center (CF)	Simplex 4100U
315	Cultural Arts Center (CU)	Simplex 4100U
316	West Campus Garage (WG)	Simplex 4100U

EMERGENCY PHONES

Emergency phone stations with visual beacon lights attached to the tops are presently utilized around the Campus. A thorough discussion of this system is not within the scope of this Plan.


SUMMARY AND RECOMMENDATIONS


The following recommendations apply to the electrical systems at Takoma Park/Silver Spring:

Extend 13.2 kV Electrical Distribution System as required for new buildings. As new buildings are constructed and major renovations take place, the underground 13.2 kV distribution system should be upgraded to provide loops throughout Campus. This will allow buildings to be fed from either end of a loop, which will minimize the duration of outages should part of a loop fail.

Replace Obsolete Fusible Electrical Service Equipment with circuit breaker equipment in the Commons, Falcon Hall, Pavilion 1 and 2, and Pavilion 3 when these buildings are renovated.

Install Metering in the Campus Buildings not presently metered.

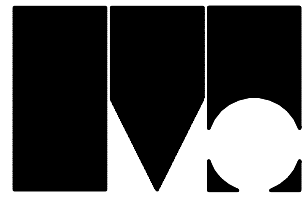
Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Existing Facilities Data																
Table 1-1 UTILITY SUMMARY SHEETS																
Wiley Wilson Commission No.: 211130.03																
Printed: 2/4/2012 11:40																
Revised: 2/2/2012			Note: In year built/renovated columns, the construction/renovation dates are year work was completed.													
Building Number	Building Code	Current Building Name	Building Function	Year Built	Year Renovated	Building Size (GSF)	Domestic Water Load (GPM)	Fire Water Flow (GPM)	Sanitary Sewer Load (GPM)	Cooling Load (Tons)	CW Source	Heating Load (Btu/hr)	Heating HW Source	Comp. Air (SCFM)	Electrical Demand (kW)	Nat. Gas Load (Therms)
Existing Utility Conditions (2011)																
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	53	2,000	52.8	84	E Central Plant	752,100	E Central Plant	-	60	-
303	FH	Falcon Hall	Classrooms, Offices, Gym, Pool, Fitness Center	1978	-	39,063	171	2,500	125.7	114	Stand Alone	1,757,835	Stand Alone	-	116.8	-
308	SS	Science South	Classrooms, Labs, Planetarium, Offices	1962	-	23,757	54	2,000	54	60	Stand Alone	831,495	Stand Alone	-	124.8	-
307	SN	Science North	Classrooms, Labs, Offices, Facilities Maint. Shops	1978	-	39,950	125	3,000	95.3	150	Stand Alone	1,598,000	Stand Alone	-	664.8	-
306	RC	Resource Center	Library, Classrooms, IT Center, Offices	1978	-	44,906	88	3,000	73.4	150	Stand Alone	1,347,180	Stand Alone	-	441.7	-
305	MP	Mathematics Pavilion	Classrooms, Labs, Offices	1975	-	6,942	72	1,250	66.5	61	Stand Alone	728,910	Stand Alone	-	189	-
318	NP	North Pavilion (Nursing Pavilion)	Classrooms, Labs, Offices, Construction PM Office	1975	-	6,942	72	1,500	66.5		Stand Alone		Stand Alone	-		-
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	-	15,013	91	1,500	81.4	44	Stand Alone	450,390	Stand Alone	-	208.5	-
304	P1	Pavilion 1 (Information Sciences)	Computer Labs, Offices	1975	-	7,386	68	1,500	62.6	43	Stand Alone	443,130	Stand Alone	-	218.3	-
309	P2	Pavilion 2 (Student Services)	Physical Plant Offices	1975	-	7,385	68	1,500	62.6	0	Stand Alone	0	Stand Alone	-		-
302	P4	Pavilion 4 (Comm. Arts Center)	Classrooms, Labs, Offices, Theater	1980	-	15,873	86	1,750	70.7	53	Stand Alone	555,555	Stand Alone	-	110.4	-
301	DC	Child Care Center	Child Care	1924	1994	3,310	0	750	-	-	Stand Alone	-	Stand Alone	-	N/A	-
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	15	3,500	-	-	-	-	-	-	51.6	-
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	177	sprinklered	124	200	W Central Plant	2,400,000	Stand Alone	-	357	-
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	145	sprinklered	103	295	E Central Plant	3,315,120	E Central Plant	310	320	-
312	ST	East Campus Central Plant	East Campus Central Heating and Cooling Plant				0	sprinklered	-	-	-	-	-	0	744	-
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3,694	0	0	-	-	-	-	-	0	N/A	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	223	sprinklered	112	350	W Central Plant	2,880,000	W Central Plant	0	330	-
313	CF	West Campus Central Plant	West Campus Central Heating and Cooling Plant	2007	-		-	sprinklered	-	0	-	-	-	0	720	-
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	-	57,243	156	sprinklered	114	160	W Central Plant	1,480,000	W Central Plant	0	150	-
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	159,795	0	sprinklered	0	-	-	-	-	0	104	-
Total Connected Bldg Loads						1,029,213	1,283	1,039		1,764	18,539,715		310		4,911	0
Campus Block Loads							898	727		1,323	13,904,786					

Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Future Facilities Data													
Table 1-2 UTILITY SUMMARY SHEETS													
Wiley Wilson Commission No.: 211130.03													
Printed: 2/4/2012 11:43													
Revised: 2/2/2012													
Note: In year built/renovated columns, the construction/renovation dates are completion year													
Building Number	Building Code	Building Name	Building Function	Year Built/ Proposed Build	Year Renovated/ Demolished	Building Size (GSF)	Domestic Water Load (GPM)	Fire Water Flow (GPM)	Sanitary Sewer Load (GPM)	Cooling Load (Tons)	Heating Load (MBH)	Electrical Demand (kW)	Nat. Gas Load Therms
Future Utility Conditions (Reference 2006-2016 Facility Master Plan Planned Facilities)													
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	53	2,000	52.8	84	752	60	-
303	FH	Falcon Hall, Renovation/Addition	Classrooms, Offices, Gym, Pool, Fitness Center	1978	TBD	45,363	171	2,500	125.7	132	2,041	136.1	-
308	SS	Science South, Demolished	-	1962	TBD	-	54	2,000	54	-	-	-	-
307	SN	Science North, Demolished	-	1978	TBD	-	125	3,000	95.3	-	-	-	-
306	RC	Resource Center, Demolished	-	1978	TBD	-	88	3,000	73.4	-	-	-	-
305	MP	Mathematics Pavilion, Demolished	-	1975	TBD	-	72	1,250	66.5	-	-	-	-
318	NP	North Pavilion (Nursing), Demolished	-	1975	TBD	-	72	1,500	66.5				-
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	TBD	15,013	91	1,500	81.4	44	450	208.5	-
304	P1	Pavilion 1 (Information Sciences), Renov.	Computer Labs, Offices	1975	TBD	7,386	68	1,500	62.6	43	443	218.3	-
309	P2	Pavilion 2 (Student Services Pavilion)	Physical Plant Offices	1975	-	7,385	68	1,500	62.6	0	0		-
302	P4	Pavilion 4 (Comm. Arts), Renov./Add.	Classrooms, Labs, Offices, Theater	1980	TBD	20,000	86	1,750	70.7	67	556	140	-
301	DC	Child Care Center, Vacated	Child Care	1924	1994	3,310	0	750	-	-	-	N/A	-
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	15	3,500	-	-	-	51.6	-
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	177	sprinklered	124	196	2,353	357	-
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	145	sprinklered	103	267	3,315	320	-
312	ST	East Campus Central Plant in ST	East Campus Central Heating and Cooling Plant				-	sprinklered	-	-	-	744	-
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3,694	-	-	-	-	-	N/A	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	151	sprinklered	136	351	4,042	330	-
313	CF	West Campus Central Plant in CF	West Campus Central Heating and Cooling Plant	2007	-		-	sprinklered	-	-	-	720	-
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	-	57,243	156	sprinklered	114	162	1,717	150	-
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	159,795	15	sprinklered	-	-	-	104	-
TBD	TBD	Math and Science Center Phase I	Classrooms and Labs	2020	-	51,000	103	sprinklered	88	157	1,530	765	-
TBD	TBD	Math and Science Center Phase II	Classrooms and Labs	TBD	-	83,600	125	sprinklered	110	258	2,508	1254	-
TBD	TBD	Library Resource Center	Library	TBD	-	84,500	207	sprinklered	177	282	2,535	423	-
TBD	TBD	New Child Care Center, size is NASF	Child Care	TBD	-	4,285	68	sprinklered	62.6	13	129	17.4	-
TBD	TBD	Future High Rise Building	Classrooms and Offices	TBD	-	200,000	210	sprinklered	142	567	6,000	1600	-
Total Connected Bldg Loads						1,340,528	2,318		1,868	2,622	28,372	2,236	0
Campus Block Loads							1,622		1,308	1,967	21,279		

Montgomery College Utility Master Plan

Abbreviations:

GSF	gross square feet
GPM	gallons per minute
Block load	load after reducing peak load to account for diversity (non-coincident peak usages)
Btu	British Thermal Unit
Btu/SF*Hr	British Thermal Units per square foot per hour
LTHW	Low temperature hot water
HW	Hot water
CW	Chilled water
Hp	Horsepower
SCFM	standard cubic foot per minute
kW	kilowatts
kVA	kilovolt-amperes



Montgomery College

Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301) 251-7363



Drawn By: **JLW** Ckd By: **ETH**
Designed By: **ETH** Approved By: **SMT**

Notes



127 Nationwide Drive, Lynchburg, Virginia 24502-4272
phone 434.947.1801 | fax 434.947.1801 | web wileywilson.com

COMM. NO. 211130.03

No.	Description	Date
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Revisions

Location Map



Project Title
**MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN**

Drawing Title
**UTILITIES SITE PLAN
EXISTING CONDITIONS**

Scale: **1"=100'**
Project No. Drawing Number
Date 02/22/13
C-1

MC Facilities No.

LEGEND AND ABBREVIATIONS

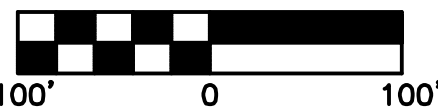
EXISTING WATER LINE	W	W
EXISTING IRRIGATION WATER LINE	IRR	IRR
EXISTING SANITARY	SS	SS
EXISTING STORM	SD	SD
EXISTING NATURAL GAS	G	G
EXISTING INFORMATION (IT)	I	T
EXISTING ELECTRICAL	E	E
EXISTING CHILLED WATER	CW	CW
EXISTING HEATING WATER	HW	HW
EXISTING COMPRESSED AIR	A	A
EXISTING FIBER OPTIC	FO	FO
EXISTING CABLE TV (BURIED)	TV	TV




UTILITIES SITE PLAN — EXISTING CONDITIONS

SCALE: 1"=100'

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




Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Existing Facilities Data							
Table 2-1B Fire Water							
Wiley Wilson Commission No.: 211130.03							
Printed: 2/4/2012 11:49							
Revised: 2/2/2012		Note: In year built/renovated columns, the construction/renovation dates are year work was completed.					
Building Number	Building Code	Current Building Name	Building Function	Year Built	Year Renovated	Building Size (GSF)	Fire Flow (GPM)
Existing Utility Conditions (2011)							
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	2,000
303	FH	Falcon Hall	Classrooms, Offices, Gym, Pool, Fitness Center	1978	-	39,063	2,500
308	SS	Science South	Classrooms, Labs, Planetarium, Offices	1962	-	23,757	2,000
307	SN	Science North	Classrooms, Labs, Offices, Facilities Maint. Shops	1978	-	39,950	3,000
306	RC	Resource Center	Library, Classrooms, IT Center, Offices	1978	-	44,906	3,000
305	MP	Mathematics Pavilion	Classrooms, Labs, Offices	1975	-	6,942	1,250
318	NP	North Pavilion (Nursing Pavilion)	Classrooms, Labs, Offices, Construction PM Office	1975	-	6,942	1,500
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	-	15,013	1,500
304	P1	Pavilion 1 (Information Sciences)	Computer Labs, Offices	1975	-	7,386	1,500
309	P2	Pavilion 2 (Student Services)	Physical Plant Offices	1975	-	7,385	1,500
302	P4	Pavilion 4 (Comm. Arts Center)	Classrooms, Labs, Offices, Theater	1980	-	15,873	1,750
301	DC	Child Care Center	Child Care	1924	1994	3,310	750
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	3,500
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	sprinklered
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	sprinklered
312	ST	East Campus Central Plant	East Campus Central Heating and Cooling Plant				sprinklered
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3694	0
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	sprinklered
313	CF	West Campus Central Plant	West Campus Central Heating and Cooling Plant	2007	-		sprinklered
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	-	57,243	sprinklered
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	159,795	sprinklered


Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Future Facilities Data													
Table 2-2A Domestic Water													
Wiley Wilson Commission No.: 211130.03													
Printed: 2/4/2012 11:52													
Revised: 2/2/2012													
Note: In year built/renovated columns, the construction/renovation dates are completion year													
Building Number	Building Code	Building Name	Building Function	Year Built/ Proposed Build	Year Renovated/ Demolished	Building Size (GSF)	Fixture Units (Number)	Fixture Units (GPM)	Hose Bibb & Wall Hydrant (GPM)	Cooling Tower (GPM)	Boilers (GPM)	Total Domestic Water Load (GPM)	Building Peak System Load @ 70% (GPM)
Future Utility Conditions (Reference 2006-2016 Facility Master Plan Planned Facilities)													
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	56	52.8	-	-	-	52.8	37
303	FH	Falcon Hall, Renovation/Addition	Classrooms, Offices, Gym, Pool, Fitness Center	1978	TBD	45,363	393	125.7	45	-	-	170.7	119
308	SS	Science South, Demolished	-	1962	TBD	-	60	54.0	-	-	-	54.0	38
307	SN	Science North, Demolished	-	1978	TBD	-	224	95.3	30	-	-	125.3	88
306	RC	Resource Center, Demolished	-	1978	TBD	-	122	73.4	15	-	-	88.4	62
305	MP	Mathematics Pavilion, Demolished	-	1975	TBD	-	97	66.5	5	-	-	71.5	50
318	NP	North Pavilion (Nursing), Demolished	-	1975	TBD	-	97	66.5	5	-	-	71.5	50
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	TBD	15,013	162	81.4	10	-	-	91.4	64
304	P1	Pavilion 1 (Information Sciences), Renov.	Computer Labs, Offices	1975	TBD	7,386	84	62.6	5	-	-	67.6	47
309	P2	Pavilion 2 (Student Services Pavilion)	Physical Plant Offices	1975	-	7,385	84	62.6	5	-	-	67.6	47
302	P4	Pavilion 4 (Comm. Arts), Renov./Add.	Classrooms, Labs, Offices, Theater	1980	TBD	20,000	112	70.7	15	-	-	85.7	60
301	DC	Child Care Center, Vacated	Child Care	1924	1994	3,310	-	-	-	-	-	0.0	0
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	-	-	15	-	-	15.0	11
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	516	150.0	15	12	-	176.5	124
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	422	130	15	-	-	145.0	101.5
312	ST	East Campus Central Plant in ST	East Campus Central Heating and Cooling Plant				-	-	-	-	-	-	-
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3,694	-	-	-	-	-	-	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	446	136	15	-	-	151.0	106
313	CF	West Campus Central Plant in CF	West Campus Central Heating and Cooling Plant	2007	-		-	-	-	-	-	-	-
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2007	-	57,243	235	136	20	-	-	156.0	109
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	159,795	-	-	15	-	-	15.0	11
TBD		Math and Science Center Phase I	Classrooms and Labs	2010	-	51,000	193	88	15	-	-	103.0	72
TBD		Math and Science Center Phase II	Classrooms and Labs	2020	-	83,600	315	110	15	-	-	125.0	88
TBD		Library Resource Center	Library	TBD	-	84,500	393	177	30	-	-	207.0	145
TBD		New Child Care Center, size is NASF	Child Care	TBD	-	4,285	84	63	5	-	-	67.6	47
TBD		Future High Rise Building	Classrooms and Offices	TBD	-	200,000	771	180	30	-	-	210.0	147

Total Connected Peak Gpm
Campus Block Peak Load

2,317.60
1,622.32

1622.32

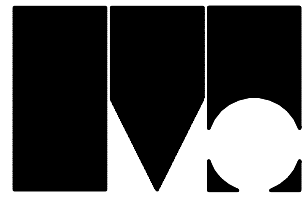
Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Future Facilities Data							
Table 2-2B Fire Water							
Wiley Wilson Commission No.: 211130.03							
Printed: 2/4/2012 11:54							
Revised: 2/2/2012			Note: In year built/renovated columns, the construction/renovation dates are completion year				
Building Number	Building Code	Building Name	Building Function	Year Built/ Proposed Build	Year Renovated/ Demolished	Building Size (GSF)	Fire Flow (GPM)
Future Utility Conditions (Reference 2006-2016 Facility Master Plan Planned Facilities)							
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	2,000
303	FH	Falcon Hall, Renovation/Addition	Classrooms, Offices, Gym, Pool, Fitness Center	1978	TBD	45,363	2,500
308	SS	Science South, Demolished	-	1962	TBD	-	2,000
307	SN	Science North, Demolished	-	1978	TBD	-	3,000
306	RC	Resource Center, Demolished	-	1978	TBD	-	3,000
305	MP	Mathematics Pavilion, Demolished	-	1975	TBD	-	1,250
318	NP	North Pavilion (Nursing), Demolished	-	1975	TBD	-	1,500
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	TBD	15,013	1,500
304	P1	Pavilion 1 (Information Sciences), Renov.	Computer Labs, Offices	1975	TBD	7,386	1,500
309	P2	Pavilion 2 (Student Services Pavilion)	Physical Plant Offices	1975	-	7,385	1,500
302	P4	Pavilion 4 (Comm. Arts), Renov./Add.	Classrooms, Labs, Offices, Theater	1980	TBD	20,000	1,750
301	DC	Child Care Center, Vacated	Child Care	1924	1994	3,310	750
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	3,500
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	sprinklered
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	sprinklered
312	ST	East Campus Central Plant in ST	East Campus Central Heating and Cooling Plant				sprinklered
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3,694	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	sprinklered
313	CF	West Campus Central Plant in CF	West Campus Central Heating and Cooling Plant	2007	-		sprinklered
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2007	-	0	sprinklered
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	57,243	sprinklered
TBD	TBD	Math and Science Center Phase I	Classrooms and Labs	2010	-	159,795	sprinklered
TBD	TBD	Math and Science Center Phase II	Classrooms and Labs	2020	-	51,000	sprinklered
TBD	TBD	Library Resource Center	Library	TBD	-	83,600	sprinklered
TBD	TBD	New Child Care Center, size is NASF	Child Care	TBD	-	84,500	sprinklered
TBD	TBD	Future High Rise Building	Classrooms and Offices	TBD	-	4,285	sprinklered

Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Future Facilities Data									
Table 3-2 Sanitary Sewer									
Wiley Wilson Commission No.: 211130.03									
Printed: 2/4/2012 11:55									
Revised: 2/2/2012			Note: In year built/renovated columns, the construction/renovation dates are completion year						
Building Number	Building Code	Building Name	Building Function	Year Built/ Proposed Build	Year Renovated/ Demolished	Building Size (GSF)	Fixture Units (Number)	Total Flow (GPM)	System Load @ 70% (GPM)
Future Utility Conditions (Reference 2006-2016 Facility Master Plan Planned Facilities)									
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	56	52.8	37.0
303	FH	Falcon Hall, Renovation/Addition	Classrooms, Offices, Gym, Pool, Fitness Center	1978	TBD	45,363	393	125.7	88.0
308	SS	Science South, Demolished	-	1962	TBD	-	60	54	37.8
307	SN	Science North, Demolished	-	1978	TBD	-	224	95.3	66.7
306	RC	Resource Center, Demolished	-	1978	TBD	-	122	73.4	51.4
305	MP	Mathematics Pavilion, Demolished	-	1975	TBD	-	97	66.5	46.6
318	NP	North Pavilion (Nursing), Demolished	-	1975	TBD	-	97	66.5	46.6
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	TBD	15,013	162	81.4	57.0
304	P1	Pavilion 1 (Information Sciences), Renov.	Computer Labs, Offices	1975	TBD	7,386	84	62.6	43.8
309	P2	Pavilion 2 (Student Services Pavilion)	Physical Plant Offices	1975	-	7,385	84	62.6	43.8
302	P4	Pavilion 4 (Comm. Arts), Renov./Add.	Classrooms, Labs, Offices, Theater	1980	TBD	20,000	112	70.7	49.5
301	DC	Child Care Center, Vacated	Child Care	1924	1994	3,310	-	-	-
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	-	-	-
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	398	124	86.8
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	269	103	72.1
312	ST	East Campus Central Plant in ST	East Campus Central Heating and Cooling Plant				-	-	-
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3,694	-	-	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	446	136	95.2
313	CF	West Campus Central Plant in CF	West Campus Central Heating and Cooling Plant	2007	-		-	-	-
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	-	57,243	151	114	79.8
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	159,795	-	-	-
TBD	TBD	Math and Science Center Phase I	Classrooms and Labs	2020	-	51,000	193	88	61.6
TBD	TBD	Math and Science Center Phase II	Classrooms and Labs	TBD	-	83,600	315	110	77.0
TBD	TBD	Library Resource Center	Library	TBD	-	84,500	393	177	123.9
TBD	TBD	New Child Care Center, size is NASF	Child Care	TBD	-	4,285	84	62.6	43.8
TBD	TBD	Future High Rise Building	Classrooms and Offices	TBD	-	200,000	490	142	99.4

Total Connected Building Load (GPM)
Campus Block Load (GPM)

1,868.10
1,307.67

1,307.67



Montgomery College

Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301) 251-7363



Drawn By: **JLW** Ckd By: **ETH**
Designed By: **ETH** Approved By: **SMT**

Notes



127 Nationwide Drive, Lynchburg, Virginia 24502-4272
phone 434.947.1801 | fax 434.947.1801 | web wileywilson.com

COMM. NO. 211130.03

No.	Description	Date
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Revisions

Location Map



Project Title
**MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN**

Drawing Title
**WATER SYSTEM SITE
PLAN – FUTURE
CONDITIONS**

Scale: **1"=100'**

Project No. Drawing Number

Date
02/22/13

C-3

MC Facilities No.

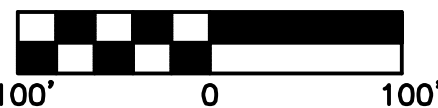
LEGEND AND ABBREVIATIONS

EXISTING WATER LINE — W — W —
FIRE HYDRANT ◊ FH
WATER METER ⊙ WM
WATER VALVE ⊙ WV
PROPOSED WATER LINE — W — W —

N

WATER SYSTEM SITE PLAN – FUTURE CONDITIONS
SCALE: 1"=100'

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





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COMM. NO. 211130.03

No.	Description	Date
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Revisions

Location Map



Project Title
**MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN**

Drawing Title
**SANITARY SYSTEM SITE
PLAN – FUTURE
CONDITIONS**

Scale: **1"=100'**
Project No. Drawing Number
Date 02/22/13
C-5

LEGEND AND ABBREVIATIONS

EXISTING

EXISTING SANITARY LINE — SS — SS — SS —
SANITARY MANHOLE ○ MH
SANITARY CLEAN OUT ○ CO
SS — SANITARY SEWER
CSS — COMBINED SANITARY SEWER

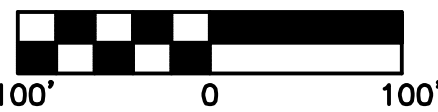
PROPOSED

PROPOSED SANITARY SEWER ———→
SANITARY MANHOLE ○ MH
SANITARY CLEANOUT ○ CO

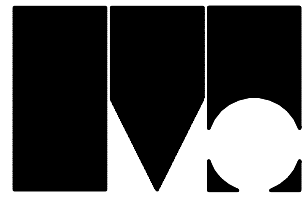
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SANITARY SYSTEM SITE PLAN – FUTURE CONDITIONS
SCALE: 1"=100'

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



MC Facilities No.



Montgomery College

Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301) 251-7363



Drawn By: **JLW** Ckd By: **ETH**
Designed By: **ETH** Approved By: **SMT**

Notes



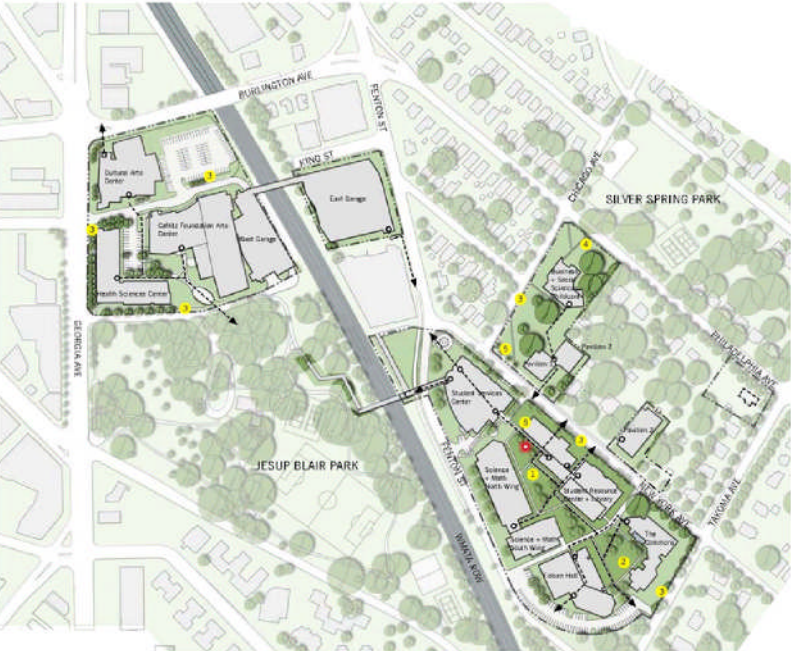
127 Nationwide Drive, Lynchburg, Virginia 24502-4272
phone 434.947.1801 | fax 434.947-1801 | web wileywilson.com

COMM. NO. 211130.03

No.	Description	Date
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Revisions

Location Map



Project Title
**MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN**

Drawing Title
**STORM SYSTEM SITE
PLAN — EXISTING
CONDITIONS**

Scale: **1"=100'**

Project No. Drawing Number

Date
02/22/13

C-6

MC Facilities No.

LEGEND AND ABBREVIATIONS

EXISTING

EXISTING STORM LINE

STORM MANHOLE

STORM CLEAN OUT

CURB INLET

DROP INLET

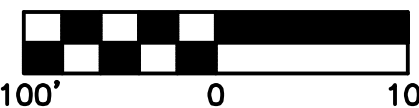
LEACHING BASIN



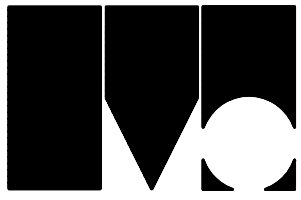
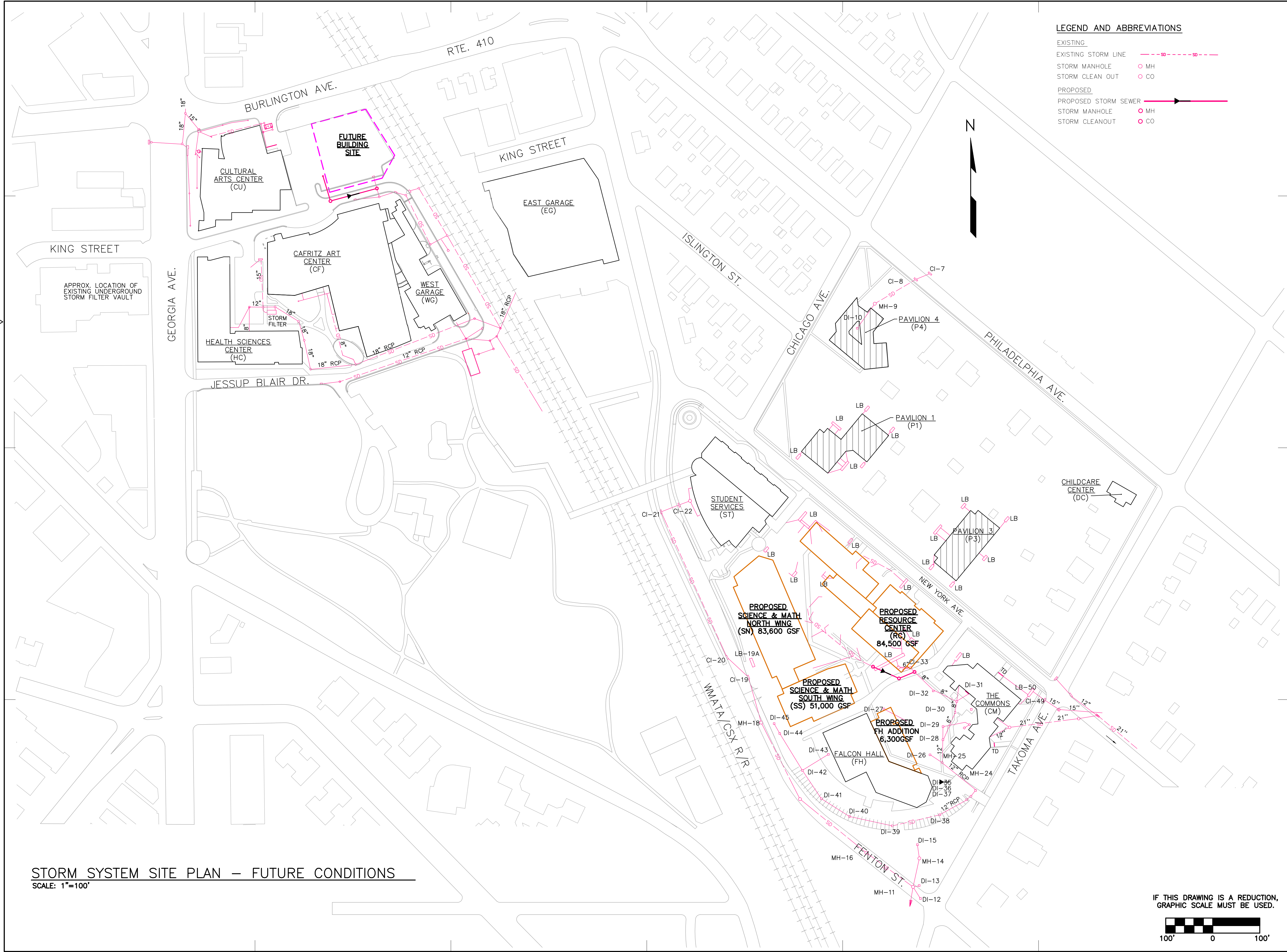
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STORM SYSTEM SITE PLAN — EXISTING CONDITIONS
SCALE: 1"=100'

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



P:\2011 Projects\211130 CBH MC Utility MP Updates\211130.03 Takoma Park-Silver Spring\CAD\21113003C-107.dwg



Montgomery College

Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md. 20850
Telephone: (301)–251–7363



Drawn By: JLW Ckd By: ETH

Designed By: ETH Approved By: SMT

Notes



127 Nationwide Drive, Lynchburg, Virginia 24502-4272
phone 434.947.1901 | fax 434.947.1901 | web wileywilson.com

COMM. NO. 211130.03

No.	Description	Date
-----	-------------	------

Revisions

Location Map



Project Title

**MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN**

Drawing Title

**STORM SYSTEM
SITE PLAN – FUTURE
CONDITIONS**


Scale: 1"=100'


Project No.

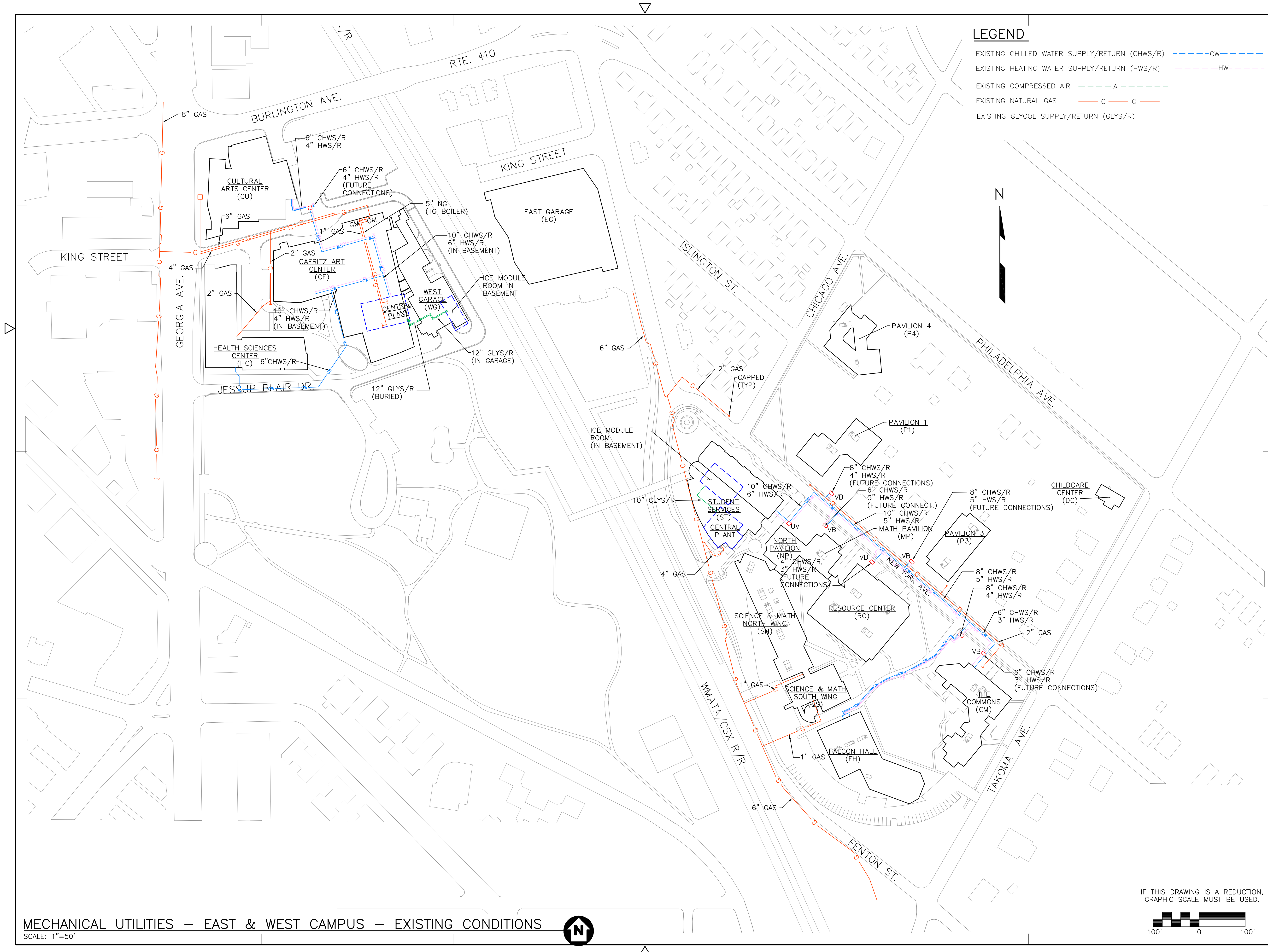
Drawing Number

Date
02/22/13

C-7

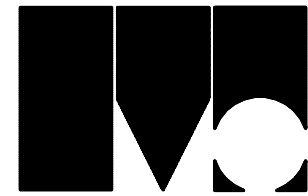
Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Existing Facilities Data															
Table 5-1 Cooling-Heating															
Wiley Wilson Commission No.: 211130.03															
Printed: 2/6/2012 14:00															
Revised: 2/2/2012													Note: In year built/renovated columns, the construction/renovation dates are year work was completed.		
Building Number	Building Code	Current Building Name	Building Function	Year Built	Year Renovated	Building Size (GSF)	Air Cond. Area (GSF)	AC Design Load Factor (Btuh/GSF)	Calculated Design Cooling (Tons)	Actual Chiller (Tons) R	CW Source	Heating Design Load Factor (Btuh/SF*Hr)	Heated Area (GSF)	Design Heating Load (Btu/Hr)	Heating HW Source
Existing Utility Conditions (2011)															
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	25,070	40	84	-	E Central Plant	30	25,070	752,100	E Central Plant
303	FH	Falcon Hall	Classrooms, Offices, Gym, Pool, Fitness Center	1978	-	39,063	39,063	35	114	-	Stand Alone	45	39,063	1,757,835	Stand Alone
308	SS	Science South	Classrooms, Labs, Planetarium, Offices	1962	-	23,757	23,757	30	60	-	Stand Alone	35	23,757	831,495	Stand Alone
307	SN	Science North	Classrooms, Labs, Offices, Facilities Maint. Shops	1978	-	39,950	39,950	45	150	-	Stand Alone	40	39,950	1,598,000	Stand Alone
306	RC	Resource Center	Library, Classrooms, IT Center, Offices	1978	-	44,906	44,906	40	150	-	Stand Alone	30	44,906	1,347,180	Stand Alone
305	MP	Mathematics Pavilion	Classrooms, Labs, Offices	1975	-	6,942	20,286	36	61	-	Stand Alone	35	20,826	728,910	Stand Alone
318	NP	North Pavilion (Nursing Pavilion)	Classrooms, Labs, Offices, Construction PM Office	1975	-	6,942		-		-	Stand Alone				Stand Alone
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	-	15,013	15,013	35	44	-	Stand Alone	30	15,013	450,390	Stand Alone
304	P1	Pavilion 1 (Information Sciences)	Computer Labs, Offices	1975	-	7,386	14,771	35	43	-	Stand Alone	30	14,771	443,130	Stand Alone
309	P2	Pavilion 2 (Student Services)	Physical Plant Offices	1975	-	7,385		-		-	Stand Alone				Stand Alone
302	P4	Pavilion 4 (Comm. Arts Center)	Classrooms, Labs, Offices, Theater	1980	-	15,873	15,873	40	53	-	Stand Alone	35	15,873	555,555	Stand Alone
301	DC	Child Care Center	Child Care	1924	1994	3,310	-	-	-	-	Stand Alone	-	-	-	Stand Alone
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	-	-	-	-	-	-	-	-	-
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	98,038	24	200	-	W Central Plant	24	98,038	2,400,000	Stand Alone
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	110,504	32	295	-	E Central Plant	30	110,504	3,315,120	E Central Plant
312	ST	East Campus Central Plant	East Campus Central Heating and Cooling Plant				-	-	-	-	-	-	-	-	
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3694	-	-	-	-	-	-	-	-	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	131,448	32	350	-	W Central Plant	21	134,748	2,880,000	W Central Plant
313	CF	West Campus Central Plant	West Campus Central Heating and Cooling Plant	2007	-		-	-	-	-	-	-	-	-	-
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	-	57,243	57,243	34	160	-	W Central Plant	26	57,243	1,480,000	W Central Plant
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	159,795	-	-	-	-	-	-	-	-	-
Total Connected Bldg Loads						1,029,213		1764						18,539,715	
Campus Block Loads								1323						13,904,786	

Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Future Facilities Data															
Table 5-2 Cooling-Heating															
Wiley Wilson Commission No.: 211130.03															
Printed: 2/6/2012 14:02															
Revised: 2/2/2012													Note: In year built/renovated columns, the construction/renovation dates are completion year		
Building Number	Building Code	Building Name	Building Function	Year Built/ Proposed Build	Year Renovated/ Demolished	Building Size (GSF)	Air Cond. Area (GSF)	AC Design Load Factor (Btuh/GSF)	Calculated Design Cooling (Tons)	Actual Chiller (Tons) R	CW Source	Heating Design Load Factor (Btuh/SF*Hr)	Heated Area (GSF)	Calculated Heating Load (MBH)	Heating HW Source
Future Utility Conditions (Reference 2006-2016 Facility Master Plan Planned Facilities)															
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	25,070	40	84	-	E Central Plant	30	25,070	752	E Central Plant
303	FH	Falcon Hall, Renovation/Addition	Classrooms, Offices, Gym, Pool, Fitness Center	1978	TBD	45,363	45,363	35	132	-	E Central Plant	45	45,363	2,041	E Central Plant
308	SS	Science South, Demolished	-	1962	TBD	-	-	-	-	-	-	-	-	-	-
307	SN	Science North, Demolished	-	1978	TBD	-	-	-	-	-	-	-	-	-	-
306	RC	Resource Center, Demolished	-	1978	TBD	-	-	-	-	-	-	-	-	-	-
305	MP	Mathematics Pavilion, Demolished	-	1975	TBD	-	-	-	-	-	-	-	-	-	-
318	NP	North Pavilion (Nursing), Demolished	-	1975	TBD	-	-	-	-	-	-	-	-	-	-
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	TBD	15,013	15,013	35	44	-	E Central Plant	30	15,013	450	E Central Plant
304	P1	Pavilion 1 (Information Sciences), Renov.	Computer Labs, Offices	1975	TBD	7,386	14,771	35	43	-	E Central Plant	30	14,771	443	E Central Plant
309	P2	Pavilion 2 (Student Services Pavilion)	Physical Plant Offices	1975	-	7,385		-		-	E Central Plant				E Central Plant
302	P4	Pavilion 4 (Comm. Arts), Renov./Add.	Classrooms, Labs, Offices, Theater	1980	TBD	20,000	20,000	40	67	-	E Central Plant	35	15,873	556	E Central Plant
301	DC	Child Care Center, Vacated	Child Care	1924	1994	3,310	-	-	-	-	-	-	-	-	-
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	-	-	-	-	-	-	-	-	-
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	98,038	24	196	-	W Central Plant	24	98,038	2,353	Standalone
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	100,000	32	267	-	E Central Plant	30	110,504	3,315	E Central Plant
312	ST	East Campus Central Plant in ST	East Campus Central Heating and Cooling Plant				-	-	-	1180	-	-	-	-	
-	PB	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3,694	-	-	-	-	-	-	-	-	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	124,000	34	351	-	W Central Plant	30	134,748	4,042	W Central Plant
313	CF	West Campus Central Plant in CF	West Campus Central Heating and Cooling Plant	2007	-		-	-	-	1180	-	-	-	-	-
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	-	57,243	57,243	34	162	-	W Central Plant	30	57,243	1,717	W Central Plant
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	159,795	-	-	-	-	-	-	-	-	-
TBD	TBD	Math and Science Center Phase I	Classrooms and Labs	2020	-	51,000	51,000	37	157	-	E Central Plant	30	51,000	1,530	E Central Plant
TBD	TBD	Math and Science Center Phase II	Classrooms and Labs	TBD	-	83,600	83,600	37	258	-	E Central Plant	30	83,600	2,508	E Central Plant
TBD	TBD	Library Resource Center	Library	TBD	-	84,500	84,500	40	282	-	E Central Plant	30	84,500	2,535	E Central Plant
TBD	TBD	New Child Care Center, size is NASF	Child Care	TBD	-	4,285	4,285	37	13	-	-	30	4,285	129	Standalone
TBD	TBD	Future High Rise Building	Classrooms and Offices	TBD	-	200,000	200,000	34	567	-	W Central Plant	30	200,000	6,000	W Central Plant
Total Connected Bldg Loads						1,340,528		2,622				28,372			
Campus Block Loads								1,967				21,279			



LEGEND

- EXISTING CHILLED WATER SUPPLY/RETURN (CHWS/R) ---CW---
- EXISTING HEATING WATER SUPPLY/RETURN (HWS/R) ---HW---
- EXISTING COMPRESSED AIR ---A---
- EXISTING NATURAL GAS ---G---G---
- EXISTING GLYCOL SUPPLY/RETURN (GLYS/R) ---GLYS---



Montgomery College

Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301)–251–7363



Drawn By: BAB Ckd By: MCR
Designed By: MCR Approved By: SMT

Notes



127 Nationwide Drive, Lynchburg, Virginia 24502-4272
phone 434.947.1801 | fax 434.947.1801 | web wileywilson.com

COMM. NO. 211130.03

No.	Description	Date
-----	-------------	------

Revisions

Location Map



Project Title
**MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN**

Drawing Title
**MECHANICAL UTILITIES EAST
& WEST CAMPUS
EXISTING CONDITIONS**

Scale: 1"=100'

Project No. Drawing Number

Date
02/22/13

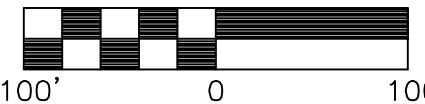
M-1

MECHANICAL UTILITIES – EAST & WEST CAMPUS – EXISTING CONDITIONS

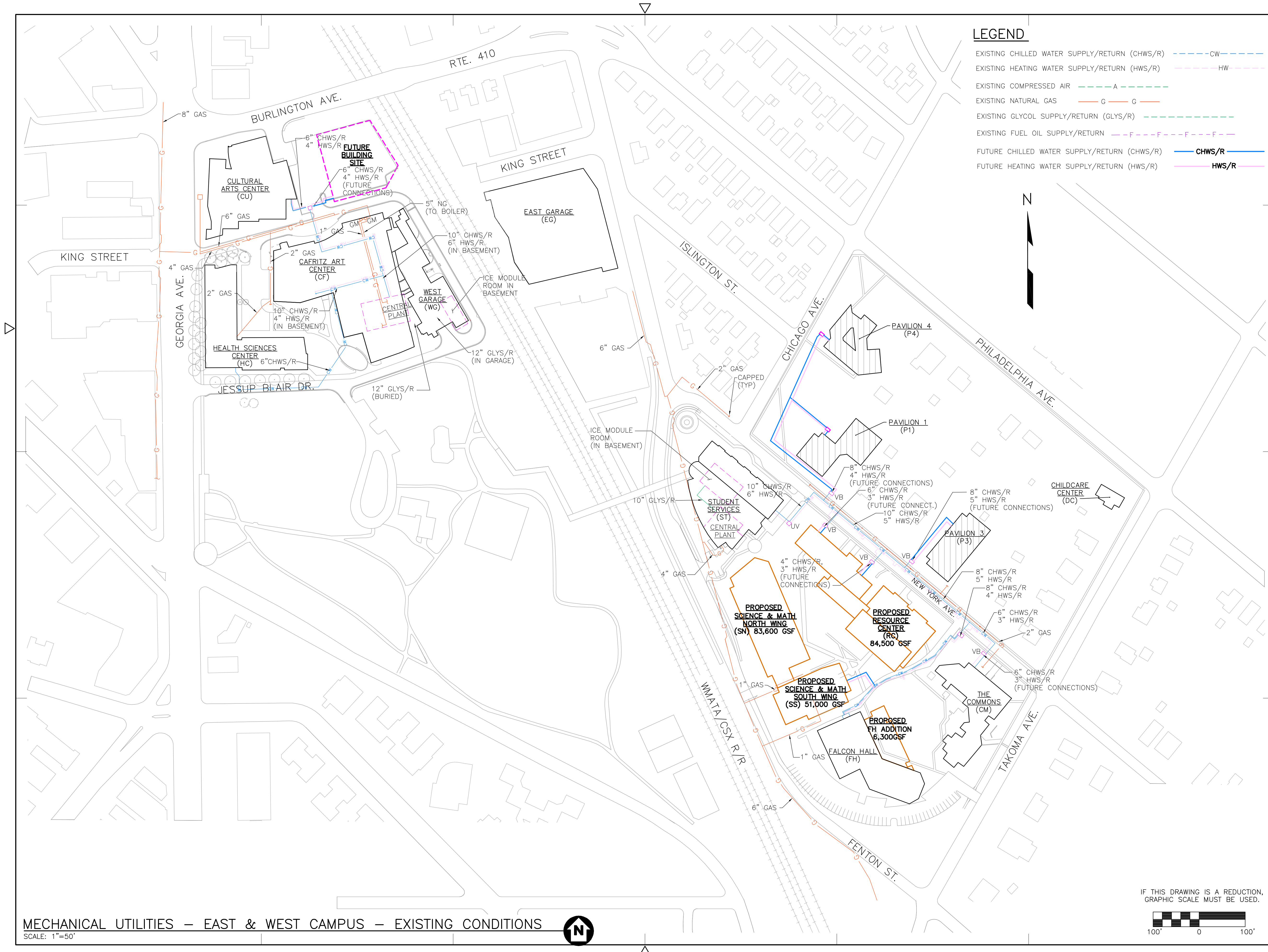
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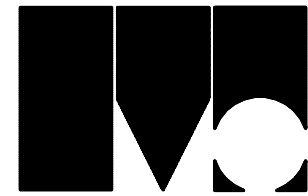


MC Facilities No.



LEGEND

- EXISTING CHILLED WATER SUPPLY/RETURN (CHWS/R) ---CW---
- EXISTING HEATING WATER SUPPLY/RETURN (HWS/R) ---HW---
- EXISTING COMPRESSED AIR ---A---
- EXISTING NATURAL GAS ---G---G---
- EXISTING GLYCOL SUPPLY/RETURN (GLYS/R) ---GLYS/R---
- EXISTING FUEL OIL SUPPLY/RETURN ---F---F---F---F---
- FUTURE CHILLED WATER SUPPLY/RETURN (CHWS/R) ---CHWS/R---
- FUTURE HEATING WATER SUPPLY/RETURN (HWS/R) ---HWS/R---



Montgomery College

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Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301) 251-7363



Drawn By: BAB Ckd By: MCR
Designed By: MCR Approved By: SMT

Notes



127 Nationwide Drive, Lynchburg, Virginia 24502-4272
phone 434.947.1801 | fax 434.947.1801 | web wileywilson.com

COMM. NO. 211130.03

No.	Description	Date
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Revisions

Location Map



Project Title
**MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN**

Drawing Title
**MECHANICAL UTILITIES EAST
& WEST CAMPUS PROPOSED
CONDITIONS**

Scale: 1"=100'

Project No. Drawing Number

Date
02/22/13

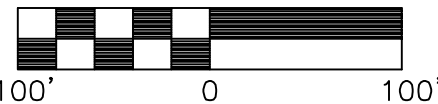
M-2

MECHANICAL UTILITIES - EAST & WEST CAMPUS - EXISTING CONDITIONS


SCALE: 1"=50'




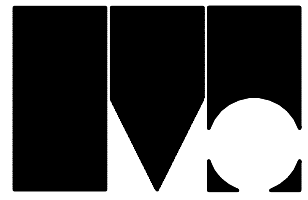
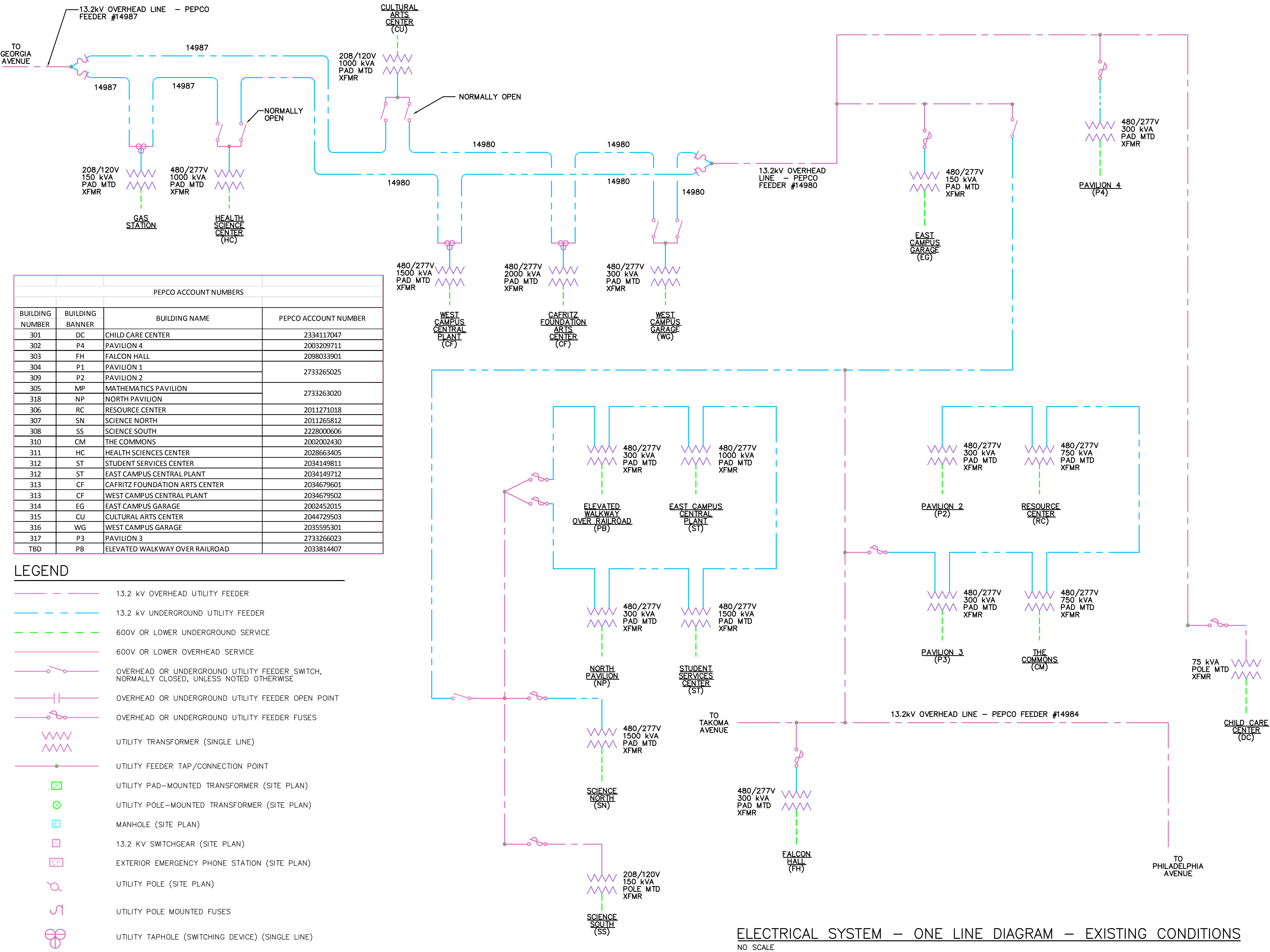
IF THIS DRAWING IS A REDUCTION,
GRAPHIC SCALE MUST BE USED.



MC Facilities No.

Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Existing Facilities Data															
Table 6-1 Electrical Service Data															
Wiley Wilson Commission No.: 211130.03															
Printed: 2/6/2012 14:08															
Revised: 2/2/2012															
Note: In year built/renovated columns, the construction/renovation dates are year work was completed.															
Building Number	Building Code	Current Building Name	Building Function	Year Built	Year Renovated	Building Size (GSF)	Pepco Account Number	Rate Schedule	Service Demand (kW)	Service Transformer (kVA)	Service Entrance Voltage	Service Entrance Ampacity	GS Service Entrance Equipment Description	HS Service Entrance Equipment Description	Service Entrance Equipment
Existing Utility Conditions (2011)															
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	2002002430	MGTLV / MMGTL2B	60.0	750	480/277	800	800A Fus. Panel	800A Fus. Panel	
303	FH	Falcon Hall	Classrooms, Offices, Gym, Pool, Fitness Center	1978	-	39,063	2098033901	MGTLV / MMGTL2A	116.8	300	480/277	400	400A Fus. Panel	400A Fus. Panel	
308	SS	Science South	Classrooms, Labs, Planetarium, Offices	1962	-	23,757	2228000606	MGTLV / MMGTL2B	124.8	1500	208/120	800			Panelboard
307	SN	Science North	Classrooms, Labs, Offices, Facilities Maint. Shops	1978	-	39,950	2011265812	MGT-LV Type IIA	664.8	1500	480/277	2000	1200A SWBD	2000A SWBD	
306	RC	Resource Center	Library, Classrooms, IT Center, Offices	1978	-	44,906	2011271018	MGTLV / MMGTL2A	441.7	750	480/277	1200	800A SWBD	1200A SWBD	
305	MP	Mathematics Pavilion	Classrooms, Labs, Offices	1975	-	6,942	2733263020	MGTLV / MMGTL2B	189.0	500	480/277	1000	350A CKT BKR	1000A CKT BKR	
318	NP	North Pavilion (Nursing Pavilion)	Classrooms, Labs, Offices, Construction PM Office	1975	-	6,942									
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	-	15,013	2733266023	MGTLV / MMGTL2B	208.5	300	480/277	400	250A CKT BKR	500A CKT BKR	
304	P1	Pavilion 1 (Information Sciences)	Computer Labs, Offices	1975	-	7,386	2733265025	MGTLV / MMGTL2B	218.3	300	480/277	1000	400A CKT BKR	1000A CKT BKR	
309	P2	Pavilion 2 (Student Services)	Physical Plant Offices	1975	-	7,385									
302	P4	Pavilion 4 (Comm. Arts Center)	Classrooms, Labs, Offices, Theater	1980	-	15,873	2003209711	MGTLV / MMGTL2B	110.4	300	480/277	1200			Panelboard
301	DC	Child Care Center	Child Care	1924	1994	3,310	2334117047	-	N/A	UNK	208/120	UNK			UNK
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	2002452015	MGTLV / MMGTL2B	51.6	150	480/277	400			Main Disconnect
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	2028663405	MGT-LV Type IIA	357.0	1000	480/277	2500			Switchboard
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	2034149712	MGT-LV Type IIB	320.0	UNK	480/277	UNK			UNK
312	ST	East Campus Central Plant	East Campus Central Heating and Cooling Plant				2034149811	MGT-LV Type IIB	744.0	UNK	480/277	UNK			UNK
-	Bridge	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3694	2033814407	GS Type 1	N/A	150	480/277	200			Main Disconnect
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	2034679601	MGT-LV Type IIB	330.0	2000	480/277	UNK			UNK
313	CF	West Campus Central Plant	West Campus Central Heating and Cooling Plant	2007	-		2034679502	MGT-LV Type IIB	720.0	1500	480/277	UNK			UNK
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	-	57,243	2044729503	MGT-LV Type IIB	150.0	1000	480/277	UNK			UNK
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	159,795	2035595301	MGT-LV Type IIB	104.0	300	480/277	UNK			UNK

Montgomery College Takoma Park/Silver Spring Campus Utility Master Plan Future Facilities Data																	
Table 6-2 Electrical Service Data																	
Wiley Wilson Commission No.: 211130.03																	
Printed: 2/6/2012 14:08																	
Revised: 2/2/2012																	
Note: In year built/renovated columns, the construction/renovation dates are completion year																	
Building Number	Building Code	Building Name	Building Function	Year Built/ Proposed Build	Year Renovated/ Demolished	Building Size (GSF)	Pepco Account Number	Rate Schedule	Service Demand (kW)	Service Transformer (kVA)	Service Entrance Voltage	Service Entrance Ampacity	GS Service Entrance Equipment Description	HS Service Entrance Equipment Description	Service Entrance Equipment	Service Notes	Power Generation Notes
Future Utility Conditions (Reference 2006-2016 Facility Master Plan Planned Facilities)																	
310	CM	The Commons	Adm. Offices, Computer Center, Classrooms	1978	2010	30,354	2002002430	MGTLV / MMGTL2B	60.0	750	480/277	800	800A Fus. Panel	800A Fus. Panel		-	30A ATS (from Science North)
303	FH	Falcon Hall, Renovation/Addition	Classrooms, Offices, Gym, Pool, Fitness Center	1978	TBD	45,363	2098033901	MGTLV / MMGTL2A	136.1	300	480/277	400	400A Fus. Panel	400A Fus. Panel		-	60A ATS (from Science North)
308	SS	Science South, Demolished	-	1962	TBD	-	-	-	-	-	-	-	-	-	-	-	-
307	SN	Science North, Demolished	-	1978	TBD	-	-	-	-	-	-	-	-	-	-	-	-
306	RC	Resource Center, Demolished	-	1978	TBD	-	-	-	-	-	-	-	-	-	-	-	-
305	MP	Mathematics Pavilion, Demolished	-	1975	TBD	-	-	-	-	-	-	-	-	-	-	-	-
318	NP	North Pavilion (Nursing), Demolished	-	1975	TBD	-	-	-	-	-	-	-	-	-	-	-	-
317	P3	Pavilion 3 (Pavilion of Fine Arts)	Classrooms, Offices	1975	TBD	15,013	2733266023	MGTLV / MMGTL2B	208.5	300	480/277	400	250A CKT BKR	500A CKT BKR		-	Inverter System for Emergency Lighting
304	P1	Pavilion 1 (Information Sciences), Renov.	Computer Labs, Offices	1975	TBD	7,386	2733265025	MGTLV / MMGTL2B	218.3	300	480/277	400	400A CKT BKR	1000A CKT BKR		-	Inverter System for Emergency Lighting
309	P2	Pavilion 2 (Student Services Pavilion)	Physical Plant Offices	1975		7,385											
302	P4	Pavilion 4 (Comm. Arts), Renov./Add.	Classrooms, Labs, Offices, Theater	1980	TBD	20,000	2003209711	MGTLV / MMGTL2B	140.0	300	480/277	1200			Panelboard	1200A Fusible Panelboard	Inverter System for Emergency Lighting
301	DC	Child Care Center, Vacated	Child Care	1924	1994	3,310	2334117047	-	N/A	UNK	208/120	UNK			UNK	-	-
314	EG	East Campus Garage	Parking, 665 spaces	1980	-	224,310	2002452015	MGTLV / MMGTL2B	51.6	150	480/277	400			Main Disconnect	3-100A and 1-60A Main Disconnects	-
311	HC	Health Sciences Center	Classrooms, Labs, Offices	2004	-	98,038	2028663405	MGT-LV Type IIA	357.0	1000	480/277	2500			Switchboard	2500A Main Breaker	33 kW Photovoltaic Array Installed 2002
312	ST	Student Services Center	Bookstore, Cafeteria, Offices, Security, Admissions	2007	-	110,504	2034149712	MGT-LV Type IIB	320.0	-	480/277	-			-	-	New 350 kW Diesel Generator
312	ST	East Campus Central Plant in ST	East Campus Central Heating and Cooling Plant		-		2034149811	MGT-LV Type IIB	744.0	-	480/277	-			-	-	-
-	Bridge	Elevated Walkway Over Railroad	Has separate electrical feed for lights	2004	-	3,694	2033814407	GS Type 1	N/A	150	480/277	200			Main Disconnect	One 200A Main Disconnect	-
313	CF	Cafritz Foundation Arts Center	Studios, Labs, Classrooms, NOC, Parking	1947	2007	134,748	2034679601	MGT-LV Type IIB	330.0	2000	480/277	TBD			TBD	TBD	New 600 kW Diesel Generator
313	CF	West Campus Central Plant in CF	West Campus Central Heating and Cooling Plant	2007	-		2034679502	MGT-LV Type IIB	720.0	1500	480/277	TBD			TBD	TBD	-
315	CU	Cultural Arts Center	Auditorium/Theater, Meeting Rooms	2010	-	57,243	2044729503	MGT-LV Type IIB	150.0	1000	480/277	TBD			TBD	TBD	-
316	WG	West Campus Garage	Parking, 357 spaces, Ice Storage Units	2010	-	159,795	2035595301	MGT-LV Type IIB	104.0	300	480/277	TBD			TBD	TBD	-
TBD	TBD	Math and Science Center Phase I	Classrooms and Labs	2020	-	51,000	TBD	TBD	765.0	1000	480/277	1600			Switchboard	1600A Main Breaker	-
TBD	TBD	Math and Science Center Phase II	Classrooms and Labs	TBD	-	83,600	TBD	TBD	1254.0	1500	480/277	2500			Switchboard	2500A Main Breaker	-
TBD	TBD	Library Resource Center	Library	TBD	-	84,500	TBD	TBD	423.0	500	480/277	800			Panelboard	800A Main Breaker	-
TBD	TBD	New Child Care Center, size is NASF	Child Care	TBD	-	4,285	TBD	TBD	17.4	75	208/120	250			Panelboard	250A Main Breaker	-
TBD	TBD	Future High Rise Building	Classrooms and Offices	TBD	-	200,000	TBD	TBD	1600.0	2000	480/277	3000			Switchboard	3000A Main Breaker	-



Montgomery College

Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301) 251-7363



Drawn By: RSE

Ckd By: JTO

Designed By: JTO

Approved By: JTO

Notes



127 Nationwide Drive, Lynchburg, Virginia 24502-4272
phone 434.947.1801 | fax 434.947-1801 | web wileywilson.com

COMM. NO. 211130.03

No. Description Date

Revisions

Location Map



Project Title

MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN

Drawing Title

ELECTRICAL SYSTEM
ONE LINE DIAGRAM
EXISTING CONDITIONS

Scale: NO SCALE

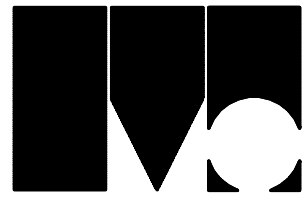
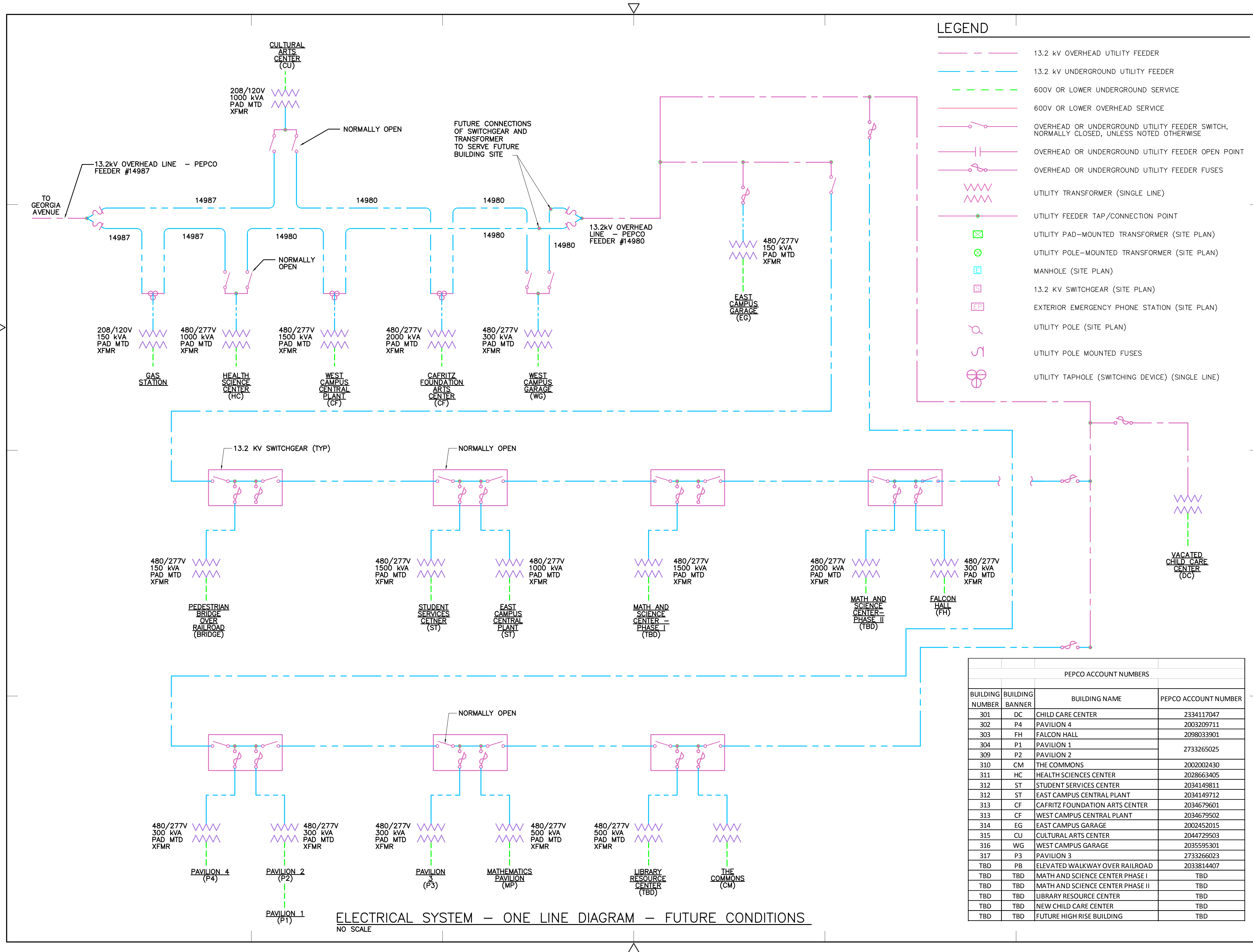
Project No.

Drawing Number

Date

02/22/13

E-1



Montgomery
College

Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301)-251-7363



Drawn By: RSE

Ckd By: JTC

Designed By: JT

Approved By: JTC

Notes



127 Nationwide Drive, Lynchburg, Virginia 24502-427
phone 434.947.1901 | fax 434.947-1601 | web wileywilson.com

COMM. NO. 211130.03

No.	Description	Date
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Revisions

Location Map



Project Title

MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN

Drawing Title

ELECTRICAL SYSTEM ONE LINE DIAGRAM FUTURE CONDITIONS

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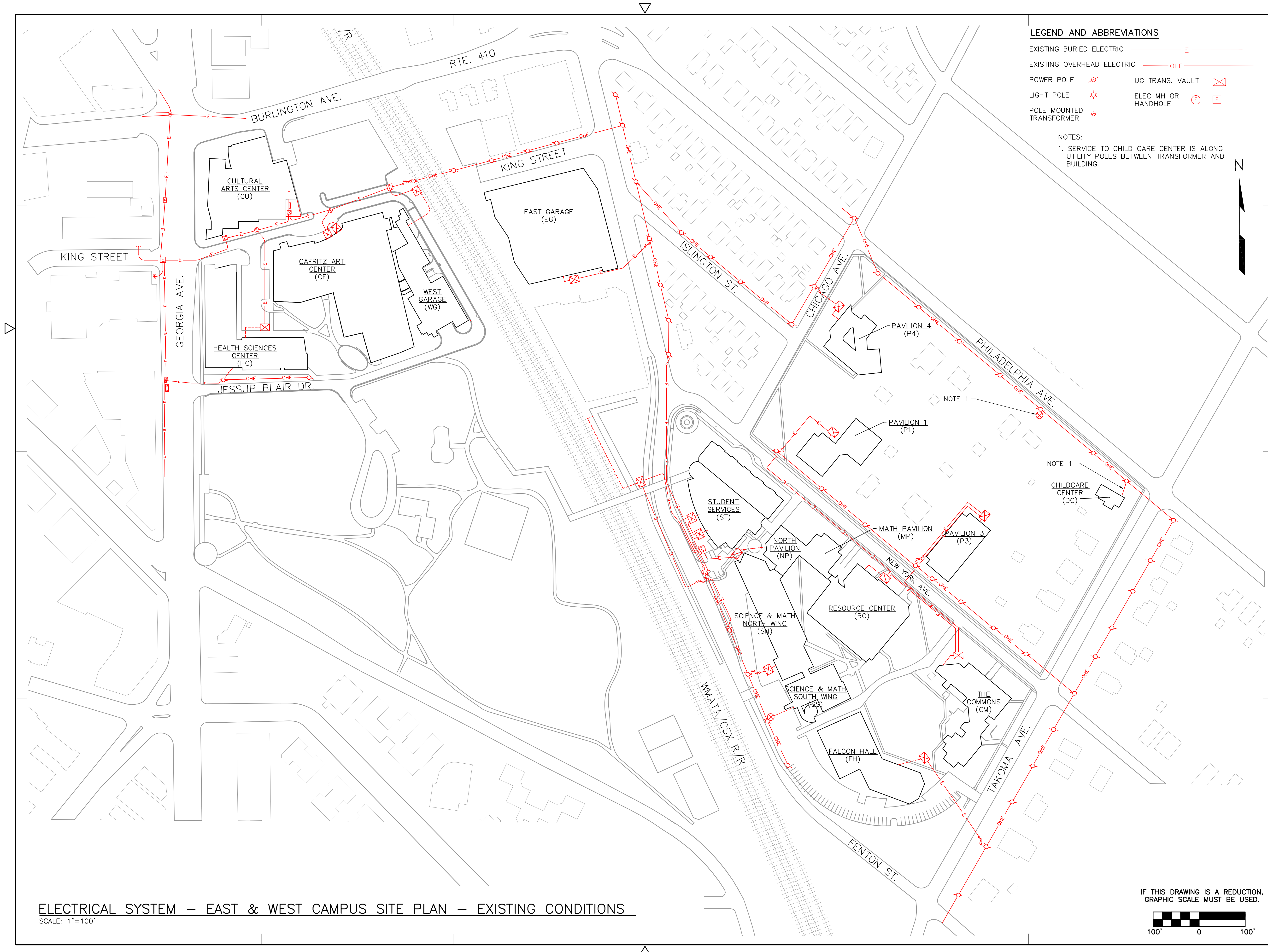
Project No.

Drawing Number

Date

02/22/13

E-2



LEGEND AND ABBREVIATIONS

EXISTING BURIED ELECTRIC — E —

EXISTING OVERHEAD ELECTRIC — OHE —

POWER POLE ⚡

LIGHT POLE ⚡

POLE MOUNTED TRANSFORMER ⚡

UG TRANS. VAULT ☒

ELEC MH OR HANDHOLE ⓔ ⓔ

NOTES:
1. SERVICE TO CHILD CARE CENTER IS ALONG UTILITY POLES BETWEEN TRANSFORMER AND BUILDING.

ELECTRICAL SYSTEM — EAST & WEST CAMPUS SITE PLAN — EXISTING CONDITIONS
SCALE: 1"=100'



Montgomery College

Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301) 251-7363



Drawn By: RSE Ckd By: JTO
Designed By: JTO Approved By: JTO

Notes



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phone 434.947.1801 | fax 434.947-1801 | web wileywilson.com

COMM. NO. 211130.03

No.	Description	Date

Revisions

Location Map



Project Title

**MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN**

Drawing Title

**ELECTRICAL SYSTEM SITE
PLAN — EXISTING
CONDITIONS**

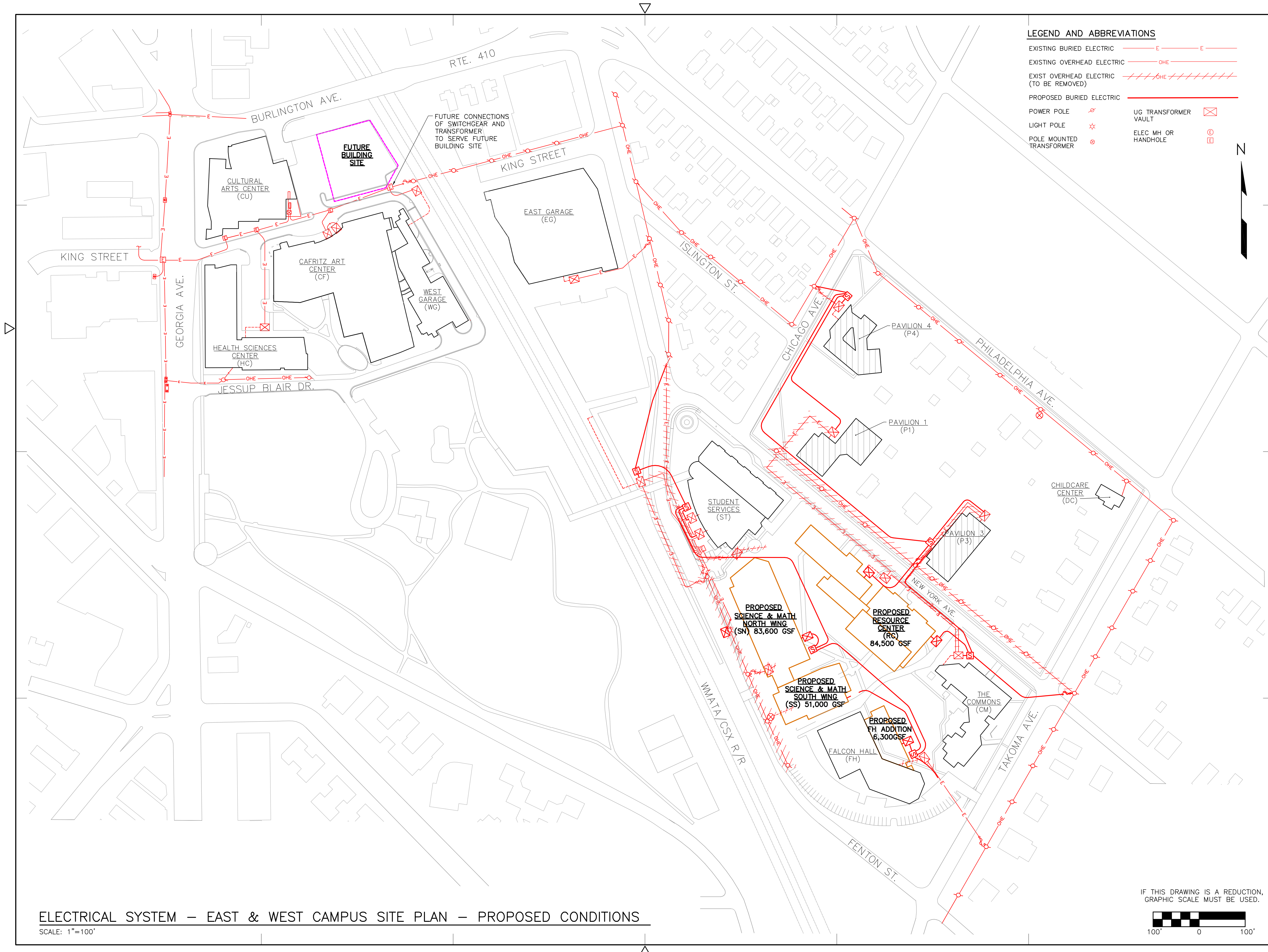
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Project No. Drawing Number

Date 02/22/13

E — 3

MC Facilities No.



LEGEND AND ABBREVIATIONS

EXISTING BURIED ELECTRIC ——— E ——— E ———
EXISTING OVERHEAD ELECTRIC ——— OHE ———
EXIST OVERHEAD ELECTRIC (TO BE REMOVED) - - - - - OHE - - - - -
PROPOSED BURIED ELECTRIC ——— E ——— E ———

POWER POLE ⚡ UG TRANSFORMER VAULT ⓧ
LIGHT POLE ☆ ELEC MH OR HANDHOLE Ⓢ
POLE MOUNTED TRANSFORMER Ⓢ

ELECTRICAL SYSTEM — EAST & WEST CAMPUS SITE PLAN — PROPOSED CONDITIONS
SCALE: 1"=100'

IF THIS DRAWING IS A REDUCTION,
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Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301)–251–7363

Drawn By: **RSE** Ckd By: **JTO**
Designed By: **JTO** Approved By: **JTO**
Notes

127 Nationwide Drive, Lynchburg, Virginia 24502-4272
phone 434.947.1801 | fax 434.947-1801 | web wileywilson.com

COMM. NO. 211130.03

No.	Description	Date

Revisions

Location Map

Project Title

**MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN**

Drawing Title

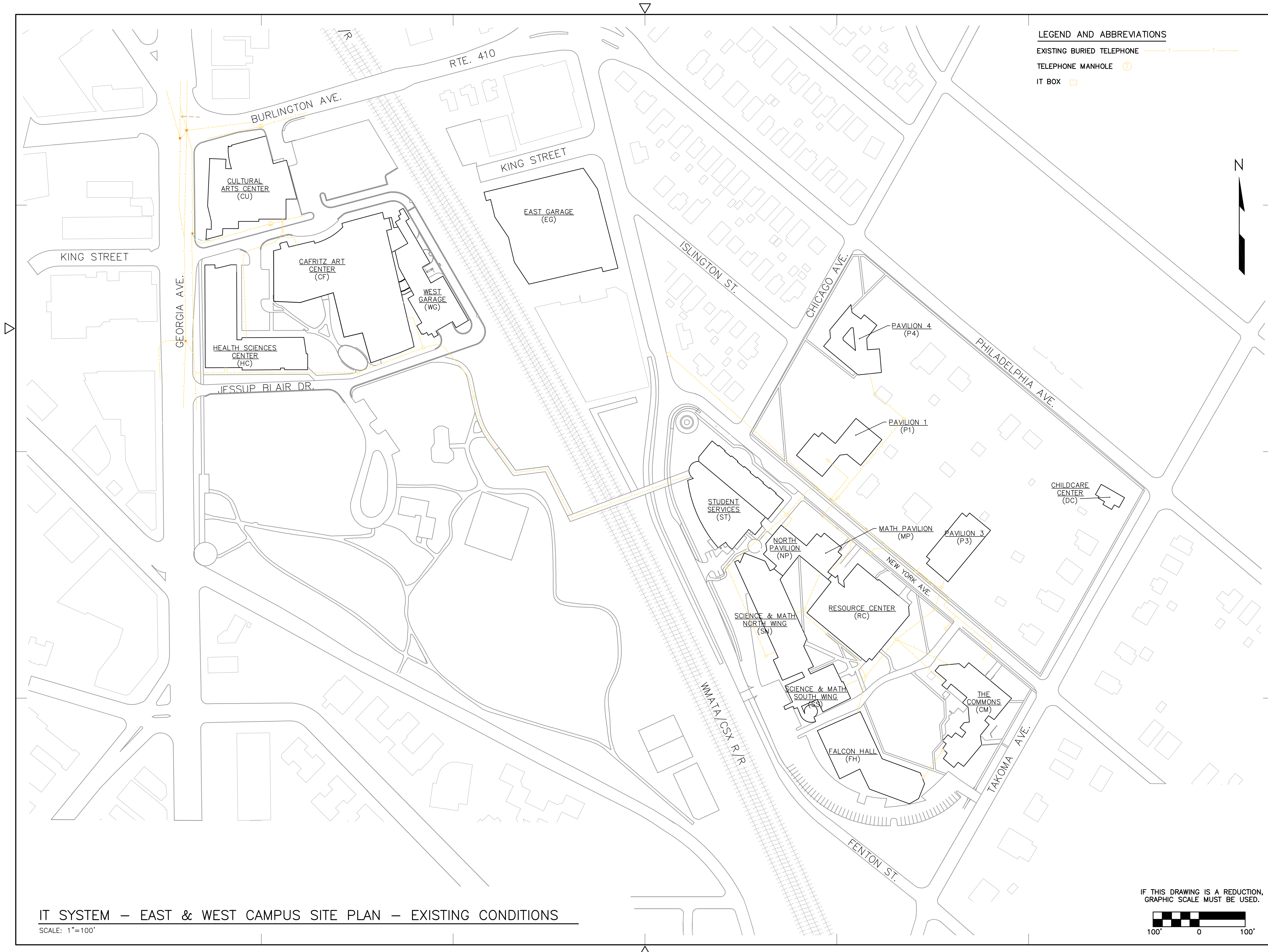
**ELECTRICAL SYSTEM SITE
PLAN — PROPOSED
CONDITIONS**

Scale: 1"=100'

Project No. Drawing Number

Date 02/22/13

E — 4

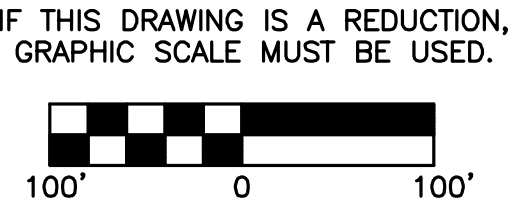


- LEGEND AND ABBREVIATIONS
- EXISTING BURIED TELEPHONE
 - TELEPHONE MANHOLE
 - IT BOX



IT SYSTEM – EAST & WEST CAMPUS SITE PLAN – EXISTING CONDITIONS

SCALE: 1"=100'



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Central Administration
Office of Facilities
900 Hungerford Drive
Rockville, Md 20850
Telephone: (301)–251–7363



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Designed By: JTO Approved By: JTO

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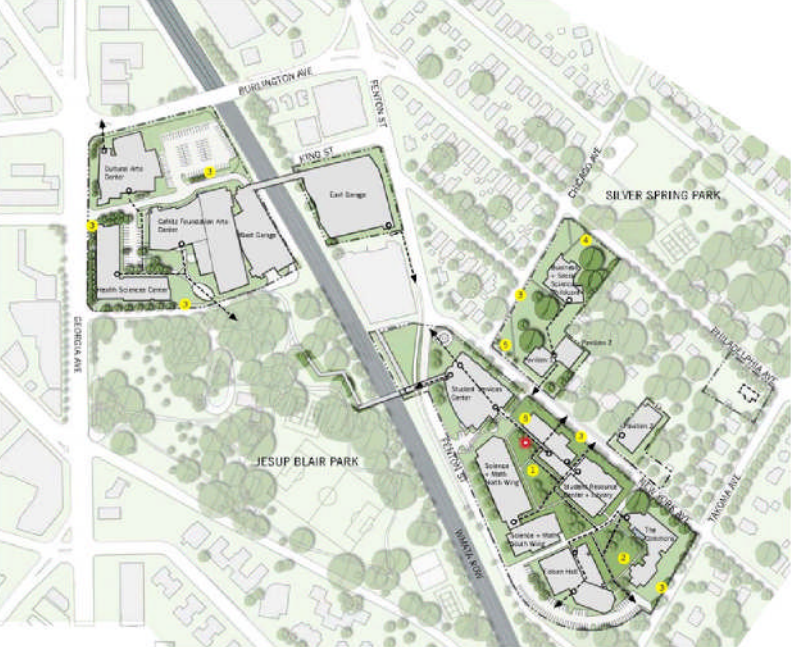
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COMM. NO. 211130.03

No.	Description	Date
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Revisions

Location Map



Project Title
MONTGOMERY COLLEGE
TAKOMA PARK/SILVER
SPRING CAMPUS
UTILITY MASTER PLAN

Drawing Title
INFORMATION TECHNOLOGY
SYSTEM SITE PLAN –
EXISTING CONDITIONS

Scale: 1"=100'

Project No. Drawing Number

Date
02/22/13

E-5

**LYNCHBURG**

127 Nationwide Drive
Lynchburg, VA 24502-4272
434.947.1901

RICHMOND

6606 West Broad St., Ste. 500
Richmond, VA 23230-1717
804.254.7242

ALEXANDRIA

2550 Huntington Ave., Ste. 310
Alexandria, VA 22303-1410
703.329.3200

ATLANTA

7000 Central Pkwy., Ste. 1475
Atlanta, GA 30328-6055
678.320.1888

wileywilson.com

