WASHINGTON STATE DEPARTMENT OF ENTERPRISE SERVICES

CAPITOL CAMPUS UTILITY RENEWAL PLAN

Olympia, WA

DES Project No. 2016-919 B (2)

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PREPARED FOR

Washington State Department of Enterprise Services

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Washington State Department of Enterprise Services
Capitol Campus Utility Renewal Plan

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FIGURES

TABLES

ACRONYMS

AHJ	Authority Having Jurisdiction
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
CIPP	Cured in Place Pipe
CMP	Corrugated Metal Pipe
DAHP	Washington State Department of Archaeology and Historic Preservation
DES	Washington State Department of Enterprise Services
DIP	Ductile Iron Pipe
Ecology	Washington State Department of Ecology
FDC	Fire Department Connection
GA	General Administration
GIS	Geographic Information System
GPM	Gallons per Minute
HABS	Historic American Building Survey
HDPE	High Density Polyethylene
KVA	Kilovolt-Ampere
LID	Low Impact Development
LOTT	LOTT (Lacey, Olympia, Tumwater, Thurston County) Clean Water Alliance
LV	Low Voltage
MV	Medium Voltage
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRB	Natural Resources Building
NRHP	National Register of Historic Places
OB2	Office Building 2
OSHA	Occupational Safety and Health Administration
PSE	Puget Sound Energy
PSI	Pounds per Square Inch
PVC	Polyvinyl Chloride
SOW	Statement of Work
WSDOH	Washington State Department of Health
WSDOT	Washington State Department of Transportation

EXECUTIVE SUMMARY

Construction of the Capitol Campus utility systems occurred over several decades. Many of the utilities have served well beyond their design life, with some original systems installed during the campus's original construction in the early 1900s still in service. While many improvements have been completed, the service condition varies from system to system. Some continue to operate at a level of effectiveness, while others need immediate improvement or replacement.

Section 1105 of the 2015-2017 Capital Budget directs the Department of Enterprise Services (DES) to assess the existing condition of underground utilities on Capitol Campus and to develop a utility renewal plan that will support the Capitol Campus into the future for the next 10 years. The plan should gradually and systematically replace or repair utility segments at a high risk of failure in an approach that is most cost effective. DES contracted Reid Middleton to perform this work.

This report summarizes the findings of past investigations and assessments, study reports, repair and construction record documents, input from Campus Building and Grounds operation staff, and Reid Middleton's findings, analysis, and evaluations. Due to budget constraints, the assessment is limited to stormwater, sanitary sewer, water, irrigation, and electrical systems; other utility systems, such as natural gas, reclaimed water, steam and chilled water, and telecommunications, are not included.

Benefitting from continual repairs and improvements, the utility systems of the campus are in generally fair condition. While many improvements are needed, some of which are urgent, there is little evidence that any utility system needs a campus-wide overhaul. In general, utilities in East Capitol Campus are in better condition than those in West Capitol Campus, in part because of the differences in ages of the facilities and construction materials.

One special concern is the West Capitol Campus water system. Available flow test data shows that the campus water system cannot deliver the required fire flow to the Legislative Building area, which includes the Legislative Building, the Temple of Justice, the Cherberg Building, and the O'Brien Building. Several reasons could contribute to the flow-capacity problem, but it will take a more-detailed and focused study and analysis to find out. And, the study should be performed as soon as possible.

Based on this study's findings, a list of necessary improvement projects was developed and prioritized for the next 10 years, with an estimated overall cost for each project. The list is provided in the Proposed Improvements section of this report (Table 3, page 55). Generally, those utility projects with the highest risk priority are included in the near-term budget biennia; however, many listed projects are more urgent than their planned implementation. One such project is the West Capitol Campus Irrigation System Replacement. Fiscal reality indicates that even critical improvements must be phased over time. This plan is presented as a balance between what must be done and the funding that can be reasonably expected.

The list does not include all utility issues on the Capitol Campus; however, with continual regular maintenance and implementation of these identified improvement projects, the utility systems should be able to support the Capitol Campus into the future for 10 years or more.

INTRODUCTION

Section 1105 of the 2015-2017 Capital Budget directs the Department of Enterprise Services (DES) to assess the existing condition of underground utilities at Capitol Campus and develop a utility renewal plan. In May 2016, DES authorized Reid Middleton, Inc., to perform the work and develop a utility renewal plan for East and West Capitol Campus in Olympia, Washington.

The objective of the project is to develop a utility renewal plan that will support Capitol Campus into the future by gradually and systematically replacing or repairing utility segments at high risk of failure in an approach that is the most cost effective.

The studied utility systems include water, electrical, sanitary sewer, irrigation, and stormwater. Due to budget constraints, other utility systems, such as chilled water, steam, natural gas, communication, and reclaimed water are not included. Utilities owned by the City of Olympia, such as the water main systems in East Capitol Campus, are not included in this project.

The project was completed in two steps. The first step assessed the existing utility conditions and identified improvement projects with high risk and priority. The second step prepared a utility renewal plan with not only detailed information about the existing utility conditions but also the sequence and priority of the necessary improvements. The project is to be completed by the end of the 2015-2017 budget biennium.

The utility renewal plan is a 10-year plan, meant to coincide with DES's *Ten-Year Capital Plan* proposals. While coordination meetings have been held between the design team and the City of Olympia during the project, the City of Olympia did not review or approve this utility renewal plan. Obtaining City approval is not required and is not in the project objectives.

DES is the contracting authority for this work. Reid Middleton is the primary consultant and project lead collaborating with Hargis Engineers for electrical engineering, Haozous Engineering for water system engineering, and Mithun for landscaping architectural services.

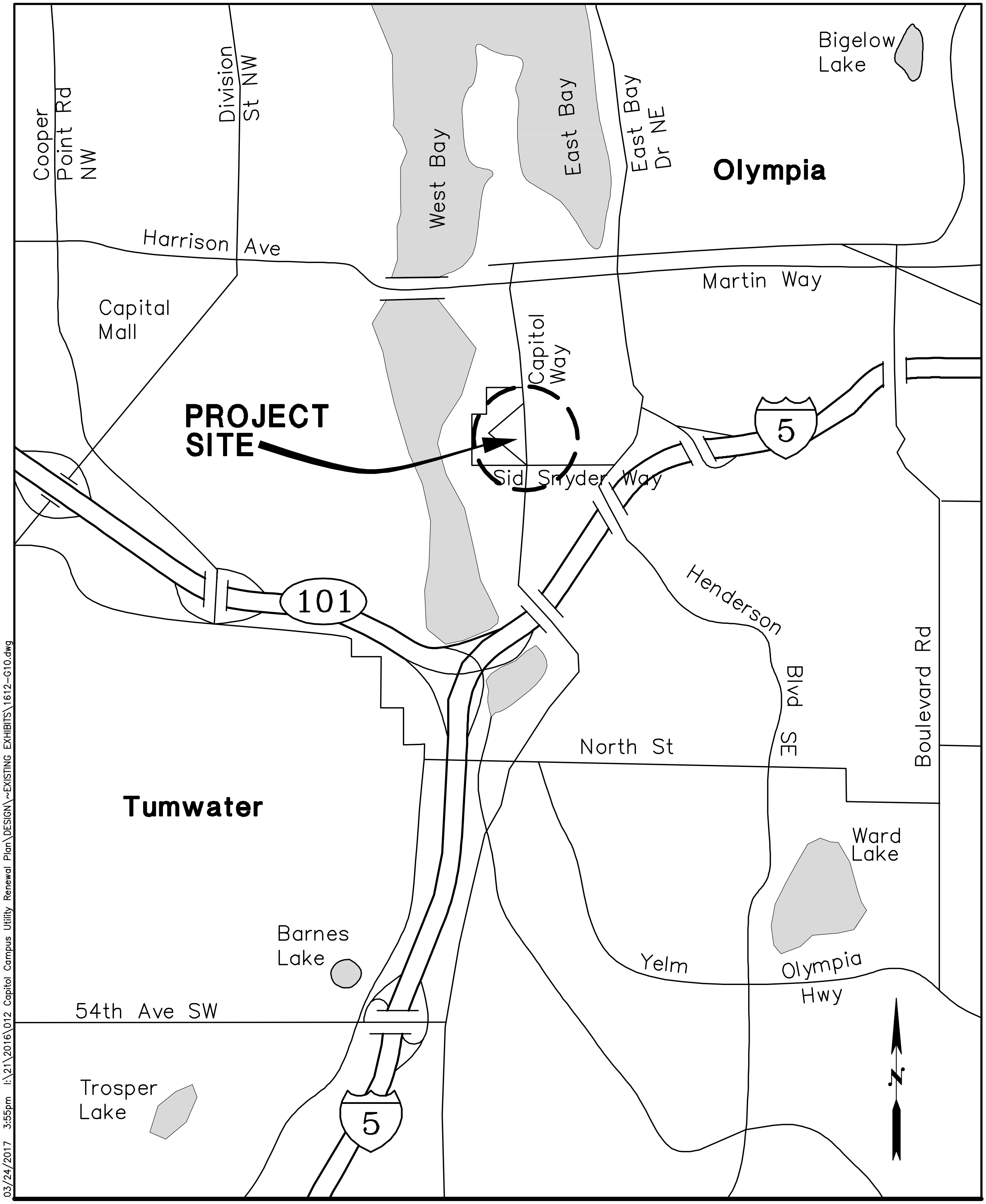
Project Objectives

The objectives of this project are to:

- Assess the existing utility conditions at Capitol Campus to identify system issues and improvement needs.
- Evaluate and prioritize identified improvement needs, so that the utility systems can be improved gradually and systematically to support the Campus into the future.
- Prepare a report with the identified improvement projects, through DES, to the Legislature for review and funding approval.
- Coordinate with the consultant team of the *Campus Master Plan for the Capitol Campus* currently being updated to plan for necessary utilities to support the proposed developments.
- Provide general planning criteria and considerations for utility improvements in future developments and redevelopments.
- Develop a utility improvement plan that is well-coordinated with other master plans, including the *2006 Campus Master Plan for the Capitol Campus*, the *2009 Capitol Campus Historic Landscape Preservation Master Plan*, the *2015 West Capitol Campus Drainage Master Plan, and the 2017 State Capitol Development Study*. The ultimate goal is that all these plans can be integrated seamlessly to create a comprehensive future development plan for the Capitol Campus.

Project Boundary

The project boundary of the Capitol Campus Utility Renewal Plan is approximately 100 acres, including both the West Capitol Campus and the East Capitol Campus. The West Capitol Campus includes state-owned properties from Capitol Way on the east to the top of the bluff at Capitol Lake on the west, and from 16th Avenue SW (projected) on the south to 10th Avenue SW on the north. The East Capitol Campus is bordered by Jefferson Street SE on the east, Maple Park Avenue SE on the south, Capitol Way on the west, and 11th Avenue SE on the north. Other Capitol Campus areas outside of the West and East Capitol Campuses, such as Centennial Park, Sylvester Park, Heritage Park, and Deschutes Parkway, are not included in this project. Figure 1, Vicinity Map, shows the general location of the project. Figure 2, Project Boundary, depicts the project area.



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VICINITY MAP
Capitol Campus Utility Renewal Plan
March 2017

Figure 1

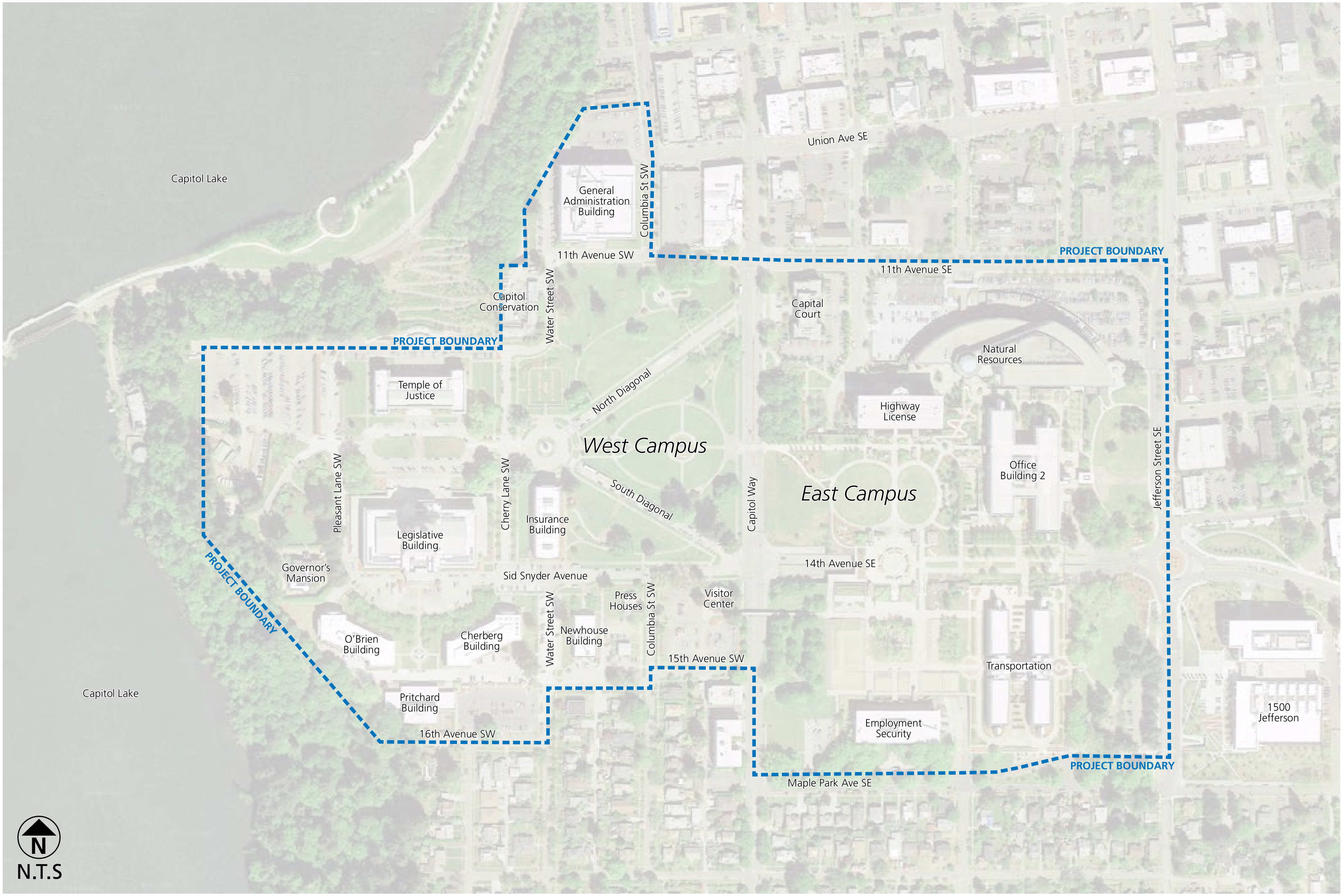

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FIGURE 2 – PROJECT BOUNDARY

Project Approach

Numerous investigations and studies have been conducted for the utility systems over the last 15 years. Some of these studies focused on a specific utility system, while others examined a specific location. Some improvements have been completed based on the results of these investigations and studies, but no systematic studies that include multiple utility systems over the entire East and West Capitol Campus have been performed. In addition, there is no whole picture of what improvements have been completed and what remains to be done.

Purpose

The purpose of this project is to review past studies and completed improvement projects, assess existing conditions and identify problems, develop a utility renewal plan to fix the high risk and high-priority problems, and respond to the master-planned developments at Capitol Campus.

Methodology

This project builds on past investigations and studies. By adding current field observations of visible utility features, the project combines the collective information into an integrated summary report. No additional field investigations, such as video inspection or potholing (spot excavation to expose utility lines), were performed. The following steps were taken:

1. Review the updated campus utility survey map prepared by other.
2. Review available investigation and assessment reports.
3. Perform field observations to collect supplemental information.
4. Visit the Campus with DES operations staff for first-hand information regarding the utility systems.
5. Review record documents of constructed improvement projects.
6. Assess existing utility conditions based on past study results, additional site observations, interviews of operation staff, age of facility elements, and completed improvements.
7. Review future development plans of the Capitol Campus.

8. Identify improvement projects based on existing utility conditions, design life, code requirements, current usage, and anticipated usage in the future.
9. Evaluate and prioritize improvement projects based on the risk priorities and future usage.
10. Develop conceptual designs and project budgets for the high risk projects with high priority for improvement over the next 10 years.

Other Related Projects

As part of the utility assessment effort, DES contracted with a separate consultant, David Evans and Associates, to update the campus utility survey map. An accurate underground utilities map was essential to developing an effective and ongoing implementation plan to replace or repair the utilities deemed at risk. Reid Middleton's team reviewed the updated Capitol Campus survey map and provided review comments. Reid Middleton also provided the survey team additional utility information learned from reviewing record documents.

DES also contracted separately with University Mechanical Contractors to assess the steam heating system and the possibility of transitioning the steam heating system to a hot water system. Conversion of the centralized steam heating system to hot water is another major effort at Capitol Campus that will impact Campus utility systems and should be taken into consideration. The cover sheet and table of content of the steam heating system assessment report is included in this report as an appendix.

In addition, DES determined that updating the stormwater management plan would be critical for maintaining a functioning drainage system at Capitol Campus while remaining in compliance with National Pollutant Discharge Elimination System (NPDES) permit requirements. The updated *Capitol Campus Stormwater Management Plan* is a separate report.

Exclusions

Due to available budget, the utility renewal plan project is limited to stormwater, sanitary sewer, water, irrigation, and electrical systems. Other utility systems, such as natural gas, reclaimed water, and telecommunications, were not included. Other elements and tasks excluded are:

1. Areas outside East and West Capitol Campus.
2. Additional field investigations and studies, such as video investigation and potholing. The utility renewal plan was developed based on the results of past field investigations and studies.
3. Quantitative analysis, such as computer modeling for water and irrigation system analysis and proposed main sizing.
4. Water main systems in East Capitol Campus, which are owned and operated by the City of Olympia.
5. Updating the *2015 West Capitol Campus Drainage Master Plan*. Necessary implementations are included in this report because the revisions affect future master plan developments. Updating the entire drainage master plan is not included.

EXISTING CONDITIONS AND ASSESSMENTS

Sanitary Sewer System

General Overview

DES owns and maintains a sanitary sewer system on West Capitol Campus. The existing sanitary sewer system consists of sewer mains, side sewers, manholes, and cleanouts. Portions of the sanitary sewer system on West Capitol Campus also serve as a combined storm and sanitary sewer system. The campus sewer system discharges to the City of Olympia's sanitary sewer system. At East Capitol Campus, the sanitary sewer system consists primarily of side sewers (building services) that discharge from buildings to the City of Olympia's sanitary sewer system in adjacent streets. Except the section of combined sewer main in Washington Street, between the Highways License Building and 11th Avenue, DES does not own sewer mains in East Capitol Campus. The existing sanitary sewer system is depicted in Appendix A, Figures 1 and 2.

The sanitary sewer systems in Capitol Campus were constructed with the development of the campus and its original buildings. West Capitol Campus construction started in the early 20th century, while the development of East Capitol Campus began in the 1960s and continued through the 1990s. Periodic modifications, replacements, and repairs have occurred, but many of the original sewer systems are still in service despite being well beyond their service life.

Several investigations and studies have been conducted on Capitol Campus sewer systems. Recent studies and investigations include a study in 2003 by Jerome W. Morrissette Associates (JWM&A), an assessment study in 2009 by Parametrix, and video investigations in 2013 by Gray & Osborne. In addition, Gray & Osborne performed an investigation and assessment of the utilities at the Powerhouse area in 2015. Many repair and improvement projects have been completed based on these investigations results, but there are still many yet to be done. Additional improvements are required to replace deteriorating elements of the system, provide additional capacity, and to support Capitol Campus into the future.

West Capitol Campus

The sanitary sewer system in West Capitol Campus was primarily constructed in the early 20th century as part of the original Olmstead Brothers utility plan. Much of the original sewer system is still in place. Over the years, repair and improvement work has been done, such as repair projects that occurred between 2005 and 2010 following studies in 2003 by JWM&A and 2009 by Parametrix.

The sanitary sewer system in West Capitol Campus consists of concrete, vitrified clay, PVC, and ductile iron pipes. The PVC and ductile iron pipes are the result of more recent repair and improvement work. Pipe sizes vary from 4 to 10 inches in diameter. The sanitary sewer is a gravity system, except for a single force main from the Powerhouse on the bottom of the bluff to the parking lot on top of the bluff.

Much of the "recent" repair work that occurred between 2005 and 2010 consisted of lining the original pipes with Cured in Place Pipe (CIPP), a method in which a resin-impregnated felt tube is inserted into a pipe and expanded to conform to the contours of the pipe wall. While the repaired portions appear to be working satisfactorily, the portions of the system that have not been repaired or replaced are beginning to show signs of aging. In the most recent investigation and study report, dated April 2013, Gray & Osborne rated, in risk management terms, one section of the sewer pipe as "High Priority", five sections as "Moderate Priority", and eleven as "Low Priority". The pipe sections in the "High Priority" category need to be repaired immediately or as soon as budget is available within 10 years. The pipes in the "Moderate Priority" category have minor to moderate issues and will likely remain in proper operation for 10 to 20 years. And those identified as "Low Priority" have minor or no issues and can be expected to function properly for more than 20 years.

The Capitol Campus sanitary system discharges to the City of Olympia's combined storm and sewer system in three locations. The first is on Columbia Street, between 10th Avenue and Union Avenue, north of the General Administration (GA) Building. The other two discharges are on Capitol Way, one at 11th Avenue and one at Sid Snyder Way.

Columbia Street Discharge

The Columbia Street connection collects sewage from the O'Brien Building, the Governor's Mansion, and half of the Legislative Building, the Temple of Justice, and the Powerhouse. The side sewers from the O'Brien Building, the Governor's Mansion, and the Legislative Building connect to an 8-inch concrete main in Pleasant Lane. This 8-inch main flows north to the area northwest of the Temple of Justice, where it joins another 8-inch gravity line picking up the flows of the forced main from the Powerhouse. From there, an 8-inch PVC line conveys sewage east under 12th Avenue to the north end of Cherry Lane. This line turns northeast and continues under the Capitol Conservatory as a concrete line to the Water Street and 11th Avenue intersection, then continues north and northeast through the GA Building parking lots before connecting to the City of Olympia's system in Columbia Street.

The Temple of Justice has two side sewers connecting to an 8-inch tile pipe. The tile pipe flows east and changes to a PVC line and then to an 8-inch concrete pipe before joining the concrete pipe running under the Conservatory in Water Street.

A number of repair projects have occurred on the sewers that connect to the Columbia Street discharge point. The O'Brien Building service was lined with CIPP in 2009 to address structural deficiencies identified in the 2009 Parametrix study. The 8-inch concrete sewer main on Pleasant Lane was also CIPP-lined in 2010 due to similar structural concerns. The portion of this main between the Legislative Building and the Temple of Justice was replaced with PVC in 2010 due to significant sag and infiltration. The Governor's Mansion sewer service was partially replaced in 2000. The 8-inch PVC main under 12th Avenue was constructed in 2004 to replace the failed original sewer main. The Temple of Justice's service was partially replaced at some point prior to 2003. The portion of the service from the intersection of Cherry Lane toward the sunken garden is rerouted from the original location. No records show that the 8-inch concrete sewer main from 12th Avenue to the Columbia Street connection point, including the main under the Conservatory, has been repaired or replaced.

Despite the repairs and improvements mentioned above, the following problems are still present in the system:

1. The 8-inch concrete pipe that passes under the Capitol Conservatory is an original construction and nearing the end of its life. The 2009 inspection by Parametrix identified an 8-inch hole in the top of the pipe, putting the pipe at a high risk of failure. At “High Risk” in Parametrix’s definition is the “sewer mains for the direct executive, legislative, and judicial buildings” and “those areas of the system that present health or safety issues”. The 2013 investigation by Gray & Osborne categorized this section of main as “Moderate Priority”, which means that it will likely remain in proper operation for 10 to 20 years. The Capitol Conservatory is located on a slope and has been permanently closed due to the risk of landslide. A failure in the sewer pipe could saturate the existing slope and contribute to a collapse in addition to shutting down services to half of West Capitol Campus's buildings. The sewer main is a big concern to West Capitol Campus operations and the stability of the steep slope because of its age, condition, location, and importance.
2. A section of the sewer main, in the parking lot south of the Legislative Building and east of the Governor’s Mansion, contains vertical bends when crossing under the utility tunnel. The timing of and reasons for the installation of these bends is unknown; they may be original construction, or they may have been added to accommodate the steam tunnel. Vertical bends are not standard in gravity sewer systems. It is unclear why the line was not constructed with a straight grade to pass under the steam tunnel and may be worth future investigation and evaluation.
3. The existing galvanized steel force main from the Powerhouse to the top of the steep hillside is approaching the end of its designed life expectancy. Galvanized steel does not perform well with sewage and in direct-buried applications. The hillside is also a known potential slide hazard; thus, open trenching through the hillside should be avoided.
4. The Temple of Justice's service, which was previously partially replaced, is showing signs of aging. Gray & Osborne identified this service line as “Low Priority” in 2013, while Parametrix identified it as a moderate risk of failure in their 2009 study. Although engineers’ opinions could vary, given

the age and material of the service line, this section of vitrified clay pipe is likely at high risk of failure.

Capitol Way and 11th Avenue Discharge

The sewer main that discharges at the intersection of Capitol Way and 11th Avenue serves the south and west parts of West Capitol Campus. It provides services to the Pritchard Building, the Cherberg Building, half of the Legislative Building, and the Insurance Building. The Pritchard Building's service line connects to a 6-inch concrete main on 15th Avenue, which transitions to an 8-inch PVC line going north on Water Street. The services for the Cherberg Building and Newhouse Building connect to an 8-inch PVC main in a manhole at the intersection of Sid Snyder Way and Water Street. From there, a 10-inch clay CIPP-lined main conveys sewage to a manhole in the South Diagonal, collecting sewer discharges from the other half of the Legislative Building and the Insurance Building. The 10-inch clay line then continues north and northwest, collecting storm drainage from some lawns, before discharging to the City of Olympia's main at Capitol Way and 11th Avenue. This combined storm and sanitary sewer main system also collects storm runoff from some areas of the parking lot east of the Pritchard Building.

The 8-inch PVC main on Water Street between 15th Avenue and Sid Snyder Way was constructed in 2011 to replace the failing original main. This project also replaced the service for the Newhouse Building and separated storm and sanitary sewer lines in Water Street. The 10-inch clay pipe that crosses Sid Snyder Way and the south lawn was lined with CIPP in 2010 from the intersection of Sid Snyder Way and Water Street to its discharge to the Capitol Way city sewer. As part of this project, 80 linear feet of this main from the manhole in the South Diagonal going southeast toward Sid Snyder Way was replaced with a PVC pipe. The Legislative Building's service line was replaced in 2014 with a PVC line as part of the Sid Snyder Way improvement project.

Identified problems in this system include:

1. The sewer service line to the Insurance Building is broken and needs to be replaced. The service is a 6-inch vitrified clay pipe that was installed in the 1920s when the Insurance Building was constructed. The 2009

Parametrix report categorized this service line as “Moderate Risk”, which means the sewer service line’s serviceability is impaired but may not impose immediate risk.” Gray & Osborne identified this line as “Moderate Priority”, which means that it will likely remain in proper operation for 10 to 20 years. DES staff reported that the service line is broken and leaking.

2. The sewer service to the Cherberg Building needs to be replaced. The service line is old. The 2009 Parametrix report categorized this service line as “High Risk”. No specific reasons were given in their report about why this sewer service line is in the “High Risk” category. A pipe is in a “High Risk” situation when it presents health or safety issues. It could be broken, sagging, reverse sloped, failing, separated, or heavily impaired by root intrusion.

3. The Pritchard Building discharges its sewage to a 6-inch concrete line on 15th Avenue. This line is original and was constructed in the early 1950s when the Pritchard Building was constructed. Given its age and that it does not directly serve the executive, legislative, or judicial buildings, the 2009 Parametrix report categorized this service line as “Moderate Risk.” Given that the sewer line has been in service for six decades, Reid Middleton thinks Parametrix's assessment is appropriate.

Capitol Way and Sid Snyder Way Discharge

The third discharge point for the sewer system in West Capitol Campus is at the intersection of Capitol Way and Sid Snyder Way. An 8-inch clay sewer main collects off-site sewage from the neighborhood south of West Capitol Campus and conveys it through Columbia Street and Sid Snyder Way to the Capitol Way sewer main. Sewer services to the Press House block are provided by this main, which also collects storm runoff from the Visitor Center parking lot, the Press House block, Columbia Street, and a small area at the Sid Snyder Way and South Diagonal intersection. The Visitor Center has a side sewer that discharges directly to the Capitol Way sewer line.

This is a combined storm and sanitary sewer system. No record indicates when the sewer system was originally constructed. No document shows completed repairs or improvements. The sections of sewer main system in 15th Avenue and Columbia

Street are owned by the City of Olympia. The ownership of the section of sewer main between Columbia Street and Capitol Way is not clear. It is not well defined, and it could be either the City's or the State's. The 2009 Parametrix study report identified this sewer main system as 'Low Risk", which means that it does not directly serve the three branches of the state government nor cause foreseen public health or safety hazards.

When Sid Snyder Way was redeveloped in 2014, storm and sanitary sewers were separated within the project limits, except for a small area on the east end of the street. A new PVC sewer main was installed, with stub-outs for future redevelopment of the Press House and Visitor Center.

The West Capitol Campus Existing Sewer System Map in Appendix A shows an overview of the sanitary sewer system.

East Capitol Campus

The sanitary sewer system on East Capitol Campus primarily consists of building sanitary sewer service lines (side sewers) that discharge directly from the buildings to the City of Olympia's sewer mains in adjacent streets. The only East Capitol Campus sewer main owned by DES is in Washington Street. The sewer lines were constructed with their associated buildings. East Capitol Campus was constructed in the 1960s and 1970s, with the newest building, the Natural Resources Building, constructed in the 1990s. The only known replacements or repairs to the East Capitol Campus sewer system involved rerouting building services to allow for the construction of the Natural Resources Building.

The sanitary sewer services for the State Archives Building and the Capitol Court Building are collected by an 8-inch sewer in Washington Street that discharges into the City's system in 11th Avenue. This 8-inch main also collects storm runoff from Washington Street and the State Archives, Capitol Court, and Highways Licenses Buildings. The Highways Licenses Building originally had a separate service line that connected to the City of Olympia's sewer on Franklin Street. This service line may have been rerouted when the Natural Resources Building was constructed in the 1990s, but where it was rerouted to is unknown. Given the building's location, surrounding topography, and available sewer services in the vicinity, it was probably rerouted to the combined storm and sanitary sewer main in Washington Street.

How the sewer service is connected to the Natural Resources Building is unknown. Sewer services to the building are not shown on the updated campus survey map and the building's record drawings could not be found. It is likely that the side sewers discharge from the building to the City of Olympia's sewer main (or mains) directly. Sewer mains used to be available in the sections of Adams Street and Franklin Street where the building was built. A sewer main is also available in the adjacent Jefferson Street. It is likely that the building discharges directly to one of these sewer mains.

The Transportation Building and Office Building 2 (OB2) have sewer services that directly connect and discharge to the City of Olympia's sewer main on Jefferson Street. The Transportation Building service is a clay pipe, and there are no records of repairs or replacement since the building was constructed in 1969. The OB2 service is concrete and has been in place since 1974, when the building was constructed. The public bathroom on the plaza above the parking garage and the Employment Security Building sewer services connect and discharge to the city's sewer on Maple Park Avenue at the intersection of Franklin Street through an 8-inch steel service line.

Limited investigation has been performed for the sanitary sewer systems in East Capitol Campus, most of which have been in service for 50 to 60 years. The existing conditions of these sewer pipes are unknown. No problems were reported by DES staff. A video investigation performed for the combined sewer main in Washington Street in 2014 shows this concrete combined sewer main is in poor condition. There are multiple root intrusions and blockages. A small section of the pipe has been replaced with PVC pipe, including a reducer and bend that cause blockages in the pipe. The investigation report, by Gray & Osborne, categorized this sewer main as "High Priority", which means that the sewer main needs to be repaired immediately or as soon as budget is available within 10 years. Given the conditions shown on the investigation video, Gray & Osborne's "High Priority" conclusion is appropriate.

Capitol Campus Domestic Water System

General Overview

The existing potable water and fire protection system consists of piping, valves, fire hydrants, and meters. The Capitol Campus water system obtains its potable water supply from the City of Olympia's water system. East Capitol Campus and State-owned facilities north of Capitol Campus are served from City of Olympia's distribution piping by metered service connections to the City's water system. West Capitol Campus has a private potable water and fire protection distribution system that serves the West Capitol Campus area through master water meter connections to the City of Olympia's water system. The existing water system is depicted in Appendix A, Figures 3 and 4.

West Capitol Campus

DES owns and operates the water system on West Capitol Campus. The West Capitol Campus water distribution system was originally constructed in 1930 to 1931 as part of the 1911 building program prepared by the State Capitol Commission. Unlined cast iron pipe was installed on the grounds to serve the original Legislative Building, Temple of Justice, Governor’s Mansion, Cherberg Building, O’Brien Building, and Insurance Building. With the construction of the Pritchard Building in the 1950s, a 6-inch water main was looped behind and south of the Cherberg Building.

The Capitol Campus distribution system was connected to the City of Olympia’s 10-inch water main on Capitol Way and originally had a booster pump at the connection point to increase service water pressure to Campus buildings. The pump was later abandoned when West Capitol Campus was converted to a higher pressure that operated with a hydraulic service elevation of 246 feet above sea level (246 service pressure zone).

The 1985 water system improvements replaced almost all of the 1930s cast iron pipe, added new master water meter connections to the City system at Sid Snyder Way and Columbia Street and at 11th Avenue and Columbia Street. Some sections of this ductile iron water system are located inside the steam tunnel. The old cast iron water system was converted to irrigation-only water service. An existing 4-inch galvanized water pipe installed inside an existing steam tunnel provides water service to the Powerhouse. This connection is important to provide makeup water for the heating steam and cooling chilled water loops for West Capitol Campus.

The Press House and Capitol Visitor’s Center are served directly by the City of Olympia through metered services connected to existing water mains along their street frontages on Columbia Way and Sid Snyder Way. The GA Building is served by a metered service to the City's water main in Columbia Street.

Recent water system improvements include installation by directional drilling of a new 2-inch HDPE water service to the Governor’s Mansion; replacement of the Pritchard Building’s 6-inch water main with an 8-inch ductile iron water main; and replacement of the 1980s-installed 10-inch water main in Sid Snyder Way from Capitol Way to Water Street as part of the street reconstruction. Water service to some of the historic buildings had poor water pressure in the upper floors, and individual building booster pump facilities were installed in the O’Brien, Cherberg, and Legislative buildings in the early 2000s to improve internal water service to all floors.

The existing water distribution system at West Capitol Campus has 12 operational fire hydrants. The hydrants are routinely inspected and tested, and servicing is provided as needed. Fire flow testing in 2012 indicated that fire flows range between 1,900 gpm and 1,200 gpm at 20 psi. Automatic fire sprinklers are installed in the Temple of Justice, Legislative Building, Insurance Building, Cherberg Building, O’Brien Building, Newhouse Building, Pritchard Building, and Governor’s Mansion. All fire sprinkler systems have fire department connections (FDC) for supplemental pressurization by the City of Olympia Fire Department. The Legislative, Temple of Justice, and O’Brien Buildings have fire sprinkler booster pumps for additional pressure of their sprinkler system.

The City of Olympia Fire Marshal has determined that the highest fire flow demand on West Capitol Campus is for large historic buildings such as the Legislative Building. This demand threshold is established at 4,000 gpm at 20 psi residual pressure.

Each State building is individually metered at its connection to the West Capitol Campus distribution system. The existing meter conditions cannot be safely determined due to lack of access because of their location inside the steam tunnels. The steam tunnels are classified as confined spaces. Accessing confined spaces requires special training. DES staff has not accessed these meters for some years and considers access to these tunnels dangerous. Meters require periodic servicing and calibration, typically at 5- to 10-year intervals. The water meters were noted as existing in the 1985 plans. If they are more than 30 years old, they are well beyond their operational life and may not function properly.

All fire sprinkler connections have cross connection control valves to prevent contamination from non-potable sources by using either double check valve assemblies or other equipment. DES staff familiar with the water system believe the potable and irrigation water systems are completely separate. However, some record drawings show the old irrigation water system may have an old legacy connection to the newer 1980s potable water system at the north side of the Insurance Building. Further investigation should be made to determine if the two systems are separate or interconnected. If they are interconnected without a cross connection control valve, they should be separated.

The domestic water main system on West Capitol Campus consists of ductile iron pipes installed in the mid 1980s and later years. Given the durability and longevity of ductile iron pipes and the soil conditions at the campus, the pipes should still be in good condition and should last for decades to come.

The biggest problem in the West Capitol Campus water system is the available fire flow. The City of Olympia's computer model indicates that the City's water system can provide 4,000 gpm at 20 psi to either of the two existing master meter connection points. Flow tests conducted in 2012 indicate that the water flow availability ranges between 1,900 gpm and 1,200 gpm at 20 psi in the state-owned system inside West Capitol Campus. This is much lower than 4,000 gpm at 20 psi that the Fire Marshal estimated is needed for large historic buildings such as the Legislative Building.

East Capitol Campus

The East Capitol Campus buildings and facilities are served directly from the City of Olympia's water distribution system using individual services with water meters. There are few, if any, State-owned distribution water piping or appurtenances on

East Capitol Campus except those associated with individual water meter and fire sprinkler system connections to the State buildings or facilities.

Because the State does not own the water main system in East Capitol Campus, the water system in East Capitol Campus is not included in this project.

City of Olympia Water System

The City of Olympia's water system has continuously served the State Capitol and Capitol Campus. The City water system's largest source is McAllister Spring, now converted to wells for protection from surface contamination. The City has several other smaller wells in the southeast and western portions of the city. The wells are chlorinated and treated for corrosion control.

The City originally served West Capitol Campus from the Fir Street Reservoirs, with a hydraulic service elevation of 226 feet above sea level. In the 1930 Capitol Campus plan, the Capitol water service pressure was boosted by an underground pump station along Capitol Way, east of the fountain. When the City later constructed the Stevens Field Standpipe Reservoir, the operating pressure/hydraulic service elevation for Capitol Campus was raised to 264 feet above sea level, which is an increase of 38 feet in hydraulic service elevation.

The 264 service pressure zone is served primarily from the 36-inch Meridian Tank/McAllister transmission water main through pressure reducers. The City of Olympia Engineering Department has prepared a hydraulic computer model of the City's system and determined that 4,000 gpm at 20 psi is provided to either of the two existing master meter connection points to the West Capitol Campus distribution water system.

The existing City 264 service pressure zone has a defined but limited capability for fire flows. The large-diameter existing water mains serving the 264 service pressure zone include:

1. A 10-inch water main in Capitol Way, extending past Capitol Campus from the Stevens Field standpipe reservoir.
2. A 10-inch water main in 14th Avenue SE from east of Henderson Boulevard.

3. A 10-inch water main in Maple Park Avenue from Jefferson Street to Capitol Way.
4. 10-inch and 12-inch water mains in Jefferson Street up to the Stevens Field Standpipe.

The existing City of Olympia water mains located directly uphill and to the south of West Capitol Campus are small-diameter (2-inch, 4-inch, and a few 6-inch) water mains that are undersized even for residential fire protection service. Capitol Campus is on the northern edge of the 264 service pressure zone of the City's water mains. North of 11th Avenue and Union Street, the water system is operated on the 226 service pressure zone and no inter-support is possible to the Capitol Campus water system from the lower-pressure 226 service zone. Water main interconnections to the north and immediately south are not possible to reinforce the State distribution water system in West Capitol Campus because water mains in these areas are either too small or in a lower pressure zone. The West Capitol Campus relies solely on water supply from the east and from the Stevens Field Standpipe Reservoir.

Capitol Campus is at the edge of the City of Olympia’s 264 service pressure zone, the edge of Capitol Lake, and the edge of the 226 service pressure zone, with small-diameter mains to the south, and is therefore reliant on water supply from the east and from the Stevens Field Standpipe.

The Old State Capitol Building at Washington Street and 7th Avenue, the Dolliver Building at Capitol Way between 7th and 8th Avenues, the Columbia Garage at Columbia Street and Union Avenue, and two small State buildings south of Centennial Park at 11th Avenue and Washington Street are all served directly by the City of Olympia from the 226 service pressure zone. East Capitol Campus is served directly by the City of Olympia from the 264 service pressure zone.

The City’s current *Water Comprehensive Plan* proposes a new transmission water main, Project #TD-13, to strengthen service to the 264 service pressure zone with a new 16-inch water main, from 12th Avenue and Eastside Street, along Henderson Boulevard, and through the City's maintenance facility, that provides an additional connection with the 264 service pressure zone at approximately 14th Avenue and 18th Avenue. This proposed water main is intended to reinforce and strengthen the existing City water distribution system by providing redundancy and sustaining pressure during high water demand periods. The City proposes to replace the existing master meters at the two connection points with the State distribution system in 2017.

The City of Olympia water system has an operating “Green” permit from the Washington State Department of Health (WSDOH) and meets all state and federal drinking water standards and requirements.

The West Capitol Campus Existing Water System Map in Appendix A shows an overview of the State-owned potable and fire protection water system.

Irrigation Water System

General Overview

Portions of the irrigation system in Capitol Campus are past their expected life. The system in West Capitol Campus was originally constructed during the 1930s. The system in East Capitol Campus was installed during the 1960s and 1970s. The irrigation system is owned and operated by the state, and water is provided by the City of Olympia's water system.

West Capitol Campus

The current irrigation distribution system serving West Capitol Campus is a network of old pipe systems and irrigation laterals. Records show that the oldest system in service dates back to 1931 and was constructed of cast iron. This 4-inch, 6-inch, and 8-inch cast iron main system originally served West Capitol Campus for fire protection, potable water, and irrigation water. The system originally connected to the City of Olympia's water main in Capitol Way at two locations, one at the intersection of Sid Snyder Way and Capitol Way, and the other near the main crosswalk from West Capitol Campus to East Capitol Campus. Figure 5 in Appendix A shows an overview of the irrigation system.

In the mid to late 1980s, a new water main system was built at the campus for fire protection and potable water. The new water main connects to the City's system at the intersection of Columbia Street and 11th Avenue and the intersection of Sid

Snyder Way and Capitol Way. The old cast iron water mains were not connected to the new mains and became a dedicated irrigation system.

Improvements to the irrigation systems over the years include the installation of lateral pipes and sprinkler heads in 1988. The irrigation water mains have not received many improvements, and reviews of available record documents reveal few investigations or studies have been conducted on the irrigation water mains. The most recent study report, completed in 2009 by Parametrix, identified the entire irrigation water main system in West Capitol Campus as “High Risk”, because these cast iron mains have been in service for more than 75 years. It is well beyond service life of cast iron pipes. The report recommended that these irrigation mains be replaced or decommissioned. Given the age of the irrigation system and from information provided by the Building and Grounds operation staff, Reid Middleton agrees with Parametrix's assessment.

The facilities have exceeded their life expectancy and are starting to show signs of age. It is suspected that the irrigation water mains might be leaking and partially causing the saturated soil problems in the large lawns in the eastern part of West Capitol Campus. In addition, operations staff report that the grounds crew has no means to adequately monitor and adjust the system to rapidly changing conditions during the summer months. It is common to observe areas of the campus that are over-irrigated by the existing system.

The irrigation water main running parallel under the south side of Sid Snyder Way was replaced in 2014 with the Sid Snyder Way project. The 6-inch cast iron line was replaced with the same size ductile iron line from Columbia Street to Cherry Lane. The connection to the City's main in Capitol Way was disconnected. The new main was connected to the City's main in Columbia Street, which connects to the new 10-inch ductile iron main on the north side of Sid Snyder Way.

East Capitol Campus

The irrigation system in East Capitol Campus was constructed with the building development. The system is segmented and does not have a master meter or meters, as does the West Capitol Campus system. The system connects to City water mains in adjacent streets at multiple locations, with each connection metered separately.

No record of systematic investigation or study of the irrigation system at East Capitol Campus is available. No existing irrigation system map of the campus was found. The campus utility survey map included very limited irrigation water main information.

The condition of the existing irrigation system is generally unknown. Operations staff report that the system performs satisfactorily in general. Through interviews and walk-throughs with operations staff, the following problems were identified:

1. A section of the irrigation main in the lawn immediately north of 14th Avenue and adjacent to Capitol Way is broken and leaks.
2. The irrigation main in the lawn south of 14th Avenue and between the Transportation Building and Jefferson Street is broken and leaks.
3. The irrigation dripline system over East Capitol Campus failed.

Storm Drainage System

General Overview

The campus storm drainage system is a complex network of pipelines, catch basins, manholes, swales, depressions, and outfalls. The West Capitol Campus system was constructed in the early 20th century, while the East Capitol Campus system was constructed in the mid to late 20th century. Segments of both systems were constructed over a series of projects spanning decades. The existing storm drainage system is depicted in Figures 6, 7, 8, 9, and 10 of Appendix A.

There is no stormwater detention facility in West Capitol Campus. Several bioretention cells for water quality treatment were constructed while redeveloping Sid Snyder Way in 2014. In East Capitol Campus, three underground stormwater detention facilities were installed with new development or improvement projects in late 20th century.

The State owns the stormwater systems in Capitol Campus and operates them as a secondary permittee to the City of Olympia under the Western Washington Phase II Municipal Stormwater Permit (NPDES Permit).

West Capitol Campus

The existing drainage facilities contain both a dedicated storm drainage system and a combined storm and sewer system. The dedicated storm drainage system discharges through three tributary areas to Capitol Lake and one basin to the City of Olympia's stormwater system in Columbia Street. There are no off-site storm drainage facilities that contribute flow to the dedicated drainage system. There is tributary flow that contributes to the combined sewer system on campus.

Dedicated Storm Drainage Basin No. 1 is located in the northwest corner of the Mansion parking lot. This small basin collects and conveys flow from the impervious parking lot surface and discharges to Capitol Lake.

Dedicated Storm Drainage Basin No. 3, located in the southwest corner of West Capitol Campus, collects surface water flow from the O’Brien and Pritchard Buildings and the southwest portion of the parking area east of the Pritchard Building. The stormwater runoff is conveyed through a series of pipelines and catch basins prior to discharging to Capitol Lake along the western bluff.

Dedicated Storm Drainage Basin No. 4, located in the northwest corner of West Capitol Campus, collects storm runoff from Water Street between 12th and 11th Avenue, the Capitol Conservatory, a portion of the large lawn along Water Street, a portion of 11th Avenue, and the GA Building and its associated parking lots. Storm runoff from the basin is collected into an underground pipe system that starts at the Capitol Conservatory and then passes through Water Street and the parking lot west of the GA Building, collecting water through catch basins on the way. The storm main turns northeast and then east along the edges of the parking lot north of the GA Building before discharging to the City storm main in Columbia Street.

Dedicated Storm Drainage Basin No. 2 is the largest drainage basin for West Capitol Campus. It comprises the majority of West Capitol Campus and discharges to Capitol Lake. A main drainage interceptor collects flow from branch systems across West Capitol Campus. The storm interceptor originates near the intersection of Sid Snyder Way, Capitol Way, and South Diagonal. The main is progressively upsized as it collects from the branch systems, from 12 to 24 inches in diameter.

The main conveys flow along the north side of South Diagonal. Near the Vietnam Veteran’s Memorial, the main gains flow from a 12-inch pipe servicing the areas in and around the Cherberg and Newhouse Buildings. Runoff from the southwest section of North Diagonal is added to the main within the intersection of Winged Victory Circle and North Diagonal.

At the intersection of Cherry Lane and Capitol Grounds, the interceptor collects flow from the area north of the Temple of Justice and runoff from the south side of the Legislative Building. From this location, the interceptor extends to the west and then runs along the north side of the circle drive, between the Temple of Justice and the Legislative Building.

West of the circle drive, at the intersection between Pleasant Lane SW and Capitol Grounds, the interceptor gains flow from the Governor’s Mansion to the south and from the area northwest of the Temple of Justice. The interceptor continues to the west, underneath the Governor’s Mansion parking lot and then down the bluff, discharging to Capitol Lake. As it progresses, the facility gains flow from both the grounds maintenance building and the Governor’s Mansion parking lot.

In addition to the dedicated storm drainage system, some of the campus grounds drain to the storm and sanitary sewer systems that discharge to the City of Olympia's sewer mains. These are mostly lawn areas along Capitol Way and 11th Avenue. The Sanitary Sewer System section provides more information about the combined sewer system.

Numerous repairs, modifications, and improvements to the stormwater system have been completed since the construction of Capitol Campus, and many investigations and studies have been conducted. The oldest dedicated storm lines still in service are in the parking lot south of the Legislative Building and the Cherry Lane area. These lines are failing and undersized by today’s standard.

The *West Capitol Campus Drainage Master Plan* was prepared in 2015. The project looked into Low Impact Development (LID) improvement opportunities and concepts to treat storm runoff quality. It also evaluated and provided design concepts to improve the underdrains of the big lawn and some tree pits. The project analyzed the flow capacity of the existing conveyance systems. The analysis calculations show that some sections of the drainage conveyance systems are undersized by today’s design code requirements, but no overflows have been experienced per campus grounds operation staff. See the *West Capitol Campus Drainage Master Plan* for more information.

There is no stormwater detention facility in West Capitol Campus. First, campus facilities were developed before flow control was required. Second, storm runoff from the campus drains directly to Capitol Lake, which is an exempted receiving water. Bioretention cells were constructed as part of the Sid Snyder Way improvement project in 2014 to treat runoff from the repaved street. These are the first water quality treatment facilities in West Capitol Campus.

The following problems are identified for improvement:

1. A 15-inch corrugated plastic stormwater drain line along South Diagonal is crushed.
2. The stormwater system in the parking lot south of the Legislative Building is failing.
3. The footing drain system of the Insurance Building is filled with debris, and the roof drain system of the building is broken.
4. The drainage system in the parking lot south of the Legislative Building is aged and failing.
5. The drainage system on Cherry Lane is aged, undersized, and failing.

Figures 6, 7, and 8 in Appendix A show an overview of the Stormwater system.

East Capitol Campus

East Capitol Campus has nine drainage subbasin areas. The largest segment encompasses the Parking Garage Plaza area. The remaining subbasins contain the buildings and their associated plaza areas. Figures 9 and 10 in Appendix A show an overview of the stormwater system in East Capitol Campus.

Drainage Basin No. 1 – Capitol Court, State Archives, and Highways Licenses

Capitol Court and its surrounding area is contained within its own subbasin. Along the southern edge of the building, there are two 8-inch lines that collect surface water from the parking lot south of the building. Flow is conveyed to the east and discharges to a 72-inch corrugated metal pipe (CMP) west of Washington Street SE.

The large-diameter pipe provides detention for the building and parking lots on site. The discharge from the detention pipe is directed to the northeast and connects to the combined sewer in Washington Street SE.

North of the Capitol Court Building, an 8-inch main collects surface water from the parking lot west of Capitol Court and conveys flow from west to east. The main discharges flow to the detention pipe mentioned above.

In the State Archives and Highways Licenses areas, storm runoff from the Highways Licenses Building and its surroundings is contained within one subbasin. A detention facility consisting of two 36-inch pipes is used to control and release flow at a design rate. The facility collects surface water from roof drains and a hardscaped plaza area. Water released from the detention pipes flows to the south end of Washington Street, where it combines with flows from the State Archives Building areas and discharges to the combined sewer main in Washington Street. This combined sewer main continues north and connects to the City sewer main in 11th Avenue.

Drainage Basin No. 2 – Natural Resources Building (NRB)

The Natural Resources Building was constructed in the early 1990s. The site complied with the modern-day stormwater regulations under the current code at construction. A 12-inch pipe runs behind the edge of the sidewalk, south of 11th Avenue SE. This pipe collects flow from the area between the parking lot retaining wall and the street sidewalk. The pipe diverts south near the intersection of Adams Street SE and 11th Avenue SE and progressively increases from 8 to 15 inches in diameter. The pipe collects additional flow from the parking lot and then discharges to a below-grade detention vault beneath the Natural Resources Building.

In the northeast corner of the parking lot, a 12-inch main collects and conveys surface flow to the southwest. This main also discharges to the below-grade detention vault. This main includes multiple joint offsets and sags. An improvement project is proposed to remove and replace this main.

The detention vault receives additional flow from an underdrain system below some planter strips south of the Natural Resources Building. This 8-inch line runs from west to east.

A 24-inch main extends east from the detention vault. The flow is combined with the discharge from the parking lot plaza, and the combined surface water extends to the east and connects to the City's system in Jefferson Street SE.

Drainage Basin No. 3 – Parking Garage

The plaza is the largest green space on East Capitol Campus. The plaza contains grass, plantings, and hardscaping. It is built on top of the East Plaza Garage, with a network of storm drainage piping hung under the garage lid. The parking garages are situated on both sides of 14th Avenue SE, west of the Transportation Building and OB2, north of the Employment Security Building, and south of the Highways Licenses Building.

The lines are exposed along the ceiling of the parking structure. There is one discharge point from the parking garage. The main drainage line transverses the length of both garages, running from south to north. The main progressively increases in size from 4 to 12 inches within the garage. The main increases to a 15-inch reinforced concrete pipe in front of OB2, where it picks up flow from a 10-inch pipe south of the Highways Licenses Building, running from west to east. The main line increases to a 21-inch pipe prior to redirecting flow to the east, south of the Natural Resources Building (NRB). The main redirects to the north and increases to a 24-inch CMP east of the NRB. The flow combines with the discharge from the NRB prior to discharging to the City's system beneath Jefferson Street SE.

Drainage Basin No. 4 – Lawn East of Office Building 2

The lawn east of OB2 slopes gently from west to east toward Jefferson Street. There are limited drainage systems in this area. Storm runoff drains to Jefferson Street as sheet flow or is collected by yard drains and then conveyed and discharged to the City storm main in Jefferson Street.

Drainage Basin No. 5 – Office Building 2

OB2 has a separate discharge to the City's system. A 12-inch line, east of OB2, collects flow from the perimeter drain lines and roof drains from the building. The 12-inch line conveys the flow to the east, where it connects to the City's storm main under Jefferson Street SE.

Drainage Basin No. 6 – Transportation Building

The Transportation Building has a separate discharge to the City's system. A discharge pipe collects and conveys flow to the east. The line picks up perimeter drainage and floor drains from the building. The size and type of pipe was not identified in the provided documentation. The main discharges to the City's storm main under Jefferson Street SE.

Drainage Basin No. 7 – Employment Security Building

The Employment Security Building has a separate discharge to the City's system. An 8-inch concrete pipe collects flow from perimeter, gutter, and floor drainage. The main conveys the flow to the south, where it discharges to the City's storm main within Maple Park Avenue SE and flows east to the storm main in Jefferson Street.

Drainage Basin No. 8 – Parking Lot East of the Transportation Building

The parking lot east of the Transportation Building and the lawn north of the parking lot slope gently from west to east toward Jefferson Street. There are limited drainage systems in the lawn and parking lot. Storm runoff drains to Jefferson as sheet flow or is collected by catch basins and conveyed and discharged to the City's storm main in Jefferson Street.

Drainage Basin No. 9 – Lawns along Capitol Way

The lawns along Capitol Way and the old IBM Building site are flat or slope slightly toward Capitol Way. Stormwater in this area is absorbed by the ground or drains to Capitol Way.

A thorough video investigation was performed in 2014 for the stormwater systems in East Capitol Campus. The investigation categorized one pipe section as "High Priority", four sections as "Moderate Priority", and 41 sections as "Low Priority". According to Gray & Osborne's definition, the pipes in the "High Priority" category need to be repaired immediately or as soon as budget is available within 10 years. The pipes in the "Moderate Priority" category have minor to moderate issues and will likely remain in proper operation for 10 to 20 years. And those identified as "Low Priority" have minor or no issues and can be expected to function properly for more than 20 years.

In general, the drainage systems for East Capitol Campus are in satisfactory condition. The following identified problems need improvements:

1. The 8-inch vitrified clay combined sewer main in Washington Street needs to be replaced. See the Sanitary Sewer System section for more information.
2. The underground detention pipe outside the Highways Licenses Building is deformed and has a breach near the crown of the pipe, allowing soil to fall into the pipe.
3. Just upstream of the detention structure for the Natural Resources Building, a section of drain pipe has sagged and accumulated sediment, reducing the pipe flow capacity.
4. The 12-inch concrete stormwater discharge pipe from OB2 to Jefferson Street has separated joints and circumferential cracks.
5. Several sections of pipe need cleaning.

Electrical System

General Overview

The primary electrical system in Capitol Campus is owned and operated by the State. The system consists of a network of medium voltage (MV) vaults, feeders, duct banks (a group of conduits encased together), switches, transformers, and various other equipment. This infrastructure serves electricity to most of the buildings, parking garages, and site lighting throughout the campus. The primary electrical system is configured as a loop, such that any building or other service point can be back-fed by an alternate power source if needed through one or more circuit switching events. This system provides redundancy if one of the power sources needs to be taken down for maintenance, new construction, or other unexpected outages. Appendix A includes a map of the existing primary electrical system.

Electrical service is provided by Puget Sound Energy (PSE) and originates from the PSE substation on the east side of the campus, near the Jefferson Building. At this substation, PSE provides 12.47KV electrical service through two step-down transformers and five three-phase circuit breakers. Two of these circuit breakers serve the Jefferson Building (circuits 16 and 27), and the other three serve the remainder of the East and West Capitol Campus (circuits 17, 25, and 26). The Jefferson Building was constructed in 2011, and the primary electrical equipment serving it is relatively new. The primary electrical infrastructure in the remainder of Capitol Campus varies in age from brand new to more than 40 years old in some locations.

Campus Power Capacity and Loading

By assessing the maximum allowable ampacities in various locations, and comparing this information to recorded electrical load data obtained from PSE and the State, we can determine the present day loading of the system and estimate the integrity of the system under several outage scenarios. This assessment will provide a high-level conservative review of these scenarios using the available data. For a more in-depth study involving more switching scenarios, protective device settings, and detailed feeder-by-feeder assessment, a load flow analysis could be performed as part of a separate power study. A recommendation for a complete power study is discussed later in this report under the Long-Term Improvements section.

Conductor Ampacity

Throughout the campus primary electrical system, the MV conductors are the main limiting factor when determining total system capacity. The campus primary loop conductors will carry the bulk of the electrical load and these conductors vary in size between #2/0, #4/0, and 500KCM. In addition, there are smaller #2 conductors for some of the branch MV feeders that are not on the main loop. Each of these conductors has an allowable ampacity that is defined in the National Electrical Code (NEC) Table 310.60(C)(77) Detail 2. Table E1 summarizes these ampacities:

Table E1. Allowable Ampacity Table (15kV, MV-105 cables)

Conductor Size (AWG or kcmil)	Allowable Ampacity (Amps)
#2	130
#2/0	185
#4/0	240
500	370

Electrical Loads

Twelve-month utility bill data was obtained from PSE for October 2015 to October 2016. With this data, we were able to determine the maximum peak demand load during the year, which was 340 amps during the month of October 2015. In addition, building-by-building monthly kilowatt-hour (kWh) power usage data was provided by DES staff. By assessing the distribution of kWh usage across campus, we can estimate the proportion of total peak demand load on each primary electrical circuit as follows:

Table E2. Distribution of Electrical Loads on Campus Primary Circuits

Primary Electrical Circuit	Percent of Total Power Usage	Estimated Peak Demand Load (Amps)
Campus Loop Ckt 16	17%	57.8
Campus Loop Ckt 17	23%	78.2
Campus Loop Ckt 25	26%	88.4
Campus Loop Ckt 26	17%	57.8
Jefferson Building Ckt	17%	57.8

Assessment of Campus Power Capacity

By comparing the allowable ampacities of the campus primary conductors (Table E1) to the estimated electrical loads (Table E2), we can make a determination regarding the integrity of the system under various outage scenarios. For a worst-case ampacity estimate, we know that the minimum possible conductor size on the main primary loop is #2/0, which has an allowable ampacity of 185 amps.

1. **Normal Operating Conditions (SATISFACTORY):** Under normal operating conditions, the maximum estimated peak demand load on any given circuit is 88.4 amps (curcuit 25). This is much less than the worst-case allowable ampacity of 185 amps, so we can infer that all campus primary circuits are operating well within their allowable ampacities under normal operating conditions.

2. **Loss of One Campus Primary Circuit (SATISFACTORY):** Upon loss of one campus primary circuit, one of the remaining circuits would be required to carry the full electrical load of the lost circuit in addition to its own electrical load. Looking at Table E2, the worst-case circuit combination would be circuits 17 and 25, which would result in a total estimated peak demand load of 166.6 amps. This is less than the worst-case allowable ampacity of 185 amps, so we can infer that the loss of any single campus primary circuit would most likely result in a stable system that is operating within its loading limits.

3. **Loss of Two Campus Primary Circuits (POSSIBLE FAILURE):** Upon the loss of two campus primary circuits, one of the remaining circuits would be required to carry the full electrical load of the lost circuits in addition to its own electrical load. Looking at Table E2, the worst-case circuit combination would be circuits 16, 17, and 25, which would result in a total estimated peak demand load of 224.4 amps. This is greater than the worst-case allowable ampacity of 185 amps; therefore, there will possibly be some circuit configurations that are not capable of operating within their loading limits under this scenario.

4. **Loss of Three Campus Primary Circuits (LIKELY FAILURE):** Upon the loss of three campus primary circuits, one of the remaining circuits would be required to carry the full electrical load of the lost circuits in addition to its own electrical load. Looking at Table E2, the worst case circuit combination would be circuits 16, 17, 25, and 26, which would result in a total estimated peak demand load of 282.2 amps. The only conductor size installed on campus that could operate under this loading is #500 kcmil. However, this conductor size is not installed throughout the campus primary loops. Most circuit configurations will likely fail under this scenario.

Brief Discussion Regarding Arc Flash Labels

As noted in the following sections, arc flash labels are not installed on most primary electrical equipment throughout the campus. These labels are required by the Occupational Safety and Health Administration (OSHA) and should be installed for the safety of campus personnel. Arc flash labels indicate the incident energy level, required clearance boundaries, and recommended PPE (personal protective equipment) for maintenance personnel. Creation of arc flash labels requires a power study to be performed. As noted previously, a recommendation for a complete power study is discussed later in this report under the Long-Term Improvements section.

An arc flash is a rapid release of energy due to an arcing fault in an electrical system. During an arc flash, the air between two conductive mediums at different potentials becomes the electrical conductor (typically between two hot conductors or between a hot conductor and a grounded conductor or equipment frame). Depending on the voltage level, the fault current magnitude, and the upstream protective device settings, the arcing fault can be explosive and life threatening. Arc flashes can be caused by break down of equipment insulation, corrosion, dust, dropped tools, improper maintenance, or a wide variety of other factors.

West Capitol Campus

West Capitol Campus is served by primary electrical circuits 17, 25, and 26. These circuits are distributed through a system of MV duct banks, which are intercepted by vaults and switches in various locations to distribute power to buildings. Each building has one or more step-down transformers used to provide low-voltage usable electricity for the local building.

Site Infrastructure

From visual inspection, the MV vaults, duct banks, feeders, and switches throughout the site appear to be in good condition. Switches within site vaults are submersible-rated and relatively new (less than 15 years). According to past studies, the site’s primary conductors were replaced between 1990 and 1992, and these conductors appear to be in good condition.

Several of the observed vaults have no locks and poor accessibility. These vaults could benefit from an upgrade to a lifting-type vault lid. Arc flash labels are not present on observed equipment.

General Administration (GA) Building

The GA Building is served by primary circuit 17 from site vault 'PR.' The building has two primary electrical equipment rooms (south electrical room and north electrical room). The incoming MV feeders land at a Power Control, Inc., (PCI) 5-way MV switch located in the south electrical room. From there, the feeders continue to a 1000KVA step-down transformer in the south electrical room and a second 1000KVA step-down transformer in the north electrical room for building power. Most of the primary equipment was installed between 1993 and 1997 and appears to be in good condition.

A parallel feed from MV circuit 17 serves the GA Building. This parallel feed lands at a pair of interlocked switch terminals. Since both incoming feeders are from circuit 17 and both originate from the same switch in vault 'PR,' the interlock serves no purpose. Both electrical rooms lack proper egress hardware and some of the electrical room doors swing inward, which could be a hazard for maintenance personnel. There are no arc flash labels on observed equipment.

Greenhouse Building (Capitol Conservatory)

The Greenhouse Building is served by primary circuit 25 from site vault 'PW.' The building has a single primary electrical equipment room. The incoming MV feeders land on a Joslyn SF6 load interrupter switch and then continue on to a 100KVA step-down transformer in the same room for building power. The load interrupter switch was installed in 1993 and appears to be in need of service. The transformer has no manufacture date listed but appears to be relatively clean and in good condition.

The single door to the equipment room lacks proper egress hardware. The room has cobwebs and visual signs of rodent presence and should be cleaned. The MV entry conduit lacks proper foaming/plugging to prevent water ingress to the room. There are no arc flash labels on observed equipment.

Temple of Justice Building

The Temple of Justice Building is served by primary circuit 25 from site vault 'PP.' The building has a single primary electrical vault, located under the parking lot in front of the building. The incoming MV feeders land on a Vista 201 switch in the vault and continue on to a 500KVA step-down transformer located in the same vault. This equipment was inaccessible for viewing, so the age and condition is unknown.

Legislative Building

The Legislative Building is served by primary circuit 25 from site vault 'PL.' The Legislative Building has an MV switch room and two primary electrical equipment rooms (east electrical room and west electrical room). The MV switch room contains a G&W 5-way MV switch and two additional Square D fused switches. The east and west electrical rooms each contain a 1000KVA transformer and various low voltage (LV) electrical equipment. The incoming MV feeder to the building lands on the 5-way switch, and one path goes back out to vault 'PL' for continuation of the campus MV loop. One path goes to one of the fused switches and then continues to the 1000KVA transformer in the east electrical room. Another path goes to the other fused switch and continues to the 1000KVA step-down transformer in the west electrical room. The final switch path is a spare. The 5-way switch is dated 2004 and appears clean and in good condition. The transformers also appear to be in good working condition.

The MV entry conduit lacks proper foaming/plugging to prevent water ingress to the MV switch room. Ground conductors appear slightly corroded. There are no arc flash labels on observed equipment.

Insurance Building

The Insurance Building is served by primary circuits 25 and 26 from site vault 'PJX' and 'PJ,' respectively. The building has a single primary electrical vault located to the east of the building. The incoming MV feeders land on a Vista 321 switch, which has a single protected feeder output to a 500KVA step-down transformer located within the same vault. This configuration allows for local selectivity of the serving primary circuit. We did not have physical access to the Insurance Building Vault, but based on photos provided by DES facility staff, the equipment appears to be in good working order. There are no arc flash labels on the equipment.

Newhouse Building

The Newhouse Building is served by primary circuit 25 from site vault 'PJX.' The building has a primary switch room and a transformer room. The incoming MV feeder lands on a G&W SF6 load interrupter switch in the switch room and then continues on to a 300KVA transformer in the transformer room. The load interrupter is dated 2009 and appears to be in good condition. The transformer looks fairly new and is in good condition.

The MV cables entering the switch room from site vault 'PJX' are not foamed or plugged, and there is evidence of previous water ingress to the room. In addition, there are unused MV feeders hanging by a string in the same room. There are no arc flash labels on observed equipment.

John O'Brien Building

The John O'Brien Building is served by primary circuits 25 and 26 from site vault 'HH3.' The building has a MV switch room and a separate MV transformer vault located to the south of the building. The incoming MV feeders land on a Vista 422 switch in the switch room, and then the two protected switch outputs continue onto a 112.5KVA transformer in the switch room and a 1500KVA transformer located in the MV transformer vault. The primary switch and transformers are dated 2009 and appear to be in good condition.

Some of the MV cables entering the switch room do not appear to be foamed or plugged. The grounding system in the switch room shows signs of corrosion in places. There are no arc flash labels on observed equipment.

Cherberg Building

The Cherberg Building is served by primary circuits 25 and 26 from site vault 'HH2.' The building has a MV switch room and a separate MV transformer room. The incoming feeders land on a Vista 431 (ckt 26) and a Vista 532 (ckt 25). Circuit 24 is an optional circuit for the building power, and the output paths continue onto the John O'Brien and Pritchard Buildings. From the Vista 532, the MV feeders continue onto a 1500KVA step-down transformer to supply building power. The transformer and switches are dated 2004 and appear to be in good condition.

The door to the transformer room lacks proper egress hardware. There are no arc flash labels on observed equipment.

Pritchard Building

The Pritchard Building is served by primary circuit 26 from the Cherberg Building Vista 431 switch. The building has a single primary electrical room. The incoming MV feeders land on a G&W load interrupter switch and then continue onto a 750KVA transformer through a surge arrester in the same room. The switch is dated 2009 and appears to be in good condition. The transformer also appears in good condition.

The door to the primary electrical room opens inwards, which is a safety hazard. There are no arc flash labels on observed equipment.

East Capitol Campus

East Capitol Campus is served by primary electrical circuits 16, 17, 25, and 26. These circuits are distributed by a system of MV duct banks, which are intercepted by vaults and switches in various locations in order to distribute power to buildings. Each building has one or more step-down transformers that are used to provide low-voltage usable electricity for the local building.

Site Infrastructure

From visual inspection, the MV vaults, duct banks, feeders, and switches throughout the site appear to be in good condition. Switches within site vaults are submersible-rated and relatively new (less than 15 years). According to past studies, the site's primary conductors were replaced between 1990 and 1992, and these conductors appear to be in good condition.

Several of the vaults have no locks and poor accessibility. These vaults could benefit from an upgrade to a lifting-type vault lid. Arc flash labels are not present on observed equipment. One of the voltage indicators on the Vista 330 at vault PABX was not working.

Natural Resources Building

The Natural Resources Building is served by primary circuits 16 and 17. The building has a single primary electrical room that contains the MV transfer switch, three fused switches, and three 2000KVA transformers. The incoming primary feeders land on the transfer switch and then continue onto the three 2000KVA transformers through the fused switches. Most of the equipment is dated 1991 and appears to be in good condition today.

The exit door from the electrical room lacks proper egress hardware. Arc flash labels are not present on observed equipment.

Office Building 2

OB2 is served by primary circuit 17 from site vault ‘PYA.’ The building has a small MV switch room and larger adjacent electrical room. The incoming feeders land on a Vista 523 switch and continue on to two 2500KVA step-down transformers in the electrical room. Two additional feeders continue on to site vault ‘PX’ as a part of the site primary loop. Primary circuit 16 feeders enter the building switch room and land on a Vista 422 switch and then continue on to site vault ‘PX’ as well. The Vista switches are dated 2008 and appear to be in good condition. The transformers are dated in the early 1990s and appear to be in good condition.

The exit doors from the switch room and electrical room lack proper egress hardware. Arc flash labels are not present on observed equipment.

Transportation Building

The Transportation Building is served by primary circuits 25 and 26 from site vaults ‘PB’ and ‘PZ,’ respectively. The building has two main electrical vaults (west vault and east vault). These vaults are electrically tied together through a 480V tie breaker. Both primary circuits initially enter the east vault, where circuit 26 lands on a fused interrupter switch and continues onto a 2000KVA step-down transformer in the same room. Circuit 25 continues onto the west vault, where it lands on a fused interrupter switch and continues onto another 2000KVA step-down transformer. Most of the equipment in both vaults is dated 2000 and appears to be in good condition.

Arc flash labels are not present on observed equipment.

Employment Security Building

The Employment Security Building is served by primary circuits 25 and 26 from site vault 'PEX.' The building has one primary electrical room. The incoming feeders land on a transfer switch and then continue onto a 2000KVA transformer through a 600A fused switch. The equipment is dated 1985 and appears to be in good condition.

Arc flash labels are not present on observed equipment.

Plaza Garage

The Plaza Garage is served by primary circuit 16 from site vault 'PG.' The garage has one primary electrical room. The incoming feeders land on a MV air terminal cabinet and then continue onto a 1000KVA step-down transformer. Most of the equipment is dated between 1965 and 1985 and is in poor condition. This equipment should be considered for replacement soon.

The electrical room seems to experience frequent water ingress and much of the equipment shows signs of water damage (rust). The air terminal is a single point of failure for the campus primary loop but contains no switching or protection device, which is a vulnerability for the integrity of the loop. Arc flash labels are not present on observed equipment.

Chilled Water and Steam

The Capitol Campus chilled water and steam systems consist of the Powerhouse facility and the distribution systems. The Powerhouse facility was completed in 1921, and the steam distribution system in West Capitol Campus was completed in the same era. The steam service was extended to East Capitol Campus in the 1970s. The chilled water system was added in the mid-1970s and serves West Capitol Campus only. The steam and chilled water from the Powerhouse are distributed over Capitol Campus through insulated pipes running in tunnels or direct-buried in ground. In East Capitol Campus, a portion of the pipes were hung under the central parking garage cover decks.

Most of the existing buildings at Capitol Campus are serviced by the steam systems. These buildings include Pritchard, O'Brien, Cherberg, Legislative, Newhouse, Insurance, Temple of Justice, GA, State Archives, Highways Licenses, OB2, and Employment Security. The Natural Resources Building is also served by steam during winter (through OB2). Chilled water serves all buildings except Newhouse at West Capitol Campus. Buildings at East Capitol Campus have their own stand-alone chilled water systems.

In 2011, KMB Design Group conducted a steam tunnel mechanical investigation in the area of the 12th Avenue and Cherry Lane intersection. The investigation identified the following problems:

1. The wood bench covering a tunnel exhaust fan is an attractive nuisance and not a suitable material for an exhaust vent cover. It should be removed. The exhaust fan should be relocated.
2. The tunnel access manhole at the intersection of 12th Avenue and Cherry Lane is too small, and its cover is chained inside, creating a safety trap for emergency access. The report recommended the access manhole be enlarged and include an access hatch.

Through a separate contract directly with DES, University Mechanical Contractors (UMC) performed investigations and studies on the steam and chilled water systems in 2015 and 2016. The study report focused on options for upgrading the entire system, including the Powerhouse, but provided little detail about the conditions of the distribution systems. Because the chilled water and steam systems are not in our contract, we did not assess the conditions of the existing systems. The coversheet and the table of content of the UMC Investment Grade Audit report is included in Appendix E for information. The full UMC report is not included in the appendix because the report is very large, and its focus is not on the steam and chilled water distribution system but on the Powerhouse facility, which is not totally relevant to this study scope.

PLANNING CRITERIA AND CONSIDERATIONS

General

As future redevelopment and utility improvement projects progress, it is recommended that a detailed option analysis be conducted to evaluate the improvement alternatives. During the design phase for each project, general consideration should be given to the following:

- **Impacts to Campus Operations.** Project interruptions to the campus's daily operations should be minimal.
- **Current Code Compliance.** Each improvement project should comply with City of Olympia municipal code and engineering requirements at the time the project is permitted and constructed. At Capitol Campus, there is no approved master plan that could potentially vest a project for an older code.
- **Permit and Regulatory Reviews.** Impacts of permit processes and approvals from regulatory reviews and their associated timelines should be considered when preparing the project schedule.
- **Potential Environmental Impacts.** Environmental impacts, such as wetlands, steep slopes, waterfronts, or other environmentally sensitive areas should be considered when planning and designing a project.
- **Constructability.** Consideration should be given to the constructability of the project relative to surface and subsurface utility conflicts, existing site constraints, and compatibility with the existing system. This review should also include factors such as construction techniques and complexities, availability of construction materials, and other contributing factors.
- **Vehicle and Pedestrian Traffic.** Due to the locations of the redevelopment projects, vehicle and pedestrian control will be required to ensure public safety and facilitate construction activities. Traffic control and signage should be considered as part of the project costs.

- **Capital Costs.** Consideration should be given to the project cost of the alternative, including construction cost, contingencies, engineering, and other associated costs.
- **Life Cycle Costs.** Consideration should be given to the life cycle costs associated with alternatives, including the capital, operation, and maintenance costs.

More-specific criteria associated with each individual utility system are included in the sections below.

Sanitary Sewer System

For sanitary sewer system improvements, the following should be considered in addition to the general items above:

- **Combined Sewer Separation.** Ten of the 48 acres of West Capitol Campus are served by a combined storm and sanitary sewer system. See Figure 7 in Appendix A. When possible, a project should separate the combined sewer system.
- **Construction Sequence and Schedule.** Some sanitary sewer mains in Capitol Campus serve several office buildings. Shutting down a sewer main will greatly affect campus operations. Construction sequence, method, and schedule should be considered to avoid or minimize impacts to campus operations.

Domestic Water System

- **Design Standards.** The state-owned West Capitol Campus distribution water system improvements should be designed in accordance with the WSDOH *Water System Design Manual*, City of Olympia water system design standards and fire code requirements.
- **Fire Flow Requirements.** Fire flow and associated requirements should be established and reviewed by the City of Olympia Fire Marshal.

Irrigation Water Main System

The following additional considerations should be given for irrigation water main system improvements:

- **Reclaimed Water Option.** The LOTT Clean Water Alliance may extend reclaimed water to Capitol Campus in the future for irrigation use. This should be included for consideration in major improvement projects.
- **Dedicated Irrigation System.** Capitol Campus has a dedicated irrigation main system in West Capitol Campus, separate from the fire protection and domestic water system. Future projects should not interconnect these two water systems.

Storm Drainage System

For drainage improvements and stormwater management, the following shall be considered in addition to the general items above:

- **Combined Sewer Separation.** Ten of the 48 acres of West Capitol Campus are serviced by a combined storm and sanitary sewer systems. When possible, a project should separate the combined sewer system.
- **Low Impact Development (LID) Compliance.** The majority of West Capitol Campus drains directly to Capitol Lake and is exempted for flow control requirements (detention) in accordance with current City of Olympia code. Because of this, LID is exempted for most parts of West Capitol Campus, although DES considers LID as a part of stromwater management and incorporates it as appropriate.
- **Bluff Protection.** The stability of the steep hillside along the west edge of the site is critical to Capitol Campus. A project should avoid introducing surface or underground water to the steep hillside and the adjacent uplands that could jeopardize the stability of the slope. When considering open ponds or cells and infiltration for stormwater management, the project designer should consult with a geotechnical engineer and review past hillside study reports.

Electrical System

For primary electrical system improvements, the following should be considered in addition to the general items mentioned above:

- **Current Code Compliance.** Each improvement project should comply with the latest release of the *National Electrical Code*.
- **Common-mode Failure Points.** As modifications are made to the campus primary electrical system, every effort should be made to avoid common-mode failure points. This includes not grouping together more than two separate primary circuits in any given room, vault, duct bank, or other space in which, if damaged, could cause partial or total failure of the campus primary system.
- **Safe Egress from MV Equipment.** New vaults, electrical rooms, or other spaces that contain MV electrical equipment should have appropriate means-of-egress and not create unsafe or confined spaces for maintenance personnel. This includes appropriate egress hardware and swing direction on electrical room doors as well as full-size lifting lids on vaults.
- **Ease of Maintenance.** New buildings or other MV service points should have a means of disconnection, such that the MV equipment can be isolated from the campus primary electrical system without impacting the operation of the system, and without requiring multiple switching operations at different geographical locations.

Historic Plans and Coordination

Master-planning-level projects completed in the last several years include:

1. 2009 West Capitol Campus Historic Landscape Preservation Master Plan
2. 2006 Master Plan for the Capitol of the State of Washington (Being updated in 2017)
3. 2015 West Capitol Campus Drainage Master Plan

4. 2016 Powerhouse/Steam System Conversion (Investment Grade Audit – Combined Heat and Power Project by University Mechanical Contractors).
5. 2017 State Capitol Development Study

These master plans, particularly 1, 2, 3, and 5, have been coordinated to some degree. The proposed improvement conceptual designs to be discussed later have been coordinated with these master plans. Future utility improvement projects, if not listed in these reports, shall be coordinated with these master plans. DES's ultimate goal is that these master plans, including the Capitol Campus Utility Renewal Plan, and future master-level plans, can be easily integrated to create a comprehensive Capitol Campus master plan.

PROPOSED IMPROVEMENTS

General Overview

Construction of the Capitol Campus utility systems occurred over several decades. Many of the utilities have served well beyond their design life, with some original systems installed during the campus's construction in the early 1900s still in service. While many improvements have been completed, the service condition varies from system to system. Some continue to operate at a level of effectiveness, while others need immediate improvement or replacement.

Based on site observations, DES staff input, reviews of record documents (investigation and study reports and record drawings), and analysis results, a list of improvement projects have been identified and prioritized. When developing and prioritizing the improvement projects, future developments planned for Capitol Campus are also included in considerations. The conceptual designs are coordinated with the other available campus master plans.

This section of the report describes the necessary improvements for the next 10 years and some long-term improvement suggestions. An improvement project table is presented first as a summary and overview of the necessary utility improvements for the next 10 years. A more-detailed explanation of these necessary improvements follows the project table. The detailed explanation is organized by utility systems. Finally, the long-term improvements, also organized by utility systems, conclude this section of proposed improvements.

Improvements for the next 10 Years

Overview

The proposed improvements discussed in this section are the necessary improvements with high priority.

An improvement project list for the next 10 years is provided in the Utility Improvement Projects Table for 2017 through 2027. Conceptual designs for some of these projects are included in Appendix C, and the opinions of probable construction costs for these improvement projects are included in Appendix D. The locations of these improvement projects on Capitol Campus are shown on figures included in Appendix B. More details about these projects are discussed in the following sections.

The utility improvement projects will have impacts beyond just the utility systems. Utility improvements could prompt the need to bring stormwater management up-to-date with the current code within the project areas. In some cases, an entire street segment will need to be repaved as the result of replacement of several utility systems. Reconstruction of these vital utility systems will often damage street pavement beyond what regular patching can restore. Additionally, landscape restorations are necessary. The full cost of the utility improvement, including street restoration or repaving, is included in the project estimate. The estimated project costs also include tax and soft costs such as consultant fee, permit fee, and project support.

Improvement Projects Table for 2017 through 2027

The improvement project table summarizes and prioritizes the proposed utility projects and their estimated costs. Generally, those utility projects with the higher risk priority are included in the more near-term budget biennium. However, many listed projects are more urgent than their planned implementation. Fiscal reality indicates that even critical improvements must be phased over time. This plan is presented as a balance between what must be done and the funding that can be reasonably expected.

Table 3. Improvement Projects Table for 2017 through 2027

2017 – 2019 BIENIUM PROJECT SCOPE & DESCRIPTION	ESTIMATED TOTAL COST
Plaza Electrical Room Upgrades – Replace primary electrical switches, distribution switch gear, transformer, primary conductors, and outdated 480V and 208V electrical panels in Plaza Parking Garage electrical room. This equipment is either broken, undersized, or obsolete. – Address electrical room drainage issues. Place new equipment on pads or raise off floor to avoid frequent water intrusion.	**$2,019,000**
12th Avenue Sewer Main Reroute – Construct new sanitary sewer extending eastward from 12th and Cherry Lane intersection to North Diagonal to address crushed and broken sanitary sewer from several West Campus buildings by diverting effluent away from unstable hillside areas to other intact conveyance systems. – Replace Temple of Justice services by connecting to existing 8" main on 12th Avenue. – Replace constricted exit of steam tunnel system at 12th and Cherry Lane. The current 24" manhole opening is too small, resulting in a dead-end trap in the event of steam pipe rupture.	**$283,900**
Sewer Service Replacement at Insurance Building – Replace broken sanitary sewer line serving Insurance Building. Unless this service line is replaced, it will continue to degrade and result in sewer leakage outside the building.	**$72,500**
South Diagonal Storm Drain – Replace crushed 15" corrugated plastic stormwater conveyance pipe on the South Diagonal and across the WW I Memorial circle with an 18" diameter main. The existing pipe has deformed, resulting in broken joints and eventual total failure.	**$740,500**

– Provide stormwater treatment for run off from some parts of the South Diagonal as planned in the *West Capitol Campus Drainage Master Plan*. – The project also provides an opportunity to implement the *Historic Landscaping Preservation Master Plan* within project limits.	
Irrigation Main Replacement near 14th Avenue and Capitol Way – Replace a section of the main and provide surface restoration resulting from irrigation line break within grass area east of Capitol Way (directly across from Tivoli Fountain).	**$152,700**
Irrigation Main Replacement near Jefferson and Maple Park Avenue – Replace section of main and provide surface restoration resulting from irrigation line break within the general area of the parking lot east of the WSDOT Building.	**$320,900**
New Fire Hydrant at Governor's Mansion – Extend a new 8" water main from Pleasant Lane to the Governor's Mansion for fire protection. – Install a fire hydrant. Currently, there is no fire hydrant inside the Governor's Mansion area. It is a safety issue.	**$132,100**
Removal of Unused Electrical Cable at Newhouse – Remove or provide proper terminations for incoming primary electrical cables labeled to be from vault 'PJ' in the Newhouse Building electrical room. Presently, these cables are unused and are hanging by a rope.	**$26,500**
Primary Electrical Cable Labeling and Ground Check – Provide consistent labeling for primary electrical system cables throughout Campus. – Verify solid ground connections to all primary electrical system equipment.	**$171,800**

– Replace split bolt ground connections with compression type connections throughout. – Conduct arc flash testing.	
Electrical Room Egress Hardware – Provide crash bars and out-swinging doors for proper egress for electrical vaults and rooms throughout Campus.	**$658,400**
Primary Electrical Vault HH3 Improvements – Provide drainage from vault to nearby catch basin located southeast of O'Brien Building. Vault is frequently filled with water; a drainage system would extend the life expectancy of the primary electrical system cables and simplify regular maintenance and testing. – Remove adjacent unlabeled handhole next to vault. This unlabeled handhole does not appear to be needed and does not have a lock. The lid is designed poorly and could easily fall in and damage the MV cables if accessed.	**$273,000**
New Water Main in 15th Avenue SW – Install new 12" water main in 15th Avenue from Capitol Way to Water Street. The new water supply main will strengthen the fire flow to the West Campus water system. Installation of the new water main is also needed for providing fire protection flow for future developments along the south edge of the West Campus.	**$747,900**
Sid Snyder Way Bioretention – Raise the largest bioretention cell berms on the north and east. – Verify overflow structure elevation. – Original earth berm has settled and is lower than the design elevation. Water in bioretention cell could overflow to adjacent sidewalks in major storm events.	**$8,400**
Total of Biennium 2017 – 2019	$5,607,600

2019 – 2021 BIENIUM PROJECT SCOPE AND DESCRIPTION	ESTIMATED TOTAL COST
Study of Water System in West Capitol Campus – Study and analyze the system to identify causes of fire flow problem. The existing system cannot deliver required fire flow to the Legislative Building area according to available flow test data. – Provide improvement recommendations.	**$75,000**
South Capitol Building Parking Lot – Reconstruct utilities underlying the parking lot south of Legislative Building and north lawns of Cherberg and O'Brien Buildings. This work will address failing stormwater systems, clay sanitary sewer lines, and water and irrigation mains (circa 1920); a segment of the steam tunnel with significant water intrusion; and other utilities. – Remove vertical bends from sanitary sewer below steam tunnel southwest of Legislative Building. – Improve drainage and provide water quality treatment for storm runoff. – Reconstruct parking lot pavement and lighting. – Provide opportunity to implement the *Historic Landscaping Preservation Master Plan*.	**$2,876,100**
Washington Street Drainage and Utility Improvements – Reconstruct utilities in Washington Street on East Campus between 11th Avenue and Highway License Building and in the plaza lying north of Highway License Building to address failing combined sewer lines, which are sending septic sewage to the ground and undermining the road's structural integrity. – Repair breached 36" corrugated steel storm line that is carrying soil away from plaza area. – Separate storm drainage from combined sewer main. – Replace aged water main.	**$1,550,700**

– Reconstruct broken sidewalks.	
Old Capitol Building Fuel Tank Removal – Remove 40-year-old underground fuel tank, which is at the end of its useful life and is no longer needed. – Repave concrete loading areas.	**$124,200**
Replacement of Insurance Building Foundation & Roof Drains – Repair and replace foundation drains and roof drains. The foundation drains are filled with debris and no longer convey water away. Similarly, breaks in roof drain lines load moisture into the ground near the foundation. – Implement the *Historic Landscaping Preservation Master Plan* while restoring disturbed areas.	**$438,600**
Total of Biennium 2019 – 2021	$5,064,600

2021 – 2023 BIENIUM PROJECT SCOPE & DESCRIPTION	ESTIMATED TOTAL COST
West Campus Irrigation System Replacement – Replace West Campus cast iron irrigation mains (circa 1920), which have become brittle and have served well beyond their design life.	**$3,721,500**
Sewer Service Replacement at Cherberg Building – Replace failing sanitary sewer service to Cherberg building. Failure of this line will result in loss of sanitary sewer service to this building.	**$65,500**
New Water Loop around O'Brien Building – Install new 12" water main from Water Street through 15th Avenue and around O'Brien building to strengthen fire flow to West Campus.	**$771,700**
New Water Main and Service to Powerhouse – Install fire hydrant and new 8" water main from 16" City main in Powerhouse Road to powerhouse for fire flow. Branch 4" main from	**$697,500**

– new 8" main to power plant for steam/chilled water refilling. – Retire and abandon existing 4" steel main in utility tunnel. Currently there is no water available for fire protection at powerhouse area, and existing 4" steel pipe in tunnel is aged and experiences leakage.	
General Administration Building Primary Circuit Selectivity – Provide primary electrical circuit selectivity similar to other critical buildings throughout Campus.	**$386,000**
Replacement of Sewer Main from Powerhouse – Replace failing steel sewer force main from powerhouse pump station to parking lot on top of hill; the line has reached its service life.	**$163,800**
Powerhouse MV Cable Modifications – Revise MV cable installation in two places; the existing cable is unsafe and needs to be revised.	**$76,000**
Total of Biennium 2021 – 2023	$5,882,000

2023 – 2025 BIENIUM PROJECT SCOPE & DESCRIPTION	ESTIMATED TOTAL COST
Replacement of Failed Storm Line at Office Building 2 (OB2) – Replace 12" storm main east of OB2 within the lawn area. The main extends from MH-O22-01 to CB-O23-01. The existing pipe has a separated joint and shows signs of an infiltration problem.	**$68,000**
East Campus Irrigation System Update – Repair and replace failed East Campus irrigation dripline system (circa 1970). Modern drip systems address failings of vintage integrated drip valves, which clog easily and do not allow water flow.	**$2,001,100**
Mapping and Improvement of Existing Fiber Network – Inventory and map fiber optic system. Campus network is unmapped, largely unknown, and generally unmanaged. State fiber network shares conduit with private service providers without documentation.	**$2,650,000**

– Identify routing, design, and construction of additional link between East and West Campuses. – Install a redundant fiber leg to create West Campus fiber loop.	
Replacement of Damaged Storm Line at Natural Resource Building – Replace 12" PVC storm main in parking lot northeast of Natural Resource Building, extending from the detention tank to CB-L23-01. There are multiple joint offsets and sags within this section of main.	**$84,900**
Legislative Building Primary Circuit Selectivity – Provide primary electrical circuit selectivity similar to other critical buildings on Campus, which will also remove a single source of failure for primary Circuit 25 within the building and allow for isolation of its electrical equipment with a single switching event.	**$430,300**
Total of Biennium 2023 – 2025	$5,234,300

2025 – 2027 BIENIUM PROJECT SCOPE & DESCRIPTION	ESTIMATED TOTAL COST
Cherry Lane Drainage and Utility Improvements – Replace and repair water, stormwater, and other utilities in Cherry Lane between Sid Snyder Way and 12th Avenue. This area holds a density of utilities, including some of the Campus's oldest. Periodic repairs have been performed, but continuing incidents of failure can be expected. It is far more cost effective to perform wholesale replacement and upgrade than to make piece-meal repairs. – Bring stormwater management to current code requirements. – Implement *Historic Landscaping Preservation Master Plan*.	**$3,538,900**
Upgrade Electrical Vault Lids – Campus-wide replacement of electrical vault lids to convert from manholes to lifting lids and bring utility access into compliance with current standards. Improved access to electrical vaults will	**$616,600**

significantly improve safety and reduce cost of future service and repair. All new vault lids should have labels welded on.	
Water Meter Replacements – Replace and upgrade existing water meters at West Capitol Campus. Many of the existing meters are old and not equipped with a remote radio reading system.	**$2,232,300**
Total of Biennium 2025 – 2027	$6,387,800

Sanitary Sewer

General Overview

The sanitary sewer systems at Capitol Campus are owned and operated by the State. Over the years, the original sewer systems have been periodically repaired and improved, and some sanitary sewer systems constructed with the original capitol campus in the early 1920s are still in service. These systems, including mains and side sewers, have served well beyond their design life, and even some repairs and improvements have become aged and outdated. To continue to service the Capitol and support future developments, continual improvements to the sewer systems are needed. The following section discusses the projects that have been identified as improvements with high priority in the next 10 years.

Proposed Improvements

12th Avenue Sewer Main Reroute

This improvement project will construct a new sanitary sewer main extending from the intersection of 12th Avenue and Cherry Lane eastward to the North Diagonal. The project will also reconnect the side sewers servicing the Temple of Justice to an existing sewer main on 12th Avenue, replace the steam tunnel exit manhole, and remove the wood bench cover over the tunnel exhaust fan at 12th Avenue and Cherry Lane. After construction of the new sewer main, the existing sewer main from 12th Avenue and Cherry Lane to 11th Avenue will be disconnected and abandoned.

The existing sewer main to be rerouted runs under Water Street, with a section going under the Conservatory Building. Past investigations show that the sewer main is crushed and broken. In addition, the steep hillside adjacent to the Conservatory and Water Street is unstable and sliding slowly downhill. The unstable hillside endangers the existing sewer main that services several buildings on campus, including O'Brien, the Governor's Mansion, part of the Legislative Building, and the Temple of Justice. If this main is broken, water would be introduced to the unstable hillside and worsen the situation. Rerouting this broken sewer main will help the stability of the steep hillside and ensure continued services to the affected buildings.

The existing steam tunnel exit at the 12th Avenue and Cherry Lane intersection is too small, with only a 24-inch manhole. In an emergency, such as a steam pipe rupture, it could become a dead-end trap for people trying to escape the tunnel.

Rerouting the sewer main will direct sanitary sewer flow from the entire West Capitol Campus to the City of Olympia's main in Capitol Way. Given the size of West Capitol Campus, the 10-inch sewer main inside the campus limit should have satisfactory capacity. During coordination meetings between the City and the consultant team for this project, the City expressed concern that directing more sewer flows to the combined sewer main in Capitol Way will worsen existing capacity problems (see meeting notes in Appendix F). Early in the design phase of this particular project, pre-application or coordination meeting should be held between the City of Olympia and DES to discuss and clarify this issue.

The Water Street improvement project and the Sid Snyder Way project have directed some drainage area away from this combined sewer main by separating the storm and sewer within the project areas. The 1063 Block project has also eliminated some combined sewer tributary areas. A future project in the Pritchard Building parking lot will eliminate more combined sewer tributary. An inventory of flow changes for the 10-inch sewer main would evaluate the new conditions and alleviate concerns.

This project's overall importance and potential safety issues identifies it as an improvement with very high priority and places it in the 2017-2019 budget biennium.

<u>Sewer Service Replacement at Insurance Building</u>

This project would replace the side sewer serving the Insurance Building. To avoid disturbing the South Diagonal and reduce project costs, the service line would be installed parallel to South Diagonal in the lawn area south of the street and connect to the existing sewer main.

The side sewer was constructed at the same time as the Insurance Building and has never been replaced. Past investigations and studies identified this side sewer as "Moderate Risk" or "Moderate Priority", which means no immediate repair is required. But DES staff have reported that the sewer service line is broken.

Sewer leakage is an environmental hazard, contaminating soils and groundwater around the leakage area. This project is identified as an improvement with very high priority and listed in the 2017-2019 budget biennium.

Sewer Service Replacement at Cherberg Building

This project would replace the failing side sewer serving the Cherberg Building and restore disturbed surface and landscaping. The 2009 Parametrix investigation report identified this sewer service line as "High Risk". "High Risk" in Parametrix's definition is that the sewer line serves directly the executive, legislative, and judicial buildings and presents health or safety issues.

This project is identified as an improvement with high priority and listed in the 2021-2023 budget biennium.

Replace Sewer Force Main from Powerhouse

This project would replace the sewer force main from the Powerhouse to the manhole on top of the steep hillside. A sewer force main is a sewer line that conveys sewage not by gravity force but by pressure difference created by a machine, in this case by a pump. This galvanized steel main, buried in-ground, has reached its service lifetime. The improvement concept is to replace this force main with a same-size (2.5 inches in diameter) line consisting of HDPE pipe and ductile iron pipe.

The steep hillside is unstable. To avoid trenching through the hillside for utility installation, the improvement concept is to direct-bury a section each of HDPE pipe at the toe and on the top of the hillside and connect the two HDPE sections with a ductile iron pipe, according to *Powerhouse Road Utility Relocation – draft*, dated 2015, by Gray & Osborne, Inc. The ductile iron pipe will be insulated and anchored to the top of the existing steam tunnel.

The necessity of the force main replacement depends on the fate and future of the Powerhouse. If a new central plant will be built in the near future on East Capitol Campus (as recommended by the 2016 steam system study report by University Mechanical Contractors), replacement of the sewer force main would not be necessary. For this reason, this project is listed in the 2021-2023 budget biennium. By then, the decision on the Powerhouse's future should have been made.

Domestic Water System

General Overview

The water distribution systems at Capitol Campus and the City of Olympia water systems are integrated and work together to provide both potable water supply and fire protection water supply to the Capitol Campus. The City's proposed 16-inch water main capital improvement project (CIP), TD-13, will help improve water system reliability, such as while the Stevens Field standpipe reservoir is being cleaned or repainted.

While the City's system has the capability of providing 4,000 gpm at 20 psi residual pressure to either of the two metering points between the two systems, the water distribution system in West Capitol Campus appears to have inadequately sized pipes and insufficiently configured fire loops to convey this required 4,000 gpm to the highest-demand buildings, including the Temple of Justice, the Legislative Building, and the Cherberg and O'Brien Buildings. This conclusion is based on the fire flow tests conducted in 2012. The fire demands and fire flows in these historic buildings may be the highest fire flows in Thurston County and will require a large response from fire crews for any significant fire.

The West Capitol Campus's existing 10-inch water main in Cherry Lane and Sid Snyder Way is the largest water main in the State's system and distributes water to all of the other water main loops and fire hydrants. However, this 10-inch water main is inadequate to distribute the required 4,000 gpm flow to the fire hydrants at the City of Olympia Fire Code required 20 psi residual pressure. Improvements to the West Capitol Campus water distribution system are needed.

System improvements should be developed to ensure:

1. 4,000 gpm fire flow is available from the West Capitol Campus water system at a minimum residual pressure of 20 psi.
2. The peak 4,000 gpm fire flow to the high fire flow buildings should be available even when:
    a. Any one fire hydrant is out of service due to maintenance.
    b. Any one fire hydrant access is blocked due to traffic, crowds, or protests.
    c. Any key City of Olympia water master meter is out of service due to maintenance, repair, replacement, or vandalism.

d. Any key water main, including the 10-inch Cherry Lane water main, is out of service due to leaking, repairs, earthquake damage, or landslides.

Proposed water system improvements can be configured, where possible, to both upgrade and strengthen the existing distribution water system and provide water supply and fire protection to any new buildings added to Capitol Campus. The water system improvement projects discussed in the next section are recommended for increasing fire flow to the core area of West Capitol Campus. The projects include installing a new water main in 15th Avenue, a new water main loop around the O'Brien Building, a new water main in the South Capitol Building parking lot, and the proposed new water main in Cherry Lane. These improvement recommendation are based on engineering experience and site observation. No quantitative system analysis such as computer modeling was performed. For a better understanding of performance of the existing system and necessary improvements, a system-wide study and analysis will need to be performed.

Water mains in East Capitol Campus are owned and operate by the City of Olympia. Improvements of these water mains are the responsibility of the City.

Proposed Improvements

Study of Water System in West Capitol Campus

The 2012 flow tests indicated that the available fire flow in West Capitol Campus is significantly lower than the required fire flow that the Fire Marshal estimated. Due to budget constraints, capacity analysis of the water system in West Capitol Campus was not performed as part of this Capitol Campus Utility Renewal Plan project. Improvement recommendations provided in this project are based on limited available records, observation, preliminary estimates, and work experience. A system analysis and computer modeling are needed to confirm improvements required to deliver the 4,000 gpm fire flow to the Legislative Building area.

This is a project with very high priority and should be completed as soon as funding is available. However, given the fiscal reality and the funding that can be reasonably expected, this project is listed in the 2019-2021 budget biennium.

New Fire Hydrant at Governor’s Mansion

This project will extend an 8-inch water main from Pleasant Lane into the Governor’s Mansion grounds and install a fire hydrant. Currently, there is no fire hydrant inside the Governor’s Mansion security fence. It could be a safety problem in a fire emergency.

Because of the potential safety issue, this project is identified as an improvement with very high priority and listed in the 2017-2019 budget biennium.

New Water Main in 15th Avenue SW

The project will install a new 12-inch DI water main from Capitol Way to Water Street and connect to the existing 8-inch water main serving the Pritchard Building. This new water main will provide a third connection and metering point for the West Capitol Campus distribution water mains to the City of Olympia's system. It will increase fire flow to the core area of the campus and provide a backup connection in the event that other connections are out of service due to repairs, servicing, or damage. Three new fire hydrants are proposed, with a new master metering point at Water Street and 15th Avenue.

Construction of this water main should be coordinated with future developments in the Newhouse Building and the Pritchard parking lot area. These new developments will need the new main.

This project is identified as an improvement with very high priority and listed in the 2017-2019 budget biennium.

New Water Loop around O’Brien Building

This project will construct a 12-inch fire water main around the west side of the O’Brien Building. The new main will connect to the existing 8-inch water main in the utility tunnel near the Governor’s Mansion and the proposed new 12-inch water main in the south Capitol Building parking lot project. On the other end, the new water main will extend east to the intersection of Water Street and 15th Avenue and connect to the existing 8-inch main and the 12-inch main to be installed in the New Water Main in 15th Avenue project discussed above. The project will increase fire flow to the Legislative Building area.

This project is identified as an improvement with very high priority and listed in the 2021-2023 budget biennium.

New Water Main and Service to Powerhouse

This project will replace the existing 4-inch steel service pipe that runs in the existing steam tunnel with a new domestic and fire protection piping system connected to the City of Olympia's water main. The new water main will connect to the City's existing 16-inch water main along the existing railroad track in Powerhouse Road. The new 8-inch main will cross under the railroad track and extend to the Powerhouse. A new fire hydrant and a 4-inch service line with a new meter will branch out from the new main. Cross connection valves will be required on the service line.

This improvement may not be needed if a new Powerhouse is planned to be constructed at a different location.

This project is identified as an improvement with very high priority and listed in the 2021-2023 budget biennium.

Water Meter Replacement

Replace all the existing building meters and add new metered connections to all taps, irrigation connections, and fire sprinkler connection bypass/leak detection meters connected to the existing West Capitol Campus water distribution system. Each building's domestic connection will be metered, using a new water revenue meter with remote reading capability. Provide remote radio reading "automated Meter Reading Systems" or AMR for "real time monitoring" of water consumption. Provide for monitoring of the City of Olympia's master meters with the AMR systems for overall water loss analysis. Add cross connection devices and valves on irrigation connections as required.

This project is identified as an improvement with high priority and listed in the 2025-2027 budget biennium.

Irrigation Water System

General Overview

The irrigation water main systems at West Capitol Campus consist mainly of cast iron pipes constructed with the campus construction in 1920s. These irrigation mains have been in service well beyond their design lifetime. Investigation and assessment conducted in 2009 categorized the irrigation system over the entire West Capitol

Campus as “High Risk” because of its age and pipe material. The investigation recommended the entire system be replaced.

The irrigation systems in East Capitol Campus are relatively “new”, but conditions are generally unknown. The systems appear to be functioning satisfactorily according to the campus grounds operation staff, although there are two identified broken pipes. Further investigation and study on the irrigation systems in East Capitol Campus is required. The irrigation systems should be mapped, with information collected for connection points, controls, pipe size, pipe material, year installed, and zoning, and an investigation and study of the system conditions performed.

Reclaimed Water Opportunities

The LOTT Clean Water Alliance has planned to extend reclaimed water to the Capitol Campus. The LOTT’s Budd Inlet Treatment Plant has the capacity to produce approximately 1.5 million gallons per day of Class A reclaimed water. The reclaimed water is currently used at the treatment facility and for landscape irrigation at the Port of Olympia, Marathon Park, Tumwater Valley Golf Course, and around Heritage Park. There is extra capacity, and LOTT wants to maximize the use of reclaimed water. The nearby Capitol Campus is a good candidate for reclaimed water usage for irrigation.

A feasibility study and routing analysis was conducted in 2015. The study estimated irrigation water usage at the campus and evaluated three different options to extend reclaimed water to Capitol Campus from LOTT's main in the Heritage Park area. One option is to install a pump station near the Powerhouse and pump water up the steep hillside to West Capitol Campus. The reclaimed water main line is then extended to East Capitol Campus along Capitol Way and Maple Park Avenue and terminated near the Transportation Building. The other two options will pump reclaimed water from the intersection of 7th Avenue and Columbia Street to West Capitol Campus but through different routes, one through Columbia Street another through Capitol Way. Once the reclaimed water reaches West Capitol Campus, it will follow the same route as in the first option to East Capitol Campus.

The potential reclaimed water extension provides opportunity as well as challenge to the irrigation systems in Capitol Campus. It is an opportunity for potable water conservation. DES has to restrict irrigation water usage at Capitol Campus from time to time, especially during drought seasons. The challenge is that the existing irrigation system in Capitol Campus is not ready for the reclaimed water conversion. For West Capitol Campus, the irrigation system is old and in poor condition. The LOTT study recommended replacement of the irrigation system prior to switching to reclaimed water. For the irrigation system in East Capitol Campus, the biggest challenge is its multiple connection points to the public water mains around the campus. Without extending the reclaimed water main around the campus, new irrigation mains may need to be installed across the campus for converting connections. In addition, completely mapping the irrigation systems, assessing their conditions, and ensuring no cross connections will need to be completed prior to switching to reclaimed water.

There is no specific timeline for when reclaimed water will be extended to Capitol Campus. It may not happen in this utility renewal plan's lifetime of the next 10 years. However, for long-term planning and future irrigation improvement projects, the reclaimed water opportunity should be included in project considerations.

Proposed Improvements

Irrigation Main Replacement near 14th Avenue and Capitol Way

This project will replace a 4-inch broken irrigation main with a new same-size pipe. The irrigation main to be replaced is approximately 240 feet long, running parallel to Capitol Way from 14th Avenue to the main East-West Capitol Campus crosswalk on Capitol Way. The project will also install a double-check valve assembly in the vault, convert existing controllers, and restore disturbed lawn for the irrigation main replacement.

This project is identified as an improvement with very high priority and listed in the 2017-2019 budget biennium.

Irrigation Main Replacement near Jefferson Street and Maple Park Avenue

This project will replace the broken irrigation main in the lawn east of the WSDOT Building. The project will also install a double-check valve assembly in the vault, add a new meter in the vault, reconnect to the public main in Jefferson Street, and restore landscape disturbed by the irrigation main replacement.

This project is identified as an improvement with very high priority and listed in the 2017-2019 budget biennium.

West Capitol Campus Irrigation System Replacement

This project will replace the entire aged irrigation system at West Capitol Campus, including irrigation water mains, laterals, sprinkler heads, valves, and control systems. The exception is the irrigation main in Sid Snyder Way, which was replaced in 2014. The project will also include the replacement of a backflow prevention device and a master water meter. Restoration of disturbed lawn and landscaping will be necessary.

Besides being aged and failing, controlling irrigation level is a challenge with the existing irrigation system. Operations staff report that the grounds crew has no means to adequately monitor and adjust the system to rapidly changing conditions during the summer months. It is common to observe areas of the campus that are over-irrigated, while some vegetation does not get adequate water. It is recommended that an in-depth investigation and analysis be performed during design phase of the project for rezoning the irrigation system. It will also be necessary to design the irrigation level to suit the existing trees and vegetation and those to be planted in the future. For information on the planned landscape improvement, the *2009 West Capitol Campus Historic Landscape Preservation Master Plan* should be referenced and coordinated.

It is possible that the new irrigation system will be connected to the reclaimed water main that LOTT plans to extend to Capitol Campus. Three reclaimed water main routes were studied, but the final routing has not yet been selected. When designing the irrigation system replacement, future connection points to the reclaimed water system should be considered. The new system should be able to connect to the reclaimed water without major modifications, regardless of the extended reclaimed water main location.

The irrigation main replacement concept design included in this report has been coordinated with the potential reclaimed water sources based on LOTT's feasibility study report. However, no quantity analysis was performed for sizing the irrigation mains. The concept is to replace the existing systems with same size pipes, with an anticipation of future connection to reclaimed water. The design of the irrigation system in the future should size the irrigation system according to calculated water demand and technical data of the water sources.

This project is identified as an improvement with very high priority. Given the condition of the existing system, the irrigation system replacement at West Capitol Campus should be completed as soon as possible. However, given the reality of how much the State can fund utility projects and the urgency of other improvements, the project is listed in the later budget biennium of 2021-2023.

East Capitol Campus Irrigation System Update

This project will replace the dripline system, and dripline system only, in East Capitol Campus.

The existing conditions of the irrigation mains in East Capitol Campus are unknown. Other than the failing dripline system, the irrigation mains appear to be functioning properly according to operations staff.

This project is identified as an improvement with high priority and listed in the 2023-2025 budget biennium.

Storm Drainage System

General Overview

The original storm drainage systems on both East and West Capitol Campuses were constructed with the development of the campuses. DES owns and operates these systems. Drainage systems in East Capitol Campus are relatively new compared with those in West Capitol Campus. The systems in East Capitol Campus mostly discharge directly from the buildings they service to the City of Olympia's storm mains in the adjacent streets through multiple connections. The stormwater and sanitary sewer systems mostly have dedicated lines. The only combined storm and sanitary sewer main in East Capitol Campus is in Washington Street, which services the Highways Licenses Building, State Archives, and Campus Court. Video investigation in 2014 showed that the storm drainage systems in East Capitol Campus are in good condition in general, with a few small repairs needed as discussed in the Proposed Improvements section of this report. With no major redevelopment planned in East Capitol Campus, no major drainage system improvement is needed. Regular maintenance is expected.

In West Capitol Campus, most campus areas drain directly through four dedicated storm drainage systems, outfalling to Capitol Lake or discharging to the City's storm system. Some campus areas drain to combined storm and sanitary sewer systems and discharge to the City's combined sewer mains. These areas include a portion of the Pritchard Building parking lot, some lawn areas along Capitol Way, and the northern part of the campus along 11th Avenue. The 1063 Block project under construction created a new drainage main that conveys stormwater downhill to an existing outfall at Heritage Park. Outside the 1063 Block project area, the new storm main is sized to include design storm runoff from some parts of 11th Avenue, Water Street, and all of the GA Building and its parking lots. When these areas are redeveloped in the future, stormwater can be directed to this new outfall. The drainage report of the 1063 Block project is included in Appendix G.

Numerous improvements and modifications have been completed for the drainage system in West Capitol Campus. The oldest dedicated storm lines still in service are in the parking lot south of the Legislative Building and Cherry Lane. These lines are aged, failing, and undersized by today's standards. In 2013, select old storm pipes (not including Cherry Lane and the parking lot south of the Legislative Building) were inspected using video cameras. The video inspection report categorized most of the inspected pipe as "Low Priority," meaning the pipes have minor or no problems and will likely be in proper operation for 20 or more years. "Moderate Priority" pipes were identified in the northern Conservatory and GA Building areas. "Moderate Priority" pipes have minor to moderate problems and could be expected to operate properly for between 10 to 20 years, which is beyond this utility renewal plan's lifetime. With the Conservatory to be demolished in the future and the GA Building area to be demolished or redeveloped, improvement of these "Moderate Priority" pipes should be a low priority.

The 2014 *West Capitol Campus Drainage Master Plan* analyzed the conveyance system capacity in West Capitol Campus. The analysis indicated that some of the drain pipes are undersized according to today's design standards. However, DES reported that the campus has never experienced flooding caused by drain pipe capacity, making upsizing the identified pipes to current standards a low priority. Given this situation, upsizing the pipes should be undertaken with other redevelopment opportunities, such as repaving roads or redevelopment of an area.

Other drainage problems, such as the failed underdrain system in the large lawn and soggy tree pits, were also addressed in the drainage master plan.

The Capitol Campus storm drainage system is operated by the state as a secondary permittee under the City of Olympia's Western Washington Phase II Municipal Stormwater Permit. While retrofitting existing systems is not mandated to meet the permit requirement, DES is making efforts to treat storm runoff from the campus prior to its discharge to Capitol Lake. The 2015 *West Capitol Campus Drainage Master Plan* identified improvement opportunities and provided concept designs to achieve this goal.

With the identified improvement projects in the master drainage plan and those to be discussed in the Proposed Improvement sections below, the drainage systems should be adequate to support Capitol Campus for the next 10 years.

Supplement to the 2014 West Capitol Campus Drainage Master Plan

Updating the *2015 West Capitol Campus Drainage Master Plan* is not in the scope of this project; however, the *2006 Master Plan for the Capitol of the State of Washington* has been updated by the *2017 State Capitol Development Study*, which studied opportunity development sites more in depth. Some modifications to the drainage master plan are necessary to better support the master-planned redevelopments at the Capitol Campus. This section discusses these necessary modifications.

The 2017 State Capitol Development Study project studied four development opportunity sites: the General Administration (GA) Building, the Pritchard Building and adjacent parking lot, the two blocks along the south side of Sid Snyder Way from the Newhouse Building to Capitol Way, and the ProArt/State Farm Building site. The first three sites are within the West Capitol Campus boundary.

Currently storm runoff from the GA building roof and adjacent parking lot is collected in an underground pipe system through roof drains and catch basins. The collected stormwater is conveyed and discharged to the City of Olympia's storm system north of the intersection of Union Avenue and Columbia Street. The 1063 Block project currently under construction is installing a new storm main that runs down the steep hill west of the GA Building and connects to an existing outfall in Heritage Park. The new storm main was sized for the 1063 Block project and the GA Building area. See the drainage report in Appendix G for more information. In the future, when the GA Building site is redeveloped, storm runoff from the site can be directed to this new outfall main rather than discharging to the City's system. It will separate the state-owned system furthermore from the city system and will eliminate the stormwater detention requirement when redeveloping the site.

For the areas along the south edge of West Capitol Campus, the 2015 *West Capitol Campus Drainage Master Plan* included stormwater detention facilities for the Pritchard parking lot site and the area from Newhouse to the Visitor's Center to control post-development peak flows because of the limited capacity of the downstream conveyance system from the redevelopment sites to Capitol Lake. Most of these proposed redevelopment areas are currently serviced by combined sewer systems. A portion of the Pritchard Building parking lot drains to the sewer main in Water Street, and the areas on both sides of Columbia Street drain to the combined sewer main in Columbia. As a long-term goal of Capitol Campus, separation of stormwater from sanitary sewer as part of the redevelopments will increase the tributary areas of the existing dedicated stormwater system. While increases to the impervious areas will be minimal because the areas to be redeveloped are already mostly paved, the increased runoff peak flows from the enlarged tributary areas will overwhelm the already undersized storm system.

The *2017 State Capitol Development Study* project provides three redevelopment scenarios without an indication of the preferred scheme. One of the scenarios is to put one building each at the Pritchard parking lot and the Newhouse site. Each proposed building will have an underground parking garage under the building. If this scenario is chosen by the Legislature, stormwater detention for these two locations, as outlined in the 2015 *West Capitol Campus Drainage Master Plan,* would no longer be required.

The Newhouse Building site is already draining to the dedicated storm system. Redeveloping the site will result in little increase to storm runoff peak flows. In the Pritchard Building parking lot, a portion of the area drains to the combined sewer, while the rest drains to the small outfall behind the O'Brien Building. Preliminary calculations show this existing 12-inch outfall has extra capacity for the area currently draining to the combined sewer. Therefore, no detention facilities are needed for the updated redevelopment plan. If the redevelopments go east beyond the Newhouse site, stormwater detention will be required for the areas east of Newhouse. These areas include the Press House and the Visitor's Center lots.

A bonus of redirecting the Pritchard Building parking area runoff from the combined sewer system to the dedicated small storm outfall is that it creates available capacity in the combined sewer system for the 12th Avenue sanitary sewer rerouting. The Sid Snyder Way project also directed some combined sewer tributary areas to the dedicated stormwater main and created available capacity in the same combined sewer main.

Proposed Improvements

South Diagonal Storm Drain

This project will replace a 15-inch storm line on the north side of South Diagonal. The existing corrugated plastic pipe is crushed. Because this storm main will convey additional runoff from areas on both sides of Columbia Street south of Sid Snyder Way when these areas undergo future redevelopment, the proposed line needs to be increased to 18 inches in diameter. The areas on both sides of Columbia Street, specifically the Visitor's Center and Press House lots, currently drain to the combined sewer system. Future redevelopments in these areas will separate stormwater from the sanitary sewer. A dedicated storm line has been installed under Sid Snyder Way for directing storm runoff to the South Diagonal from these areas in the future. The storm line crossing under Sid Snyder Way is currently capped on both ends and not in operation. In the future, the storm line can be extended from the north side of Sid Snyder Way to the South Diagonal storm main. This future extension is not included in the South Diagonal Storm Drain project.

The South Diagonal Storm Drain replacement project is also included in the 2014 *West Capitol Campus Drainage Master Plan*. As part of the master plan to achieve the campus's long-term objective, the project takes the opportunity to collect and treat storm runoff from some parts of South Diagonal and the World War I Memorial Circle by using LID elements. The project includes landscaping restoration and improvements within the project limits.

This project is identified as an improvement with very high priority and listed in the 2017-2019 budget biennium.

Sid Snyder Way Bioretention

This project will raise the northern and eastern berms of the largest bioretention cell to their designed elevations. The project also includes verifying the overflow elevation as designed. The landscaped berms have settled over time and appear lower than they should be. An overflow occurred one time during a big storm, and water spilled over the berms onto the adjacent sidewalks. Water on the sidewalk could be a safety problem on an icy day.

This project is identified as an improvement with very high priority because of the potential safety problem. It is listed in the 2017-2019 budget biennium.

Replacement of Insurance Building Foundation and Roof Drains

This project will replace the footing drain and roof drain systems of the Insurance Building. These systems are old and have served well beyond their design life. The footing drains are filled with debris beyond what regular cleaning can remove, and they no longer function properly. The roof drain system leaks. The nonfunctional footing and roof drain systems failed the building moisture controls.

Landscape restoration is also part of this project.

This project is identified as an improvement with very high priority and listed in the 2019-2021 budget biennium.

Replacement of Failed Storm Line at Office Building 2 (OB2)

This project will replace the 12-inch storm main discharging storm runoff from OB2 to the public storm main in Jefferson Street. The concrete storm line has separated joints and appears to be cracking circumferentially at one location. While the storm line could likely be repaired using the Cured-in-Place-Pipe (CIPP) method, replacement of the entire line with double-walled corrugated plastic storm pipe will be more cost effective in the long run because of the age of the existing storm main and material.

This project is identified as an improvement with high priority but not urgent. It is listed in the 2023-2025 budget biennium.

Replacement of Damaged Storm Line at Natural Resources Building

This project will replace the 12-inch storm main under the northeast parking lot of the Natural Resources Building. The storm main collects and conveys storm runoff from this parking area to the detention vault located under the south side of the parking structure. This PVC storm line has multiple joint offsets and a significant sag. The sag has accumulated sediments, reducing pipe capacity.

This project is identified as an improvement with high priority but not urgent. It is listed in the 2023-2025 budget biennium.

Electrical System

General Overview

Overall, the primary electrical system has been regularly upgraded and most major components appear to be in good condition. After thorough review of existing documents, several site visits, and discussions with campus maintenance staff, a number of system elements have been identified that are outdated, pose safety hazards, or could benefit from increased redundancy and security. This section discusses items that have a high improvement priority in the next 10 years. A plan view of the recommended modifications is provided in Appendix B on the "Primary Electrical System – Proposed Projects Map."

Proposed Improvements

Plaza Garage, Electrical Room Upgrades

This project addresses the following issues in the Plaza Garage electrical room.

1. Replace outdated equipment: Replace the primary transformer, distribution switchgear, primary conductors, and outdated 480V and 208V electrical panels in the Plaza Parking Garage electrical room. This equipment is either broken, undersized, or obsolete.
2. Add a Vista switch: A new Vista 321 switch, along with some minor modifications to the switch in vault PGA, which would add the following capabilities:
    a. The ability to locally select the primary circuit source in the Plaza Garage, similar to many other critical buildings throughout the campus.

b. The ability to easily isolate the electrical room equipment for maintenance locally and with a single switching event.

3. Drainage Issues: Drainage issues should be addressed in the electrical room, and new equipment should be placed on pads or raised off the floor due to frequent water ingress. Temporary power will be required, since space constraints prevent installation of most of the new electrical equipment until the existing equipment is demolished.

This project is identified as an improvement with a very high priority and is listed in the 2017-2019 budget biennium.

Newhouse Building, Remove Unused Primary Cables

This project will remove the unused set of incoming primary cables located in the primary electrical switch room. The cables are labeled to be from vault ‘PJ’ but are unused and the MV cable terminations are hanging by a rope.

This project is listed in the 2017-2019 budget biennium.

Primary Cable Labeling and Grounding Check

This project will provide consistent labeling to all primary cables across campus. Many primary system cables are not labeled or are inconsistently labeled. Proper labeling that indicates the circuit number and the source and destination of the cable will reduce research time spent by contractors on future construction projects. This project will also verify solid ground connections throughout the campus primary system, replace all split-bolt ground connections with compression-type connections, and check for corrosion in the grounding system.

This project is listed in the 2017-2019 budget biennium.

Electrical Room Egress Hardware

This project will upgrade the existing electrical room and vault doors with proper egress hardware, fire rating, and swing direction. The following known electrical rooms lack proper egress hardware:

- Natural Resources Building (needs egress hardware)
- Pritchard Building (in-swinging door)
- Cherberg Building (needs egress hardware)

- Powerhouse Building (needs egress hardware)
- GA Building, North and South Electrical rooms (need egress hardware)
- Office Building 2 (needs egress hardware)
- Newhouse Building (in-swinging door)
- Plaza Garage Electrical Room (needs egress hardware)
- Greenhouse Electrical Room (needs egress hardware)

This project is listed in the 2017-2019 budget biennium.

Primary Electrical Vault ‘HH3’ Improvements

Provide drainage from vault 'HH3' to a nearby catch basin located southeast of the O’Brien Building. Vault 'HH3' is frequently filled with water and a drainage system would extend the life expectancy of the primary electrical system cables and simplify regular maintenance and testing. The adjacent unlabeled handhole next to vault 'HH3' should be removed; it does not appear to be needed and does not have a lock. The lid is poorly designed and could fall in and damage the MV cables if accessed.

This project is listed in the 2017-2019 budget biennium.

General Administration Building Primary Circuit Selectivity

This project will provide primary circuit selectivity in the GA Building, similar to many other critical buildings throughout the campus. The modification involves providing a new vault, ‘PWX,’ with a Vista 422 switch adjacent to vault ‘PW’. This new switch will receive a feed from primary circuit 25 to provide a protected output to the GA Building as an optional source.

This project is listed in the 2021-2023 budget biennium.

Powerhouse MV Cable Modifications

This project will revise the MV cable installation in the Powerhouse Building in two places.

Location 1 is on the main floor of the Powerhouse Building, where the MV cable is lying on or near the floor from the steam tunnel to the high voltage splice box (approximately 30 feet). This is an unsafe installation due to the close proximity to heavy equipment, tools, and stacked boxes all around the cable. The proposed installation would reroute the MV cable above potential impact zones and protect it from accidental impact.

Location 2 is in the underfloor plenum beneath the MV equipment in the upper floor electrical room, where the space is shared between medium voltage and low voltage conduit and wiring. The MV cable in this space is exposed, causing an unsafe condition for those who may be working on the low voltage cabling nearby. The proposed installation would enclose the MV raceway in this space in Rigid Galvanized Steel (RGS) conduit and provide proper labeling to reduce the chances of accidental contact with the line.

This project is listed in the 2021-2023 budget biennium.

Legislative Building Primary Circuit Selectivity

This project will allow primary circuit selectivity in the Legislative Building, similar to many other critical buildings throughout the campus. It also removes a single source of failure for primary circuit 25 within the Legislative Building and allows for isolation of the Legislative Building electrical equipment with a single switching event.

This project is listed in the 2023-2025 budget biennium.

Upgrade Electrical Vault Lids

This project will convert electrical vault lids from manholes to lockable lifting lids throughout the campus. This task will bring utility access into compliance with current standards. Improved access to electrical vaults will significantly improve safety and reduce the costs of future service and repair. Vault lids recommended to be replaced are PA, PAA, PAB, PAC, PB, PC, PE, PF, PK, PM, PP, PQ, PS, PV, and PW.

This project is listed in the 2023-2025 budget biennium.

Multi-discipline Improvements

General Overview

Some areas of Capitol Campus have utility systems that have been in service since the original development of the campus or have not been upgraded for long periods. Often these areas have more than one failed or failing utility systems.

When multiple utilities need to be placed in one area, utility trenching may damage the already aged surface pavement beyond regular repair. In this situation, repaving is typically a more cost-effective approach than patching or repairing. Repaving will likely trigger the requirements for bringing stormwater management and landscaping design to current code standards, resulting in an infrastructure redevelopment project.

Proposed Improvements

South Legislative Building Parking Lot

This project will improve drainage problems at the parking lot, install new water mains to enhance water flow for fire protection, improve waterproofing for the utility tunnel, fix the vertical-bend sewer main problem, improve lighting, and repave the parking lot. The project will also repair the roof drain connection to the O'Brien Building and restore landscaping.

This project is included in the 2014 *West Capitol Campus Drainage Master Plan*. The South Legislative Building Parking Lot area, which is in the core of the West Capitol Campus and among the earliest developments, has the oldest utilities on the campus. The storm drain lines are undersized by today's standard, the pavement is broken, and other utilities are aged and failing.

This project is identified as an improvement with very high priority and is urgent. However, the reality of potential funding and the urgency of other utility improvements push this project down the list. It is currently listed in the 2019-2021 budget biennium. If budget allows, this project should be completed earlier.

Washington Street Drainage and Utility Improvements

Washington Street has the only combined storm and sanitary sewer main in East Capitol Campus. The vitrified clay combined sewer main is old and in bad condition. Tree roots intrude into the pipe through many joints. A previous fix using a short piece of 6-inch PVC pipe to connect the broken pipes together caused flow interruption. The existing water main is old and failing as well.

The Washington Street Drainage and Utility Improvement project will replace the failed combined sewer line and separate the storm and sanitary sewer. The project will also replace the water main and improve street lighting. After these utility replacements, the street and sidewalk will be restored by repaving. The sidewalks on the west side of the street have failed. The project also includes repair of the broken stormwater detention pipe outside the Highway Licenses building.

Storm runoff from Washington Street is currently collected in underground drain pipes at the edge of 11th Avenue. From available survey information and site observation, it appears that the collected water discharges to the combined sewer main. The 2014 Gray & Osborne video investigation report stated that there is a buried brick manhole at the Washington Street and 11th Avenue intersection. We suspect that stormwater from Washington Street is discharged through this buried manhole into the combined sewer system. Because the stormwater on Washington Street discharges to the combined sewer system at the 11th Avenue intersection, the proposed storm and sewer separation would be just a separation within Capitol Campus. The separated flows will combine again once entering the City's system beyond 11th Avenue.

This project is identified as an improvement with very high priority. It is currently listed in the 2019-2021 budget biennium.

<u>Cherry Lane Drainage and Utility Improvements</u>

The Cherry Lane area has some of the oldest utilities on the campus. The storm drain lines are old and undersized by today’s standard, and the irrigation main is old and failing. Periodic utility repairs have been performed and will be required in the future. It is more cost-effective to replace and upgrade all utilities and the entire street at one time than to make multiple smaller repairs.

The Cherry Lane Drainage and Utility Improvement project will replace storm drain line, irrigation mains, and the electrical system for lighting. The project will also add a new water main to strengthen fire flow capacity to the core area of the campus. Replacement of sidewalk and street pavement is anticipated after the utility replacement, and landscape restoration is expected.

This project is identified as an improvement with very high priority. However, it is currently listed in the 2025-2027 budget biennium due to cost and expected funding. If budget allows, this project should be completed in an earlier year.

Other Projects

Old Capitol Building Fuel Tank Removal

The pavement in the Old Capitol Building loading dock area is broken and needs to be repaved. The old fuel tank under the loading dock, which is no longer used, could be either removed or abandoned in place when repaving the loading dock. Decommissioning the tank during repaving of the loading dock could avoid having to repave the loading dock if the fuel tank is removed in a later year.

The existing fuel tank is located very close to the building foundation. Removal of the fuel tank will require shoring the building foundation, which will increase the project cost. If the fuel tank has never leaked and the soil around the tank is not contaminated, abandoning the existing fuel tank in place would be a better choice.

Further investigation is recommended prior to the decision of removing or abandoning the tank in place. While removing the loading dock pavement, sample the soils around the tank for contamination level tests. If the soil is not contaminated and requires no clean-up, abandoning the fuel tank in place would be more cost efficient, and excavation close to the building foundation could be avoided. Otherwise, the fuel tank will have to be removed, and the contaminated soil will need to be excavated.

This project is identified as an improvement with very high priority and listed in the 2019-2021 budget biennium.

Mapping and Improvement of Existing Fiber Network

This project will inventory and map the existing fiber optic system in East and West Capitol Campus and then design and install a redundant fiber optic link to complete a campus loop. The existing campus fiber optic communication system is unmapped, largely unknown, and generally unmanaged. State fiber lines share conduits with private service systems without documentation. The project will allow the State to better understand their own system, plan necessary improvements, and provide effective management. The efforts will also increase the reliability and security of the system.

This project is identified as an improvement with high priority and listed in the 2023-2025 budget biennium.

Coordination and Improvement of Landscaping

Capitol Campus is a valuable cultural resource for Washington State. West Capitol Campus is a national registered historic site, a public park and tourism attraction, and the state government offices. West Capitol Campus grounds were designed originally by the legendary Olmsted Brothers and have been well laid out and carefully landscaped. Some of Olmsted Brothers' original design ideas have not yet been realized.

The proposed utility improvement projects will disturb campus grounds that will need to be restored. Some of the larger projects may trigger current code requirements for landscape improvements. When restoring existing or incorporating new landscaping elements as part of a utility improvement project, the 2009 *West Capitol Campus Historic Landscape Preservation Master Plan* should be referenced. This plan was developed for the preservation of existing plants and trees and implementation of Olmsted Brothers' original vision.

To reflect the importance of the landscape to Capitol Campus, particularly the West Capitol Campus core areas where the Legislative Building, Insurance Building, and Temple of Justice are located, conceptual landscape designs were prepared as part of the South Capitol Building Parking Lot, Replacement of Insurance Foundation and Roof Drains, and Cherry Lane Drainage and Utility Improvements projects. The landscape restoration concepts are well-coordinated with the campus historic landscape preservation master plan and the proposed utility improvements. These concept design sketches in addition to a landscape design guideline memorandum are provided in Appendix H.

Capital Impacts

The opinions of probable project costs presented in the table of "Utility Improvement Projects for the Next 10 Years" are based on general master-planning-level concepts. A number of factors may affect the actual costs of the projects, such as labor and material costs, competitive market conditions at bidding, detailed utility and topographic surveys, project schedule, final project scope, final design, and other variables unknown at this time.

The opinion of probable project costs are for overall project costs for budgeting purposes. Each estimated cost includes construction costs, consultant service fees, permit fees, project administration, contingency, state sale tax, and escalation. Detailed breakdowns of these project costs are provided in Appendix D.

Long-term Improvements

Overview

This section discusses findings that do not qualify as 'high priority' for the 10-year improvement budget planning but should be addressed separately as part of campus maintenance plans, policy initiatives, or further discussion and planning by the State.

Sanitary Sewer System

Replacement of Sewer Main on 15th Avenue

The sewer line in 15th Avenue conveys sanitary sewage from the Pritchard Building to the sewer main in Water Street. This 6-inch service line can be categorized more as a side sewer than a main. A study in 2009 categorized this sewer line as "Moderate Risk", meaning the serviceability of the sewer line is impaired but may not impose immediate risk. Given the age of the sewer line, however, emergency repairs may be needed sooner than anticipated.

This sewer service line should be replaced with an 8-inch sewer main to provide easy connections for the planned Pritchard Building renovation and expansion and for the future building to be constructed on the adjacent parking lot. The replacement will provide reliable service to the new and renovated buildings for decades to come. Because this sewer line replacement is not urgent and the improvement is more beneficial for future redevelopments along the south side of 15th Avenue, this sewer line replacement could be constructed with one of the redevelopment projects, such as the Pritchard Building renovation and expansion.

Domestic Water System

Long Range Water System Improvements – Temple of Justice and 12th WM Loop

Construction of a new 12-inch ductile iron water main loop with fire hydrants in the north parking lot along the north and west sides of the Temple of Justice Building is recommended to improve fire suppression for this building. The new water main will extend from the existing 10-inch MW in Cherry Lane, westerly to the west end of the Temple of Justice building. The new water main will then be routed south for connection to the existing 8-inch water main in Pleasant Lane and near the Governor's Mansion driveway. The project would include approximately 850 linear feet of new 12-inch DI pipe, four new fire hydrants, and two connections to existing State distribution water mains.

Primary Electrical System

West Capitol Campus Future Development (Newhouse and Pritchard)

The West Capitol Campus master plan indicates possible replacement of the Newhouse Building and construction of an additional building in the parking lot to the east of the Pritchard Building. Both buildings are planned to be four stories with underground parking garages. The primary electrical infrastructure will need to be modified to support this work. The following modifications are recommended to provide primary circuit selectivity in each of the new buildings. The "Primary Electrical System – Proposed Projects Map" in Appendix B shows a plan view of the recommended modifications.

Two new primary site vaults would be installed at the SW corner of 15th Avenue and Water Street ('PJ2' & 'PJ2X'). Each vault would include a new Vista 422 switch. Vault 'PJ2' would be served by primary circuit 25 and 'PJ2X' would be served by primary circuit 26. Each vault would provide one protected feed to each building such that each of the two new buildings will be served by a single feeder from both primary circuits 25 and 26. It is estimated that the existing #2/0 primary feeders will be sufficient to carry the additional building loads to these vaults, but the circuits should be metered prior to construction to verify current loading.

In the Newhouse Building, the existing load interrupter and 300KVA transformer will be replaced with a Vista 321 switch and a 1500KVA step-down transformer. The

Vista 321 switch would be configured with a normally open (NO) path on the incoming primary circuit 25 feeder and a normally closed (NC) path on the incoming primary circuit 26 feeder. The protected output from the switch would serve the building step-down transformer.

The new building to the east of the Pritchard Building would require an installation similar to the Newhouse, except the incoming circuit 25 feeder would be NC and the incoming circuit 26 feeder would be NO.

Maintenance Plan

There is currently no regular maintenance plan in place for the campus primary electrical system. A schedule should be developed to provide phased testing of the existing primary electrical system cables and equipment in accordance with ANSI/NETA MTS guidelines. As a general guideline, MV transformers, switches, and protective devices should be tested every 3 to 5 years. MV cables should be tested every 4 to 7 years. Historical testing data and trending should be recorded as part of this maintenance plan. Any equipment or cables that fail testing or show negative trending data should be considered for replacement. In addition to regular phased testing, the primary vaults should also periodically be drained and cleaned, and all grounding checked for corrosion and solid connections.

Standards

There are currently no documented standards in place for the design and installation of primary electrical infrastructure throughout the site. It would be beneficial to clearly define the following:

Standard primary equipment types and preferred manufacturers (switches, transformers, etc.).

- Feeder labeling and color requirements.
- Preferred vault sizes and lid types.
- Arc flash labeling requirements.
- Grounding installation requirements.

- Power monitoring requirements.
- Preferred installation scheme for new buildings and building remodels (dual sourced, redundant connections, egress hardware, etc.).
- Any other preferences or requirements that the campus facility staff requests or typically looks for when reviewing primary system construction projects.

Having well-defined standards documented and in place will provide a more consistent system across the campus, which will reduce long-term maintenance costs, streamline new construction and modifications, and improve the safety and understanding of the system.

Power Study

Based on the data available, we were unable to determine when, or if, a power study has been performed on the campus primary electrical system. In particular, we observed the following during our site visits:

- There are no arc flash labels on equipment (OSHA requirement).
- The protective device settings are not clearly defined throughout the primary system, and it is unknown if they are properly coordinated. If not properly coordinated, a single fault in the wrong place could potentially take out power to a large portion of the campus, or the entire campus altogether. Improperly configured protective devices can also increase arc flash hazards, which raises safety concerns.
- The available fault current at various locations throughout the campus is unknown. Because of this, the required equipment withstand and interrupt ratings are unknown.
- There is no way to determine the load flow and available system capacity/voltage drop under various switching scenarios with the information available today.
- Campus maintenance staff have indicated that the primary transformer taps may be set too high at the PSE substation. Load voltages at the O'Brien and

Cherberg Buildings have been measured above-recommended values in the past.

A comprehensive power study of the primary system, including load flow study, fault current study, protective device coordination study, and arc flash study could be performed to rectify these issues as well as expose any potential problems or deficiencies.

Sealing of Conduit Entering Buildings

There are many locations throughout the campus where the primary conduit entering buildings is not sealed. We recommend that all conduit entering buildings is sealed to reduce the chance of water ingress and to fully comply with NEC 300.50(F) "Raceway Seal". Sealing bushings or inflatable conduit seals such as "Tyco Rayflate" are recommended for ease of installation and long-term watertight sealing.

Greenhouse Building Load Interrupter Switch

The 200A Joslyn SF6 load interrupter switch in the Greenhouse Building is low on SF6 gas (density gauge is in the red) and should be maintained.

CONCLUSION

Capitol Campus has dense underground utility systems. These utility systems were originally constructed with the development of Capitol Campus in the early 1900s. Many of these originally constructed utility systems are still in service. The oldest system elements can be traced back to the 1920s.

Numerous repairs, modifications, and improvements have been completed since the construction of these utilities. These continual repairs and improvements are critical to the health of these utility systems and keep them operational.

Because of these continual repairs and improvements, the utility systems in Capitol Campus are in generally fair condition. While there are still many improvements to be made, and some of these improvements are urgent, observations and review of available data did not find evidence that any one utility systems needs a campus-wide overhaul. In general, utilities in East Capitol Campus are in better condition than those in West Capitol Campus, partly because of the different ages and construction materials of the facilities.

The water system in West Capitol Campus is especially concerning. The City of Olympia's water system can provide 4,000 gpm of fire flow to the two master meter locations that connect the City's system and the State's system. However, available flow test data indicate there is significantly lower available flow in West Capitol Campus. There are several reasons why the water system cannot deliver that much water flow, and it will take a thorough study and analysis to determine an efficient and cost-effective improvement plan. This study should be done soon. A 4,000 gpm available fire flow is critical based on the fire marshal's estimates of the flow necessary to protect a building such as the Legislative Building by current code.

Regular maintenance is critical to maintain the operation of these utility systems. Continual improvements to the utility systems by implementing the identified projects will support Capitol Campus into the future for 10 years or more.

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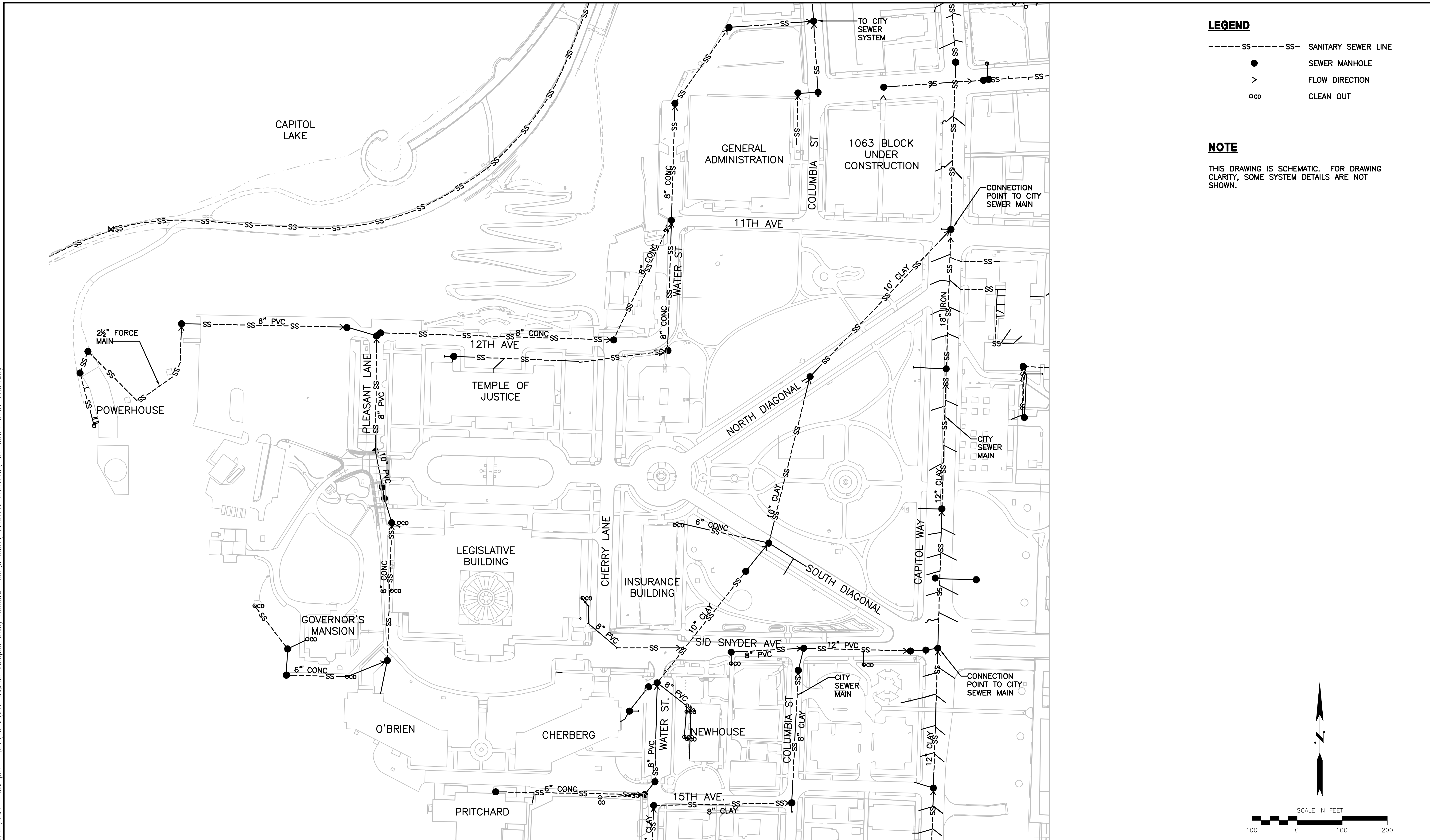
APPENDICES

APPENDIX A
EXISTING CONDITION MAPS



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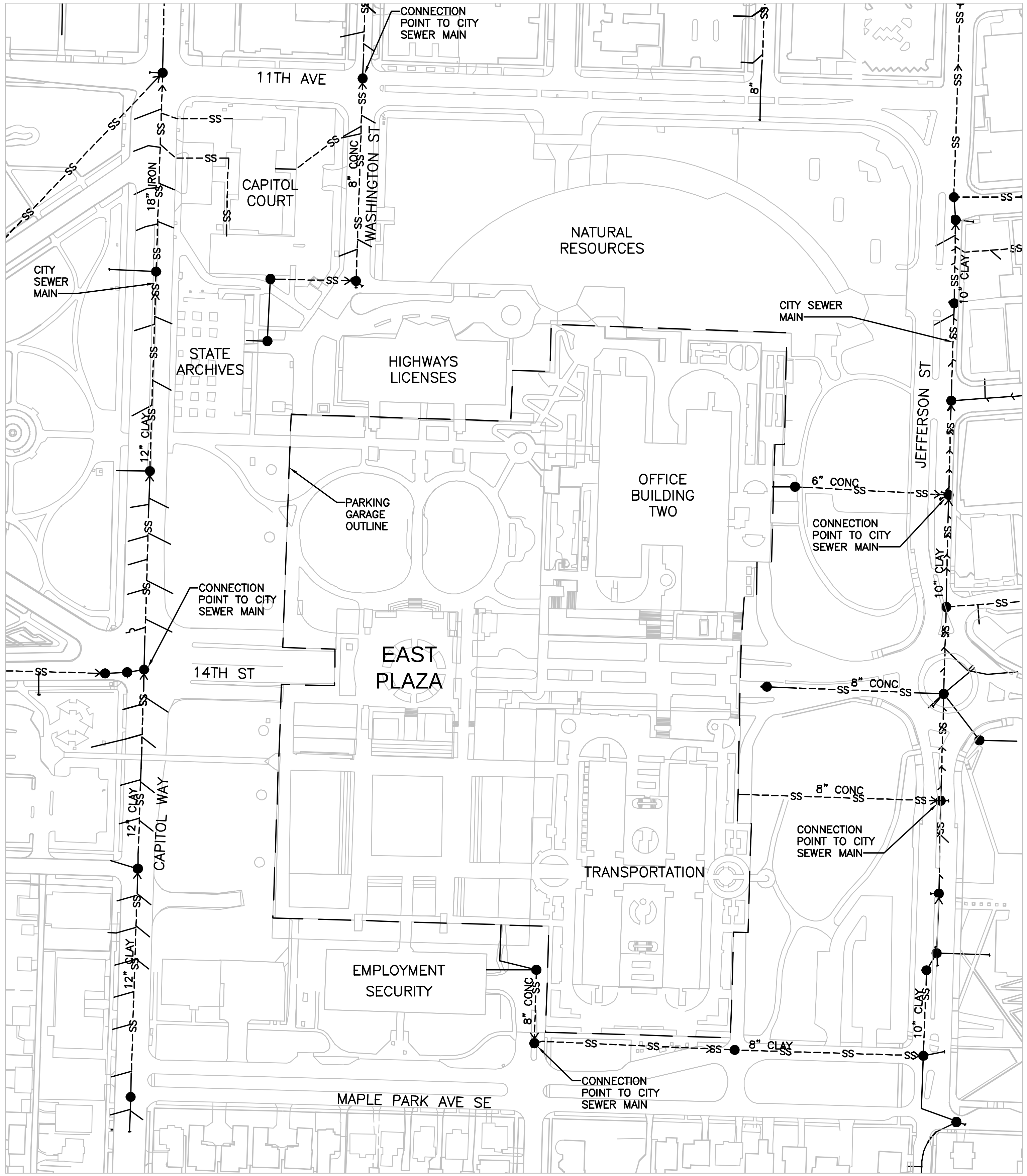
WEST CAMPUS EXISTING SANITARY SEWER SYSTEM MAP
Capitol Campus Utility Renewal Plan
March 2017

Figure 1

03/24/2017 3:01pm I:\21\2016\012 Capitol Campus Utility Renewal Plan\DESIGN\~EXISTING EXHIBITS\FIG1-SSWR-WEST-EXST.dwg

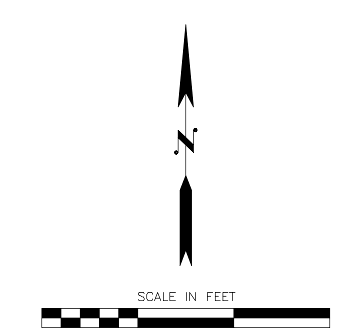


LEGEND

------SS------SS-	SANITARY SEWER LINE
●	SEWER MANHOLE
>	FLOW DIRECTION

NOTE

THIS DRAWING IS SCHEMATIC. FOR DRAWING CLARITY, SOME SYSTEM DETAILS ARE NOT SHOWN.



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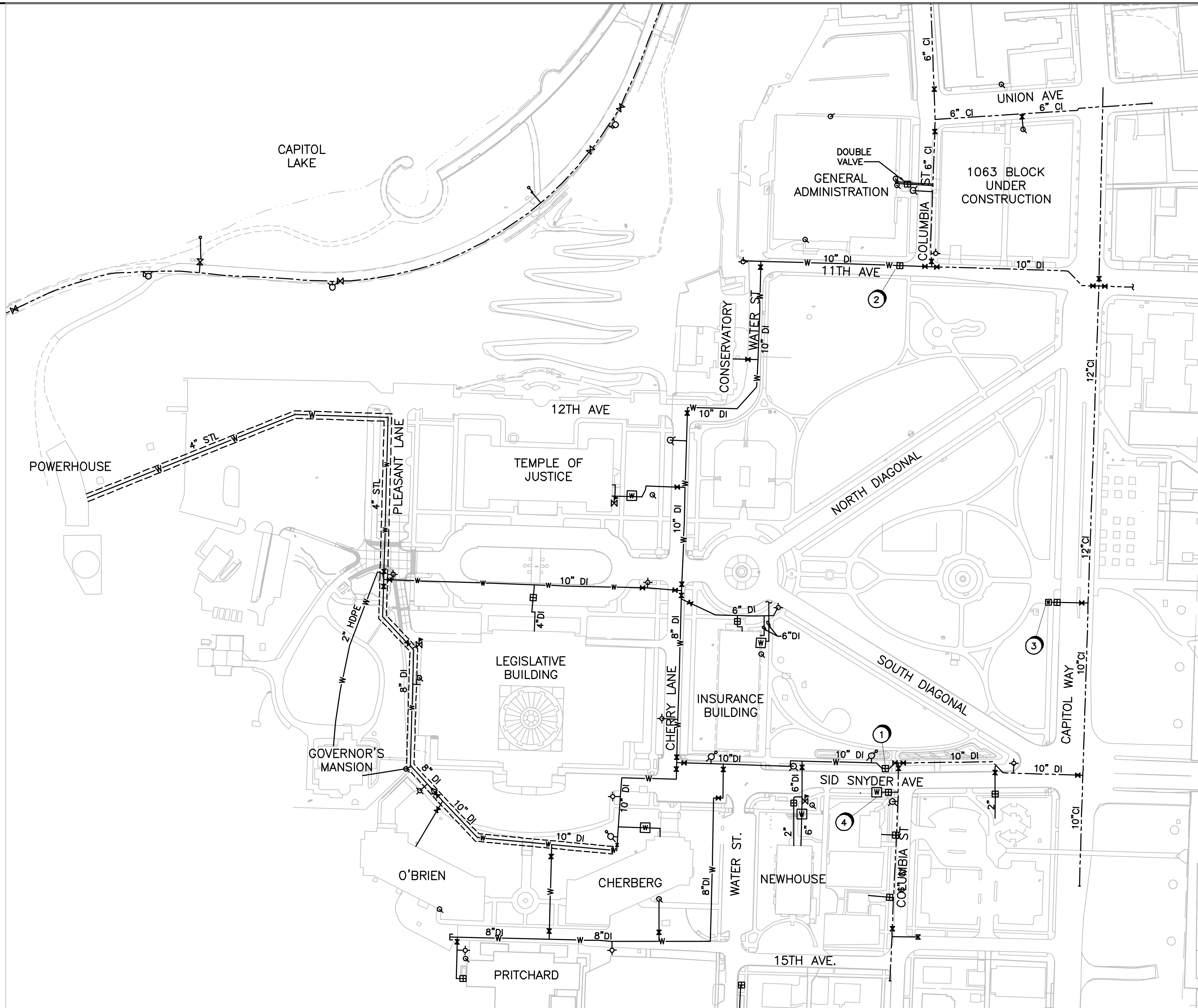
EAST CAMPUS EXISTING SANITARY SEWER SYSTEM
Capitol Campus Utility Renewal Plan
March 2017

Figure 2



LEGEND

- FIRE DEPARTMENT CONNECTION
- FIRE HYDRANT
- POST INDICATOR VALVE
- WATER METER
- AIR RELIEF VALVE
- VALVE
- REDUCER
- DOUBLE CHECK VALVE ASSEMBLY IN VAULT
- CITY OF OLYMPIA WATERMAIN
- WATERMAIN
- WATERMAIN IN UTILITY TUNNEL

WATER MAP NOTES:

1. MASTER METER #1
2. MASTER METER #2
3. IRRIGATION MASTER METER AND DOUBLE CHECK VALVE ASSEMBLY #1
4. IRRIGATION MASTER METER AND DOUBLE CHECK VALVE ASSEMBLY #2

GENERAL NOTES:

1. THIS DRAWING IS SCHEMATIC. FOR DRAWING CLARITY, SOME SYSTEM DETAILS ARE NOT SHOWN.
2. MOST OF THE STATE-OWNED WATERMAINS WERE INSTALLED IN THE MID-1980s. THE SECTION OF THE WATERMAIN IN SID SNYDER WAY FROM CAPITOL WAY TO WATER STREET WAS INSTALLED IN 2014.
3. THE METER FOR WATER SERVICE TO THE GOVERNOR'S MANSION IS LOCATED INSIDE THE UTILITY TUNNEL.
4. THE FOLLOWING BUILDINGS HAVE BOOSTER PUMPS IN THE BUILDING:

TEMPLE OF JUSTICE:	BOOSTER PUMP FOR FIRE SERVICE CAPACITY = 500 GPM
LEGISLATIVE BUILDING:	BOOSTER PUMP FOR FIRE SERVICE CAPACITY = 1,000 GPM
LEGISLATIVE BUILDING:	BOOSTER PUMP FOR DOMESTIC WATER SERVICE CAPACITY = 251 GPM MODEL = GRUNDFOS CRE 15-02
CHERBERG BUILDING:	BOOSTER PUMP FOR DOMESTIC WATER SERVICE CAPACITY = 138 GPM MODEL = GRUNDFOS CRE 10-03
O'BRIEN BUILDING:	BOOSTER PUMP FOR DOMESTIC WATER SERVICE CAPACITY = 308 GPM MODEL = GRUNDFOS CRE 20-10
O'BRIEN BUILDING:	BOOSTER PUMP FOR FIRE SERVICE CAPACITY = 500 GPM

N

SCALE IN FEET
100 0 100 200

03/24/2017 3:05pm I:\21\2016\012 Capitol Campus Utility Renewal Plan\DESIGN\~EXISTING EXHIBITS\FIG3-WATR-WEST-EXST.dwg

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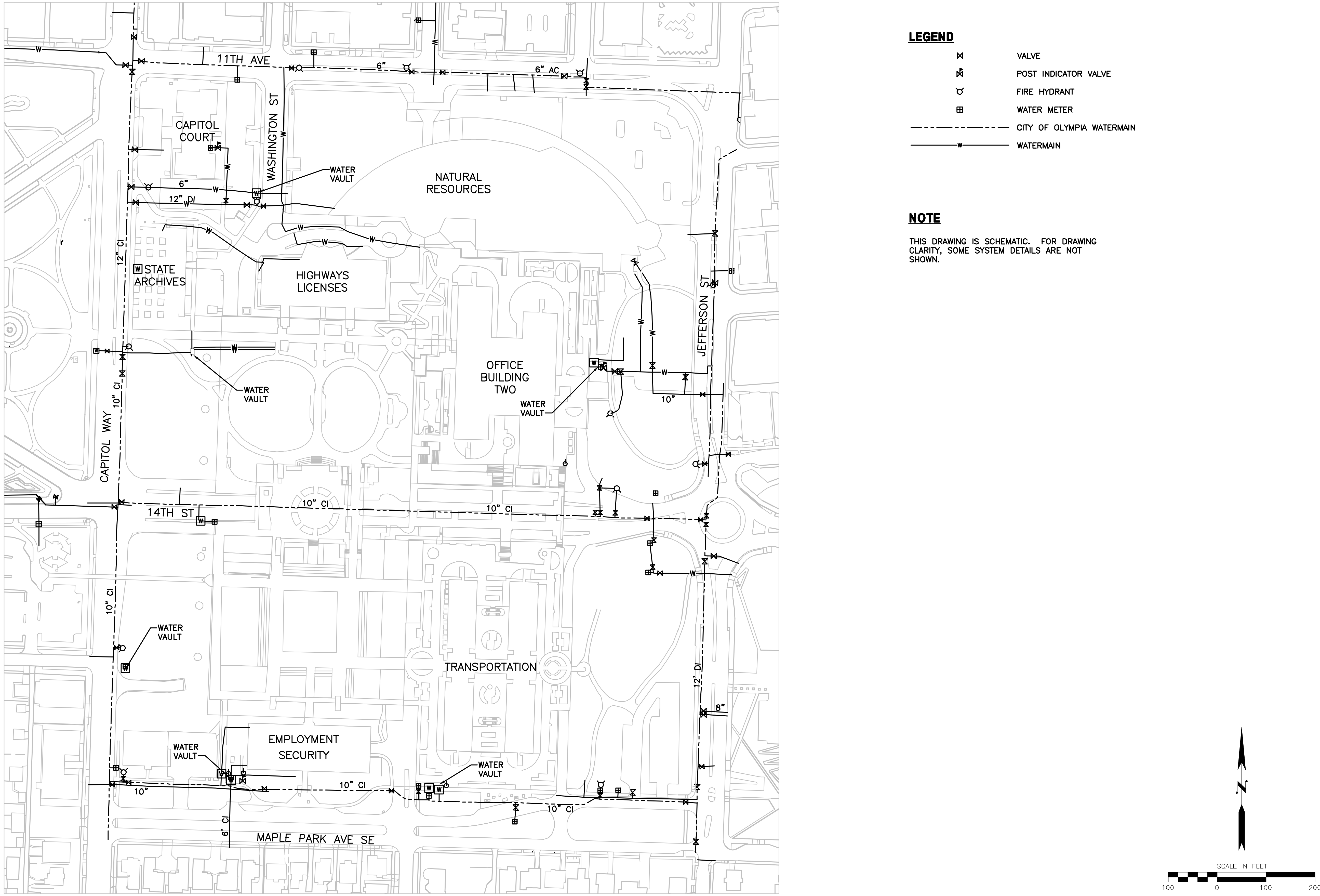
WEST CAMPUS EXISTING WATER SYSTEM
Capitol Campus Utility Renewal Plan
March 2017

Figure 3



LEGEND

⋈	VALVE
	POST INDICATOR VALVE
	FIRE HYDRANT
⊞	WATER METER
— · — · —	CITY OF OLYMPIA WATERMAIN
——W——	WATERMAIN

NOTE

THIS DRAWING IS SCHEMATIC. FOR DRAWING CLARITY, SOME SYSTEM DETAILS ARE NOT SHOWN.

03/24/2017 3:06pm I:\21\2016\012 Capitol Campus Utility Renewal Plan\DESIGN\~EXISTING EXHIBITS\FIG4-WATR-EAST-EXST.dwg

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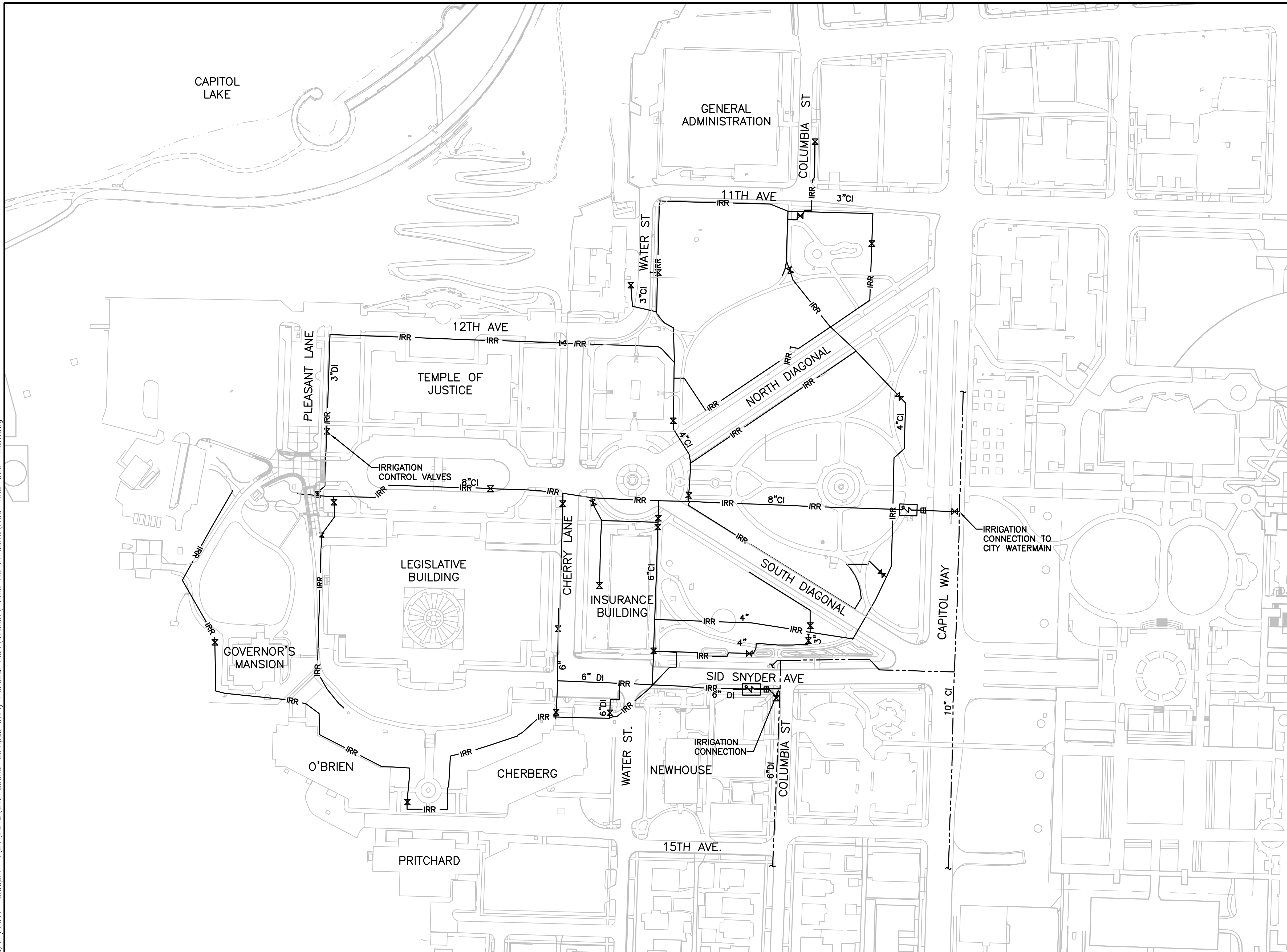
EAST CAMPUS EXISTING WATER SYSTEM
Capitol Campus Utility Renewal Plan
March 2017

Figure 4



LEGEND

- IRR — IRRIGATION LINE
- CITY WATERMAIN
- WATER METER
- DOUBLE CHECK VALVE IN VAULT
- VALVE

NOTE

THIS DRAWING IS SCHEMATIC. FOR DRAWING CLARITY, SOME SYSTEM DETAILS ARE NOT SHOWN.

03/24/2017 3:06pm I:\21\2016\012 Capitol Campus Utility Renewal Plan\DESIGN\~EXISTING EXHIBITS\FIG5-IRRG-WEST-EXST.dwg

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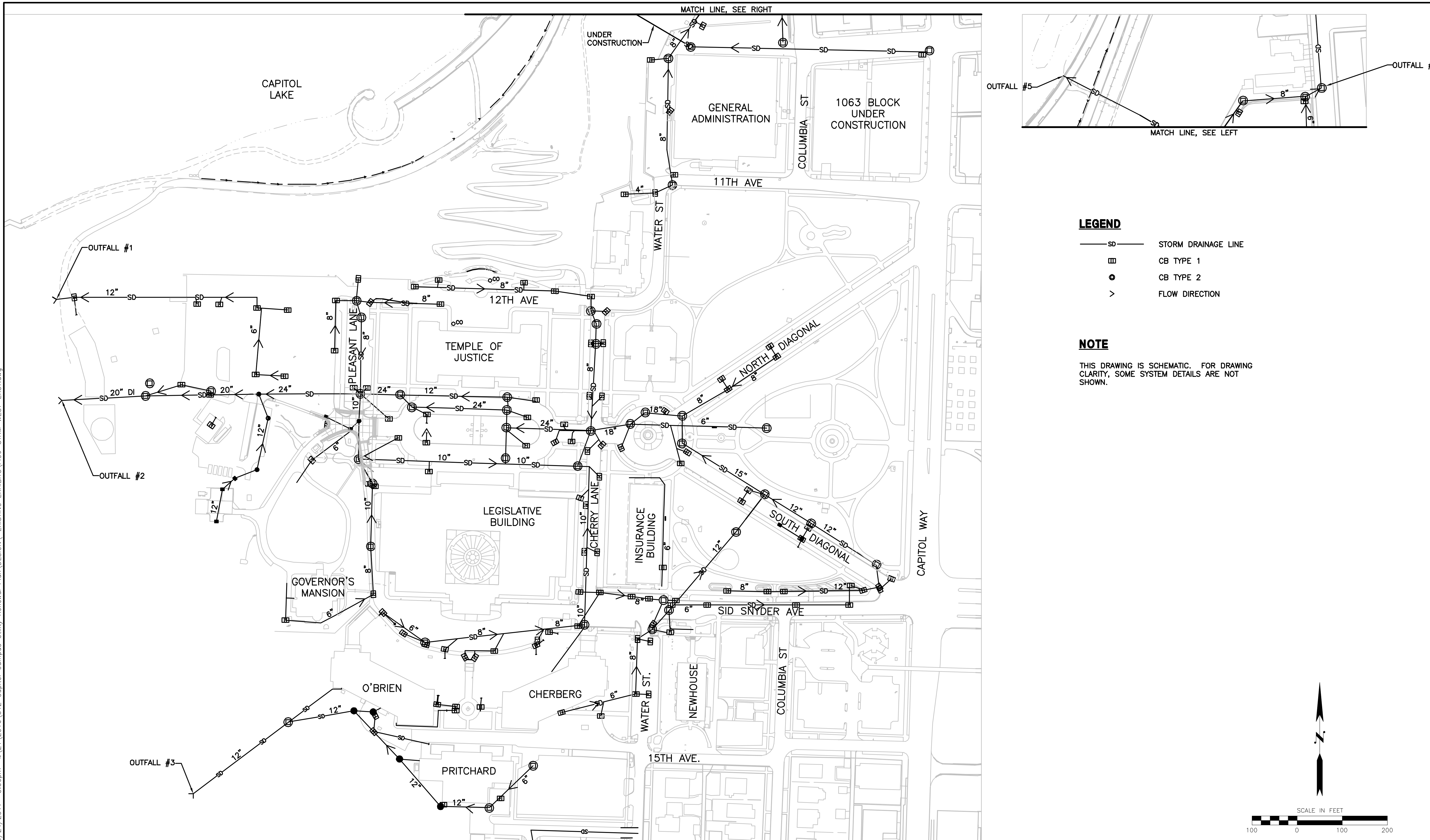
WEST CAMPUS EXISTING IRRIGATION SYSTEM MAP
Capitol Campus Utility Renewal Plan
March 2017

Figure 5



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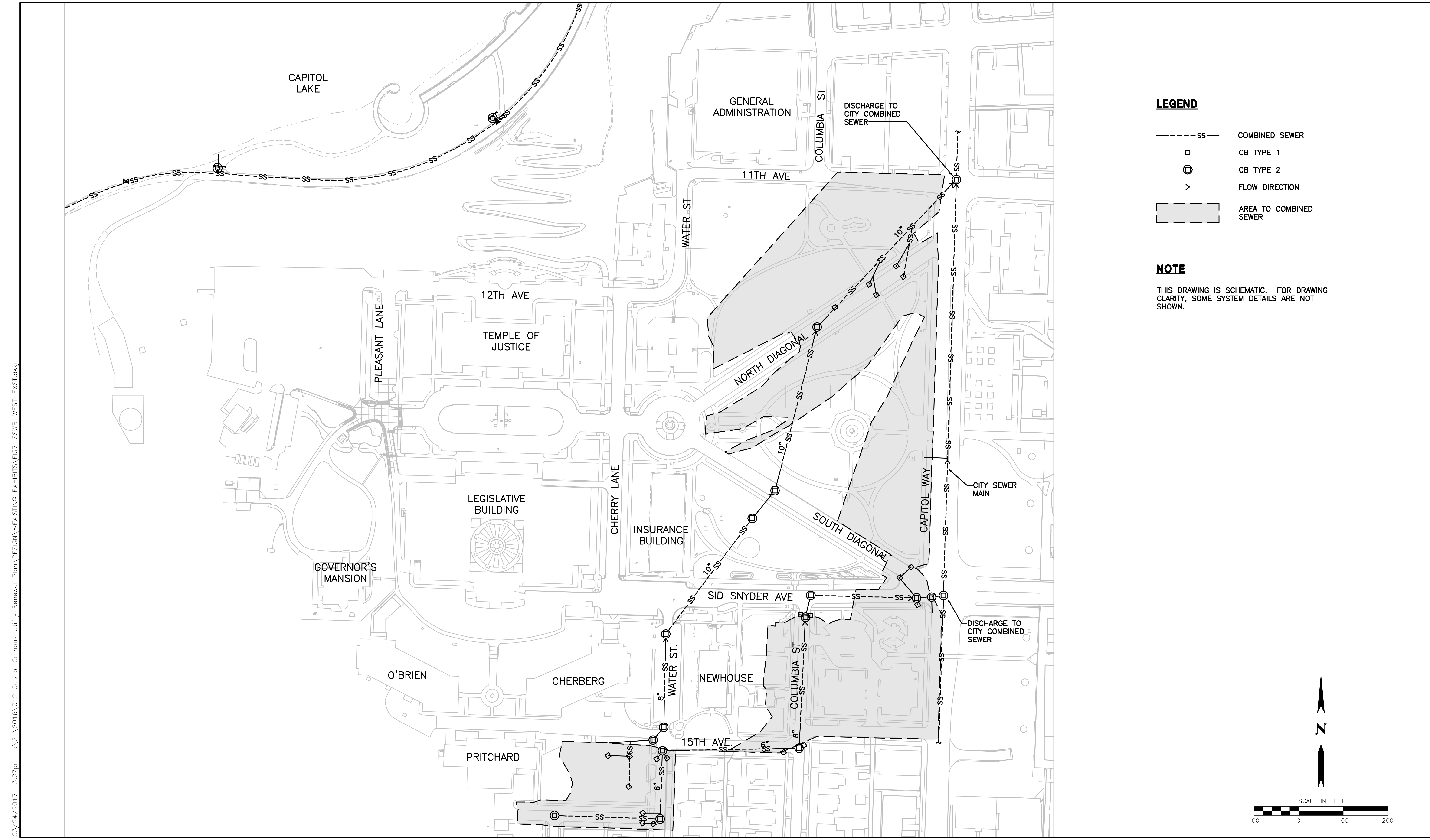
WEST CAMPUS EXISTING DEDICATED STORM SYSTEM

Capitol Campus Utility Renewal Plan

March 2017

Figure 6



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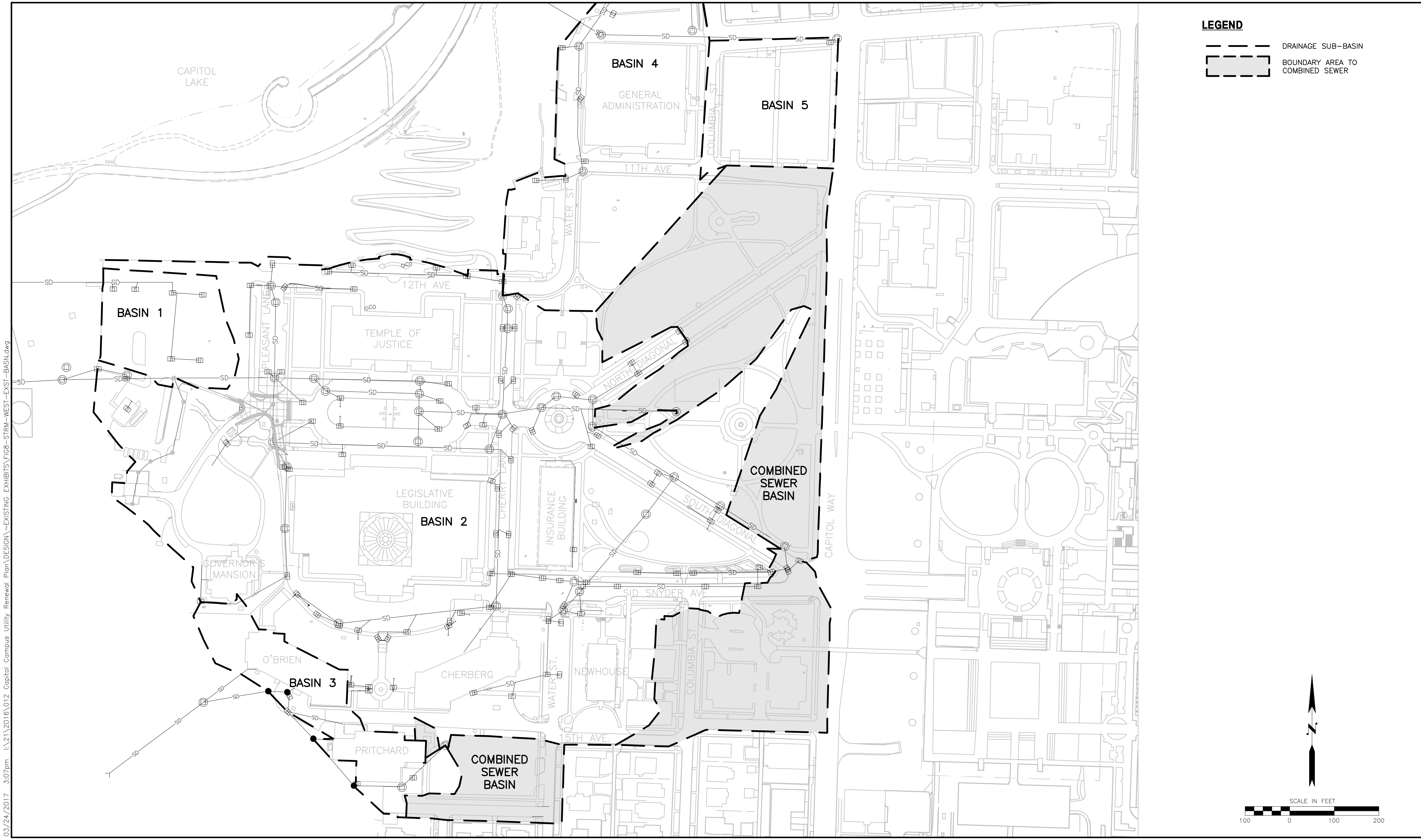
WEST CAMPUS EXISTING COMBINED SANITARY SEWER SYSTEM

Capitol Campus Utility Renewal Plan

March 2017

Figure 7



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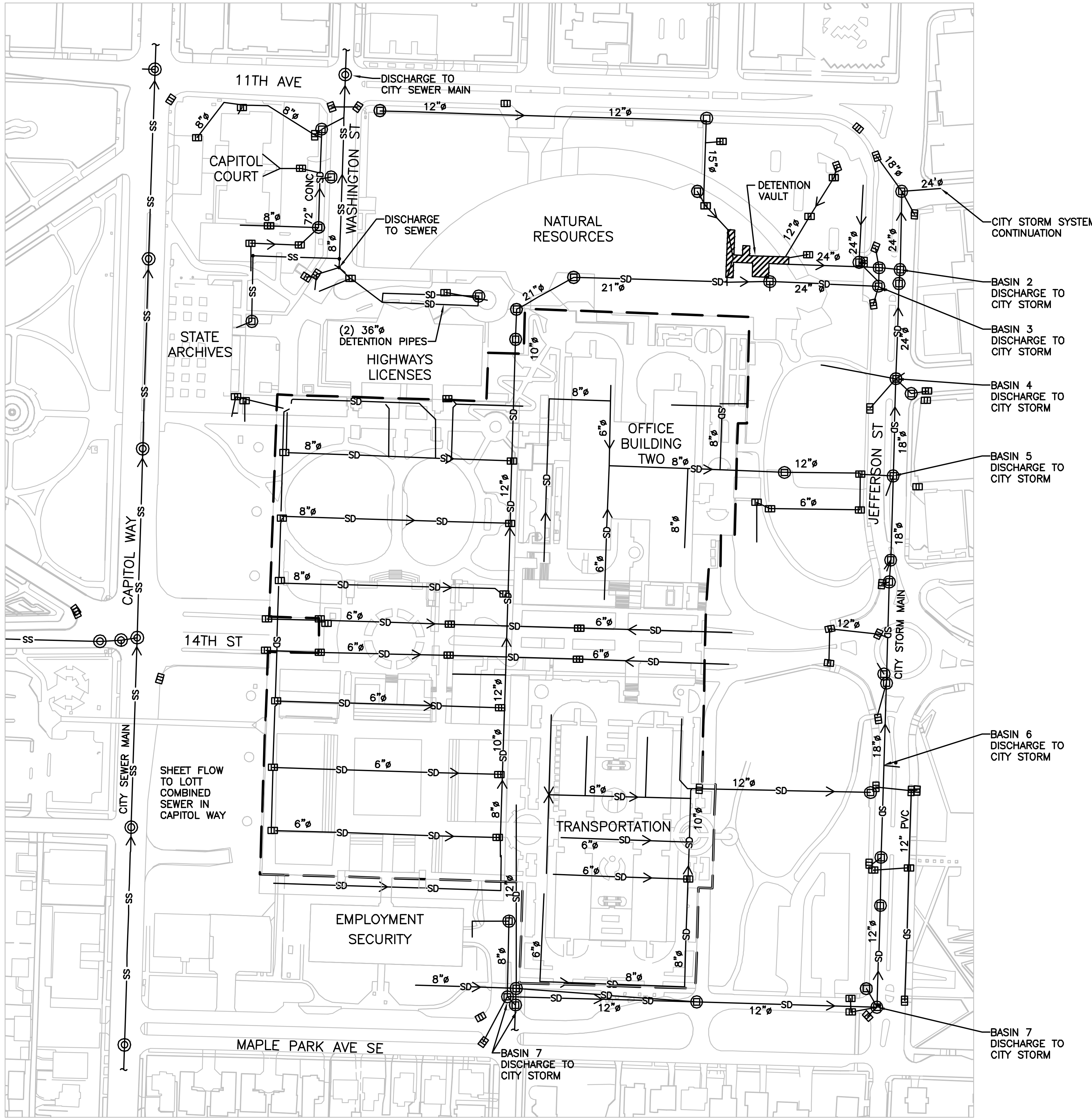
WEST CAMPUS STORM DRAINAGE BASINS
Capitol Campus Utility Renewal Plan
January 2017

Figure 8



LEGEND

——SD——	STORM DRAIN LINE
——SS——	SANITARY SEWER LINE
▥	CATCH BASIN TYPE 1
◎	CATCH BASIN TYPE 2
>	FLOW DIRECTION
— — —	GARAGE LIMIT

NOTE

THIS DRAWING IS SCHEMATIC. FOR DRAWING CLARITY, SOME SYSTEM DETAILS ARE NOT SHOWN.

N

SCALE IN FEET

100 0 100 200

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EAST CAMPUS EXISTING STORM SYSTEM

Capitol Campus Utility Renewal Plan

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Figure 9

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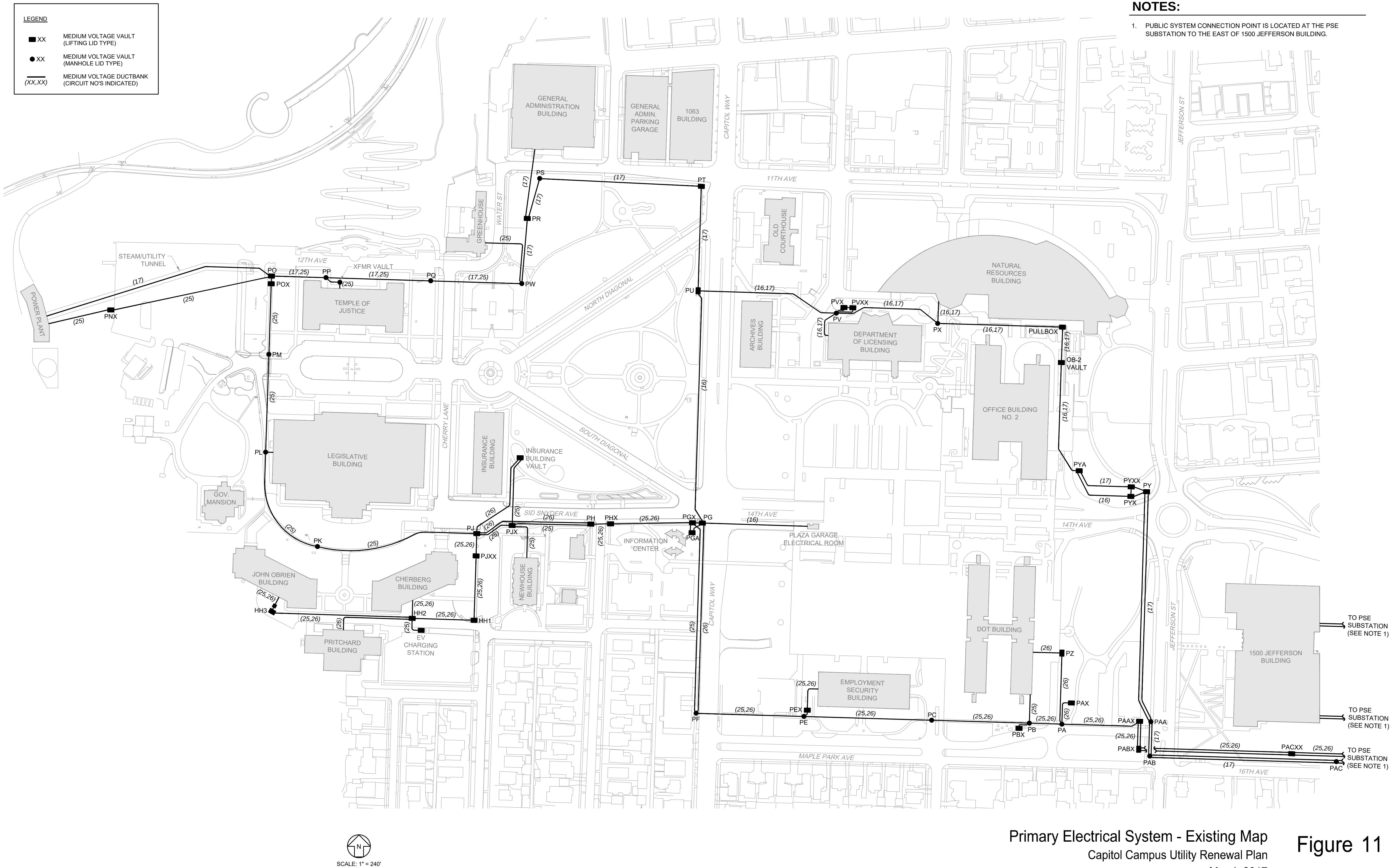
EAST CAMPUS STORM DRAINAGE BASINS
Capitol Campus Utility Renewal Plan
March 2017

Figure 10



NOTES:

1. PUBLIC SYSTEM CONNECTION POINT IS LOCATED AT THE PSE SUBSTATION TO THE EAST OF 1500 JEFFERSON BUILDING.

Primary Electrical System - Existing Map

Capitol Campus Utility Renewal Plan

March 2017

Figure 11

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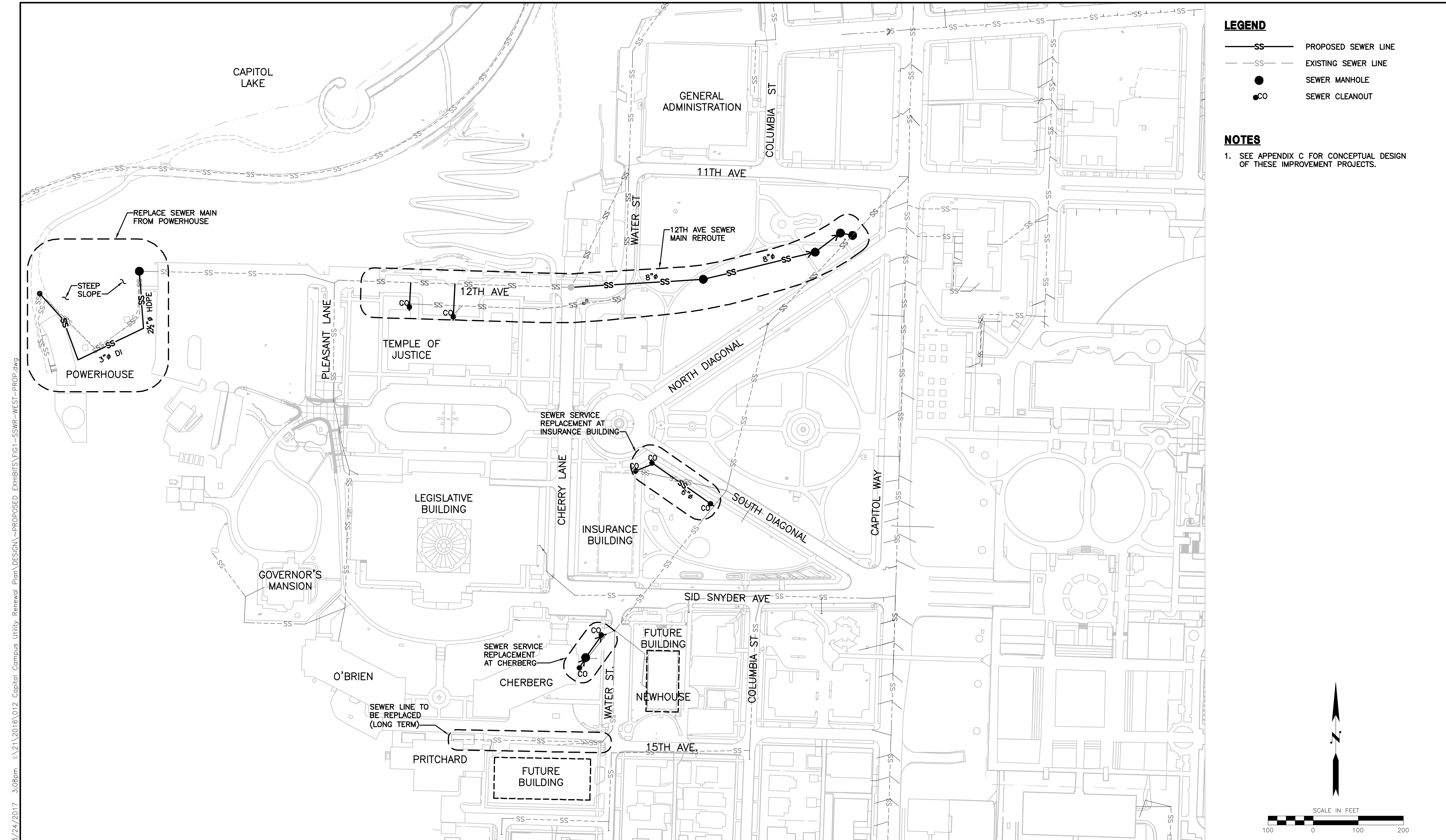
APPENDIX B

PROPOSED IMPROVEMENT OVERVIEW MAPS



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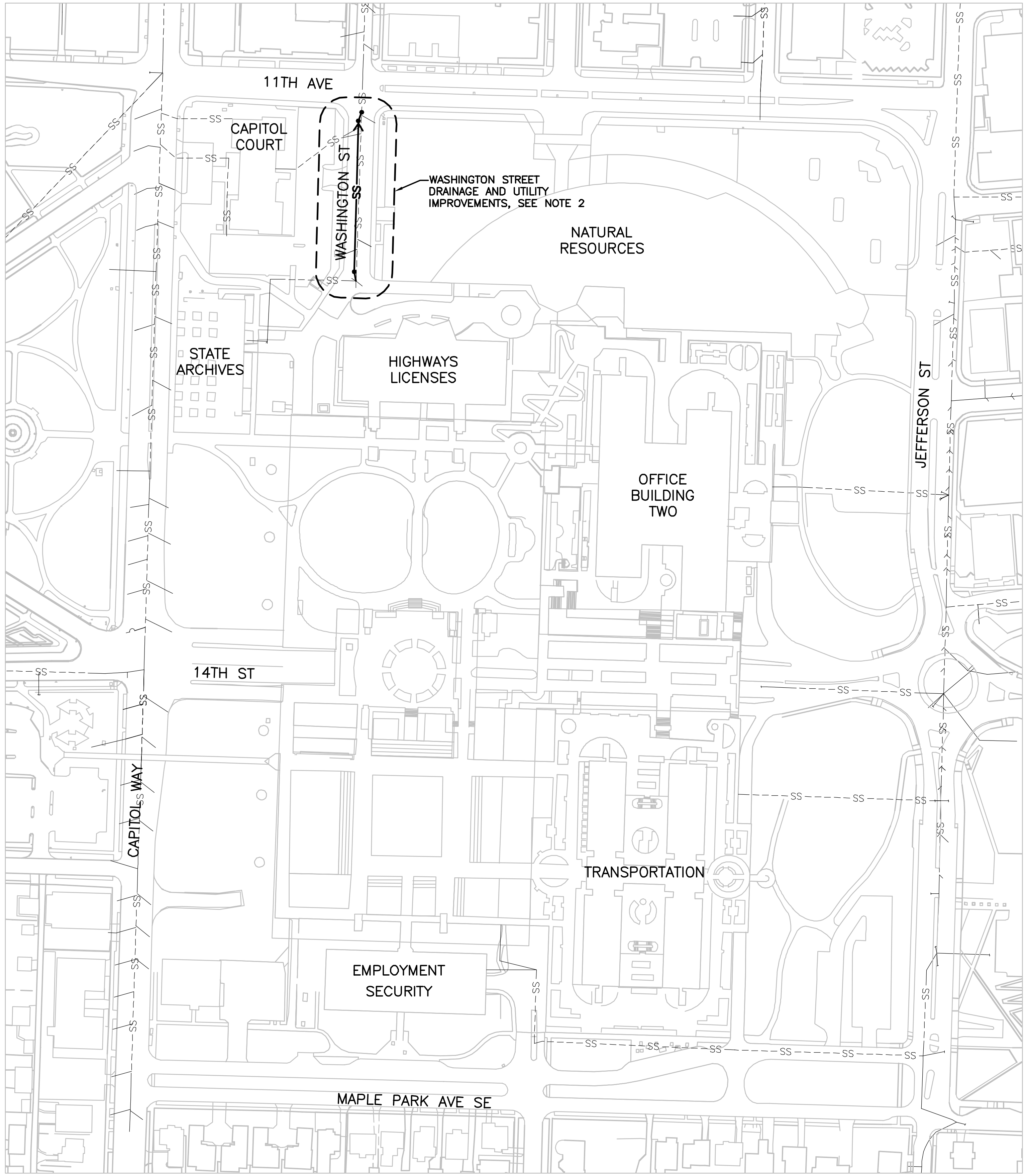
WEST CAMPUS PROPOSED SANITARY SEWER SYSTEM IMPROVEMENTS
Capitol Campus Utility Renewal Plan
March 2017

Figure 1



LEGEND

—SS—	PROPOSED SEWER LINE
— —SS— —	EXISTING SEWER LINE
●	SEWER MANHOLE
•CO	SEWER CLEANOUT

NOTES

1. SEE APPENDIX C FOR CONCEPTUAL DESIGN OF THESE IMPROVEMENT PROJECTS.
2. THIS IS A MULTI-DISCIPLINED PROJECT. SEE PROPOSED WATER AND STORMWATER SYSTEM IMPROVEMENTS ON FIGURE 3 AND FIGURE 7.

03/24/2017 3:08pm I:\21\2016\012 Capitol Campus Utility Renewal Plan\DESIGN\~PROPOSED EXHIBITS\FIG2-SSWR-EAST-PROP.dwg

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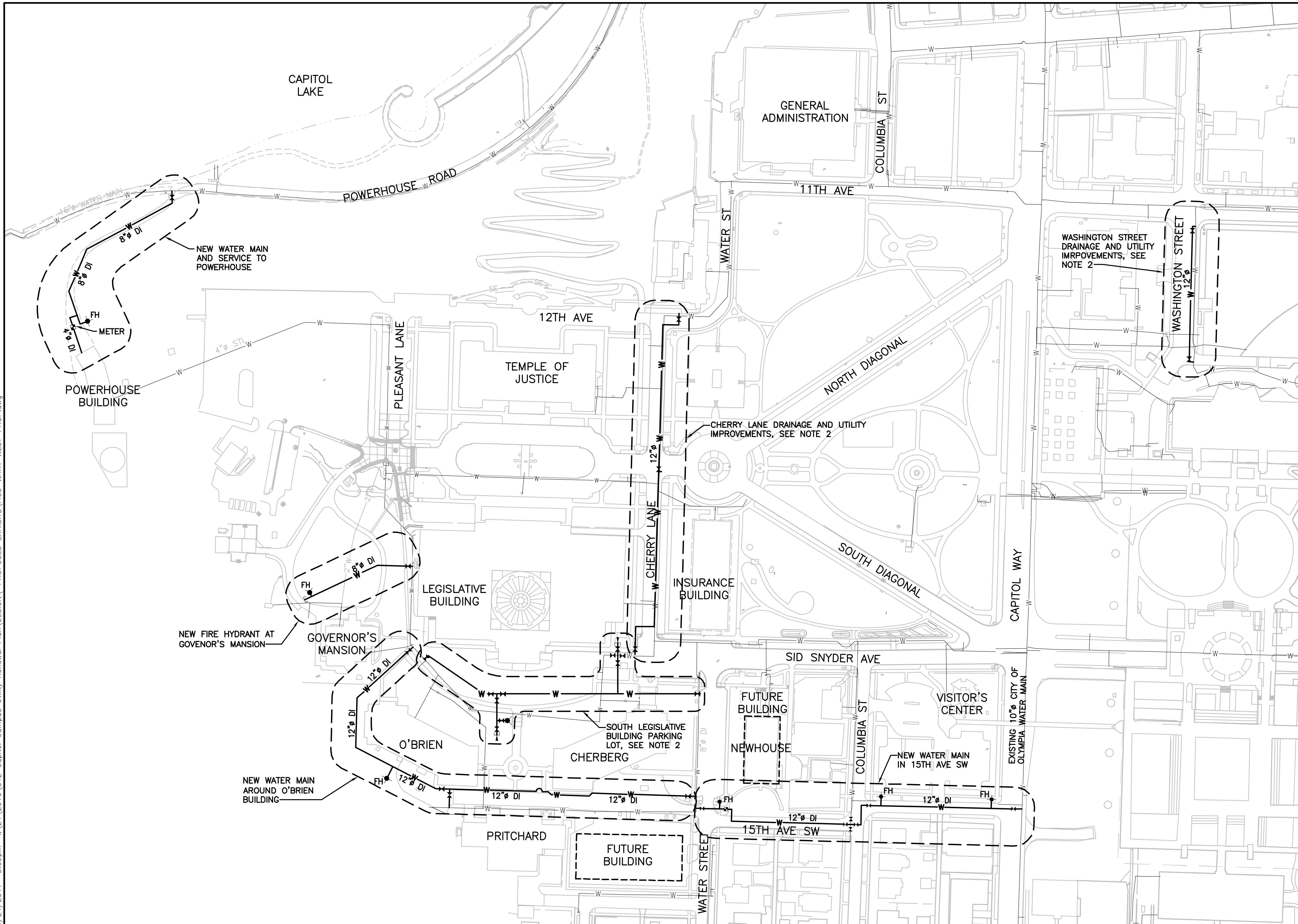
EAST CAMPUS PROPOSED SANITARY SEWER SYSTEM IMPROVEMENTS
Capitol Campus Utility Renewal Plan
March 2017

Figure 2



LEGEND

W	WATER LINE
W	EXISTING WATER LINE
FH	FIRE HYDRANT
	VALVE
	WATER METER

NOTES

1. SEE APPENDIX C FOR CONCEPTUAL DESIGN OF THESE IMPROVEMENT PROJECTS.
2. THIS IS A MULTI-DISCIPLINED PROJECT. SEE PROPOSED STORMWATER SYSTEM IMPROVEMENTS ON FIGURE 6.

03/24/2017 3:09pm I:\21\2016\012 Capitol Campus Utility Renewal Plan\DESIGN\~PROPOSED EXHIBITS\FIG3-WATR-WEST-PROP.dwg

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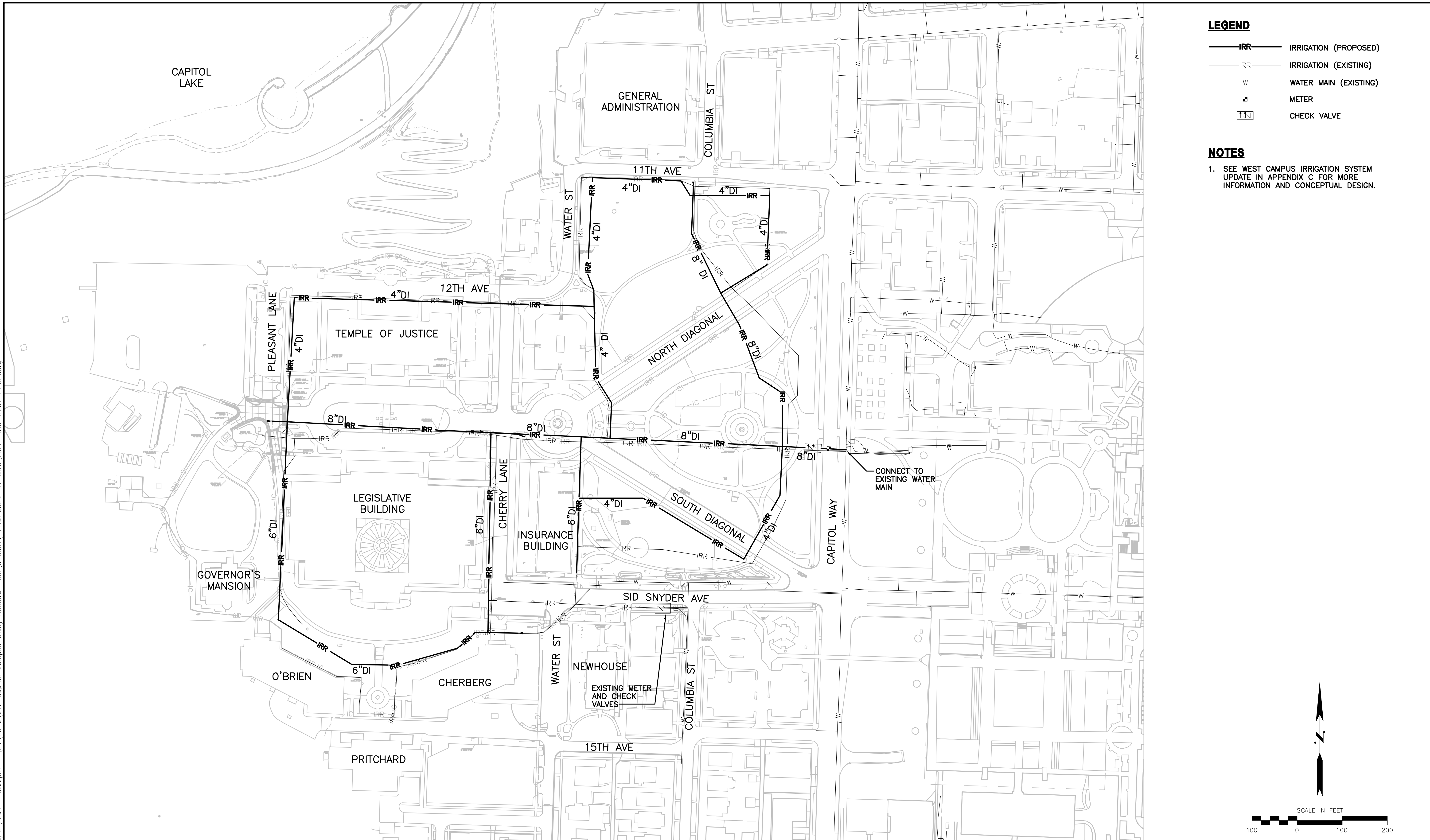
WEST CAMPUS PROPOSED WATER SYSTEM
Capitol Campus Utility Renewal Plan
March 2017

Figure 3



03/24/2017 3:09pm I:\21\2016\012 Capitol Campus Utility Renewal Plan\DESIGN\~PROPOSED EXHIBITS\FIG4-IRRG-WEST-PROP.dwg

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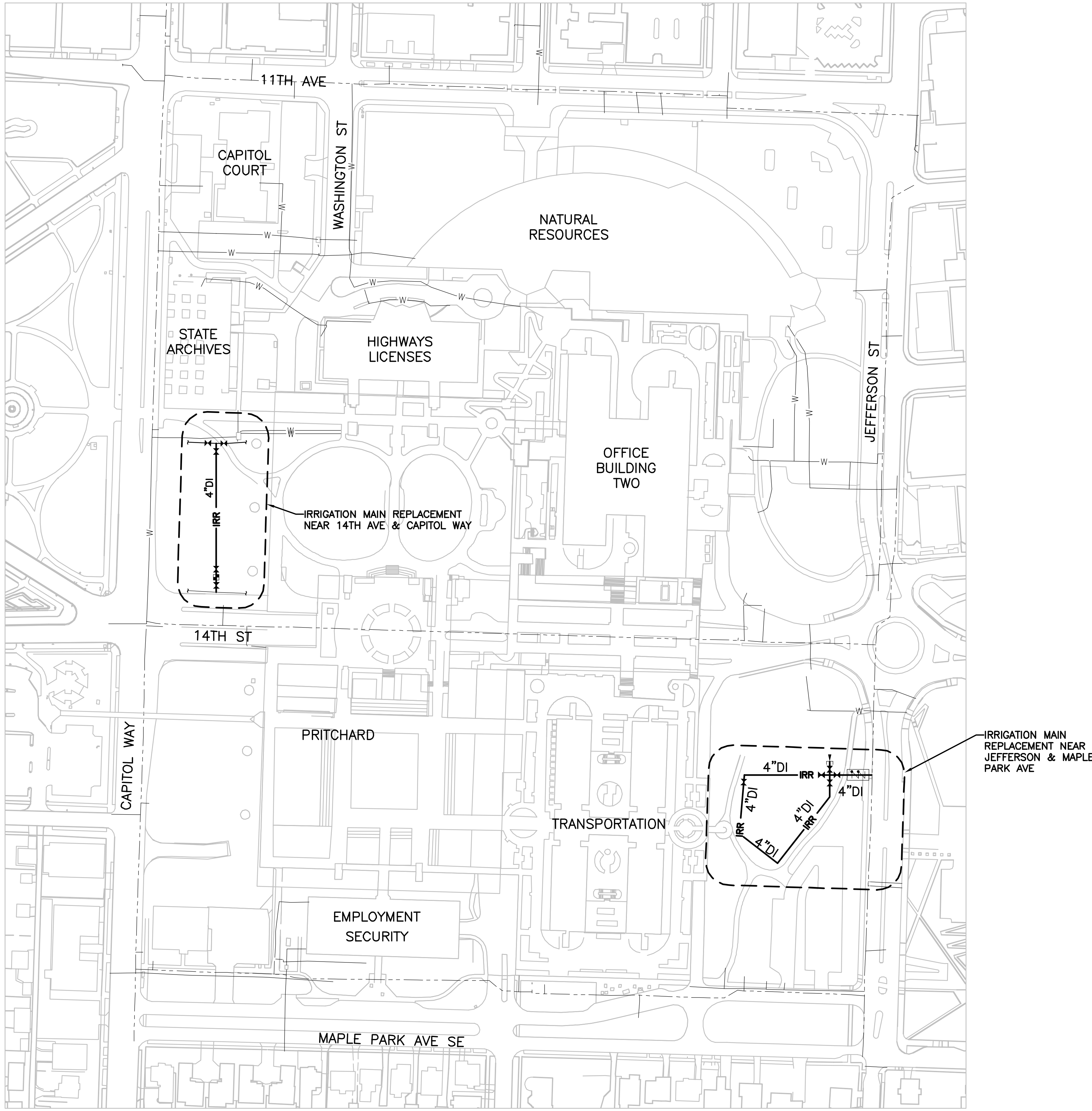
WEST CAMPUS PROPOSED IRRIGATION SYSTEM IMPROVEMENTS
Capitol Campus Utility Renewal Plan
March 2017

Figure 4



LEGEND

IRR	IRRIGATION (PROPOSED)
W	WATER MAIN (EXISTING)
	METER
	CHECK VALVE
	VALVE

NOTES

1. SEE APPENDIX C FOR CONCEPTUAL DESIGN OF THESE IMPROVEMENT PROJECTS.

N

SCALE IN FEET

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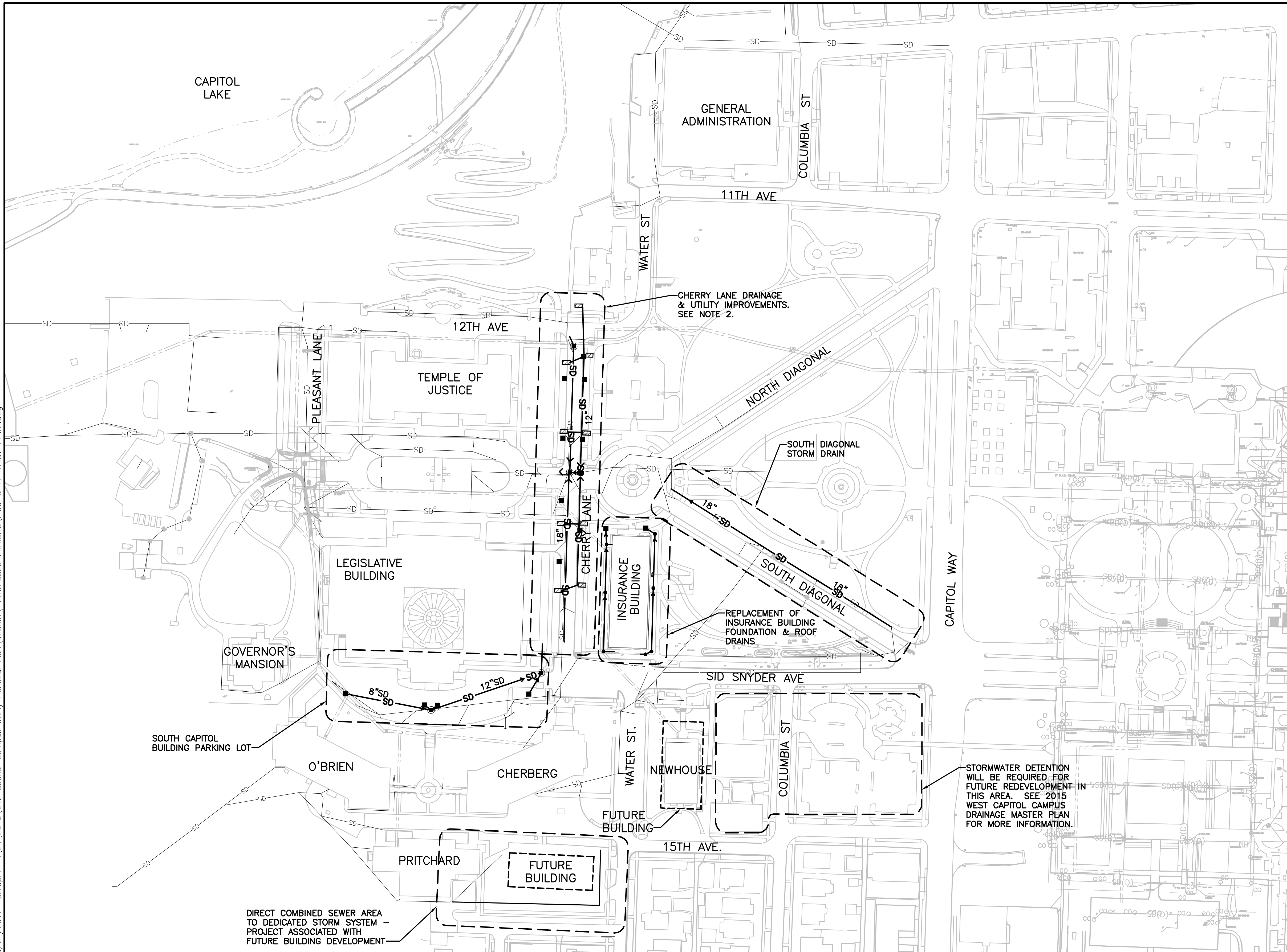
EAST CAMPUS PROPOSED IRRIGATION SYSTEM
Capitol Campus Utility Renewal Plan
March 2017

Figure 5



LEGEND

- SD — STORM LINE (PROPOSED)
- SD — STORM LINE (EXISTING)
- ■ CATCH BASIN (NEW)
- ◉ CB TYPE 2
- BIORETENTION

NOTES

1. SEE APPENDIX C FOR CONCEPTUAL DESIGN OF THESE IMPROVEMENT PROJECTS.
2. THIS IS A MULTI-DISCIPLINED PROJECT. SEE PROPOSED WATER SYSTEM IMPROVEMENTS ON FIGURE 3.

N

SCALE IN FEET
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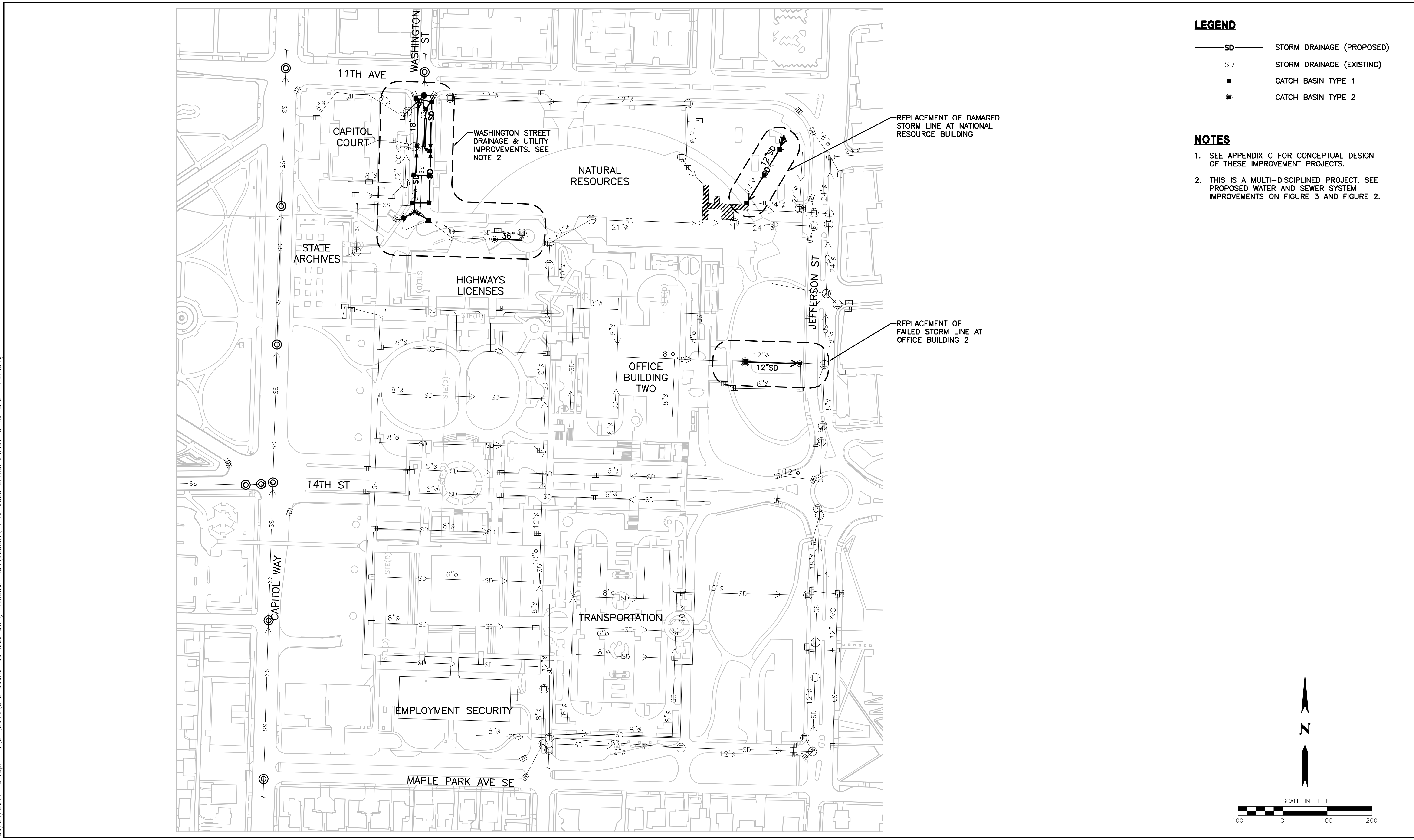
WEST CAMPUS PROPOSED STORM SYSTEM
Capitol Campus Utility Renewal Plan
March 2017

Figure 6



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EAST CAMPUS PROPOSED STORM SYSTEM

Capitol Campus Utility Renewal Plan

March 2017

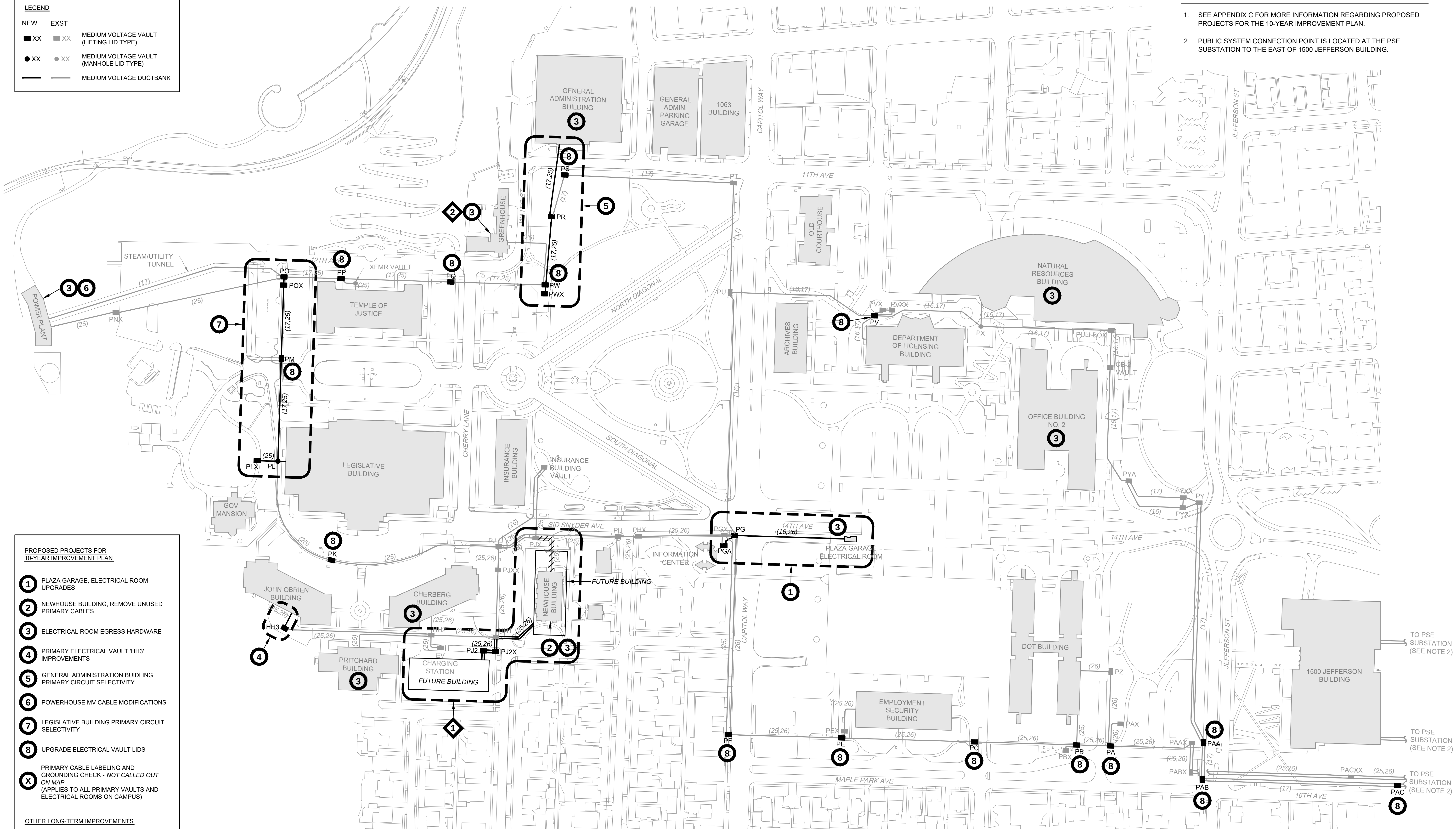
Figure 7

LEGEND

NEW	EXST	
■ XX	■ XX	MEDIUM VOLTAGE VAULT (LIFTING LID TYPE)
● XX	● XX	MEDIUM VOLTAGE VAULT (MANHOLE LID TYPE)
▬	▬	MEDIUM VOLTAGE DUCTBANK

NOTES:

1. SEE APPENDIX C FOR MORE INFORMATION REGARDING PROPOSED PROJECTS FOR THE 10-YEAR IMPROVEMENT PLAN.
2. PUBLIC SYSTEM CONNECTION POINT IS LOCATED AT THE PSE SUBSTATION TO THE EAST OF 1500 JEFFERSON BUILDING.



PROPOSED PROJECTS FOR 10-YEAR IMPROVEMENT PLAN

1. PLAZA GARAGE, ELECTRICAL ROOM UPGRADES
2. NEWHOUSE BUILDING, REMOVE UNUSED PRIMARY CABLES
3. ELECTRICAL ROOM EGRESS HARDWARE
4. PRIMARY ELECTRICAL VAULT 'HH3' IMPROVEMENTS
5. GENERAL ADMINISTRATION BUIDLING PRIMARY CIRCUIT SELECTIVITY
6. POWERHOUSE MV CABLE MODIFICATIONS
7. LEGISLATIVE BUILDING PRIMARY CIRCUIT SELECTIVITY
8. UPGRADE ELECTRICAL VAULT LIDS

X. PRIMARY CABLE LABELING AND GROUNDING CHECK - *NOT CALLED OUT ON MAP* (APPLIES TO ALL PRIMARY VAULTS AND ELECTRICAL ROOMS ON CAMPUS)

OTHER LONG-TERM IMPROVEMENTS

1. WEST CAMPUS FUTURE DEVELOPMENT (NEWHOUSE AND PRITCHARD)
2. GREENHOUSE BUILDING LOAD INTERRUPTER SWITCH MAINTENANCE

N

SCALE: 1" = 240'

Primary Electrical System - Proposed Project Map

Capitol Campus Utility Renewal Plan

March 2017

Figure 8

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APPENDIX C

CONCEPTUAL DESIGN SKETCHES

12th Ave Sewer Main Reroute

Project Description

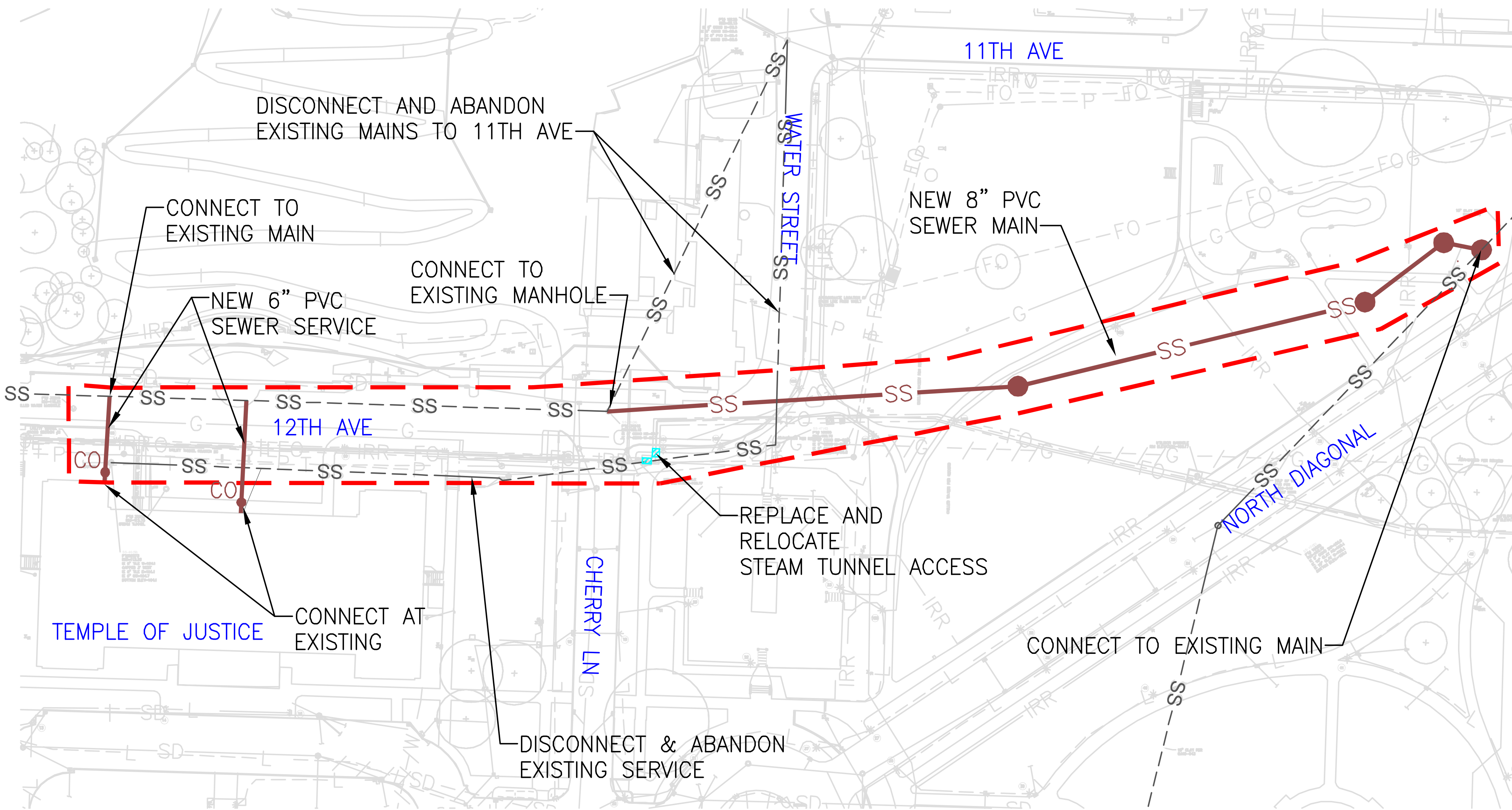
- Construct new sanitary sewer main from the intersection of 12th Avenue and Cherry Lane east to the North Diagonal.
- Abandon existing mains from 12th Avenue northeast to 11th Ave.
- Disconnect and abandon existing Temple of Justice sanitary service.
- Construct new sanitary sewer service for the Temple of Justice to the existing main on 12th Street.
- Restore disturbed surface and landscaping
- Replace and relocate existing steam tunnel manhole with locking hatch and remove wood bench over steam tunnel fan.

Cost Summary

Current Construction Total without Sales Tax	$168,800
Consultant Service Fee	$42,200
Permit Fee - Allowance	$6,000
DES Project Management and Support	$12,700
Project Contingency	$23,000
Escalation (3% / year for 2 years)	$15,400
Sales Tax (8.8% of escalated construction cost)	$15,800
Escalated Project Total(Year 2018)	$283,900

Legend

Project Boundary
Sewer Manhole
Sewer Cleanout
Sewer Line
Existing Sewer Line
Steam Tunnel Access



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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

ReidMiddleton

Sewer Service Replacement at Insurance Building

Project Description

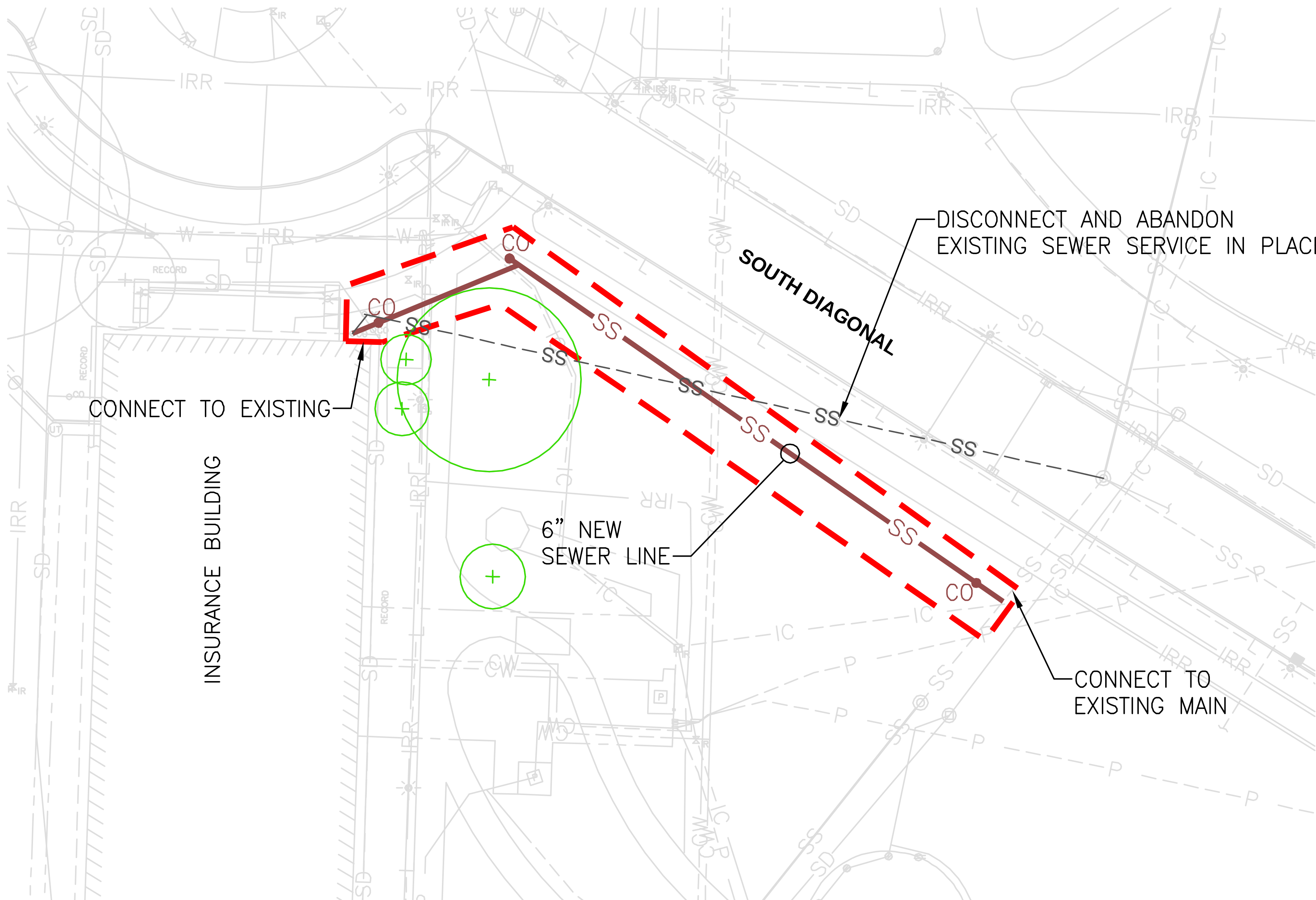
- Disconnect and abandon existing 6" side sewer
- Install new 6" service line
- Restore disturbed surface and landscaping

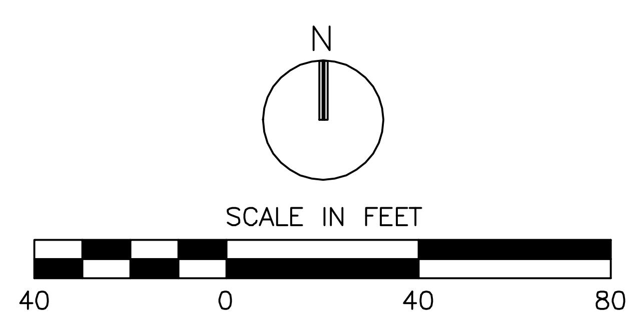
Cost Summary

Current Construction Total without Sales Tax	$42,800
Consultant Service Fee	$10,700
Permit Fee - Allowance	$2,000
DES Project Management and Support	$3,200
Project Contingency	$5,900
Escalation (3% / year for 2 years)	$3,900
Sales Tax (8.8% of escalated construction cost)	$4,000
Escalated Project Total (Year 2018)	$72,500

Legend

Project Boundary
CO Sewer Clean Out
SS Sewer Line
SS Existing Sewer Line
Existing Tree





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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

Reid Middleton

South Diagonal Storm Drain

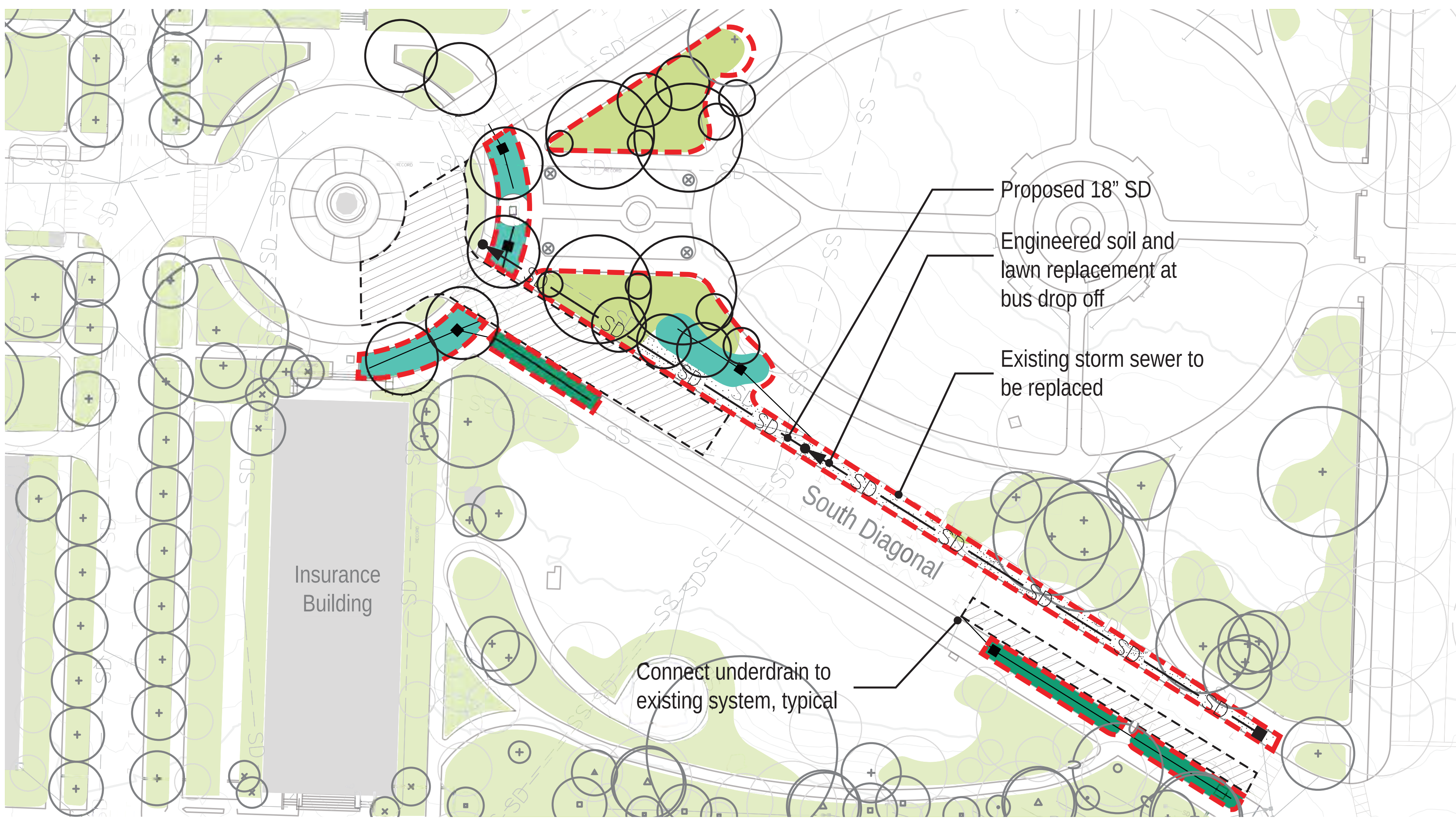
Project Description

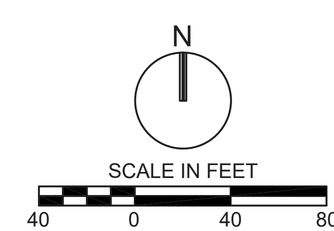
- Abandon and replace existing storm sewer pipeline north of South Diagonal Way. Increase size to accommodate current standards for capacity.
- Utilize existing roadway and planter strip topography to provide water quality treatment. A combination of bioretention planters and cells will provide treatment to sections of the roadway.
- Reconstruct sections of the curb and gutter to accommodate surface water flow to the water quality treatment areas.
- Provide plantings consistent with the Historic Landscape Preservation Plan.

Pollution-generating Surface Area Treated: 9,200 SF
Bioretention Area Required: 920 SF
Bioretention Capacity: 3,000 SF

Cost Summary

Current Construction Total without Sales Tax	$448,100
Consultant Service Fee	$112,000
Permit Fee — Allowance	$5,000
DES Project Management	$33,600
Project Contingency	$59,900
Escalation (3% / year for 2 years)	$40,100
Sales Tax (8.8% of escalated construction cost)	$41,800
Escalated Project Total (Year 2018)	$740,500

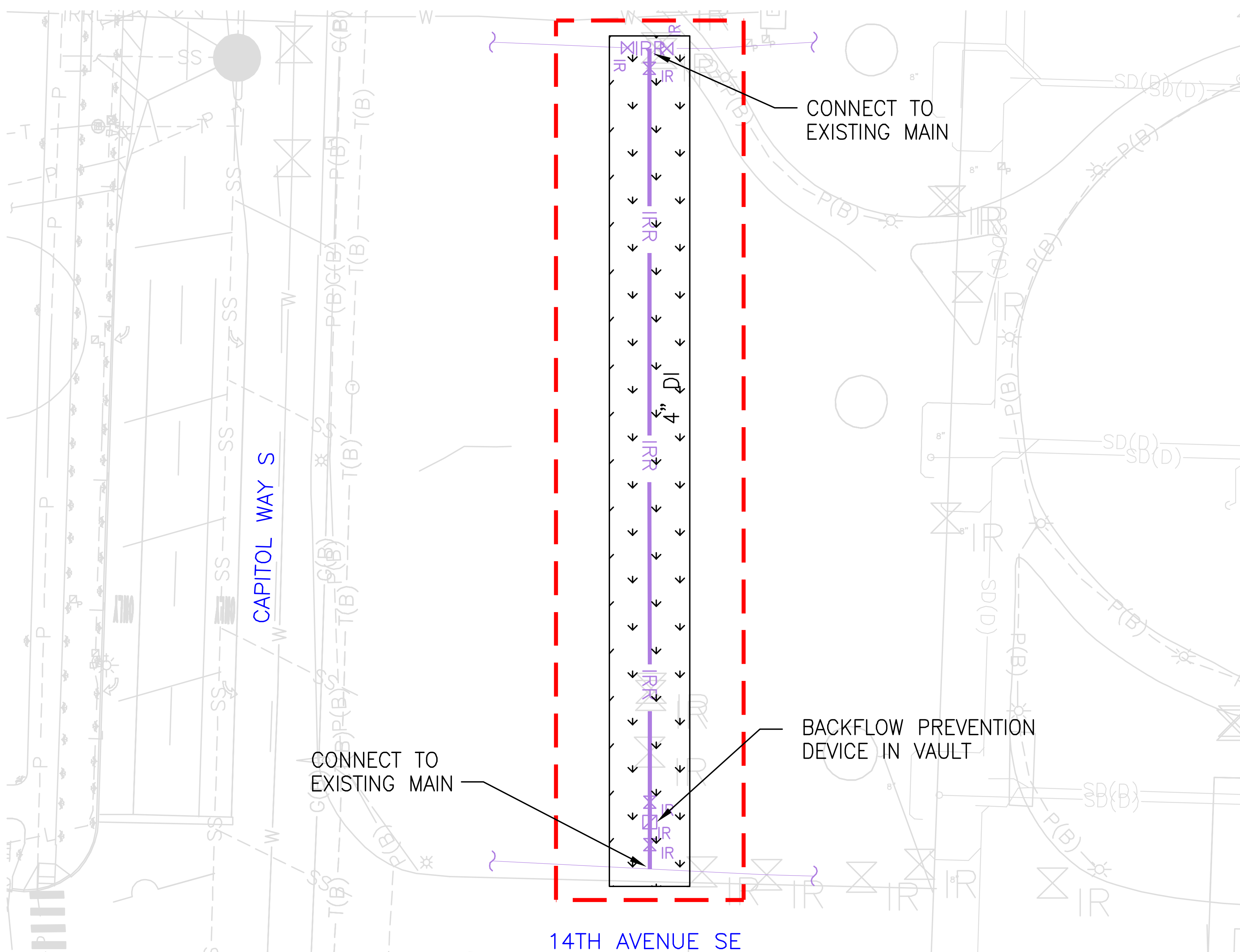




Irrigation Main Replacement near 14th Ave and Capitol Way

Project Description

- Abandon existing irrigation main. This section has a line break.
- Install new irrigation main and isolation valves.
- Convert existing controllers and install new valves as needed.
- Reconnect irrigation lateral system to main. Restore controllers and electrical feeds.



Cost Summary

Current Construction Total without Sales Tax	$92,700
Consultant Service Fee	$23,200
Permit Fee - Allowance	$500
DES Project Management	$7,000
Project Contingency	$12,300
Escalation (3% / year for 2 year)	$8,300
Sales Tax (8.8% of escalated construction cost)	$8,700
Escalated Project Total (Year 2018)	$152,700

Legend

- Project Boundary
- Irrigation Valve
- Irrigation
- Landscape Restoration

N

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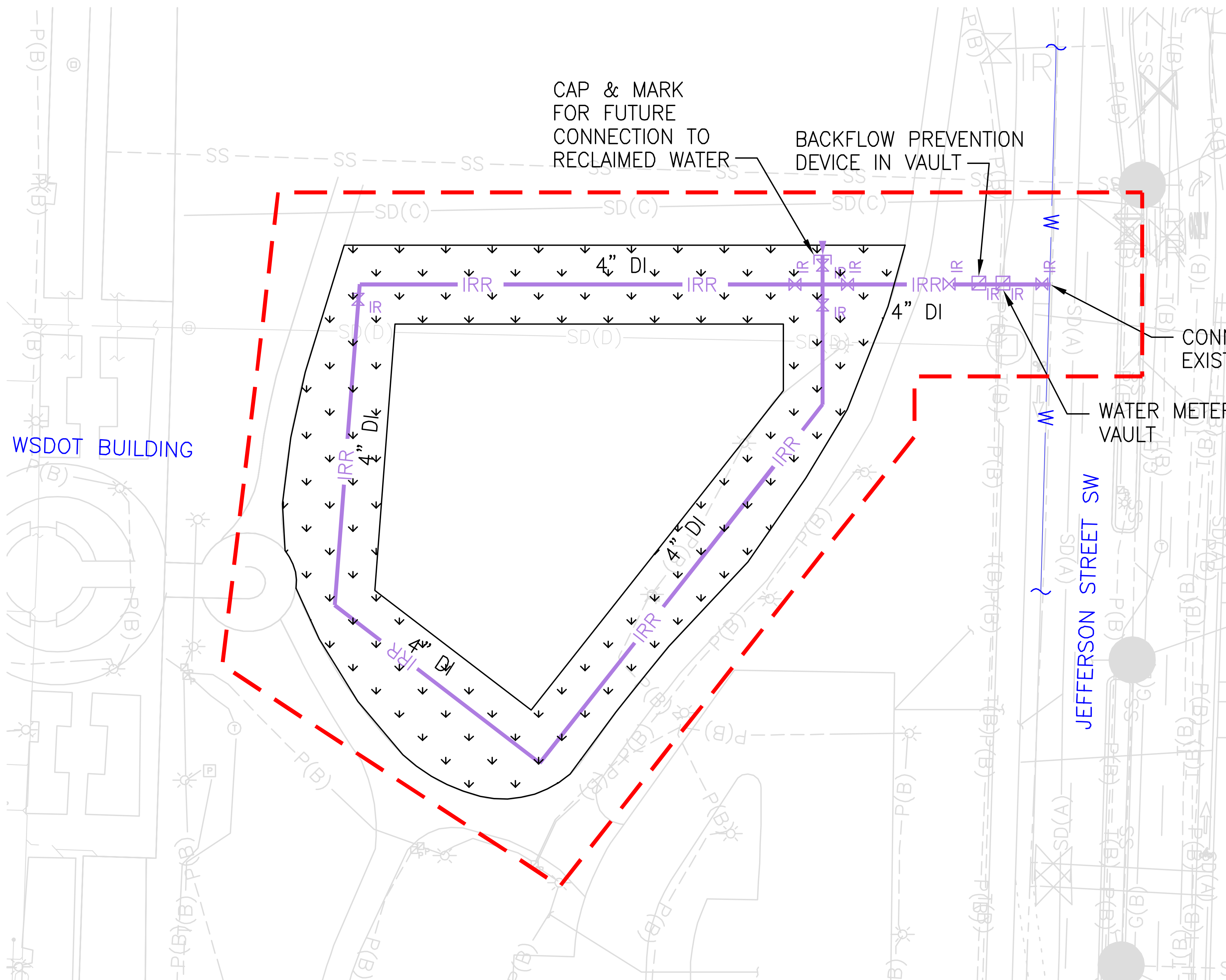
Irrigation Main Replacement near Jefferson and Maple Park Avenue

Project Description

- Abandon existing irrigation main. This section has a line break.
- Install new irrigation main and isolation valves.
- Reconnect irrigation lateral system to main. Restore controllers and electrical feeds.

Cost Summary

Current Construction Total without Sales Tax	$203,000
Consultant Service Fee	$40,600
Permit Fee - Allowance	$500
DES Project Management	$14,600
Project Contingency	$25,900
Escalation (3% / year for 2 year)	$17,300
Sales Tax (8.8% of escalated construction cost)	$19,000
Escalated Project Total (Year 2018)	$320,900



Legend

- Project Boundary
- Irrigation Valve
- Irrigation
- Landscape Restoration

N

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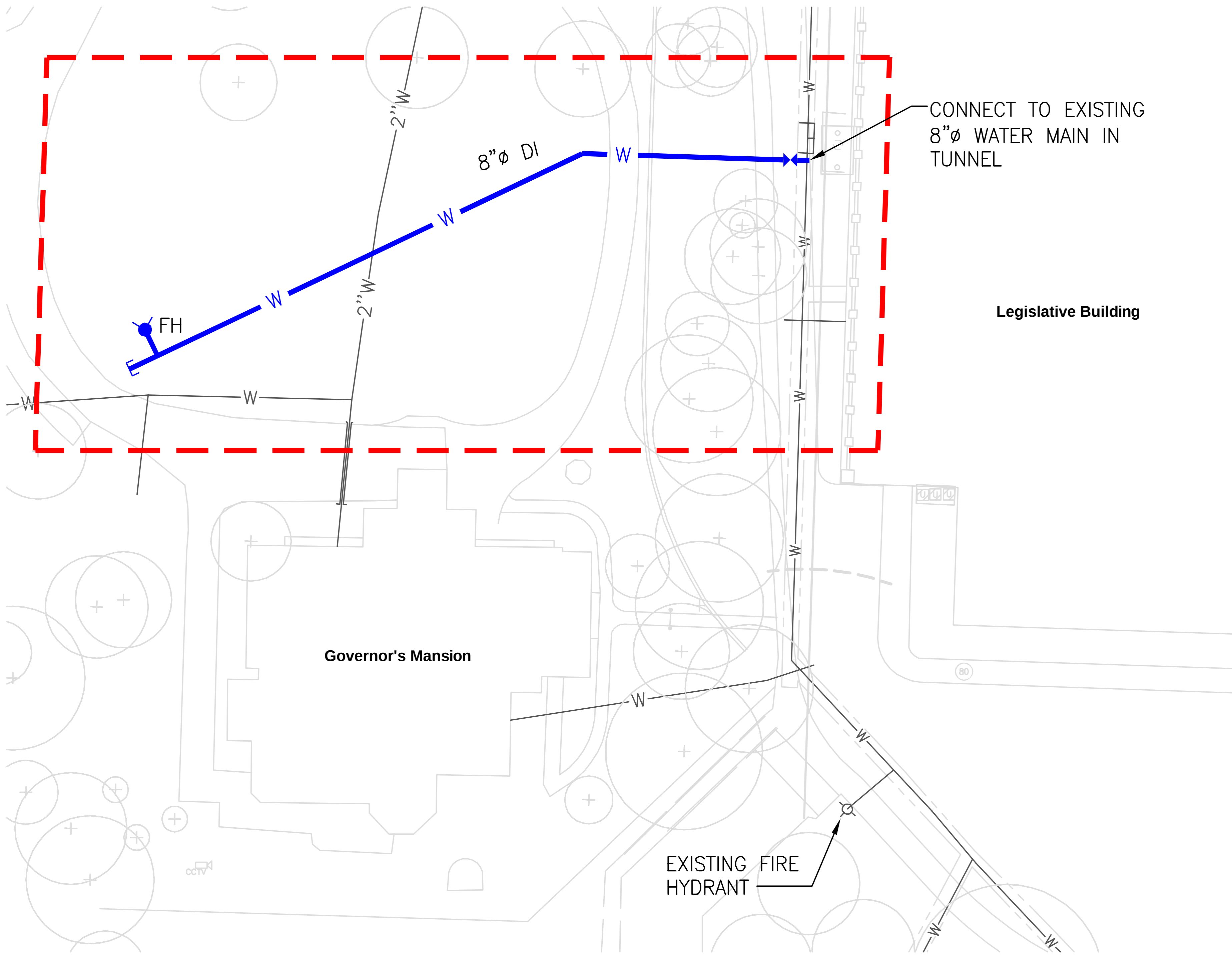
NEW FIRE HYDRANT AT GOVERNOR'S MANSION

Project Description

- Extend a new 8-inch water main from Pleasant Lane to Governor's mansion.
- Install a new fire hydrant.

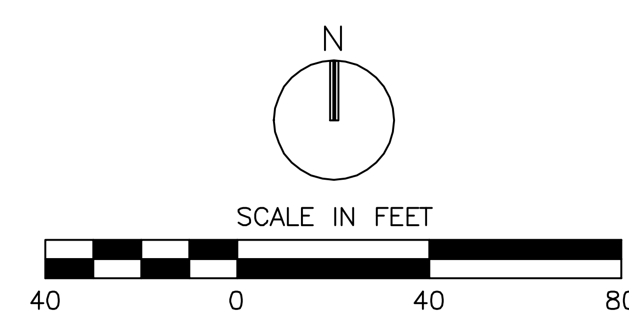


Cost Summary

Current Construction Total without Sales Tax	$81,900
Consultant Service Fee	$16,400
Permit Fee - Allowance	$2,500
DES Project Management & Support	$5,900
Project Contingency	$10,700
Escalation (3% / year for 2 years)	$7,100
Sales Tax (8.8% of escalated construction cost)	$7,600
Escalated Project Total (year 2018)	$132,100

Legend

Project Boundary
W Water Line
W Existing Water Line
FH Fire Hydrant
Valve
Cap



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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

ReidMiddleton

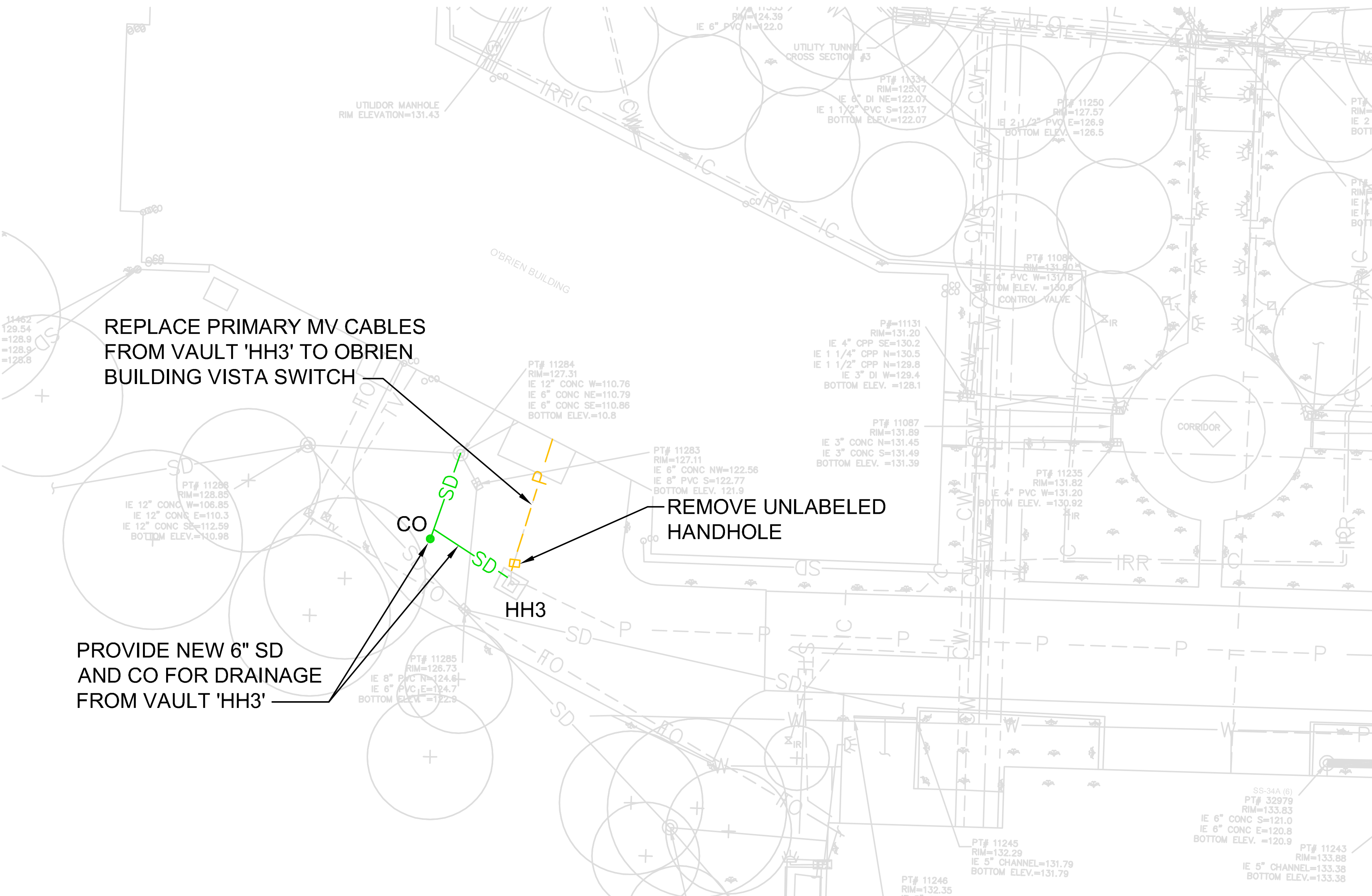
PRIMARY ELECTRICAL VAULT 'HH3' IMPROVEMENTS

Project Description

- Provide drainage system for vault 'HH3'.
- Remove adjacent unlabeled handhole. This is a legacy system handhole which is not required and it has a non-lockable heavy square lid which could easily fall in and damage the primary system cables.
- Provide splice in vault 'HH3' and replace primary cables from vault 'HH3' to Vista switch within the Obrien Building.

Cost Summary

Current Construction Total without Sales Tax	$160,200
Consultant Service Fee	$40,100
Permit Fee - Allowance	$2,000
DES Project Management	$12,000
Project Contingency	$21,400
Escalation (3% / year) for 3 years	$21,900
Sales Tax (8.8% of escalated construction cost)	$15,400
Escalated Project Total for 2019	$273,000



Legend

- Project Boundary
- Water Symbols
- Water
- Sewer Symbols
- Sewer
- Catch Basin Type 1
- Catch Basin Type 2
- Storm Drainage Symbols
- Storm Drainage
- Irrigation Symbols
- Irrigation
- Power Symbols
- Power
- Natural Gas Symbols
- Natural Gas
- Asphalt Paving
- Concrete Paving
- Landscape Restoration
- Existing Tree
- Future Tree - Historic landscape preservation plan

N

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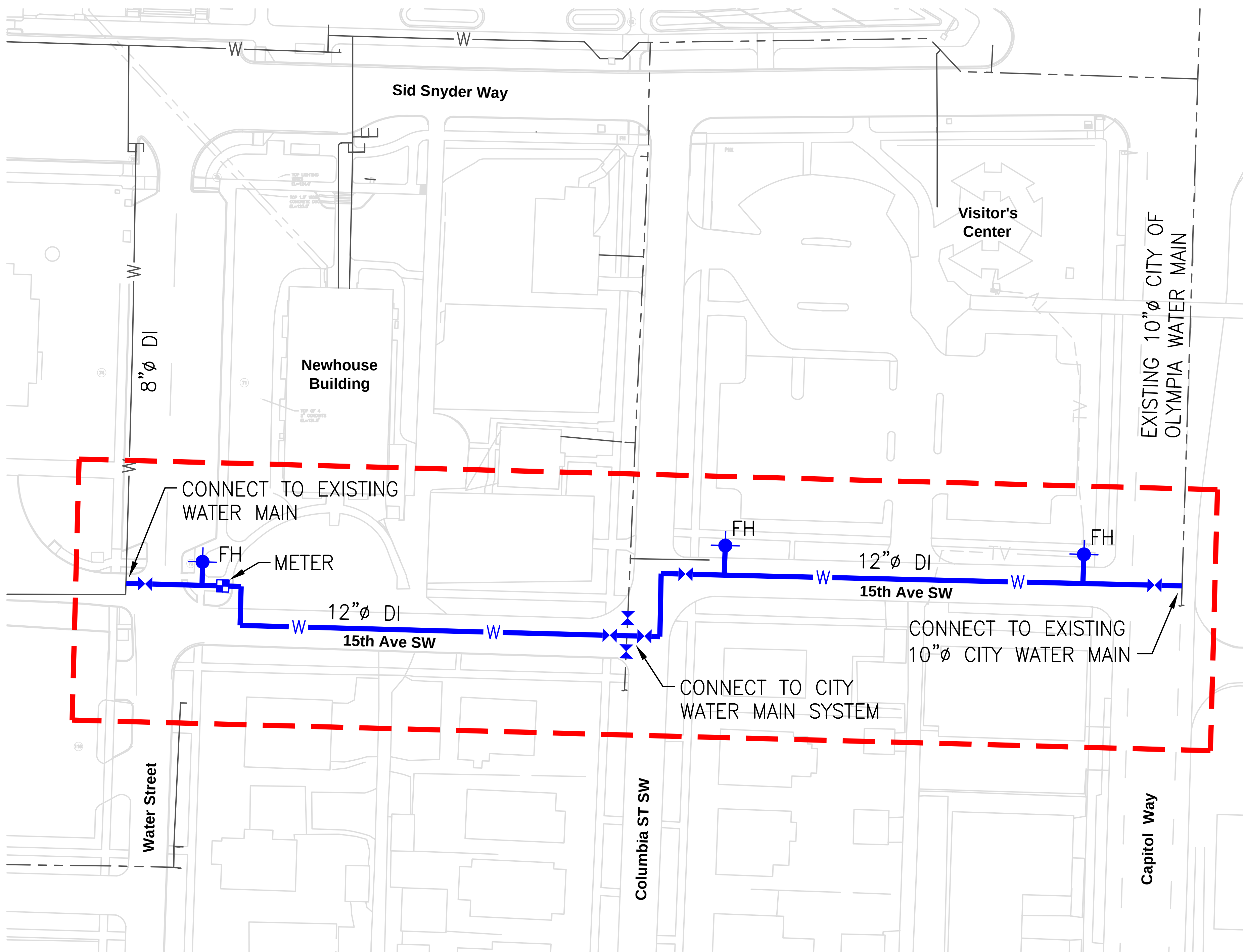
ReidMiddleton

New Water Main in 15th Ave SW

Project Description

- Install new 12-inch water main from Capitol Way to Water Street to increase fire flow from the city system to state system.
- Install a new water meter.
- Install new fire hydrants.
- Restore street surface curb to curb.

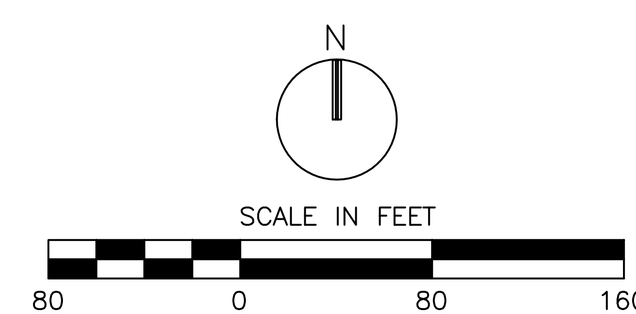


Cost Summary

Current Construction Total without Sales Tax	$449,000
Consultant Service Fee	$112,300
Permit Fee - Allowance	$10,000
DES Project Management & Support	$33,700
Project Contingency	$60,500
Escalation (3% / year for 2 years)	$40,500
Sales Tax (8.8% of escalated construction cost)	$41,900
Escalated Project Total (year 2018)	$747,900

Legend

- Project Boundary
- W Water Line
- W Existing Water Line
- FH Fire Hydrant
- Meter
- Valve



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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

ReidMiddleton

South Capitol Building Parking Lot

Project Description

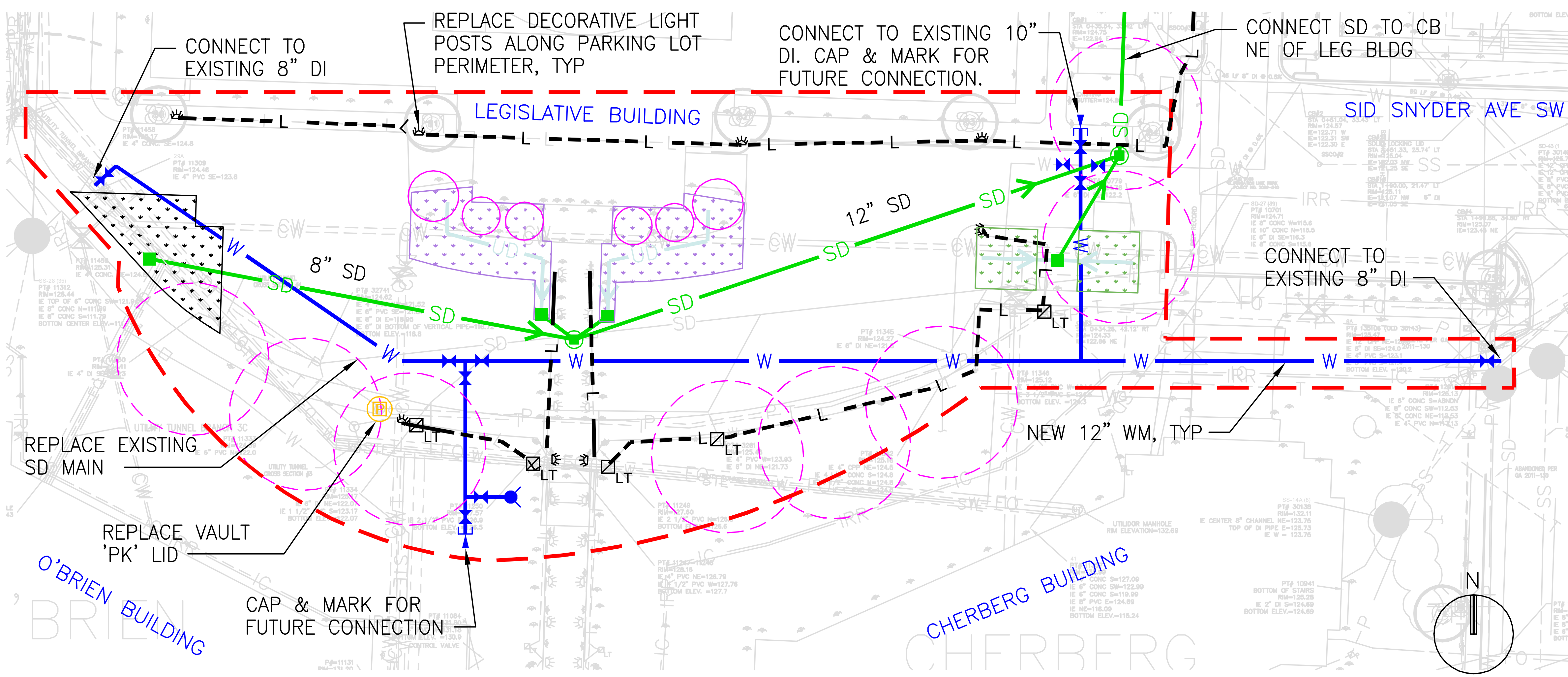
- Replace existing pavement surface with new concrete pavement
- Replace existing SD and roof drain connections to Cherberg & O'Brien
- Proposed storm water treatment:
  - Center: Regrade pavement to direct flow to north. Use bioretention planters south of the Legislative Building
  - West: Regrade pavement to direct flow west. Install CB Insert to treat surface water.
  - East: Regrade pavement to direct flow east. Redevelop grass area at the intersection of Cherry Ln & Sid Snyder Ave. Install bioretention cells.
- Import or amend soils to provide soils consistent with the requirements of bioretention, tree, and planting areas. Replace irrigation as needed.
- Restore understory and tree plantings
- Provide underdrains for bioretention, tree, and plantings areas
- Expose tunnel and provide waterproof barrier. Install footing drains, CBs, and sump pumps.
- Install new water main. Provide connections for future water main project service to the Pritchard redevelopment.
- Remove bends from SS below trench. Reroute line as needed.
- Vault 'PK': Convert lid from manhole type to steel, lockable, hinged, double-door, traffic rated access hatch
- Lighting: Replace decorative light posts throughout project area. Replace all underground lighting raceway and conductors throughout the project area. Upgrade lighting to provide standard light levels in parking spaces and driving lanes.

Cost Summary

Current Construction Total without Sales Tax	$1,639,200
Consultant Service Fee	$409,800
Permit Fee - Allowance	$20,000
DES Project Management	$122,900
Project Contingency	$219,200
Escalation (3% / year for 4 years)	$302,600
Sales Tax (8.8% of escalated construction cost)	$162,400
Escalated Project Total (Year 2020)	$2,876,100

Legend

- Project Boundary
- Water Symbols
- Water
- Catch Basin Type 1
- Catch Basin Type 2
- Storm Drainage
- Under Drain
- Power Symbols
- Lighting
- Light Symbols
- Landscape Restoration
- Bioretention Planter
- Bioretention Cell
- Future Tree/Tree Restoration



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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

Reid Middleton

Washington Street Drainage & Utility Improvements

Project Description

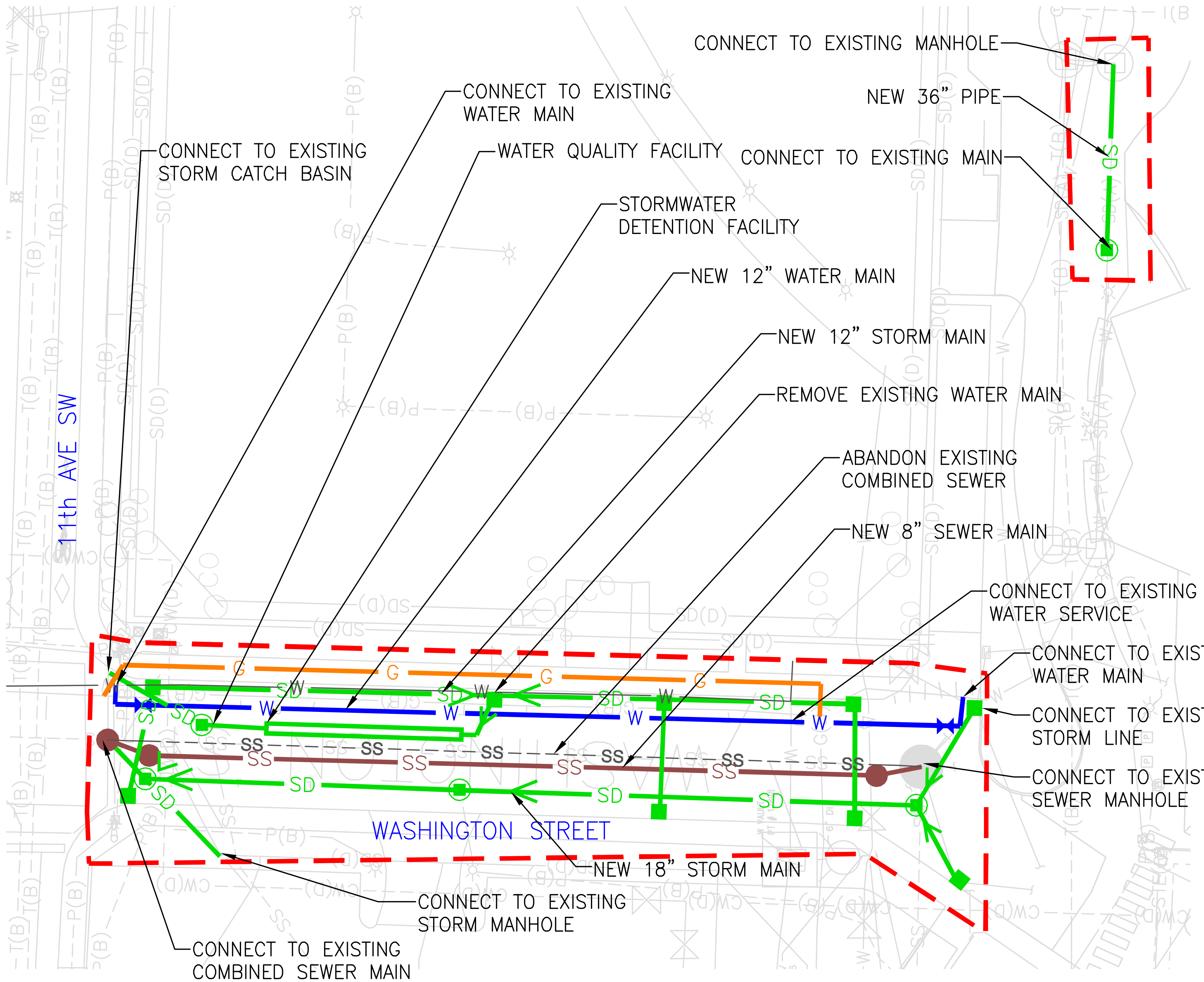
- Separate sewer and storm mains
- Replace sewer main and abandon existing main in place
- Install dedicated storm sewer main & provide stormwater management facilities and LID facilities
- Replace water main and remove existing main
- Replace damaged section of 36"storm pipe in Highway License Building Plaza
- Replace existing gas line
- Install new street lighting
- Replace street pavement, curb&gutter, and sidewalk

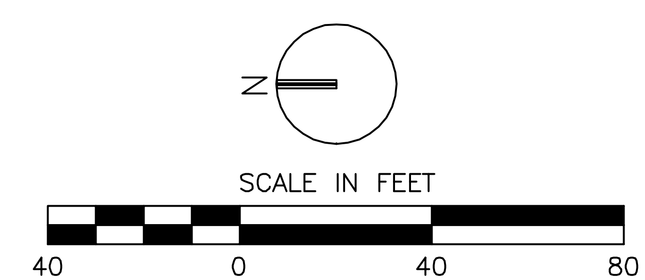
Cost Summary

Current Construction Total without Sales Tax	$877,300
Consultant Service Fee	$219,300
Permit Fee - Allowance	$20,000
DES Project Management & Support	$65,800
Project Contingency	$118,200
Escalation (3% / year for 4 years)	$163,200
Sales Tax (8.8% of escalated construction cost)	$86,900
Escalated Project Total (Year 2020)	$1,550,700

Legend

- Project Boundary
- Water Valve
- W Water Line
- Sewer Manhole
- SS Sewer Line
- Catch Basin Type 1
- Catch Basin Type 2
- SD Storm Drainage Line
- G Gas Line
- SS Existing Sanitary Sewer Line
- W Existing Water Line





CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

Reid Middleton

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Replacement of Insurance Building Foundation and Roof Drains

Project Description

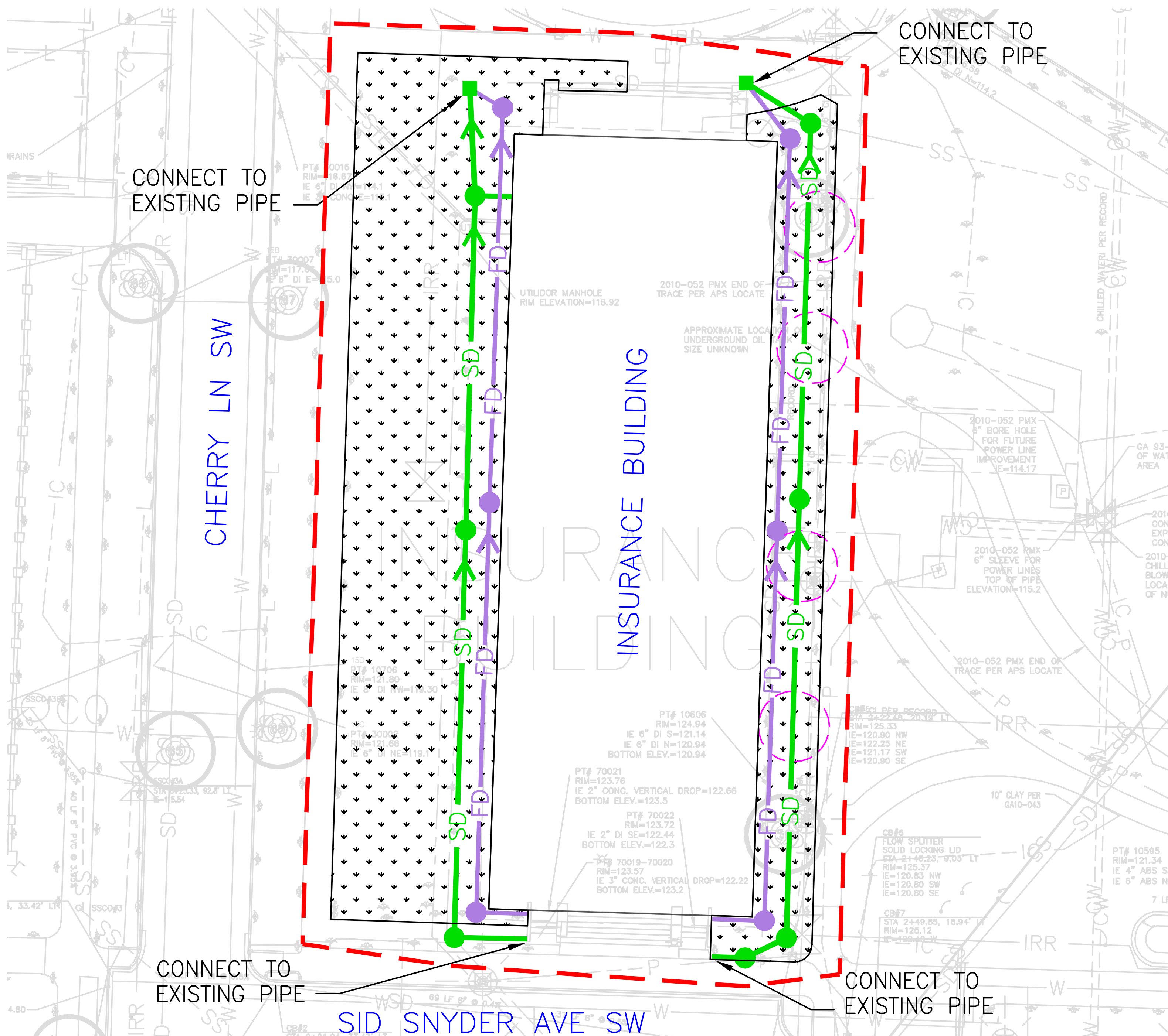
- The foundation and roof drains are failing. These failing systems retain moisture around the foundation of the building.
- Replace existing foundation drains. Install new piping, backfill material, waterproof barrier, cleanouts, and catch basins. Reconnect to existing storm drainage system.
- Replace existing roof drain. Install scuppers, downspouts, below grade piping, cleanouts, and catch basins. Reconnect to existing storm drainage system.
- Restore understory and tree plantings.

Cost Summary

Current Construction Total without Sales Tax	$250,800
Consultant Service Fee	$62,700
Permit Fee - Allowance	$2,000
DES Project Management	$18,800
Project Contingency	$33,400
Escalation (3% / year for 4 years)	$46,100
Sales Tax (8.7% of escalated construction cost)	$24,800
Escalated Project Total (Year 2020)	$438,600

Legend

- Project Boundary
- Cleanout
- Catch Basin Type 1
- Catch Basin Type 2
- SD — Storm Drainage
- FD — Footing Drain
- Landscape Restoration
- Future Tree/ Tree Restoration



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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

West Campus Irrigation System Update (1 of 2)

Project Description

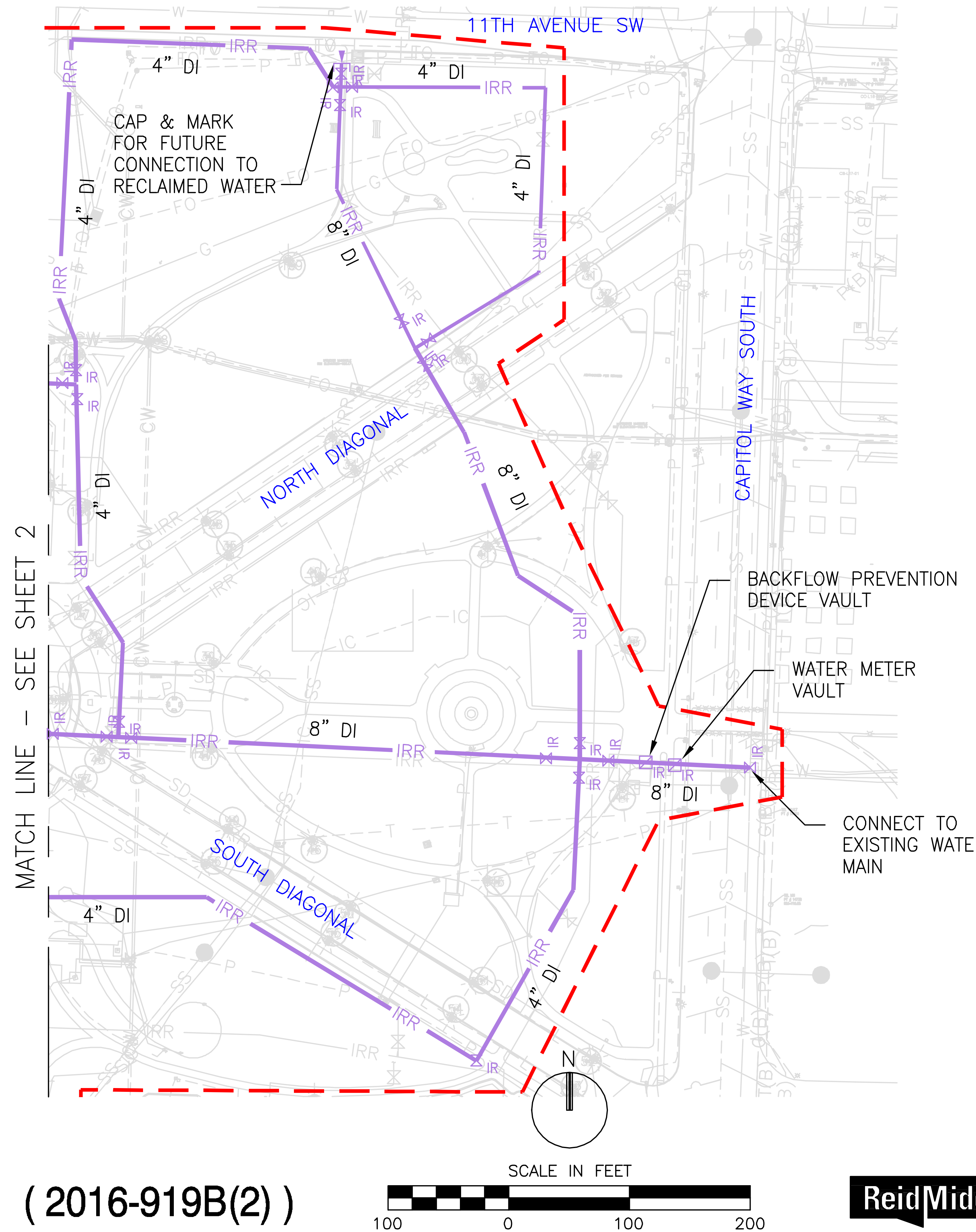
- Replace existing irrigation mains with new ductile iron pipe system
- Replace and connect irrigation lateral systems to the new mains. Replace controllers and lateral valves as needed.
- Restore disturbed landscape areas
- Abandon existing irrigation system in-place
- Provide connection point for future reclaimed water service

Cost Summary

Current Construction Total without Sales Tax	$2,013,100
Consultant Service Fee	$503,300
Permit Fee - Allowance	$5,000
DES Project Management	$151,000
Project Contingency	$267,200
Escalation (3% / year for 6 years)	$570,400
Sales Tax (8.8% of escalated construction cost)	$211,500
Escalated Project Total (Year 2022)	$3,721,500

Legend

Project Boundary
IR Irrigation Valve
IRR Irrigation



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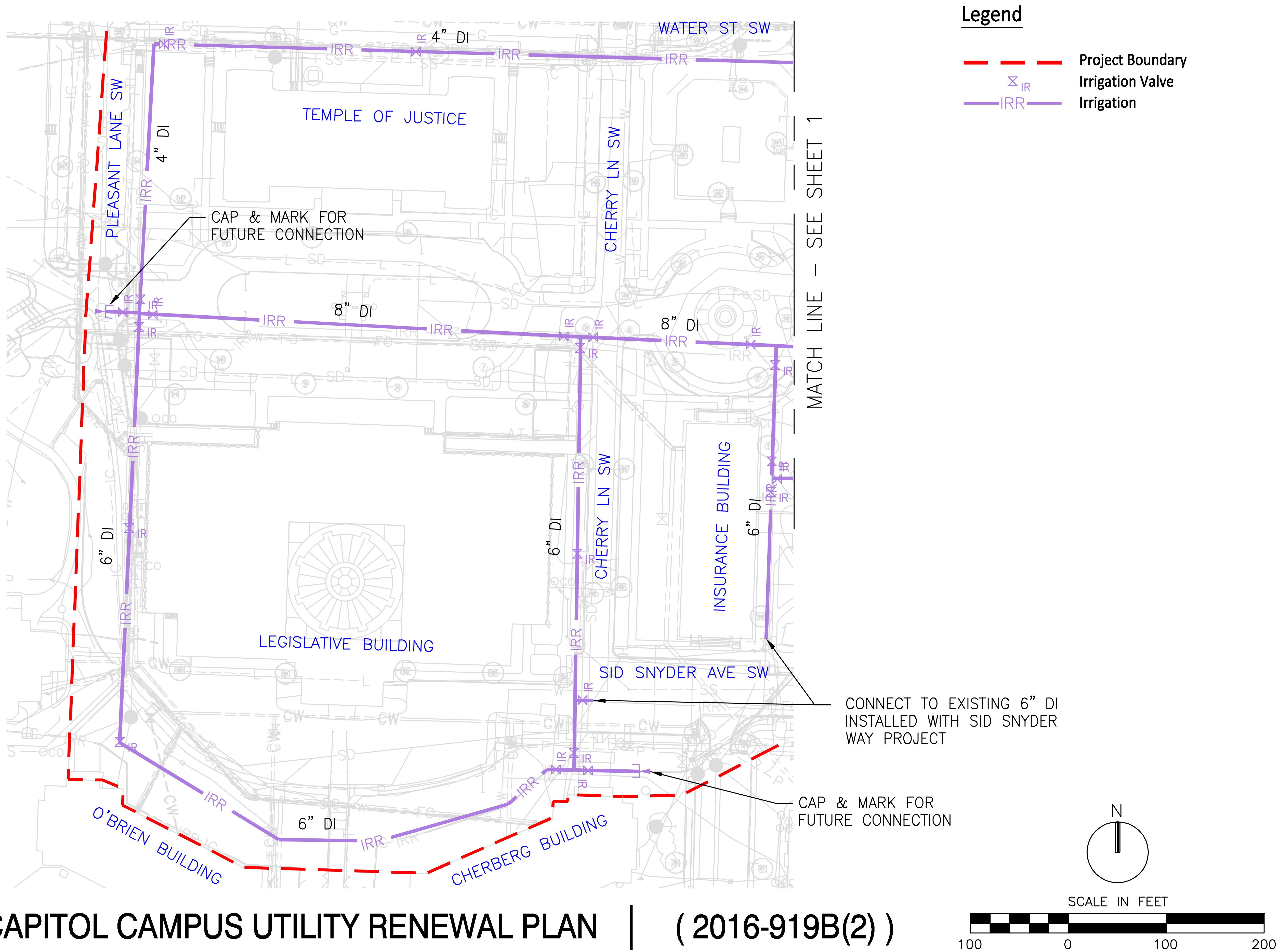
ReidMiddleton

West Campus Irrigation System Update (2 of 2)



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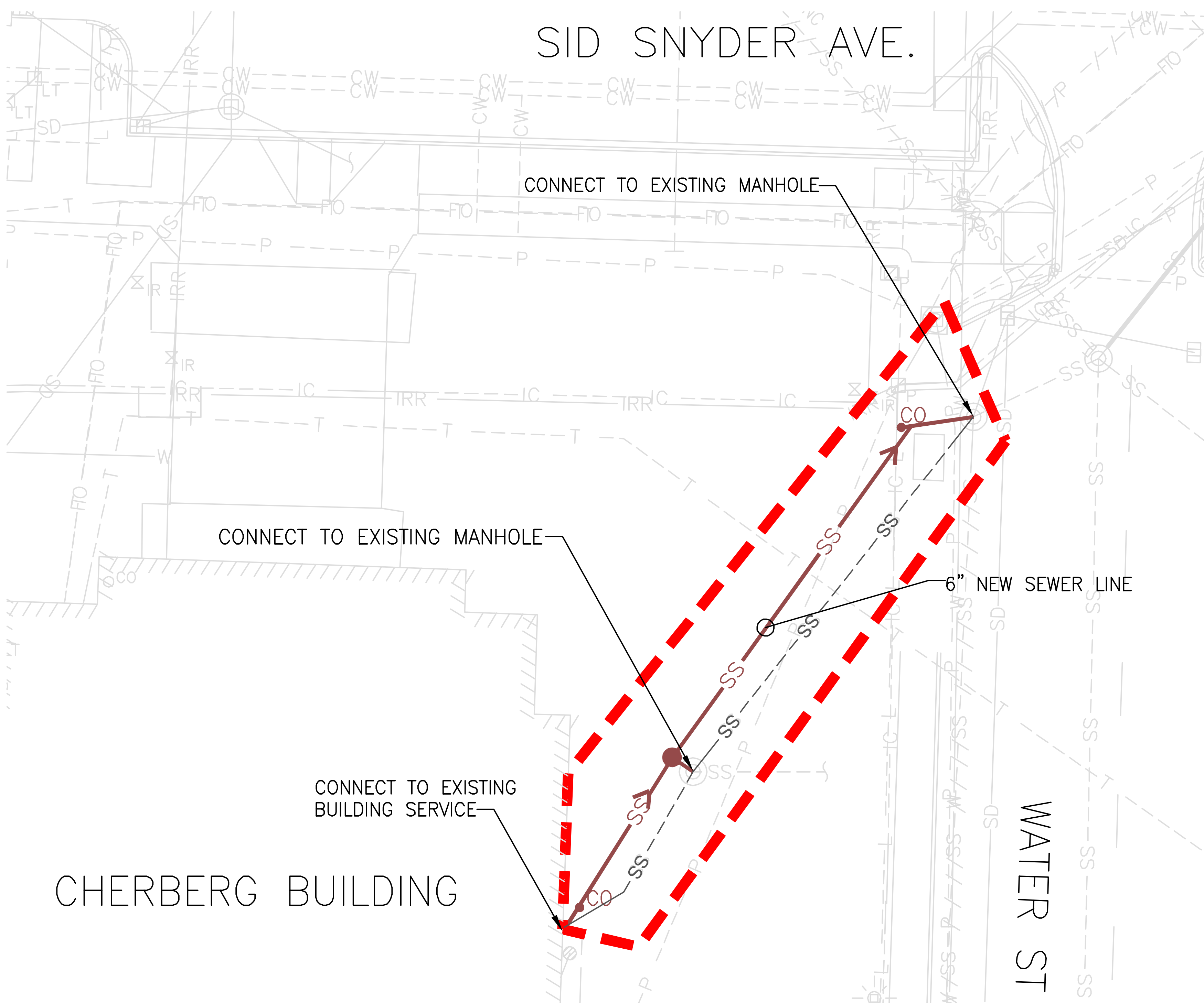
CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

ReidMiddleton

Sewer Service Replacement at Cherberg Building

Project Description

- Disconnect and abandon existing 6" side sewer and 8" sewer main
- Install new main and service to Cherberg Building
- Restore disturbed surface and landscaping

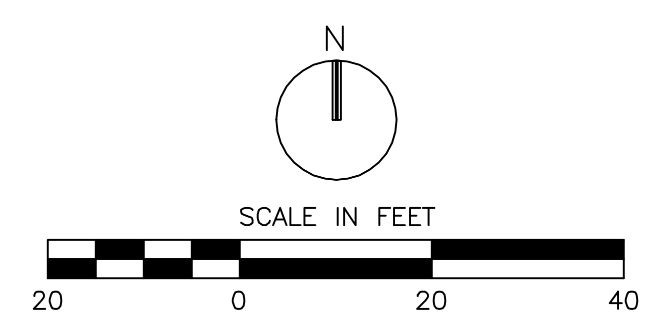


Cost Summary

Current Construction Total without Sales Tax	$34,000
Consultant Service Fee	$8,500
Permit Fee - Allowance	$2,000
DES Project Management and Support	$2,600
Project Contingency	$4,700
Escalation (3% / year for 6 years)	$10,100
Sales Tax (8.8% of escalated construction cost)	$3,600
Escalated Project Total (Year 2022)	$65,500

Legend

- Project Boundary
- Sewer Manhole
- CO Sewer Cleanout
- SS Sewer Line
- SS Existing Sewer Line



New Water Main around O'Brien Building

Project Description

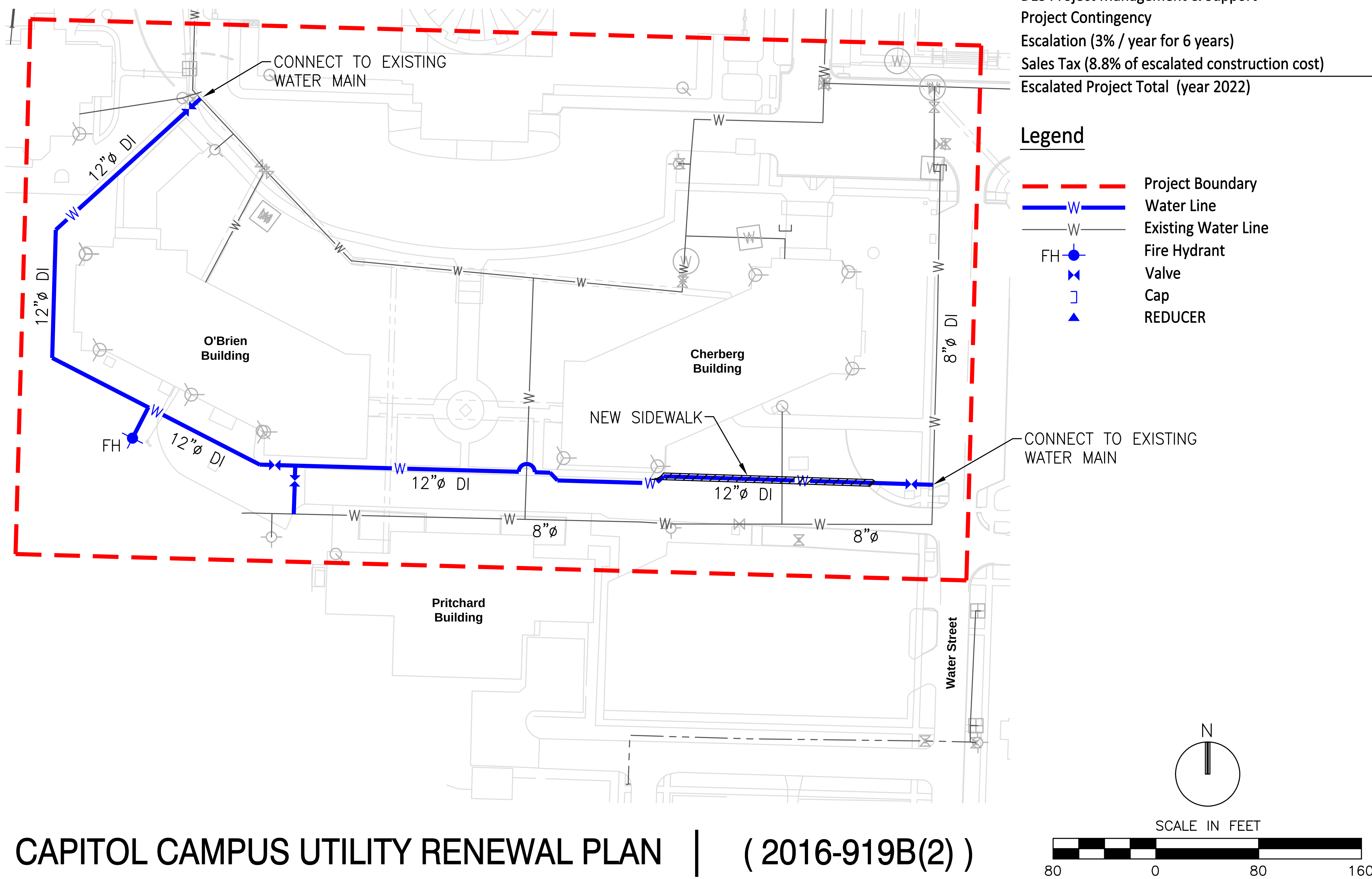
- Extend a 12-inch water main to through 15th Ave and around O'Brien Building.
- Install a fire hydrant.
- Install new sidewalk along parking lot south of Cherberg Building.

Cost Summary

Current Construction Total without Sales Tax	$411,000
Consultant Service Fee	$102,800
Permit Fee - Allowance	$10,000
DES Project Management & Support	$30,800
Project Contingency	$55,500
Escalation (3% / year for 6 years)	$118,400
Sales Tax (8.8% of escalated construction cost)	$43,200
Escalated Project Total (year 2022)	$771,700

Legend

- Project Boundary
- W Water Line
- W Existing Water Line
- FH Fire Hydrant
- Valve
- Cap
- REDUCER



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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

ReidMiddleton

NEW WATER MAIN & SERVICE TO POWERHOUSE

Project Description

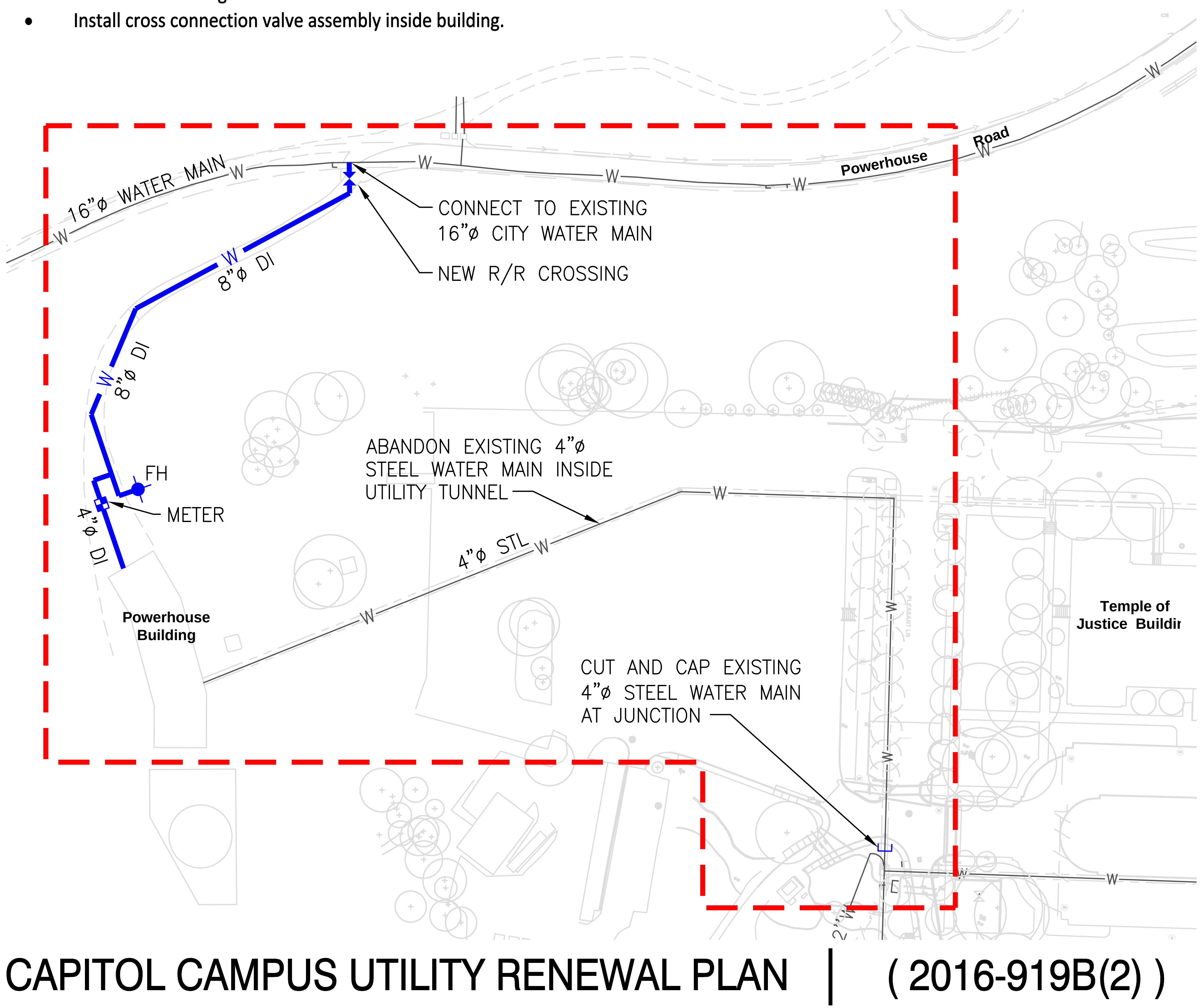
- Bring in a new 8-inch water main from Powerhouse Road and install new fire hydrant for fire protetion.
- Install a 4-inch water service from the new 8-inch water main to the Powerhouse Building for domestic and refilling use.
- Retire and abandon the existing aged 4-inch steel water main in utility tunnel.
- Bore under existing railroad for the new 8-inch water main installation.
- Install cross connection valve assembly inside building.

Cost Summary

Current Construction Total without Sales Tax	$389,100
Consultant Service Fee	$77,800
Permit Fee - Allowance	$5,000
DES Project Management & Support	$28,000
Project Contingency	$50,000
Escalation (3% / year for 6 years)	$106,700
Sales Tax (8.8% of escalated construction cost)	$40,900
Escalated Project Total (year 2022)	$697,500

Legend

- Project Boundary
- Water Line
- Existing Water Line
- Fire Hydrant
- Meter
- Valve
- Cap



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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

ReidMiddleton

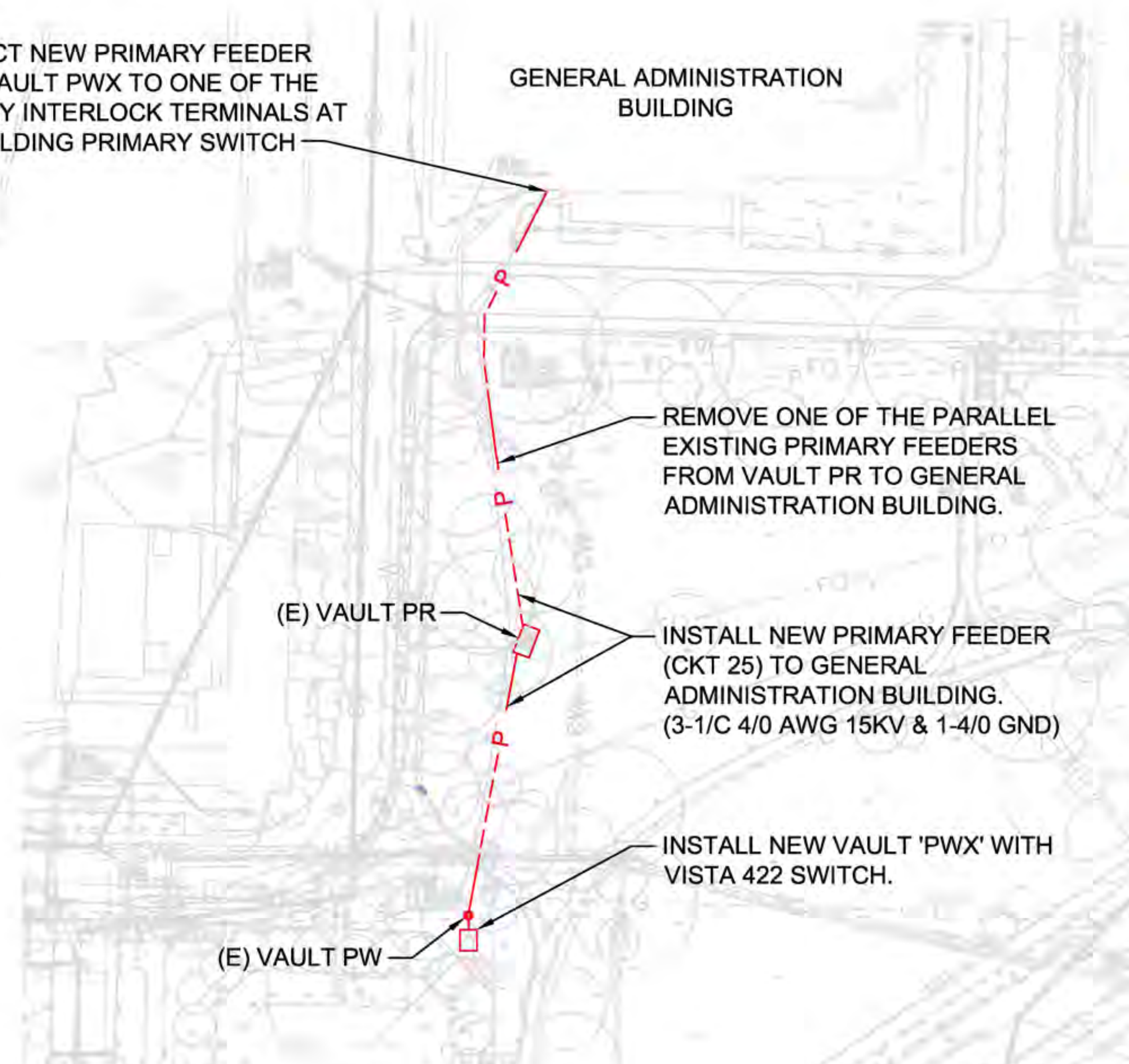
GENERAL ADMIN BUILDING PRIMARY CIRCUIT SELECTIVITY

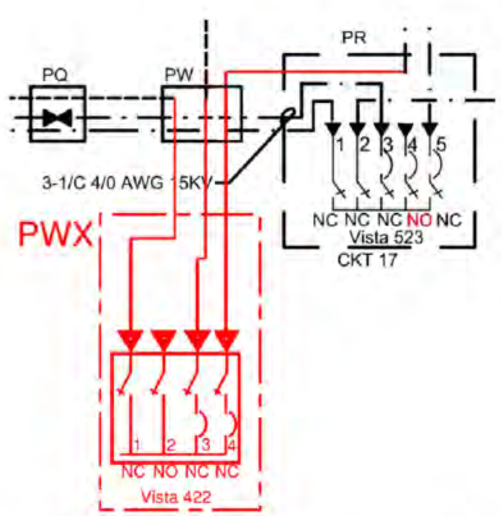
Project Description

- This project will provide primary circuit selectivity in the General Administration Building similar to many other critical buildings throughout the campus.
- Install new vault 'PWX' with new Vista 422 switch. Switch will have a load break connection in from primary circuit 25 (from vault PW), a spare load break switch for future expansion, and fault protected outputs to both the Greenhouse Building and the General Administration Building.
- Provide new primary feeder from new vault PWX Vista switch to General Administration Building switch. One of the existing parallel primary feeds to the kirk-key interlock terminals in the General Administration Building will be removed and replaced with this new feed.

Cost Summary

Current Construction Total without Sales Tax	$201,700
Consultant Service Fee	$50,400
Permit Fee - Allowance	$2,000
DES Project Management	$15,100
Project Contingency	$26,900
Escalation (3% / year) for 7 years	$68,100
Sales Tax (8.8% of escalated construction cost)	$21,800
Escalated Project Total for 2023	$386,000

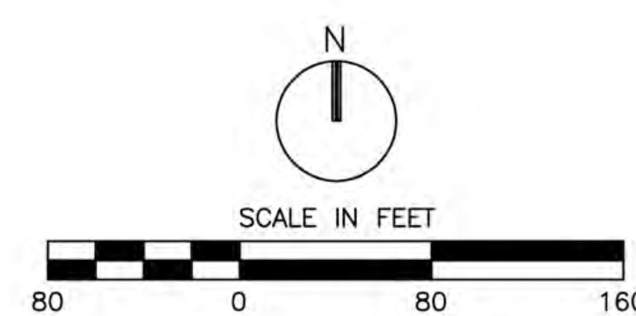




ONE-LINE DIAGRAM OF PROPOSED VAULT AND VISTA SWITCH

Legend

- Project Boundary
- Water Symbols
- Water
- Sewer Symbols
- Sewer
- Catch Basin Type 1
- Catch Basin Type 2
- Storm Drainage Symbols
- Storm Drainage
- Irrigation Symbols
- Irrigation
- Power Symbols
- Power
- Natural Gas Symbols
- Natural Gas
- Asphalt Paving
- Concrete Paving
- Landscape Restoration
- Existing Tree
- Future Tree - Historic landscape preservation plan



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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

ReidMiddleton

Replace Sewer Main from Powerhouse

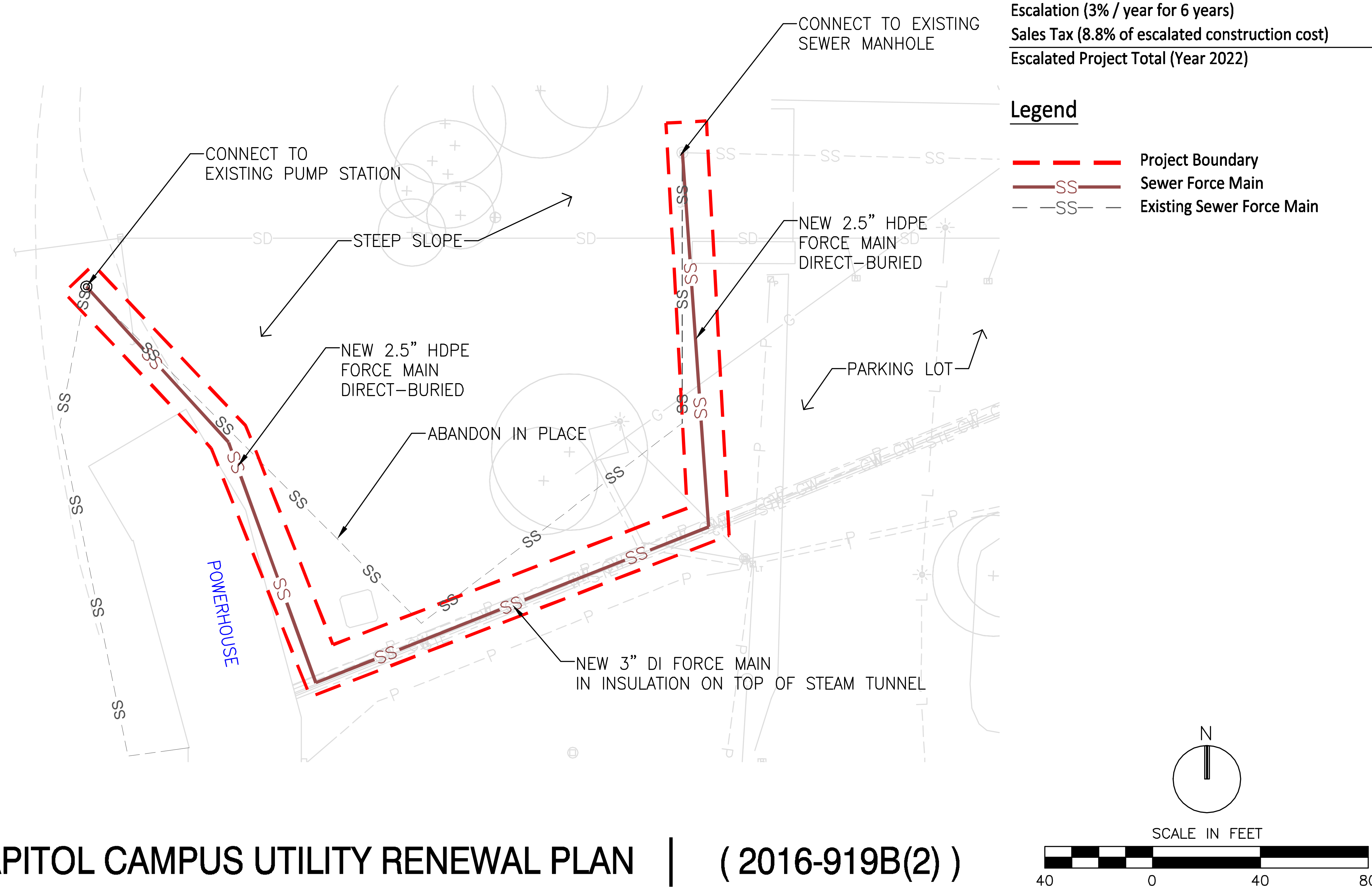
Project Description

- Abandon existing sewer force main
- Install new force main on top of the existing utility tunnel

Cost Summary

Current Construction Total without Sales Tax	$86,600
Consultant Service Fee	$21,700
Permit Fee - Allowance	$3,000
DES Project Management & Support	$6,500
Project Contingency	$11,800
Escalation (3% / year for 6 years)	$25,100
Sales Tax (8.8% of escalated construction cost)	$9,100
Escalated Project Total (Year 2022)	$163,800

Legend



Reid Middleton

Replacement of Failed Storm Line at Office Building 2 (OB2)

Project Description

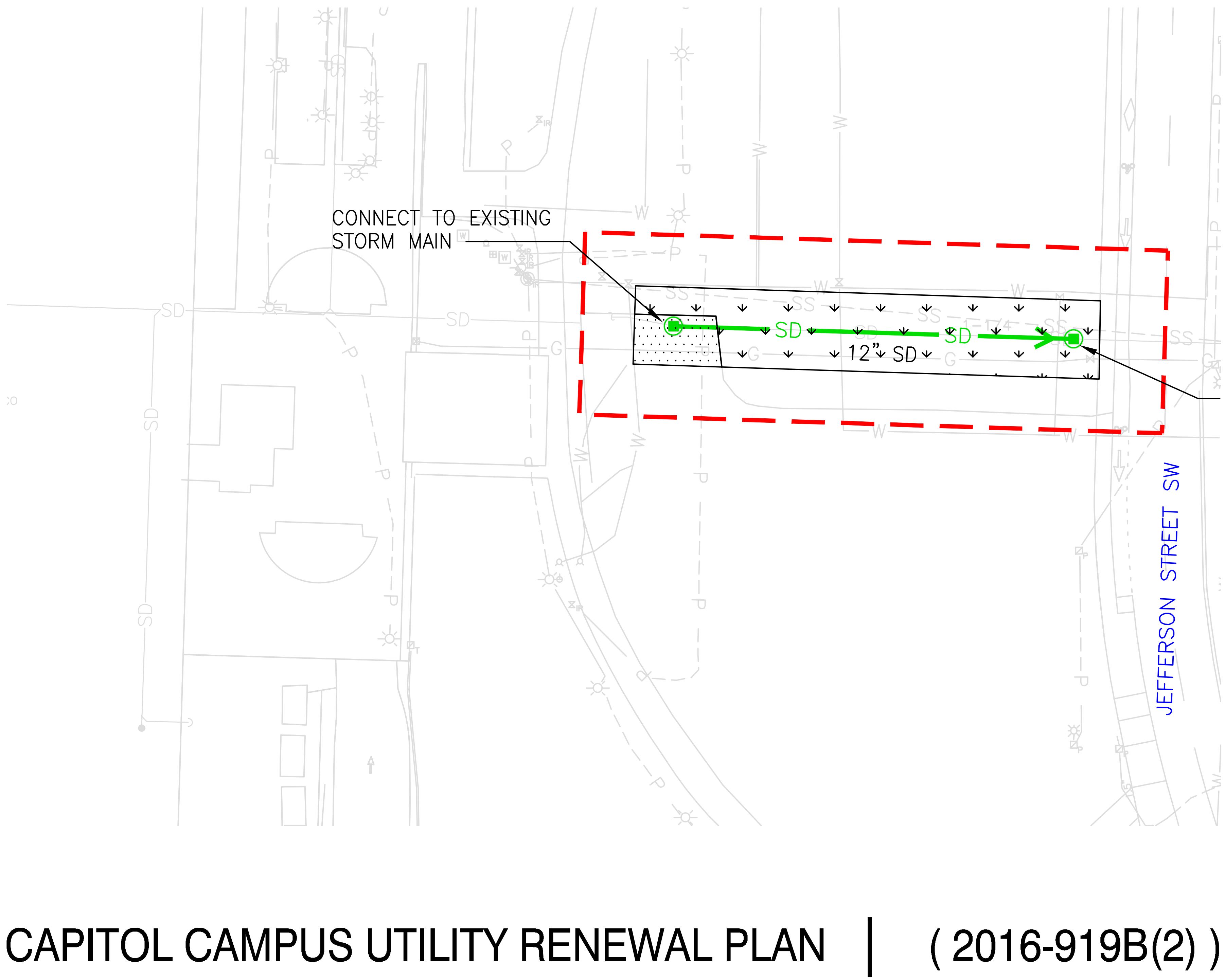
- Remove and replace existing storm main. The existing pipe has a separated joint and signs of infiltration.
- Restore asphalt paving and landscaping disturbed during construction

Cost Summary

Current Construction Total without Sales Tax	$34,000
Consultant Service Fee	$8,500
Permit Fee - Allowance	$1,000
DES Project Management	$2,600
Project Contingency	$4,600
Escalation (3% / year for 8 years)	$13,500
Sales Tax (8.8% of escalated construction cost)	$3,800
Escalated Project Total (Year 2024)	$68,000

Legend

Project Boundary
Catch Basin Type 2
Storm Drainage
Asphalt Paving
Landscape Restoration



Replacement of Damaged Storm Line at Natural Resource Building

Project Description

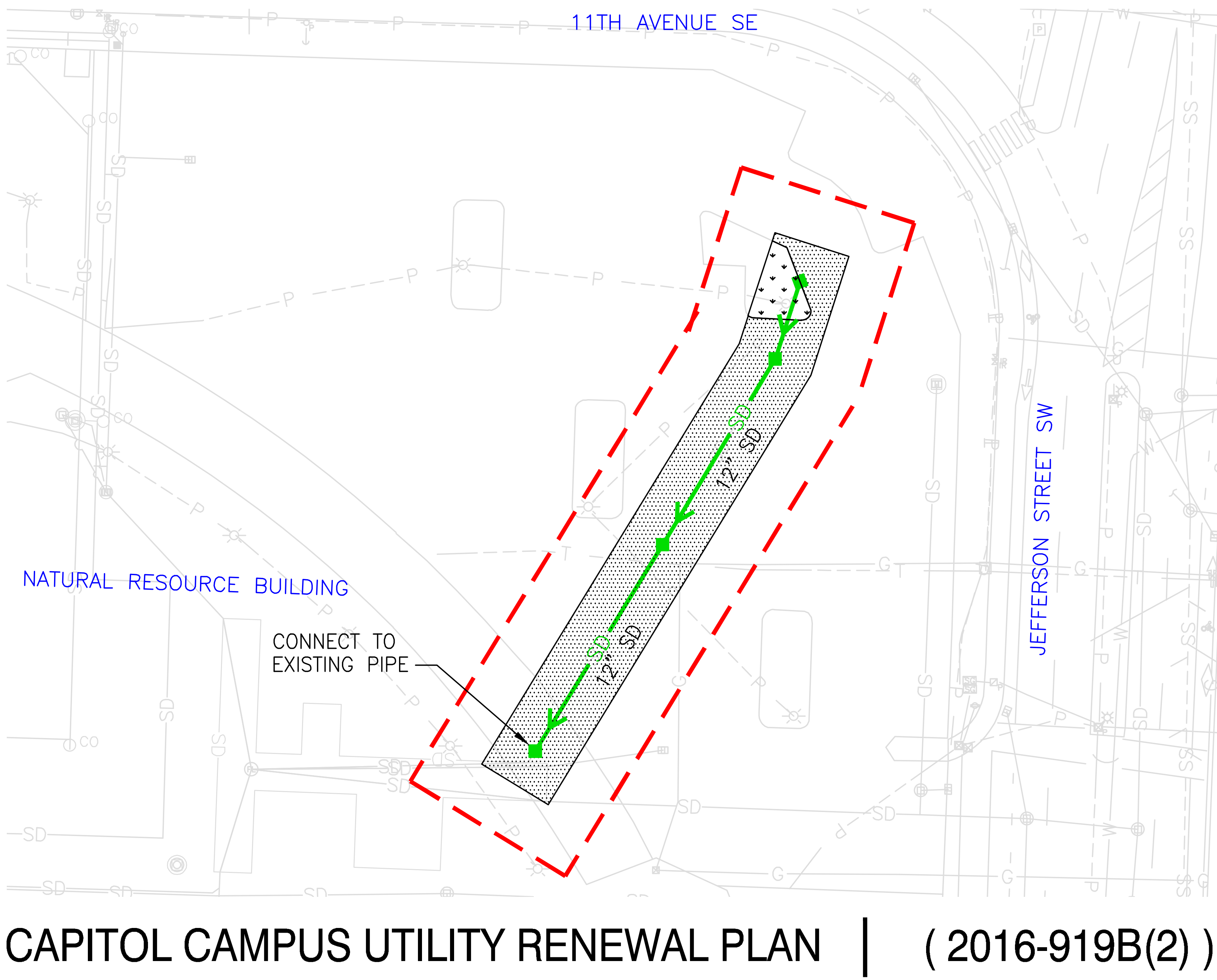
- Remove and replace existing storm main. There are multiple joint offsets and sags within this section of main.
- Reconnect new main to the detention facility
- Restore asphalt paving and landscaping disturbed during construction

Cost Summary

Current Construction Total without Sales Tax	$38,300
Consultant Service Fee	$15,300
Permit Fee - Allowance	$1,000
DES Project Management	$3,200
Project Contingency	$5,800
Escalation (3% / year for 8 years)	$17,000
Sales Tax (8.8% of escalated construction cost)	$4,300
Escalated Project Total (Year 2024)	$84,900

Legend

- Project Boundary
- Catch Basin Type 1
- SD Storm Drainage
- Asphalt Paving
- Landscape Restoration

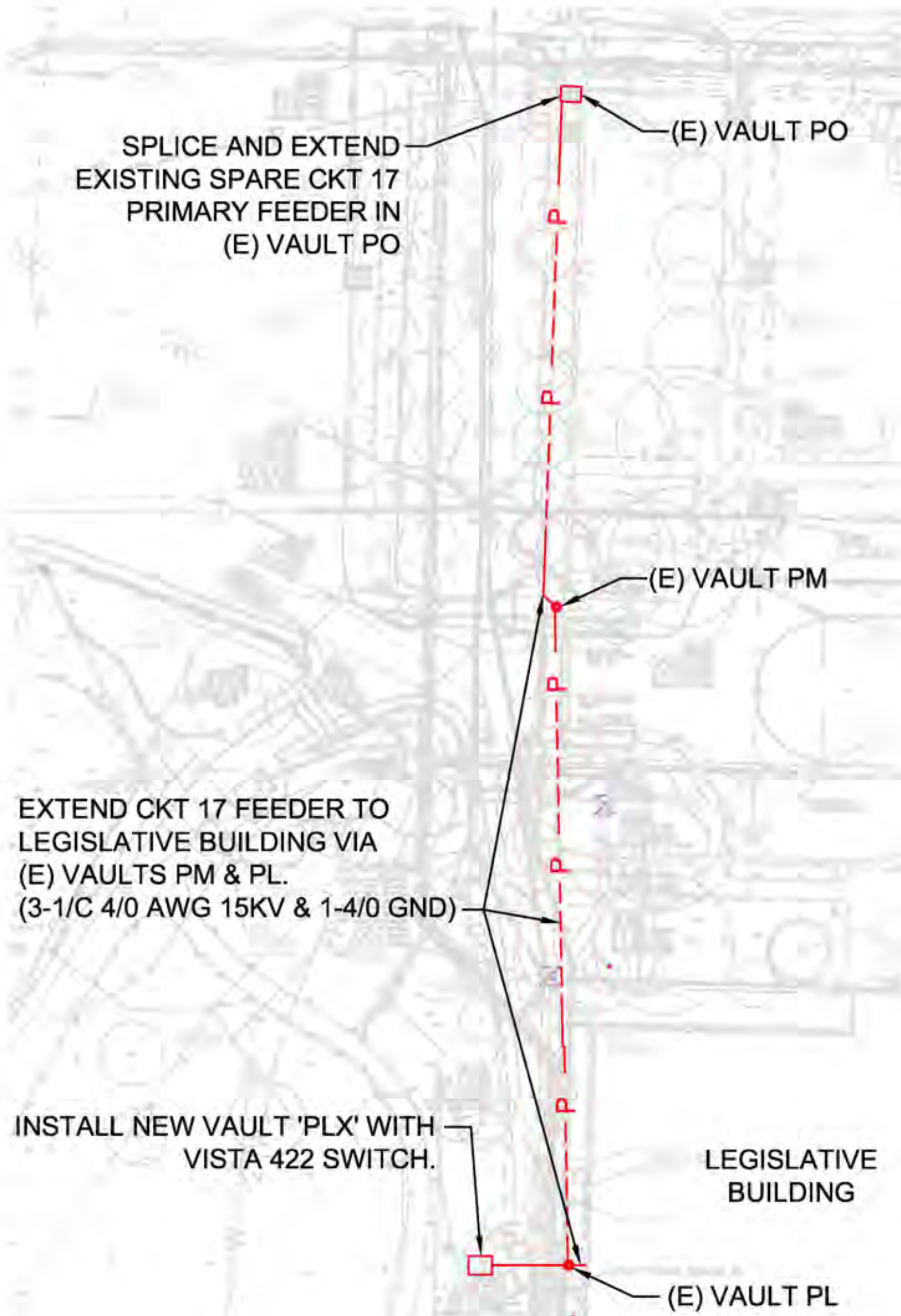


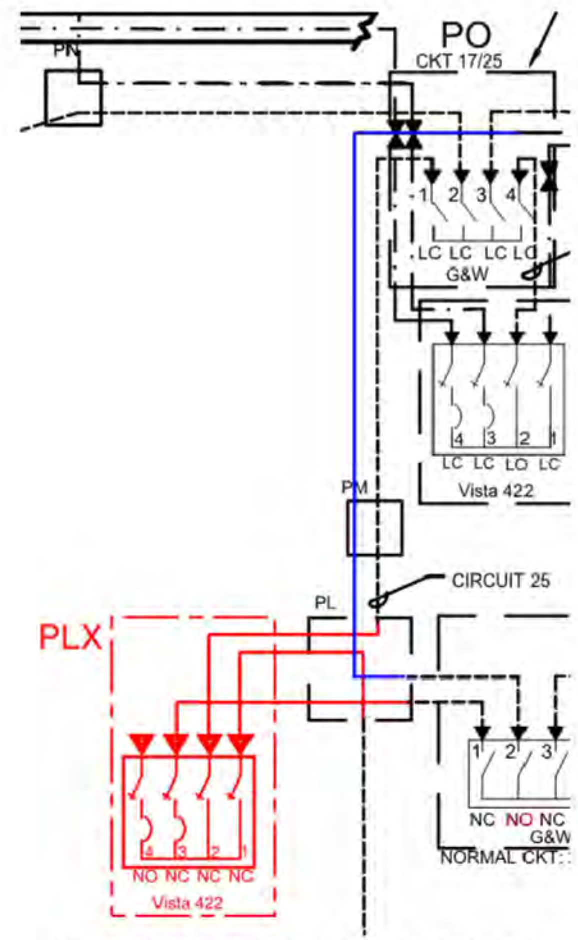
ReidMiddleton

LEGISLATIVE BUILDING PRIMARY CIRCUIT SELECTIVITY

Project Description

- This project will allow primary circuit selectivity in the Legislative Building similar to many other critical buildings throughout the campus. It also removes a single source of failure for primary circuit 25 within the Legislation Building and allows for isolation of Legislation Building electrical equipment with a single switching event.
- Install new vault 'PLX' with new Vista 422 switch. Switch will have a load break connection from primary circuit 25 (from vaults PO, PM, PL), a load break connection from primary circuit 25 (from vaults PK, PJ, PJX), a fault protected switch with output to the Legislative Building, and a spare fault protected switch for future expansion.
- Remove the extra circuit 25 primary feed into the building (remove in/out feed into building, only a single feed to switch position 1 in Legislative Building will remain.)
- Extend existing circuit 17 spare feeder from vault PO through vaults PM and PL and into the Legislative Building Primary Switch, position 2. Switch position 2 shall be padlocked 'normally open'. Switch position 1 shall be padlocked 'normally closed'.





ONE-LINE DIAGRAM OF PROPOSED INSTALLATION

Cost Summary

Current Construction Total without Sales Tax	$212,000
Consultant Service Fee	$53,000
Permit Fee - Allowance	$2,000
DES Project Management	$15,900
Project Contingency	$28,300
Escalation (3% / year) for 9 years	$94,800
Sales Tax (8.8% of escalated construction cost)	$24,300
Escalated Project Total for 2025	$430,300

Legend

- Project Boundary
- Water Symbols
- Water
- Sewer Symbols
- Sewer
- Catch Basin Type 1
- Catch Basin Type 2
- Storm Drainage Symbols
- Storm Drainage
- Irrigation Symbols
- Irrigation
- Power Symbols
- Power
- Natural Gas Symbols
- Natural Gas
- Asphalt Paving
- Concrete Paving
- Landscape Restoration
- Existing Tree
- Future Tree - Historic landscape preservation plan

N

SCALE IN FEET

80 0 80 160

Cherry Lane Drainage & Utility Improvements

Project Description

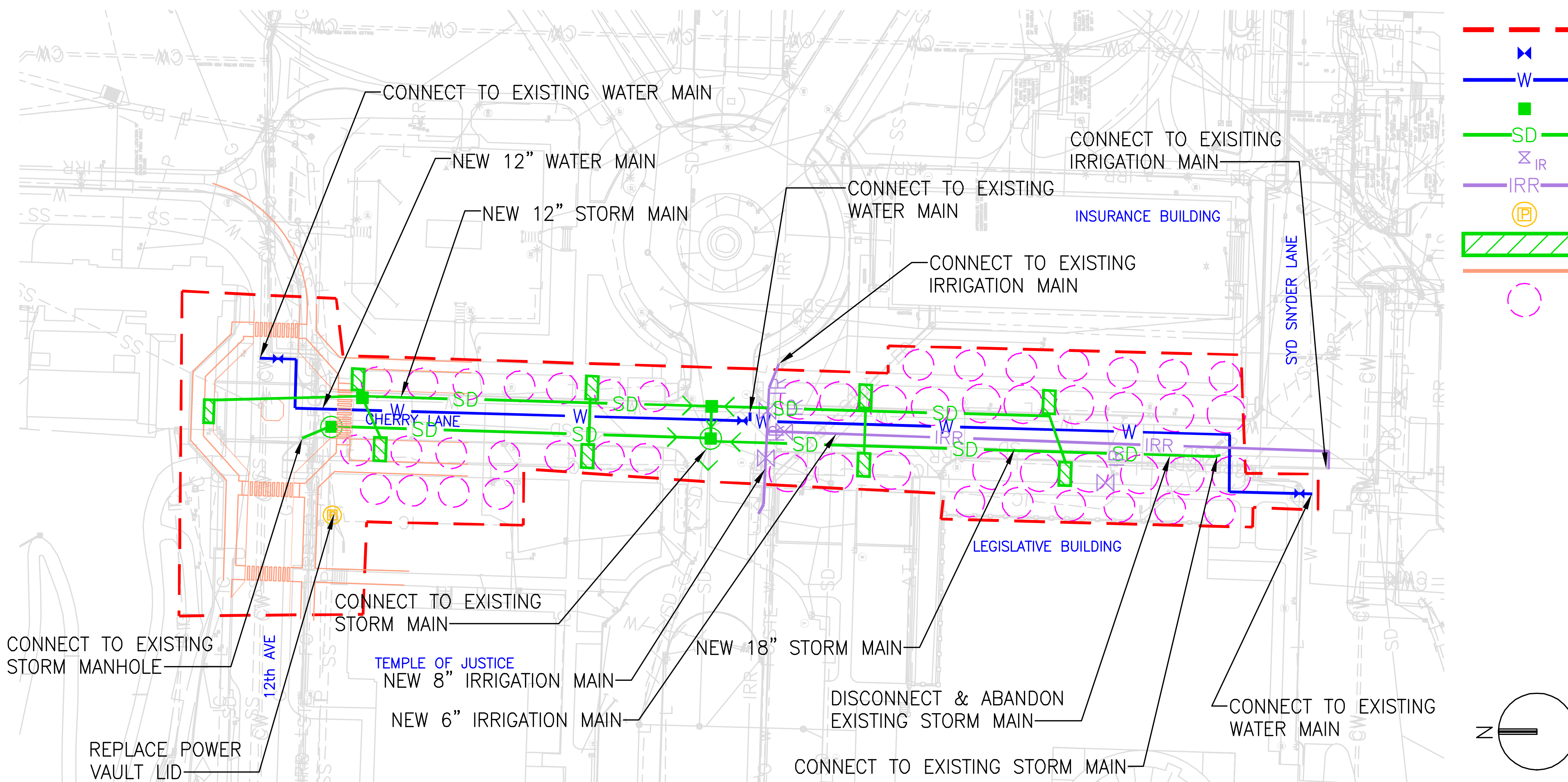
- Install new 12" Water Main and connect to existing main
- Replace stormwater main and abandon existing main in place
- Improve drainage and install water quality treatment facility
- Remove existing trees and replace with new trees
- Replace irrigation mains and abandon existing in place
- Restore disturbed landscaping
- Replace existing street concrete pavement, curb and gutter, and sidewalks
- Convert power vault lid from manhole type to hinged steel access hatch
- Protect existing street lighting poles and luminaries in place. Replace all existing underground lighting raceway, conductors and pullboxes within the project area
- Install underdrain system to mitigate soil saturation in planting areas
- Improve the intersection at 12th Ave and Cherry Lane

Cost Summary

Current Construction Total without Sales Tax	$1,689,600
Consultant Service Fee	$422,400
Permit Fee - Allowance	$20,000
DES Project Management and Support	$126,700
Project Contingency	$225,900
Escalation (3% / year for 10 years)	$854,500
Sales Tax (8.8% of escalated construction cost)	$199,800
Escalated Project Total (Year 2026)	$3,538,900

Legend

- Project Boundary
- Water Valve
- Water Line
- Catch Basin
- Storm Drainage Line
- Irrigation Valve
- Irrigation Line
- Power Vault
- Bioretention Planter with Overflow
- Edge of Concrete
- Future Tree/ Tree Restoration



SCALE IN FEET

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CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

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APPENDIX D

OPINION OF PROBABLE CONSTRUCTION COSTS

Reid Middleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SEWER SERVICE REPLACEMENT AT CHERBERG BUILDING
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: CAD
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Cherberg San Service.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	CHERBERG BUILDING SANITARY SEWER			$22,300
SUBTOTAL				**$22,300**
Design contingency			25%	$5,575
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$27,900**
General conditions			10%	$2,790
General contractor's OH & P			12%	$3,348
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$34,000**
Consultant Service Fee			25%	$8,500
Permit Fee - Allowance				$2,000
DES Project Management			6%	$2,600
CURRENT PROJECT SUBTOTAL without SALES TAX				**$47,100**
Project Contingency			10%	$4,700
CURRENT PROJECT TOTAL without SALES TAX				**$51,800**
Escalation (3%/year)		6 years	19.41%	$10,100
Sales Tax (8.8% of escalated construction cost)			8.8%	$3,600
ESCALATED PROJECT TOTAL(YEAR 2022)				**$65,500**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

Reid Middleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SEWER SERVICE REPLACEMENT AT CHERBERG BUILDING
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: CAD
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Cherberg San Service.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	*CHERBERG BUILDING SANITARY SEWER*				
1.01	CB Filter	ea	3	$250.00	$750
1.02	Maintenance and Removal	ls	1	$250.00	$250
1.03	Abandon Manholes	ea	1	$300.00	$300
1.04	Abandon & Plug & Fill Utility Lines	ea	1	$1,000.00	$1,000
1.05	Remove Curb & Gutter	ls	1	$100.00	$100
1.06	Connect to Exist. Sewer Manhole	ea	2	$800.00	$1,600
1.07	6" PVC Side Sewer, including trench & native fill	lf	100	$30.00	$3,000
1.08	Sewer Manhole	ea	1	$3,500.00	$3,500
1.09	Clean out	ea	2	$650.00	$1,300
1.10	Sawcut Pavement	ls	1	$200.00	$200
1.11	Remove Pavement	ls	1	$200.00	$200
1.12	Dispose of Pavement Debris	ls	1	$100.00	$100
1.13	Dispose of Unsuitable	cy	135	$25.00	$3,375
1.14	Concrete Sidewalk Restoration	sf	60	$7.00	$420
1.15	Concrete Curb and Gutter Restoration	ls	1	$1,000.00	$1,000
1.16	Gravel Borrow for Trench Backfill	cy	135	$35.00	$4,725
1.17	Landscaping Restoration	ls	1	$500.00	$500
TOTAL CHERBERG BUILDING SERVICE					**$22,300**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SEWER SERVICE REPLACEMENT AT INSURANCE BUILDING
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: CAD
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Insurance Building Service.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	INSURANCE BUILDING SEWER SERVICE			$28,100
SUBTOTAL				**$28,100**
Design contingency			25%	$7,025
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$35,100**
General conditions			10%	$3,510
General contractor's OH & P			12%	$4,212
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$42,800**
Consultant Service Fee			25%	$10,700
Permit Fee - Allowance				$2,000
DES Project Management			6%	$3,200
CURRENT PROJECT SUBTOTAL without SALES TAX				**$58,700**
Project Contingency			10%	$5,900
CURRENT PROJECT TOTAL without SALES TAX				**$64,600**
Escalation (3%/year)		2 years	6.09%	$3,900
Sales Tax (8.8% of escalated construction cost)			8.8%	$4,000
ESCALATED PROJECT TOTAL(Year 2018)				**$72,500**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

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Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: CAD
Check By: DCY

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SEWER SERVICE REPLACEMENT AT INSURANCE BUILDING
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

PRELIMINARY

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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**INSURANCE BUILDING SEWER SERVICE**				
1.01	CB Filter	ea	3	$250.00	$750
1.02	Maintenance and Removal	ls	1	$250.00	$250
1.03	Abandon & Plug& Fill Utility Lines	ls	1	$1,000.00	$1,000
1.04	Side Sewer Connection	ea	1	$1,000.00	$1,000
1.05	6" PVC Side Sewer, including trench & native fill	lf	225	$30.00	$6,750
1.06	Clean out	ea	3	$650.00	$1,950
1.07	Sawcut Pavement	ls	1	$200.00	$200
1.08	Remove Pavement	ls	1	$200.00	$200
1.09	Dispose of Pavement Debris	ls	1	$100.00	$100
1.10	Dispose of Unsuitable	cy	240	$25.00	$6,000
1.11	Gravel Borrow for Trench Backfill	cy	240	$35.00	$8,400
1.12	Concrete Sidewalk Restoration	ls	1	$500.00	$500
1.13	Landscape Restoration	ls	1	$1,000.00	$1,000
TOTAL INSURANCE BUILDING SEWER SERVICE					**$28,100**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
12TH AVE SEWER MAIN REROUTE
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 11/08/2016
Calc By: CAD
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Revised Costs - 111116\[Cherry and 12th Ave Main.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	12TH AVE SEWER MAIN REROUTE			$110,700
SUBTOTAL				**$110,700**
Design contingency			25%	$27,675
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$138,400**
General conditions			10%	$13,840
General contractor's OH & P			12%	$16,608
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$168,800**
Consultant Service Fee			25%	$42,200
Permit Fee - Allowance				$6,000
DES Project Management			6%	$12,700
CURRENT PROJECT SUBTOTAL without SALES TAX				**$229,700**
Project Contingency			10%	$23,000
CURRENT PROJECT TOTAL without SALES TAX				**$252,700**
Escalation (3%/year)		2 years	6.09%	$15,400
Sales Tax (8.8% of escalated construction cost)			8.8%	$15,800
ESCALATED PROJECT TOTAL(Year 2018)				**$283,900**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
CHERRY LANE AND 12TH AVE SEWER MAIN REROUTE
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 11/08/2016
Calc By: CAD
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Revised Costs - 111116\[Cherry and 12th Ave Main.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	12TH AVE SEWER MAIN REROUTE				
1.01	Silt Fence	lf	500	$5.50	$2,750
1.02	CB Filter	ea	6	$250.00	$1,500
1.03	Maintenance and Removal	ls	1	$500.00	$500
1.04	Abandon Manholes	ea	3	$300.00	$900
1.05	Abandon & Plug &Fill Utility Lines	ls	1	$3,000.00	$3,000
1.06	Remove Curb & Gutter	lf	20	$5.00	$100
1.07	Connect to Exist. Sewer Manhole	ea	1	$800.00	$800
1.08	Side Sewer Connection	ea	2	$500.00	$1,000
1.09	6" PVC Side Sewer, including trench	lf	140	$30.00	$4,200
1.10	8" PVC Pipe, including trench	lf	670	$35.00	$23,450
1.11	Sewer Manhole	ea	4	$3,500.00	$14,000
1.12	Clean out	ea	2	$650.00	$1,300
1.13	Sawcut Pavement	lf	700	$2.50	$1,750
1.14	Remove Pavement	sf	1,550	$2.00	$3,100
1.15	Dispose of Pavement Debris	cy	20	$22.00	$440
1.16	Dispose of Unsuitable	cy	450	$25.00	$11,250
1.17	Gravel Borrow for Trench Backfill	cy	450	$35.00	$15,750
1.18	Landscape Restoration	ls	1	$5,000.00	$5,000
1.19	PCC Concrete Sidewalk	sf	750	$7.00	$5,250
1.20	PCC Concrete Pavement	sf	800	$9.00	$7,200
1.21	Concrete Curb & Gutter	ls	1	$1,000.00	$1,000
1.22	Lawn Underdrain Restoration Allowance	ls	1	$2,500.00	$2,500
1.23	Remove Wood Bench covering Steam Fan	ls	1	$1,000.00	$1,000
1.24	Steam Tunnel Access Hatch	ls	1	$3,000.00	$3,000
TOTAL SEWER REROUTE					**$110,700**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
REPLACE SEWER MAIN FROM POWERHOUSE
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: CAD
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Power Plant.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	POWERHOUSE FORCE MAIN REPLACEMENT			$56,800
SUBTOTAL				**$56,800**
Design contingency			25%	$14,200
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$71,000**
General conditions			10%	$7,100
General contractor's OH & P			12%	$8,520
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$86,600**
Consultant Service Fee			25%	$21,700
Permit Fee - Allowance				$3,000
DES Project Management & Support			6%	$6,500
CURRENT PROJECT SUBTOTAL without SALES TAX				**$117,800**
Project Contingency			10%	$11,800
CURRENT PROJECT TOTAL without SALES TAX				**$129,600**
Escalation (3%/year)		6 years	19.41%	$25,100
Sales Tax (8.8% of escalated construction cost)			8.8%	$9,100
ESCALATED PROJECT TOTAL (Year 2022)				**$163,800**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
REPLACE SEWER MAIN FROM POWERHOUSE
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: CAD
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES, Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Power Plant.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**POWERHOUSE FORCE MAIN REPLACEMENT**				
1.01	General Erosion Control	ls	1	$2,000.00	$2,000
1.02	Abandon & Plug Utility Lines	ls	1	$750.00	$750
1.03	Connect to Exist. Sewer Manhole	ea	2	$1,500.00	$3,000
1.04	3" DI Force Main incld anchors and insulation	lf	160	$150.00	$24,000
1.05	2.5" HDPE Force Main	lf	315	$40.00	$12,600
1.06	Dispose of Unsuitable	cy	140	$25.00	$3,500
1.07	Gravel Borrow for Trench Backfill	cy	140	$35.00	$4,900
1.08	Landscaping Restoration	ls	1	$1,000.00	$1,000
1.09	Additional Cost for Steep Slope Construction	ls	1	$5,000.00	$5,000
TOTAL FORCE MAIN REPLACEMENT					**$56,800**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
NEW WATER LOOP Around O'BRIEN BUILDING
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#:
Created: 9-16-16
Updated: 9-30-16
Calc By. REB
Check By: DCY

PRELIMINARY

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ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	WATER SYSTEM			$269,550	
SUBTOTAL				**$269,550**	
Design contingency			25%	$67,388	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$336,900**	
General conditions			10%	$33,690	
General contractor's OH & P			12%	$40,428	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$411,000**	
Consultant Service Fee			25%	$102,800	
Permit Fee - Allowance				$10,000	
DES Project Management & Support			6%	$30,800	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$554,600**	
Project Contingency			10%	$55,500	
CURRENT PROJECT TOTAL without SALES TAX				**$610,100**	
Escalation (3%/year)		6 years	19.41%	$118,400	
Sales Tax (8.8% of escalated construction cost)			8.8%	$43,200	
ESCALATED PROJECT TOTAL (Year 2022)				**$771,700**	

CONSTRUCTION COST BREAKDOWN

Item No.	Description	Unit	Quantity	Unit Price	Total
1.01	Connect to Ex. WM- 8"	ea	2	$8,000.00	$16,000
1.02	4" DI Pipe Restrained W/ Trench	lf	100	$30.00	$3,000
1.03	6" DI Pipe Restrained W/ Trench	lf	100	$40.00	$4,000
1.04	12" DI Pipe Restrained W/ Trench	lf	900	$75.00	$67,500
1.05	6" GV	ea	2	$1,000.00	$2,000
1.06	8" GV	ea	1	$2,000.00	$2,000
1.07	12" Butterfly Valve	ea	4	$3,500.00	$14,000
1.08	12" Tee and Cross	ea	4	$450.00	$1,800
1.09	Fire Hydrant w/Storz	ea	1	$4,500.00	$4,500
1.10	Saw Cut Pavment	lf	1000	$2.50	$2,500
1.11	Remove Pavement	sf	3000	$2.00	$6,000
1.12	Remove Sidewalk	sf	1500	$2.00	$3,000
1.13	Dispose of Pavement Debris	cy	100	$20.00	$2,000
1.14	Disposal of Unsuitable Materials	cy	800	$20.00	$16,000
1.15	Gravel Borrow for Trench Backfill	cy	800	$30.00	$24,000
1.16	Pavement Patch AC	sf	1500	$3.50	$5,250
1.17	Pavement Patch PCC	sf	5000	$8.00	$40,000
1.18	Gravel for Pipe Bedding	cy	100	$45.00	$4,500
1.19	Landscaping Restoration	ls	1	$10,000.00	$10,000
1.20	Sidewalk Replacement	sf	1500	$7.00	$10,500
1.21	Parking Lot Drainage Improvement	ls	1	$5,000.00	$5,000
1.22	Curb & Gutter	lf	600	$20.00	$12,000
1.23	Wheel chair Ramp	ea	4	$3,500.00	$14,000
				Total	**$269,550**

Notes & Assumptions:

1 Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.

2 Assumed native soil is not suitable for utility trench backfill.

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
NEW WATER MAIN in 15th AVE SW
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#:
Created 9-16-16
Updated: 9/30/2016
Calc By: REB
Check By: DCY

PRELIMINARY

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ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	WATER SYSTEM			$294,400	
SUBTOTAL				**$294,400**	
Design contingency			25%	$73,600	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$368,000**	
General conditions			10%	$36,800	
General contractor's OH & P			12%	$44,160	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$449,000**	
Consultant Service Fee			25%	$112,300	
Permit Fee - Allowance				$10,000	
DES Project Management & Support			6%	$33,700	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$605,000**	
Project Contingency			10%	$60,500	
CURRENT PROJECT TOTAL without SALES TAX				**$665,500**	
Escalation (3%/year)		2 years	6.09%	$40,500	
Sales Tax (8.8% of escalated construction cost)			8.8%	$41,900	
ESCALATED PROJECT TOTAL (Year 2018)				**$747,900**	

CONSTRUCTION COST BREAKDOWN

Item No.	Description	Unit	Quantity	Unit Price	Total
1.01	Temporary Erosion Control	ls	1	$5,000.00	$5,000
1.02	Connect to Ex. WM- 10" Wet Tap	ea	1	$8,000.00	$8,000
1.03	6" DI Pipe Restrained W/ Trench	lf	150	$40.00	$6,000
1.04	12" DI Pipe W/ Trench	lf	700	$70.00	$49,000
1.05	6" GV	ea	5	$1,000.00	$5,000
1.06	12" Butterfly Valve	ea	5	$3,500.00	$17,500
1.07	12" Tee	ea	6	$450.00	$2,700
1.08	Fire Hydrant w/Storz	ea	3	$4,500.00	$13,500
1.09	Saw Cut Pavement	lf	2000	$2.50	$5,000
1.10	Remove Pavement	sf	4200	$2.00	$8,400
1.11	Dispose of Pavement Debris	cy	150	$20.00	$3,000
1.12	Disposal of Unsuitable Materials	cy	600	$20.00	$12,000
1.13	Gravel Borrow for Trench Backfill	cy	600	$30.00	$18,000
1.14	Pavement Patch AC	sf	4000	$2.50	$10,000
1.15	Pavement Patch PCC	sf	200	$8.00	$1,600
1.16	Entire Street Overlay - 2" Asphalt	sf	17000	$2.00	$34,000
1.17	Gravel for Pipe Bedding	cy	100	$45.00	$4,500
1.18	Sidewalk Replacement	sf	200	$6.00	$1,200
1.19	Wheel chair Ramp	ea	10	$3,500.00	$35,000
1.20	City of Olympia Meter and Vault	ls	1	$45,000.00	$45,000
1.21	Connect to Ex. WM- 12" DI pipe Connection	ea	2	$5,000.00	$10,000
				Total	**$294,400**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill.

Reid Middleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
WATER METER REPLACEMENT
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#:
Created: 9-16-16
Updated: 9/30/2016
Calc By: REB
Check By: DCY

PRELIMINARY

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ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	WATER SYSTEM			$795,000	
SUBTOTAL				**$795,000**	
Design contingency			15%	$119,250	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$914,300**	
General conditions			10%	$91,430	
General contractor's OH & P			12%	$109,716	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$1,115,400**	
Consultant Service Fee			20%	$223,100	
Permit Fee - Allowance				$2,000	
DES Project Management & Support			6%	$80,300	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$1,420,800**	
Project Contingency			10%	$142,100	
CURRENT PROJECT TOTAL without SALES TAX				**$1,562,900**	
Escalation (3%/year)		10 years	34.39%	$537,500	
Sales Tax (8.8% of escalated construction cost)			8.8%	$131,900	
ESCALATED PROJECT TOTAL (2026)				**$2,232,300**	

CONSTRUCTION COST BREAKDOWN

Item No.	Description	Unit	Quantity	Unit Price	Total
1.01	Replace old WM Vaults	ea	4	$40,000.00	160,000
1.02	Remote Read Water Meter system	LS	1	$65,000.00	65,000
1.03	Individual Water meter transmitter	ea	12	$5,000.00	60,000
1.04	Replace ex. Water Meters	ea	12	30,000.00	360,000
1.05	AMR Terminal, Radio Transmitter & Repeaters	LS	1	$150,000.00	150,000
				Total	**795,000**

NOTES:

Replacement of the two large meters at 11th Ave & Columbia and Sid Snyder Way & Columbia intersections is not included. These two meters are owned and maintained by City of Olympia.

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	Job#:
WA DEPARTMENT OF ENTERPRISE SERVICES	Created: 9-16-16
CAPITOL CAMPUS UTILITY RENEWAL PLAN	**Updated: 9/30/16**
NEW WATER MAIN & SERVICE TO POWER HOUSE	Calc By: REB
PLANNING PHASE	Check By: DCY
OPINION OF PROBABLE PROJECT COSTS	

PRELIMINARY

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ESTIMATE SUMMARY

Item No.	Description				Current Amount	Notes
1.0	WATER SYSTEM				$277,300	
SUBTOTAL					**$277,300**	
Design contingency				15%	$41,595	
CONSTRUCTION SUBTOTAL without GC MARK-UPS					**$318,900**	
General conditions				10%	$31,890	
General contractor's OH & P				12%	$38,268	
CURRENT CONSTRUCTION TOTAL without SALES TAX					**$389,100**	
Consultant Service Fee				20%	$77,800	
Permit Fee - Allowance					$5,000	
DES Project Management & Support				6%	$28,000	
CURRENT PROJECT SUBTOTAL without SALES TAX					**$499,900**	
Project Contingency				10%	$50,000	
CURRENT PROJECT TOTAL without SALES TAX					**$549,900**	
Escalation (3%/year)			6 years	19.41%	$106,700	
Sales Tax (8.8% of escalated construction cost)				8.8%	$40,900	
ESCALATED PROJECT TOTAL (Year 2022)					**$697,500**	

CONSTRUCTION COST BREAKDOWN

Item No.	Description	Unit	Quantity	Unit Price	Total
1.01	Connect to Ex. WM- 8" Wet Tap	ea	1	$8,000.00	$8,000
1.02	4" DI Pipe Restrained W/ Trench	lf	100	$30.00	$3,000
1.03	8" DI Pipe Restrained W/Trench	lf	300	$50.00	$15,000
1.04	4" GV	ea	2	$750.00	$1,500
1.05	6" GV	ea	1	$1,000.00	$1,000
1.06	8" GV	ea	2	$2,000.00	$4,000
1.07	8" Tee	ea	2	$450.00	$900
1.08	8" Bend	ea	4	$350.00	$1,400
1.09	Fire Hydrant w/Storz	ea	1	$4,500.00	$4,500
1.10	4" DCVA inside Building	ea	1	$25,000.00	$25,000
1.11	4" Water Meter and Vault	ea	1	$20,000.00	$20,000
1.12	Disposal of Unsuitable Materials	cy	300	$20.00	$6,000
1.13	Gravel Borrow for Trench Backfill	cy	300	$30.00	$9,000
1.14	Pavement Patch AC	sf	2500	$3.50	$8,750
1.15	Gravel for Pipe Bedding	cy	250	$45.00	$11,250
1.16	Rail Road Boring and Casing	LS	1	$150,000.00	$150,000
1.17	Temporary Erosion Control	LS	1	$5,000.00	$5,000
1.18	Abandon existing 4" steel pipe in place	LS	1	$3,000.00	$3,000
				Total	**$277,300**

Notes & Assumptions:

1 Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.

2 Assumed native soil is not suitable for utility trench backfill.

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES	Job#:
CAPITOL CAMPUS UTILITY RENEWAL PLAN	Created: 9-16-16
NEW FIRE HYDRANT AT GOVENOR'S MANSION	Updated: 9/30/2016
PLANNING PHASE	Calc By: REB
OPINION OF PROBABLE PROJECT COSTS	Check By: DCY

PRELIMINARY

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ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	WATER SYSTEM			$53,650	
SUBTOTAL				**$53,650**	
Design contingency			25%	$13,413	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$67,100**	
General conditions			10%	$6,710	
General contractor's OH & P			12%	$8,052	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$81,900**	
Consultant Service Fee			20%	$16,400	
Permit Fee - Allowance				$2,500	
DES Project Management & Support			6%	$5,900	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$106,700**	
Project Contingency			10%	$10,700	
CURRENT PROJECT TOTAL without SALES TAX				**$117,400**	
Escalation (3%/year)		2 years	6.09%	$7,100	
Sales Tax (8.8% of escalated construction cost)			8.8%	$7,600	
ESCALATED PROJECT TOTAL (2018)				**$132,100**	

CONSTRUCTION COST BREAKDOWN

Item No.	Description	Unit	Quantity	Unit Price	Total
1.01	Connect to Ex. WM- 8" in Tunnel	ea	1	$12,000.00	$12,000
1.02	8" DI Pipe Restrained W/Trench	lf	210	$50.00	$10,500
1.03	8" GV	ea	1	$2,000.00	$2,000
1.04	8" Tee	ea	1	$450.00	$450
1.05	8" Bend	ea	3	$350.00	$1,050
1.06	Fire Hydrant w/Storz	ea	1	$4,500.00	$4,500
1.07	Saw Cut Pavement	lf	150	$2.50	$375
1.08	Remove Pavement	sf	600	$2.00	$1,200
1.09	Dispose of Pavement Debris	cy	20	$20.00	$400
1.10	Disposal of Unsuitable Materials	cy	150	$20.00	$3,000
1.11	Gravel Borrow for Trench Backfill	cy	150	$30.00	$4,500
1.12	Pavement Patch AC	sf	200	$3.50	$700
1.13	Pavement Patch PCC	sf	400	$8.00	$3,200
1.14	Gravel for Pipe Bedding	cy	75	$45.00	$3,375
1.15	Landscaping Restoration	ls	1	$5,000.00	$5,000
1.16	Sidewalk Replacement	sf	100	$6.00	$600
1.17	Wheel chair Ramp	ea	2	$400.00	$800
				Total	**$53,650**

Notes & Assumptions:

1 Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.

2 Assumed native soil is not suitable for utility trench backfill.

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
IRRIGATION MAIN REPLACEMENT
NEAR 14TH AVENUE AND CAPITOL WAY
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/20/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

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ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	IRRIGATION WATER SYSTEM			$60,800
SUBTOTAL				**$60,800**
Design contingency			25%	$15,200
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$76,000**
General conditions			10%	$7,600
General contractor's OH & P			12%	$9,120
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$92,700**
Consultant Service Fee			25%	$23,200
Permit Fee - Allowance				$500
DES Project Management			6%	$7,000
CURRENT PROJECT SUBTOTAL without SALES TAX				**$123,400**
Project Contingency			10%	$12,300
CURRENT PROJECT TOTAL without SALES TAX				**$135,700**
Escalation (3%/year)		2 years	6.09%	$8,300
Sales Tax (8.8% of escalated construction cost)			8.8%	$8,700
ESCALATED PROJECT TOTAL (YEAR 2018)				**$152,700**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
IRRIGATION MAIN REPLACEMENT
NEAR 14TH AVENUE AND CAPITOL WAY
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/20/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**IRRIGATION WATER SYSTEM**				
1.01	General erosion control	ea	1	$2,500.00	$2,500
1.02	Abandon & Plug Utility Lines	ls	1	$1,500.00	$1,500
1.03	4" Ductile Iron Pipe	lf	250	$30.00	$7,500
1.04	4" Gate Valve	ea	5	$750.00	$3,750
1.05	4" DCVA & Box	ea	1	$10,000.00	$10,000
1.06	Dispose of Unsuitable Materials	cy	120	$25.00	$3,000
1.07	Gravel Borrow for Trench Backfill	cy	90	$35.00	$3,150
1.08	Gravel for pipe bedding	cy	30	$45.00	$1,350
1.08	Lateral line reconnection	ea	2	$1,500.00	$3,000
1.09	Sprinkler, Pipe, and Controller Replacement	ls	1	$15,000.00	$15,000
1.10	Landscaping Restoration	ls	1	$10,000.00	$10,000
TOTAL IRRIGATION WATER SYSTEM					**$60,800**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
IRRIGATION MAIN REPLACEMENT
NEAR JEFFERSON AND MAPLE PARK AVENUE
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/20/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

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ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	DEMOLITION			$900
2.0	IRRIGATION WATER SYSTEM			$130,400
3.0	PAVENT RESTORATION			$1,800
SUBTOTAL				**$133,100**
Design contingency			25%	$33,275
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$166,400**
General conditions			10%	$16,640
General contractor's OH & P			12%	$19,968
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$203,000**
Consultant Service Fee			20%	$40,600
Permit Fee - Allowance				$500
DES Project Management			6%	$14,600
CURRENT PROJECT SUBTOTAL without SALES TAX				**$258,700**
Project Contingency			10%	$25,900
CURRENT PROJECT TOTAL without SALES TAX				**$284,600**
Escalation (3%/year)		2 years	6.09%	$17,300
Sales Tax (8.8% of escalated construction cost)			8.8%	$19,000
ESCALATED PROJECT TOTAL (YEAR 2018)				**$320,900**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
IRRIGATION MAIN REPLACEMENT
NEAR JEFFERSON AND MAPLE PARK AVENUE
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/20/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**DEMOLITION**				
1.01	Sawcut Asphalt Pavement	lf	25	$3.00	$75
1.02	Sawcut Concrete Pavement	lf	25	$5.00	$125
1.03	Remove Asphalt Pavement	sf	50	$2.00	$100
1.04	Remove Concrete Pavement	sf	50	$5.00	$250
1.05	Dispose of Asphalt & Concrete Debris	cy	3	$20.00	$60
1.06	Abandon & Plug Utility Lines	ea	1	$300.00	$300
TOTAL DEMOLITION					**$900**
2.0	**IRRIGATION WATER SYSTEM**				
2.01	Connect to Exist. Water Main - 4" Wet Tap	ea	1	$3,000.00	$3,000
2.02	General erosion control	ea	1	$2,500.00	$2,500
2.03	4" Ductile Iron Pipe	lf	580	$30.00	$17,400
2.04	4" Gate Valve	ea	7	$750.00	$5,250
2.05	4" Double Check Valve Assembly & Vault	ea	1	$30,000.00	$30,000
2.06	4" Water Meter & Vault	ea	1	$20,000.00	$20,000
2.07	Dispose of Unsuitable Materials	cy	260	$25.00	$6,500
2.08	Gravel Borrow for Trench Backfill	cy	200	$35.00	$7,000
2.09	Gravel for pipe bedding	cy	60	$45.00	$2,700
2.10	Lateral line reconnection	ea	1	$3,500.00	$3,500
2.10	Sprinkler, Pipe, and Controller Replacement	ls	1	$25,000.00	$25,000
2.11	Landscaping Restoration	ls	1	$5,000.00	$5,000
2.12	Electrical Allowance	ls	1	$2,500.00	$2,500
TOTAL WATER SYSTEM					**$130,400**
3.0	**PAVENT RESTORATION**				
3.01	PCC Concrete Sidewalk	sf	50	$7.00	$350
3.02	Asphalt Pavement, Including Base, 2" over 4"	sf	50	$4.00	$200
3.03	Concrete Curb & Gutter	lf	10	$20.00	$200
3.04	Pavement Marking	ls	1	$1,000.00	$1,000
TOTAL SITE PAVING					**$1,800**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
EAST CAMPUS IRRIGATION SYSTEM UPDATE
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/22/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[ECC Irrigation Drip Lines.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	IRRIGATION			$670,000
SUBTOTAL				**$670,000**
Design contingency			25%	$167,500
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$837,500**
General conditions			10%	$83,750
General contractor's OH & P			12%	$100,500
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$1,021,800**
Consultant Service Fee			25%	$255,500
Permit Fee - Allowance				$500
DES Project Management			6%	$76,600
CURRENT PROJECT SUBTOTAL without SALES TAX				**$1,354,400**
Project Contingency			10%	$135,400
CURRENT PROJECT TOTAL without SALES TAX				**$1,489,800**
Escalation (3%/year)		8 years	26.68%	$397,400
Sales Tax (8.8% of escalated construction cost)			8.8%	$113,900
ESCALATED PROJECT TOTAL (YEAR 2024)				**$2,001,100**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill
3. This project intends to replace aging drip lines and controllers in planter areas. It does not include main or splinker head replacement.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
EAST CAMPUS IRRIGATION SYSTEM UPDATE
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/22/2016
Updated: 09/30/2016
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Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[ECC Irrigation Drip Lines.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**IRRIGATION**				
1.01	Landscape Planting (groundcovers area)	sf	150,000	$2.50	$375,000
1.02	Drip Line Replacement	sf	150,000	$1.50	$225,000
1.03	Convert controllers and valves	ls	1	$50,000.00	$50,000
1.04	Reconnect lateral line	ea	20	$500.00	$10,000
1.05	Electrical Allowance	ls	1	$10,000.00	$10,000
TOTAL LANDSCAPING					**$670,000**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
WEST CAMPUS IRRIGATION SYSTEM REPLACEMENT
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/19/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[WCC Irrigation.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	TEMPORARY EROSION CONTROL			$12,500
2.0	DEMOLITION			$39,800
3.0	IRRIGATION WATER SYSTEM			$1,179,300
4.0	PAVEMENT RESTORATION			$88,500
SUBTOTAL				**$1,320,100**
Design contingency			25%	$330,025
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$1,650,100**
General conditions			10%	$165,010
General contractor's OH & P			12%	$198,012
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$2,013,100**
Consultant Service Fee			25%	$503,300
Permit Fee - Allowance				$5,000
DES Project Management			6%	$151,000
CURRENT PROJECT SUBTOTAL without SALES TAX				**$2,672,400**
Project Contingency			10%	$267,200
CURRENT PROJECT TOTAL without SALES TAX				**$2,939,600**
Escalation (3%/year)		6 years	19.41%	$570,400
Sales Tax (8.8% of escalated construction cost)			8.8%	$211,500
ESCALATED PROJECT TOTAL (YEAR 2022)				**$3,721,500**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
WEST CAMPUS IRRIGATION SYSTEM REPLACEMENT
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/19/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[WCC Irrigation.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**TEMPORARY EROSION CONTROL**				
1.01	CB Filter	ea	50	$250.00	$12,500
TOTAL EROSION CONTROL					**$12,500**
2.0	**DEMOLITION**				
2.01	Sawcut Concrete Pavement	lf	3,500	$2.50	$8,750
2.02	Remove Concrete Pavement	sf	8,500	$2.50	$21,250
2.03	Dispose of Asphalt & Concrete Debris	cy	160	$20.00	$3,200
2.04	Abandon & Plug Utility Lines	ea	12	$300.00	$3,600
2.05	Remove Curb & Gutter	lf	600	$5.00	$3,000
TOTAL DEMOLITION					**$39,800**
3.0	**IRRIGATION WATER SYSTEM**				
3.01	Dispose of Unsuitable	cy	2,920	$25.00	$73,000
3.02	Landscape Restoration	ls	1	$20,000.00	$20,000
3.03	Connect to Exist. Water Main - 8" Wet Tap	ea	1	$3,000.00	$3,000
3.04	4" Ductile Iron Pipe	lf	3,510	$30.00	$105,300
3.05	6" Ductile Iron Pipe, incld. Trenching	lf	1,150	$40.00	$46,000
3.06	8" Ductile Iron Pipe, incld. Trenching	lf	1,900	$50.00	$95,000
3.07	4" Gate Valve	ea	6	$750.00	$4,500
3.08	6" Gate Valve	ea	10	$1,000.00	$10,000
3.09	8" Gate Valve	ea	25	$2,000.00	$50,000
3.10	4" Bend	ea	12	$200.00	$2,400
3.11	6" Tee	ea	1	$350.00	$350
3.12	6" Bend	ea	5	$250.00	$1,250
3.13	8" Tee	ea	4	$450.00	$1,800
3.14	8" Bend	ea	4	$300.00	$1,200
3.15	8" Cross	ea	3	$600.00	$1,800
3.16	Reducer/Adaptor	ea	8	$300.00	$2,400
3.17	8" Double Check Valve Assembly & Vault	ea	1	$40,000.00	$40,000
3.18	8" Meter in Vault	ea	1	$50,000.00	$50,000
3.19	Gravel Borrow for Trench Backfill	cy	2,187	$35.00	$76,533
3.20	Gravel for pipe bedding	cy	440	$45.00	$19,800
3.21	Underdrain Restoration	ls	1	$15,000.00	$15,000
3.22	Reconnect lateral line	ea	20	$1,500.00	$30,000
3.23	Sprinkler, Pipe, Drip Line, Controller Replacement	sf	520,000	$1.00	$520,000
3.24	Electrical Allowance	ls	1	$10,000.00	$10,000
TOTAL IRRIGATION WATER SYSTEM					**$1,179,300**
4.0	**PAVEMENT RESTORATION**				
4.01	PCC Concrete Sidewalk	sf	2,500	$7.00	$17,500
4.02	PCC Concrete Pavement	sf	6,000	$9.00	$54,000
4.03	Concrete Curb & Gutter	lf	600	$20.00	$12,000

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
WEST CAMPUS IRRIGATION SYSTEM REPLACEMENT
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/19/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES, Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[WCC Irrigation.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
4.04	Pavement Marking	ls	1	$5,000.00	$5,000
TOTAL SITE PAVING					**$88,500**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

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WS DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
REPLACEMENT OF DAMAGED STORM LINE
AT NATURAL RESOURCE BUILDING
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/21/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction cost\Cost Estimates - 093016\[ECC NRB SD.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	TEMPORARY EROSION CONTROL			$1,300
2.0	DEMOLITION			$5,200
3.0	STORM DRAINAGE			$18,600
SUBTOTAL				**$25,100**
Design contingency			25%	$6,275
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$31,400**
General conditions			10%	$3,140
General contractor's OH & P			12%	$3,768
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$38,300**
Consultant Service Fee			40%	$15,300
Permit Fee - Allowance				$1,000
DES Project Management			6%	$3,200
CURRENT PROJECT SUBTOTAL without SALES TAX				**$57,800**
Project Contingency			10%	$5,800
CURRENT PROJECT TOTAL without SALES TAX				**$63,600**
Escalation (3%/year)		8 years	26.68%	$17,000
Sales Tax (8.8% of escalated construction cost)			8.8%	$4,300
ESCALATED PROJECT TOTAL (YEAR 2024)				**$84,900**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

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WS DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
REPLACEMENT OF DAMAGED STORM LINE
AT NATURAL RESOURCE BUILDING
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/21/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES, Capitol Campus Utility Renewal Plan\Sconstruction_cost\Cost Estimates - 093016\[ECC NRB SD.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**TEMPORARY EROSION CONTROL**				
1.01	CB Filter	ea	5	$250.00	$1,250
TOTAL EROSION CONTROL					**$1,300**
2.0	**DEMOLITION**				
2.01	Remove Storm & Utilities Lines	lf	175	$15.00	$2,625
2.02	Sawcut Asphalt Pavement	lf	375	$2.50	$938
2.03	Remove Asphalt Pavement	sf	725	$2.00	$1,450
2.04	Dispose of Asphalt & Concrete Debris	cy	5	$20.00	$100
2.05	Remove Curb & Gutter	lf	20	$5.00	$100
TOTAL DEMOLITION					**$5,200**
3.0	**STORM DRAINAGE**				
3.01	Connect to Existing System	ea	1	$500.00	$500
3.02	12" ADS Storm Drain Pipe, including trench & nativ	lf	175	$32.00	$5,600
3.03	Catch Basin Type I	ea	4	$1,300.00	$5,200
3.04	Dispose of Unsuitable	cy	60	$25.00	$1,500
3.05	Gravel Borrow for Trench Backfill	cy	60	$35.00	$2,100
3.06	Pavement Patching - asphalt	sf	725	$4.50	$3,263
3.07	Concrete Curb & Gutter	lf	20	$20.00	$400
3.08	Landscaping Restoration	sf	20	$1.50	$30
TOTAL STORM DRAINAGE					**$18,600**

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WS DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
REPLACEMENT OF FAILED STORM LINE
AT OFFICE BUILDING 2 (OB2)
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/21/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\Sconstruction_cost\Cost Estimates - 093016\[ECC OB2 SD xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	TEMPORARY EROSION CONTROL			$1,000
2.0	DEMOLITION			$3,000
3.0	STORM DRAINAGE			$18,300
SUBTOTAL				**$22,300**
Design contingency			25%	$5,575
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$27,900**
General conditions			10%	$2,790
General contractor's OH & P			12%	$3,348
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$34,000**
Consultant Service Fee			25%	$8,500
Permit Fee - Allowance				$1,000
DES Project Management			6%	$2,600
CURRENT PROJECT SUBTOTAL without SALES TAX				**$46,100**
Project Contingency			10%	$4,600
CURRENT PROJECT TOTAL without SALES TAX				**$50,700**
Escalation (3%/year)		8 years	26.68%	$13,500
Sales Tax (8.8% of escalated construction cost)			8.8%	$3,800
ESCALATED PROJECT TOTAL (Year 2024)				**$68,000**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

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WS DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
REPLACEMENT OF FAILED STORM LINE
AT OFFICE BUILDING 2 (OB2)
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/21/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES, Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[ECC OB2 SD xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**TEMPORARY EROSION CONTROL**				
1.01	CB Filter	ea	4	$250.00	$1,000
TOTAL EROSION CONTROL					**$1,000**
2.0	**DEMOLITION**				
2.01	Remove Storm & Utilities Lines	lf	125	$15.00	$1,875
2.02	Sawcut Asphalt Pavement	ls	1	$200.00	$200
2.03	Remove Asphalt Pavement	sf	400	$2.00	$800
2.04	Dispose of Asphalt & Concrete Debris	cy	5	$20.00	$100
TOTAL DEMOLITION					**$3,000**
3.0	**STORM DRAINAGE**				
3.01	Connect to Existing System	ea	2	$500.00	$1,000
3.02	12" ADS Storm Drain Pipe, including trench & nativ	lf	125	$32.00	$4,000
3.03	Catch Basin Type 2, 48-inch	ea	2	$2,700.00	$5,400
3.04	Dispose of Unsuitable	cy	60	$25.00	$1,500
3.05	Gravel Borrow for Trench Backfill	cy	60	$35.00	$2,100
3.06	Pavement Patching -asphalt	sf	400	$4.50	$1,800
3.07	Landscaping Restoration	ls	1	$2,500.00	$2,500
TOTAL STORM DRAINAGE					**$18,300**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
REPLACEMENT OF INSURANCE BUILDING
FOUNDATION AND ROOF DRAINS
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Insurance Bldg Drains.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	TEMPORARY EROSION CONTROL			$11,100
2.0	DEMOLITION			$3,700
3.0	EARTHWORK			$5,300
4.0	STORM DRAINAGE			$77,200
5.0	SITE PAVING			$800
6.0	LANDSCAPING			$66,400
SUBTOTAL				**$164,500**
Design contingency			25%	$41,125
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$205,600**
General conditions			10%	$20,560
General contractor's OH & P			12%	$24,672
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$250,800**
Consultant Service Fee			25%	$62,700
Permit Fee - Allowance				$2,000
DES Project Management			6%	$18,800
CURRENT PROJECT SUBTOTAL without SALES TAX				**$334,300**
Project Contingency			10%	$33,400
CURRENT PROJECT TOTAL without SALES TAX				**$367,700**
Escalation (3%/year)		4 years	12.55%	$46,100
Sales Tax (8.8% of escalated construction cost)			8.8%	$24,800
ESCALATED PROJECT TOTAL (YEAR 2020)				**$438,600**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
REPLACEMENT OF INSURANCE BUILDING
FOUNDATION AND ROOF DRAINS
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Insurance Bldg Drains.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**TEMPORARY EROSION CONTROL**				
1.01	Silt Fence	lf	600	$5.50	$3,300
1.02	Construction Entrance	ls	1	$3,000.00	$3,000
1.03	CB Filter	ea	15	$250.00	$3,750
1.04	Maintenance and Removal	ls	1	$1,000.00	$1,000
TOTAL EROSION CONTROL					**$11,100**
2.0	**DEMOLITION**				
2.01	Sawcut Concrete Pavement	lf	40	$2.50	$100
2.02	Remove Concrete Pavement	sf	200	$2.50	$500
2.03	Dispose of Asphalt & Concrete Debris	cy	3	$20.00	$60
2.04	Abandon & Plug Utility Lines	ea	8	$300.00	$2,400
2.05	Remove Tree	ea	2	$300.00	$600
TOTAL DEMOLITION					**$3,700**
3.0	**EARTHWORK**				
3.01	Dispose of Unsuitable	cy	50	$25.00	$1,250
3.02	Fine Grading	sf	16,000	$0.25	$4,000
TOTAL EARTHWORK					**$5,300**
4.0	**STORM DRAINAGE**				
4.01	Connect to Existing System	ea	4	$500.00	$2,000
4.02	6" ADS Storm Drain Pipe, including trench	lf	540	$20.00	$10,800
4.03	4" PVC Perforated Pipe, including trench	lf	480	$25.00	$12,000
4.04	Clean Outs	ea	13	$650.00	$8,450
4.05	Catch Basin Type I	ea	2	$1,300.00	$2,600
4.06	Waterproof barrier	sf	2,400	$2.00	$4,800

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
REPLACEMENT OF INSURANCE BUILDING
FOUNDATION AND ROOF DRAINS
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Insurance Bldg Drains.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
4.07	Drain Backfill	cy	250	$45.00	$11,250
4.08	Filter fabric	sy	540	$1.50	$810
4.08	Gravel Borrow for Trench Backfill	cy	700	$35.00	$24,500
TOTAL STORM DRAINAGE					**$77,200**

5.0	SITE PAVING				
5.01	PCC Concrete Sidewalk	ls	1	$400.00	$400
5.02	Concrete Curb & Gutter	lf	20	$20.00	$400
TOTAL SITE PAVING					**$800**

6.0	LANDSCAPING				
6.01	Tree	ea	4	$600.00	$2,400
6.02	Landscape Planting (groundcovers)	sf	16,000	$2.50	$40,000
6.03	Irrigation Restoration	sf	16,000	$1.50	$24,000
TOTAL LANDSCAPING					**$66,400**

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SID SNYDER WAY BIORETENTION
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/22/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Cost Estimate - Bio Berm.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	BIORETENTION RESTORATION			$3,300
SUBTOTAL				**$3,300**
Design contingency			25%	$825
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$4,100**
General conditions			10%	$410
General contractor's OH & P			12%	$492
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$5,000**
Consultant Service Fee			25%	$1,300
DES Project Management			6%	$400
CURRENT PROJECT SUBTOTAL without SALES TAX				**$6,700**
Project Contingency			10%	$700
CURRENT PROJECT TOTAL without SALES TAX				**$7,400**
Escalation (3%/year)		2 years	6.09%	$500
Sales Tax (8.8% of escalated construction cost)			8.8%	$500
ESCALATED PROJECT TOTAL (YEAR 2018)				**$8,400**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SID SNYDER WAY BIORETENTION
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/22/2016
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Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Cost Estimate - Bio Berm.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**BIORETENTION RESTORATION**				
1.01	Top Soil, 6"	cy	20	$45.00	$900
1.02	Mulch	cy	10	$35.00	$350
1.03	Shrub Planting & Groundcover	ls	1	$1,500.00	$1,500
1.04	Adjust Overflow Frame and Grate	ls	1	$500.00	$500
TOTAL	**BIORETENTION RESTORATION**				**$3,300**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SID SNYDER WAY BIORETENTION
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
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Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Cost Estimate - Bio Berm xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**BIORETENTION RESTORATION**				
1.01	Top Soil, 6"	cy	20	$45.00	$900
1.02	Mulch	cy	10	$35.00	$350
1.03	Shrub Planting & Groundcover	ls	1	$1,500.00	$1,500
1.04	Adjust Overflow Frame and Grate	ls	1	$500.00	$500
TOTAL	**BIORETENTION RESTORATION**				**$3,300**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SOUTH DIAGONAL STORM DRAIN
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/21/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\Sconstruction_cost\Cost Estimates - 093016\[S Diagonal.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	TEMPORARY EROSION CONTROL			$13,300
2.0	DEMOLITION			$20,100
3.0	EARTHWORK			$21,100
4.0	STORM DRAINAGE			$112,000
5.0	LANDSCAPING			$127,300
SUBTOTAL				**$293,800**
Design contingency			25%	$73,450
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$367,300**
General conditions			10%	$36,730
General contractor's OH & P			12%	$44,076
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$448,100**
Consultant Service Fee			25%	$112,000
Permit Fee - Allowance				$5,000
DES Project Management			6%	$33,600
CURRENT PROJECT SUBTOTAL without SALES TAX				**$598,700**
Project Contingency			10%	$59,900
CURRENT PROJECT TOTAL without SALES TAX				**$658,600**
Escalation (3%/year)		2 years	6.09%	$40,100
Sales Tax (8.8% of escalated construction cost)			8.8%	$41,800
ESCALATED PROJECT TOTAL (YEAR 2018)				**$740,500**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SOUTH DIAGONAL STORM DRAIN
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/21/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES, Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[S Diagonal.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**TEMPORARY EROSION CONTROL**				
1.01	Silt Fence	lf	500	$5.50	$2,750
1.02	Construction Entrance	ls	1	$3,000.00	$3,000
1.03	CB Filter	ea	10	$250.00	$2,500
1.04	Straw Bale Barrier	lf	500	$10.00	$5,000
TOTAL EROSION CONTROL					**$13,300**
2.0	**DEMOLITION**				
2.05	Sawcut Concrete Pavement	lf	200	$3.50	$700
2.07	Remove Concrete Pavement	sf	200	$3.50	$700
2.08	Dispose of Concrete Debris	cy	10	$20.00	$200
2.10	Abandon & Plug & Fill Utility Lines	ls	1	$6,000.00	$6,000
2.11	Traffic Control	ls	1	$10,000.00	$10,000
2.12	Remove Curb & Gutter	lf	500	$5.00	$2,500
TOTAL DEMOLITION					**$20,100**
3.0	**EARTHWORK**				
3.01	Dispose of Unsuitable	cy	750	$25.00	$18,750
3.02	Stripping	cy	100	$5.00	$500
3.03	Fine Grading	sf	7,500	$0.25	$1,875
TOTAL EARTHWORK					**$21,100**
4.0	**STORM DRAINAGE**				
4.01	Connect to Existing System	ea	7	$500.00	$3,500
4.02	6" ADS Storm Drain Pipe, including trench	lf	260	$20.00	$5,200
4.03	8" ADS Storm Drain Pipe, including trench	lf	110	$25.00	$2,750
4.04	18" ADS Storm Drain Pipe, including trench & nativ	lf	500	$42.00	$21,000
4.05	Trench Drain	lf	100	$150.00	$15,000
4.06	Catch Basin Type I	ea	5	$1,300.00	$6,500

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SOUTH DIAGONAL STORM DRAIN
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/21/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[S Diagonal.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
4.07	Catch Basin Type 2, 48-inch	ea	4	$2,700.00	$10,800
4.08	Bioretention Garden Excavation	cy	350	$5.00	$1,750
4.09	Compost for Bioretention	cy	30	$40.00	$1,200
4.08	Dispose of Unsuitable	cy	410	$25.00	$10,250
4.10	Gravel for Underdrain System	cy	40	$30.00	$1,200
4.11	Gravel Borrow for Trench Backfill	cy	410	$35.00	$14,350
4.12	Foundation Material for Pipe	cy	70	$25.00	$1,750
4.13	Pavement Patching	sf	135	$50.00	$6,750
4.14	Concrete Curb & Gutter	lf	500	$20.00	$10,000
TOTAL STORM DRAINAGE					**$112,000**

5.0	**LANDSCAPING**				
5.01	Planting Soil, Bioretention, & Standard Planting Soil	cy	920	$45.00	$41,400
5.02	Bioretention Planters (Vertical Concrete Curbs)	lf	510	$30.00	$15,300
5.03	Planting (Shrub and Groundcover Layer)	sf	12,500	$2.50	$31,250
5.04	Lawn (Seeded, not including soil or irrig.)	sf	4,000	$0.20	$800
5.05	Trees - 3" caliper deciduous	ea	9	$600.00	$5,400
5.06	Trees - 10' ht. multi-stemmed deciduous	ea	14	$600.00	$8,400
5.07	Irrigation	sf	16,500	$1.50	$24,750
TOTAL LANDSCAPING					**$127,300**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

SEPTEMBER 28, 2016

Capitol Campus Utility Renewal Plan
Washington State Capitol Campus
Olympia, WA 98504

ATTENTION Ding Ye, Project Manager

REGARDING Upgrade Vault Lids

OVERVIEW

This memo provides a description and opinion of probable costs for the 'Upgrade Vault Lids' project which has been recommended as a part of the Capitol Campus Utility Renewal Plan.

PROJECT DESCRIPTION

This project will convert existing electrical vault lids from manholes to lifting lids throughout the campus. This task will bring utility access into compliance with current standards. Improved access to electrical vaults will significantly improve safety and reduce the cost of future service and repair.

Vault lids to be replaced: PA, PAA, PAB, PAC, PB, PC, PE, PF, PK, PM, PP, PQ, PS, PV, PW

OPINION OF PROBABLE COSTS

The escalated project total cost, assuming construction in 2025, is $616,600. See attached 'Opinion of Probable Construction Costs' and itemized list below for backup. Itemized costs include materials, labor, and sub-contractor overhead & profit.

Demolition/Modification to existing vaults	$54,000
Electrical Isolation During Work/Primary Electrical System Switching	$27,000
New Vault Lids	$144,000
Construction Subtotal before sales tax:	$225,000

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WA STATE DEPT OF ENTERPRISE SERVICES
UPGRADE VAULT LIDS

PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#:
Created: 09/28/2016
Updated:
Calc By: LB
Check By: ES

PRELIMINARY

M:\JOBS\16\16114\Design\Electrical\Projects and Sketches\07_Upgrade Vault Lids\[Cost Mark-ups.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	DEMOLITION			$54,000	
2.0	SITE ELECTRICAL			$171,000	
SUBTOTAL				**$225,000**	
Design contingency			25%	$56,250	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$281,300**	
General conditions			10%	$28,130	
General contractor's OH & P			12%	$33,756	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$343,200**	
Consultant Service Fee			10%	$34,300	
Permit Fee - Allowance				$2,000	
DES Project Management and Support			6%	$22,700	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$402,200**	
Project Contingency			10%	$40,200	
CURRENT PROJECT TOTAL without SALES TAX				**$442,400**	
Escalation (3%/year)		9 years	30.48%	$134,800	
Sales Tax (8.8% of escalated construction cost)			8.8%	$39,400	
ESCALATED PROJECT TOTAL FOR 2025 CONSTRUCTION				**$616,600**	

SEPTEMBER 28, 2016

Capitol Campus Utility Renewal Plan
Washington State Capitol Campus
Olympia, WA 98504

ATTENTION Ding Ye, Project Manager

REGARDING Primary Cable Labeling and Grounding Check

OVERVIEW

This memo provides a description and opinion of probable costs for the 'Primary Cable Labeling and Grounding Check' project which has been recommended as a part of the Capitol Campus Utility Renewal Plan.

PROJECT DESCRIPTION

This project will provide consistent labeling to all primary cables across campus. Many primary system cables today are not labeled or are inconsistently labeled. Proper labeling which indicates the circuit number as well as the source and destination of the cable will reduce research time spent by contractors on future construction projects. This project will also verify solid ground connections throughout the campus primary system, replace all split bolt ground connections with compression type connections, and check for corrosion in the grounding system.

OPINION OF PROBABLE COSTS

The escalated project total cost, assuming construction in 2019, is $171,800. See attached 'Opinion of Probable Construction Costs' and itemized list below for backup. Itemized costs include materials, labor, and sub-contractor overhead & profit.

Primary Cable Labeling (46 vaults + 18 elec rooms, 236 hours labor + parts)	$50,000
Check Ground Connections (46 vaults + 18 elec rooms, 164 hours labor + parts)	$48,000
Construction Subtotal before sales tax:	$98,000

Reid Middleton

WA STATE DEPT OF ENTERPRISE SERVICES
PRIMARY CABLE LABELING AND
GROUNDING CHECK
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#:
Created: 09/28/2016
Updated:
Calc By: LB
Check By: ES

PRELIMINARY

M:\JOBS\16\16114\Design\Electrical\Projects and Sketches\03_Primary Cable Labeling and Ground Check\[Cost Mark-ups.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	SITE ELECTRICAL			$98,000	
SUBTOTAL				**$98,000**	
Design contingency			0%	$0	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$98,000**	
General conditions			5%	$4,900	
General contractor's OH & P			12%	$11,760	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$114,700**	
Consultant Service Fee			10%	$11,500	
Permit Fee - Allowance				$0	
DES Project Management and Support			6%	$7,600	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$133,800**	
Project Contingency			10%	$13,400	
CURRENT PROJECT TOTAL without SALES TAX				**$147,200**	
Escalation (3%/year)		3 years	9.27%	$13,600	
Sales Tax (8.8% of escalated construction cost)			8.8%	$11,000	
ESCALATED PROJECT TOTAL FOR 2019 CONSTRUCTION				**$171,800**	

SEPTEMBER 28, 2016

Capitol Campus Utility Renewal Plan
Washington State Capitol Campus
Olympia, WA 98504

ATTENTION Ding Ye, Project Manager

REGARDING Electrical Room Egress Hardware

OVERVIEW

This memo provides a description and opinion of probable costs for the 'Electrical Room Egress Hardware' project which has been recommended as a part of the Capitol Campus Utility Renewal Plan.

PROJECT DESCRIPTION

This project will upgrade the existing electrical room/vault doors with proper egress hardware, fire rating, and swing direction. Known electrical rooms lacking proper egress hardware are as follows:

1. Natural Resources Building (needs egress hardware)
2. Pritchard Building (in-swinging door)
3. Cherberg Building (needs egress hardware)
4. Power House Building (needs egress hardware)
5. General Administration Building North and South Electrical rooms (need egress hardware)
6. Office Building No. 2 (needs egress hardware)
7. Newhouse Building (in-swinging door)
8. Plaza Garage Electrical Room (needs egress hardware)
9. Greenhouse Electrical Room (needs egress hardware)

OPINION OF PROBABLE COSTS

The escalated project total cost, assuming construction in 2019, is $658,400. See attached 'Opinion of Probable Construction Costs' and itemized list below for backup. Itemized costs include materials, labor, and sub-contractor overhead & profit.

Demolition of existing doors	$44,000
New 3hr fire rated doors with egress hardware + installation	$212,000
Construction Subtotal before sales tax:	$256,000

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WA STATE DEPT OF ENTERPRISE SERVICES
ELECTRICAL ROOM EGRESS HARDWARE

PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#:
Created: 09/28/2016
Updated:
Calc By: LB
Check By: ES

PRELIMINARY

M:\JOBS\16\16114\Design\Electrical\Projects and Sketches\04_Electrical Room Egress Hardware\[Cost Mark-ups.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	DEMOLITION			$44,000	
2.0	SITE ELECTRICAL			$256,000	
SUBTOTAL				**$300,000**	
Design contingency			25%	$75,000	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$375,000**	
General conditions			10%	$37,500	
General contractor's OH & P			12%	$45,000	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$457,500**	
Consultant Service Fee			5%	$22,900	
Permit Fee - Allowance				$2,000	
DES Project Management and Support			6%	$28,800	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$511,200**	
Project Contingency			10%	$51,100	
CURRENT PROJECT TOTAL without SALES TAX				**$562,300**	
Escalation (3%/year)		3 years	9.27%	$52,100	
Sales Tax (8.8% of escalated construction cost)			8.8%	$44,000	
ESCALATED PROJECT TOTAL FOR 2019 CONSTRUCTION				**$658,400**	

SEPTEMBER 28, 2016

Capitol Campus Utility Renewal Plan
Washington State Capitol Campus
Olympia, WA 98504

ATTENTION Ding Ye, Project Manager

REGARDING Plaza Garage Electrical Room Upgrades

OVERVIEW

This memo provides a description and opinion of probable costs for the 'Plaza Garage Electrical Room Upgrades' project which has been recommended as a part of the Capitol Campus Utility Renewal Plan.

PROJECT DESCRIPTION

This project addresses several issues in the Plaza Garage electrical room as follows:

1. Replace outdated equipment: Replace the primary transformer, distribution switchgear, primary conductors, and outdated 480V & 208V electrical panels in Plaza Parking Garage electrical room. This equipment is either broken, undersized, or obsolete.

2. Add a Vista switch: A new Vista 321 switch along some minor modifications to the switch in vault PGA would add the following capabilities.
    a. Add the ability to locally select the primary circuit source in the Plaza Garage, similar to many other critical buildings throughout the campus.
    b. Add the ability to easily isolate the electrical room equipment for maintenance locally, and with a single switching event.

3. Drainage Issues: Drainage issues should be addressed in the electrical room and new equipment should be placed on pads or raised off the floor due to frequent water ingress. Temporary power will be required since most of the new electrical equipment cannot be installed until the existing equipment is demolished due to space constraints.

OPINION OF PROBABLE COSTS

The escalated project total cost, assuming construction in 2019, is $2,019,000. See attached 'Opinion of Probable Construction Costs' and itemized list on the next page for backup. Itemized costs include materials, labor, and sub-contractor overhead & profit.

Demolition	$84,000
Temporary Power	$60,000
Unit Substation	$336,000
New Vista 321 Switch and Vault PGA Switch Modifications	$72,000
Low Voltage Equipment (panels, xfmrs, etc.)	$96,000
Electrical Raceway (conduit, conductors, j-boxes, etc.)	$60,000
Replace Primary Feeders from electrical room to vault PG	$30,000
Electrical Room Drainage Improvements	$48,000
Construction Subtotal:	$783,000

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WA STATE DEPT OF ENTERPRISE SERVICES
PLAZA GARAGE ELECTRICAL ROOM UPGRADES

PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#:
Created 09/28/2016
Updated:
Calc By: LB
Check By: ES

PRELIMINARY

M:\JOBS\16\16114\Design\Electrical\Projects and Sketches\01_Plaza Garage Electrical Upgrades\[Cost Mark-ups.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	DEMOLITION			$84,000	
2.0	STORM DRAINAGE			$48,000	
3.0	SITE ELECTRICAL			$651,000	
SUBTOTAL				**$783,000**	
Design contingency			25%	$195,750	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$978,800**	
General conditions			10%	$97,880	
General contractor's OH & P			12%	$117,456	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$1,194,100**	
Consultant Service Fee			25%	$298,500	
Permit Fee - Allowance				$2,000	
DES Project Management and Support			6%	$89,600	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$1,584,200**	
Project Contingency			10%	$158,400	
CURRENT PROJECT TOTAL without SALES TAX				**$1,742,600**	
Escalation (3%/year)		3 years	9.27%	$161,600	
Sales Tax (8.8% of escalated construction cost)			8.8%	$114,800	
ESCALATED PROJECT TOTAL FOR 2019 CONSTRUCTION				**$2,019,000**	

SEPTEMBER 28, 2016

Capitol Campus Utility Renewal Plan
Washington State Capitol Campus
Olympia, WA 98504

ATTENTION Ding Ye, Project Manager

REGARDING Newhouse Building, Remove Unused Primary Cables

OVERVIEW

This memo provides a description and opinion of probable costs for the 'Newhouse Building, Remove Unused Primary Cables' project which has been recommended as a part of the Capitol Campus Utility Renewal Plan.

PROJECT DESCRIPTION

This project will remove the unused set of incoming primary cables located in the primary electrical switch room in the Newhouse Building. These cables are labeled to be from vault 'PJ' but they are unused and the MV cable terminations are hanging by a rope.

OPINION OF PROBABLE COSTS

The escalated project total cost, assuming construction in 2019, is $26,500. See attached 'Opinion of Probable Construction Costs' and itemized list below for backup. Itemized costs include materials, labor, and sub-contractor overhead & profit.

Site Investigation (verify existing conditions)	$6,000
Remove MV Cables	$6,000
Construction Subtotal before sales tax:	$12,000

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WA STATE DEPT OF ENTERPRISE SERVICES
NEWHOUSE BLDG
REMOVE UNUSED PRIMARY CABLES
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#:
Created: 09/28/2016
Updated:
Calc By: LB
Check By: ES

PRELIMINARY

M:\JOBS\16\16114\Design\Electrical\Projects and Sketches\02_Newhouse Bldg Remove MV Cable\[Cost Mark-ups.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	DEMOLITION			$12,000	
SUBTOTAL				**$12,000**	
Design contingency			10%	$1,200	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$13,200**	
General conditions			10%	$1,320	
General contractor's OH & P			12%	$1,584	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$16,100**	
Consultant Service Fee			10%	$1,600	
Permit Fee - Allowance				$2,000	
DES Project Management and Support			6%	$1,100	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$20,800**	
Project Contingency			10%	$2,100	
CURRENT PROJECT TOTAL without SALES TAX				**$22,900**	
Escalation (3%/year)		3 years	9.27%	$2,100	
Sales Tax (8.8% of escalated construction cost)			8.8%	$1,500	
ESCALATED PROJECT TOTAL FOR 2019 CONSTRUCTION				**$26,500**	

SEPTEMBER 29, 2016

Capitol Campus Utility Renewal Plan
Washington State Capitol Campus
Olympia, WA 98504

ATTENTION Ding Ye, Project Manager

REGARDING Power House MV Cable Modifications

OVERVIEW

This memo provides a description and opinion of probable costs for the 'Power House MV Cable Modifications' project which has been recommended as a part of the Capitol Campus Utility Renewal Plan.

PROJECT DESCRIPTION

This project will revise the MV cable installation in two places in the Power House Building.

Location 1: On the main floor of the Power House Building the MV cable is laying on or near the floor from the steam tunnel to the high voltage splice box (approximately 30'). This is an unsafe installation due to the close proximity to heavy equipment, tools, and stacked boxes all around the cable. The proposed installation should route the MV cable above potential impact zones and protect it from accidental impact.

Location 2: In the underfloor plenum beneath the MV equipment in the upper floor electrical room, the space is shared between medium voltage and low voltage conduit and wiring. The medium voltage cable in this space is exposed which causes an unsafe condition for those who may be working on the low voltage cabling nearby. The proposed installation should enclose the MV raceway in this space in RGS conduit and provide proper labeling to reduce the chances of accidental contact with the line.

OPINION OF PROBABLE COSTS

The escalated project total cost, assuming construction in 2022, is $76,000. See attached 'Opinion of Probable Construction Costs' and itemized list below for backup. Itemized costs include materials, labor, and sub-contractor overhead & profit.

Isolation/Switching of MV Cables (de-energizing, campus coordination)	$3,000
Main Floor MV Cable Modifications	$15,000
Upper Floor MV Cable Modifications	$8,000
Construction Subtotal:	$26,000

HARGIS

ReidMiddleton

WA STATE DEPT OF ENTERPRISE SERVICES
POWER HOUSE MV CABLE MODIFICATIONS

PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#:
Created: 09/29/2016
Updated:
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Check By: ES

PRELIMINARY

M:\JOBS\16\16114\Design\Electrical\Projects and Sketches\05_Power House MV Cable Routing\[Cost Mark-ups xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount	Notes
1.0	SITE ELECTRICAL			$26,000	
SUBTOTAL				**$26,000**	
Design contingency			25%	$6,500	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$32,500**	
General conditions			10%	$3,250	
General contractor's OH & P			12%	$3,900	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$39,700**	
Consultant Service Fee			25%	$9,900	
Permit Fee - Allowance				$2,000	
DES Project Management and Support			6%	$3,000	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$54,600**	
Project Contingency			10%	$5,500	
CURRENT PROJECT TOTAL without SALES TAX				**$60,100**	
Escalation (3%/year)		6 years	19.41%	$11,700	
Sales Tax (8.8% of escalated construction cost)			8.8%	$4,200	
ESCALATED PROJECT TOTAL FOR 2022 CONSTRUCTION				**$76,000**	

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Job#: 212016-012-001
Created: 09/09/2016
Updated: 11/08/2016
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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
CHERRY LANE DRAINAGE & UTILITY IMPROVEMENTS
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Revised Costs - 111116\[Cherry Lane Renewal.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	TEMPORARY EROSION CONTROL			$87,500
2.0	DEMOLITION			$89,600
3.0	EARTHWORK			$57,900
4.0	WATER SYSTEM			$100,100
5.0	IRRIGATION MAIN			$40,700
6.0	STORM DRAINAGE			$150,300
7.0	SITE PAVING			$367,900
8.0	SITE ELECTRICAL			$55,000
9.0	LANDSCAPING			$158,900

SUBTOTAL			**$1,107,900**
Design contingency		25%	$276,975
CONSTRUCTION SUBTOTAL without GC MARK-UPS			**$1,384,900**
General conditions		10%	$138,490
General contractor's OH & P		12%	$166,188
CURRENT CONSTRUCTION TOTAL without SALES TAX			**$1,689,600**
Consultant Service Fee		25%	$422,400
Permit Fee - Allowance			$20,000
DES Project Management& Support		6%	$126,700
CURRENT PROJECT SUBTOTAL without SALES TAX			**$2,258,700**
Project Contingency		10%	$225,900
CURRENT PROJECT TOTAL without SALES TAX			**$2,484,600**
Escalation (3%/year)	10 years	34.39%	$854,500
Sales Tax (8.8% of escalated construction cost)		8.8%	$199,800
ESCALATED PROJECT TOTAL (YEAR 2026)			**$3,538,900**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
CHERRY LANE DRAINAGE & UTILITY IMPROVEMENTS
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PRELIMINARY

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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**TEMPORARY EROSION CONTROL**				
1.01	Silt Fence	lf	500	$5.50	$2,750
1.02	Construction Entrance	ls	1	$3,000.00	$3,000
1.03	CB Filter	ea	15	$250.00	$3,750
1.04	Sediment Trap	ea	1	$5,000.00	$5,000
1.05	Treatment Train Rental & Operation	month	4	$12,000.00	$48,000
1.06	Treatment Train Mob/Setup/Demob	ls	1	$15,000.00	$15,000
1.07	Maintenance and Removal	ls	1	$5,000.00	$5,000
1.08	Water Discharge Monitoring & Test	ls	1	$5,000.00	$5,000
TOTAL EROSION CONTROL					**$87,500**
2.0	**DEMOLITION**				
2.01	Sawcut Concrete Pavement	lf	700	$2.50	$1,750
2.02	Remove Concrete Pavement	sf	19,000	$2.50	$47,500
2.03	Remove Sidewalks	sf	8,000	$2.50	$20,000
2.04	Dispose of Asphalt & Concrete Debris	cy	330	$20.00	$6,600
2.05	Remove Tree	ea	24	$300.00	$7,200
2.06	Remove Curb & Gutter	lf	1,300	$5.00	$6,500
TOTAL DEMOLITION					**$89,600**
3.0	**EARTHWORK**				
3.01	Dispose of Unsuitable	cy	2,125	$25.00	$53,125
3.02	Fine Grading	sf	19,000	$0.25	$4,750
TOTAL EARTHWORK					**$57,900**

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
CHERRY LANE DRAINAGE & UTILITY IMPROVEMENTS
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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
4.0	**WATER SYSTEM**				
4.01	Connect to Exist. Water Main - 10" Wet Tap	ea	3	$3,000.00	$9,000
4.02	12" DI Pipe, including trenching	lf	800	$70.00	$56,000
4.03	12" Tee	ea	1	$550.00	$550
4.04	12" Bend	ea	4	$350.00	$1,400
4.05	12" Valve	ea	4	$3,500.00	$14,000
4.06	Gravel Borrow for Trench Backfill	cy	450	$35.00	$15,750
4.07	Gravel for pipe bedding	cy	75	$45.00	$3,375
TOTAL WATER SYSTEM					**$100,100**
5.0	**IRRIGATION MAIN**				
5.01	Connect to Exist. Irrigation Main - 6"	ea	1	$1,000.00	$1,000
5.02	Connect to Exist. Irrigation Main - 8"	ea	2	$1,000.00	$2,000
5.03	6" Ductile Iron Pipe, incld. Trenching	lf	380	$40.00	$15,200
5.04	8" Ductile Iron Pipe, incld. Trenching	lf	100	$50.00	$5,000
5.05	6" Gate Valve	ea	1	$1,000.00	$1,000
5.06	8" Gate Valve	ea	2	$2,000.00	$4,000
5.07	6" Tee	ea	1	$350.00	$350
5.08	8" Tee	ea	1	$450.00	$450
5.09	Gravel Borrow for Trench Backfill	cy	270	$35.00	$9,450
5.10	Gravel for pipe bedding	cy	50	$45.00	$2,250
TOTAL IRRIGATION SYSTEM					**$40,700**
6.0	**STORM DRAINAGE**				
6.01	Connect to Existing System	ea	3	$500.00	$1,500
6.02	12" ADS Storm Drain Pipe, including trench	lf	700	$32.00	$22,400
6.03	18" ADS Storm Drain Pipe, including trench	lf	350	$42.00	$14,700
6.04	Catch Basin Type 1	ea	7	$1,300.00	$9,100
6.05	Catch Basin Type 2, 48-inch	ea	7	$2,700.00	$18,900
6.06	Gravel Borrow for Trench Backfill	cy	2,000	$35.00	$70,000
6.07	Gravel for pipe bedding	cy	180	$45.00	$8,100
6.08	Bioretention Garden Excavation	cy	125	$5.00	$625
6.09	Compost for Bioretention	cy	125	$40.00	$5,000
TOTAL STORM DRAINAGE					**$150,300**

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
CHERRY LANE DRAINAGE & UTILITY IMPROVEMENTS
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
7.0	**SITE PAVING**				
7.01	PCC Concrete Sidewalk	sf	11,150	$7.00	$78,050
7.02	PCC Concrete Pavement	sf	27,980	$9.00	$251,820
7.03	Concrete Curb & Gutter	lf	1,600	$20.00	$32,000
7.04	Pavement Marking	ls	1	$5,000.00	$5,000
7.05	Signs	ls	1	$1,000.00	$1,000
TOTAL SITE PAVING					**$367,900**

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
8.0	**SITE ELECTRICAL**				
8.01	Replace underground raceways and power vault lid	LS	1	$55,000.00	$55,000
TOTAL LANDSCAPING					**$55,000**

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
9.0	**LANDSCAPING**				
9.01	Planting Soil, Bioretention & Standard Planting Soil	cy	125	$45.00	$5,625
9.02	Bioretention Planters (Vertical Concrete Curbs)	sf	1,025	$30.00	$30,750
9.03	Tree	ea	50	$600.00	$30,000
9.04	Shrub& Groundcover Planting	sf	23,000	$2.50	$57,500
9.05	Irrigation	sf	23,000	$1.50	$34,500
9.06	Mulch (around Trees)	cy	15	$35.00	$525
TOTAL LANDSCAPING					**$158,900**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SOUTH CAPITOL BUILDING PARKING LOT
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/14/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[S Capitol Lot.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	TEMPORARY EROSION CONTROL			$16,600
2.0	DEMOLITION			$119,100
3.0	EARTHWORK			$73,500
4.0	WATER SYSTEM			$127,500
5.0	SANITARY SEWER SYSTEM			$10,000
6.0	TUNNEL WATERPROOFING			$28,100
7.0	STORM DRAINAGE			$63,700
8.0	SITE PAVING			$368,100
9.0	SITE ELECTRICAL			$167,000
10.0	LANDSCAPING			$101,300
SUBTOTAL				**$1,074,900**
Design contingency			25%	$268,725
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$1,343,600**
General conditions			10%	$134,360
General contractor's OH & P			12%	$161,232
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$1,639,200**
Consultant Service Fee			25%	$409,800
Permit Fee - Allowance				$20,000
DES Project Management			6%	$122,900
CURRENT PROJECT SUBTOTAL without SALES TAX				**$2,191,900**
Project Contingency			10%	$219,200
CURRENT PROJECT TOTAL without SALES TAX				**$2,411,100**
Escalation (3%/year)		4 years	12.55%	$302,600
Sales Tax (8.8% of escalated construction cost)			8.8%	$162,400
ESCALATED PROJECT TOTAL (YEAR 2020)				**$2,876,100**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SOUTH CAPITOL BUILDING PARKING LOT
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**TEMPORARY EROSION CONTROL**				
1.01	Silt Fence	lf	1,200	$5.50	$6,600
1.02	Construction Entrance	ls	1	$3,000.00	$3,000
1.03	CB Filter	ea	8	$250.00	$2,000
1.04	Miscellaneous Erosion Control Items	ls	1	$5,000.00	$5,000
TOTAL EROSION CONTROL					**$16,600**
2.0	**DEMOLITION**				
2.01	Sawcut Concrete Pavement	lf	1,000	$2.50	$2,500
2.02	Remove Concrete Pavement	sf	30,000	$2.50	$75,000
2.03	Dispose of Asphalt & Concrete Debris	cy	650	$20.00	$13,000
2.04	Abandon Manholes	ea	12	$300.00	$3,600
2.05	Abandon & Plug & Fill Utility Lines	ls	1	$10,000.00	$10,000
2.06	Traffic Control	ls	1	$10,000.00	$10,000
2.07	Remove Curb & Gutter	lf	1,000	$5.00	$5,000
TOTAL DEMOLITION					**$119,100**
3.0	**EARTHWORK**				
3.01	Dispose of Unsuitable	cy	2,500	$25.00	$62,500
3.02	Fine Grading	sf	30,000	$0.25	$7,500
3.03	Tunnel Excavation	cy	500	$7.00	$3,500
TOTAL EARTHWORK					**$73,500**
4.0	**WATER SYSTEM**				
4.01	6" Ductile Iron Pipe, incld. Trenching	lf	20	$40.00	$800
4.02	12" DI Pipe, including trenching	lf	750	$70.00	$52,500
4.03	6" Gate Valve	ea	1	$1,000.00	$1,000
4.04	12" Butterfly Valve	ea	10	$3,500.00	$35,000
4.05	12" Cross	ea	1	$700.00	$700
4.06	6"x12"x12" Tee	ea	1	$400.00	$400
4.07	12"x12"x12" Tee	ea	4	$550.00	$2,200
4.08	12" Bend	ea	2	$350.00	$700
4.09	Reducer/Adaptor, 8"x12"	ea	4	$300.00	$1,200
4.10	Reducer/Adaptor, 10"x12"	ea	2	$350.00	$700
4.10	Fire Hydrant Assembly with Storz Adaptor	ea	1	$4,500.00	$4,500
4.11	Bollard for Hydrant Protection	ea	2	$250.00	$500
4.12	Gravel Borrow for Trench Backfill	cy	650	$35.00	$22,750
4.13	Gravel for pipe bedding	cy	100	$45.00	$4,500
TOTAL WATER SYSTEM					**$127,500**

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SOUTH CAPITOL BUILDING PARKING LOT
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
5.0	**SANITARY SEWER SYSTEM**				
5.01	Vertical bend removal & reroute	ls	1	$10,000.00	$10,000
TOTAL SANITARY SEWER SYSTEM					**$10,000**
6.0	**TUNNEL WATERPROOFING**				
6.01	Tunnel Excavation	cy	250	$7.00	$1,750
6.02	6" ADS Storm Drain Pipe	lf	25	$20.00	$500
6.03	4" PVC Perforated Pipe	lf	160	$25.00	$4,000
6.04	2" Force Main, HDPE	lf	50	$15.00	$750
6.05	Sump Pump	ea	2	$250.00	$500
6.06	Catch Basin Type I	ea	2	$1,300.00	$2,600
6.07	Waterproof barrier	sf	1,600	$2.00	$3,200
6.08	Drain Backfill	cy	45	$45.00	$2,025
6.09	Filter Fabric	sy	90	$45.00	$4,050
6.10	Gravel Borrow for Backfill	cy	250	$35.00	$8,750
TOTAL SANITARY SEWER SYSTEM					**$28,100**
7.0	**STORM DRAINAGE**				
7.01	Connect to Existing System	ea	1	$500.00	$500
7.02	8" ADS Storm Drain Pipe, including trench	lf	210	$25.00	$5,250
7.03	12" ADS Storm Drain Pipe, including trench	lf	230	$32.00	$7,360
7.04	18" ADS Storm Drain Pipe, including trench	lf	325	$42.00	$13,650
7.05	6" PVC Perforated Pipe, including trench	lf	235	$25.00	$5,875
7.06	Clean Outs	ea	4	$650.00	$2,600
7.07	Catch Basin Type I	ea	3	$1,300.00	$3,900
7.08	Catch Basin Type 2, 48-inch	ea	2	$2,700.00	$5,400
7.09	Catch Basin Insert (for treatment)	ea	1	$5,000.00	$5,000
7.10	Bioretention Garden Excavation	cy	350	$5.00	$1,750
7.11	Compost for Bioretention	cy	40	$40.00	$1,600
7.12	Porous Gravel for Underdrain System	cy	35	$45.00	$1,575
7.13	Gravel Borrow for Trench Backfill	cy	260	$32.00	$8,320
7.14	Foundation Material for Pipe	cy	30	$32.00	$960
TOTAL STORM DRAINAGE					**$63,700**
8.0	**SITE PAVING**				
8.01	Overexcavation for Base Course Installation	cy	1,150	$4.50	$5,175
8.02	PCC Concrete Sidewalk	sf	1,000	$5.50	$5,500
8.03	PCC Concrete Pavement	sf	30,000	$10.00	$300,000
8.04	Color Concrete	sf	200	$11.00	$2,200
8.05	ADA Ramp	ea	2	$1,500.00	$3,000

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
SOUTH CAPITOL BUILDING PARKING LOT
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
8.06	Concrete Curb & Gutter	lf	450	$20.00	$9,000
8.07	Roadway Channelization	ls	1	$3,000.00	$3,000
8.08	Crushed Surfacing Top Course for Sidewalk	ton	130	$25.00	$3,250
8.09	Gravel Borrow for Fill	cy	1,200	$30.00	$36,000
8.10	Permanent Signing	ls	1	$1,000.00	$1,000
TOTAL SITE PAVING					**$368,100**

9.0	**SITE ELECTRICAL**				
9.01	Electrical Cost	ls	1	$167,000.00	$167,000
TOTAL SITE ELECTRICAL					**$167,000**

10.0	**LANDSCAPING**				
10.01	Planting Soil, Bioretention & Standard Planting Soil	ea	245	$45.00	$11,025
10.02	Standard Planting Soil Mix	sf	300	$45.00	$13,500
10.03	Bioretention Planters (Vertical Concrete Curbs)	sf	650	$30.00	$19,500
10.04	Planting (Shrub and Groundcover Layer)	sf	13,500	$2.50	$33,750
10.05	Lawn (Seeded, not including soil or irrig.)	sf	4,000	$0.20	$800
10.06	Mulch (PA plus trees in lawn)	cy	50	$35.00	$1,750
10.07	Trees - 3' caliper deciduous	ea	8	$600.00	$4,800
10.08	Trees - 10' ht. multi-stemmed deciduous	ea	6	$600.00	$3,600
10.09	Irrigation	sf	8,400	$1.50	$12,600
TOTAL LANDSCAPING					**$101,300**

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
WASHINGTON STREET DRAINAGE AND UTILITY IMPROVEMENTS
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Washington Street.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	TEMPORARY EROSION CONTROL			$11,100
2.0	DEMOLITION			$27,500
3.0	WATER SYSTEM			$49,400
4.0	SANITARY SEWER SYSTEM			$34,200
5.0	STORM DRAINAGE			$218,500
6.0	SITE PAVING			$96,900
7.0	SITE ELECTRICAL			$95,000
8.0	LANDSCAPING			$2,500
9.0	NATURAL GAS			$13,200
10.0	36" STORM PIPE REPLACEMENT			$27,000
SUBTOTAL				**$575,300**
Design contingency			25%	$143,825
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$719,100**
General conditions			10%	$71,910
General contractor's OH & P			12%	$86,292
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$877,300**
Consultant Service Fee			25%	$219,300
Permit Fee - Allowance				$20,000
DES Project Management& Support			6%	$65,800
CURRENT PROJECT SUBTOTAL without SALES TAX				**$1,182,400**
Project Contingency			10%	$118,200
CURRENT PROJECT TOTAL without SALES TAX				**$1,300,600**
Escalation (3%/year)		4 years	12.55%	$163,200
Sales Tax (8.8% of escalated construction cost)			8.8%	$86,900
ESCALATED PROJECT TOTAL (Year 2020)				**$1,550,700**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill
3. Site Gas Trench includes only cost for trench excavation and backfill. Design and installation of natural gas line is not included. Natural gas lines usually are designed and installed by natural gas company.
4. This Cost Estimate covers from back of sidewalk to back of sidewalk only. Retaining Wall, if any, along edge of Capitol Court parking lot is not included.

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
WASHINGTON STREET DRAINAGE AND UTILITY IMPROVEMENTS
PLANNING PHASE
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Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**TEMPORARY EROSION CONTROL**				
1.01	Silt Fence	lf	200	$5.50	$1,100
1.02	Construction Entrance	ls	1	$3,000.00	$3,000
1.03	CB Filter	ea	4	$250.00	$1,000
1.04	Sediment Trap	ea	1	$5,000.00	$5,000
1.05	Maintenance and Removal	ls	1	$1,000.00	$1,000
TOTAL EROSION CONTROL					**$11,100**
2.0	**DEMOLITION**				
2.01	Sawcut Asphalt Pavement	lf	100	$1.50	$150
2.02	Sawcut Concrete Pavement	lf	120	$2.50	$300
2.03	Remove Asphalt Pavement	sf	12,000	$1.00	$12,000
2.04	Remove Concrete Pavement	sf	360	$2.50	$900
2.05	Remove Concrete Sidewalks	sf	2,700	$2.50	$6,750
2.06	Dispose of Asphalt & Concrete Debris	cy	190	$20.00	$3,800
2.07	Abandon Manholes	ea	2	$300.00	$600
2.08	Remove Curb & Gutter	lf	600	$5.00	$3,000
TOTAL DEMOLITION					**$27,500**
3.0	**WATER SYSTEM**				
3.01	Connect to Exist. Water Main - 12" Wet Tap	ea	2	$3,000.00	$6,000
3.02	Reconnect to domestic and irrigation services	ls	1	$5,000.00	$5,000
3.03	12" Ductile Iron Pipe, incld. Trenching	lf	280	$70.00	$19,600
3.04	12" Gate Valve	ea	2	$3,500.00	$7,000
3.05	12" Tee	ea	1	$600.00	$600
3.06	12" Bend	ea	2	$400.00	$800
3.07	Gravel Borrow for Trench Backfill	cy	150	$35.00	$5,250
3.08	Gravel for pipe bedding	cy	20	$45.00	$900
3.09	Dispose of Unsuitable	cy	170	$25.00	$4,250
TOTAL WATER SYSTEM					**$49,400**

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
WASHINGTON STREET DRAINAGE AND UTILITY IMPROVEMENTS
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/09/2016
Updated: 09/30/2016
Calc By: CAD
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Washington Street.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
4.0	**SANITARY SEWER SYSTEM**				
4.01	Connect to Exist. Sewer Manhole	ea	1	$800.00	$800
4.02	8" PVC Pipe, including trench	lf	270	$35.00	$9,450
4.03	Sewer Manhole	ea	3	$3,500.00	$10,500
4.04	Gravel Borrow for Trench Backfill	cy	200	$35.00	$7,000
4.05	Gravel for pipe bedding	cy	20	$45.00	$900
4.06	Dispose of Unsuitable	cy	220	$25.00	$5,500
TOTAL SANITARY SEWER SYSTEM					**$34,200**
5.0	**STORM DRAINAGE**				
5.01	Connect to Existing System	ea	3	$500.00	$1,500
5.02	12" ADS Storm Drain Pipe, including trench	lf	400	$32.00	$12,800
5.03	18" ADS Storm Drain Pipe, including trench	lf	375	$42.00	$15,750
5.04	Underground Detention Facility	ea	1	$90,000.00	$90,000
5.05	Water Quality Facility	ea	1	$40,000.00	$40,000
5.06	LID Allowance	ea	1	$10,000.00	$10,000
5.07	Catch Basin Type 1	ea	7	$1,300.00	$9,100
5.08	Catch Basin Type 2, 48-inch	ea	3	$2,700.00	$8,100
5.09	Gravel Borrow for Trench Backfill	cy	450	$35.00	$15,750
5.10	Gravel for pipe bedding	cy	60	$45.00	$2,700
5.11	Dispose of Unsuitable	cy	510	$25.00	$12,750
TOTAL STORM DRAINAGE					**$218,500**
6.0	**SITE PAVING**				
6.01	Fine Grading	sf	15,000	$0.25	$3,750
6.02	Asphalt Pavement, Including Base, 2" over 4" Base	sf	12,000	$4.00	$48,000
6.03	PCC Concrete Sidewalk	sf	2,700	$7.00	$18,900
6.04	PCC Concrete Pavement	sf	360	$9.00	$3,240
6.05	Concrete Curb & Gutter	lf	600	$20.00	$12,000
6.06	Pavement Marking	ls	1	$5,000.00	$5,000
6.07	Signs	ls	1	$1,000.00	$1,000
6.08	Construction Traffic Control	ls	1	$5,000.00	$5,000
TOTAL SITE PAVING					**$96,900**

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
WASHINGTON STREET DRAINAGE AND UTILITY IMPROVEMENTS
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
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Calc By: CAD
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Washington Street.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
7.0	**SITE ELECTRICAL**				
7.01	New Street Lighting	ls	1	$95,000.00	$95,000
TOTAL	**SITE ELECTRICAL**				**$95,000**
8.0	**LANDSCAPING**				
8.01	Restore Disturbed areas	ls	1	$2,500.00	$2,500
TOTAL	**LANDSCAPING**				**$2,500**
9.0	**NATURAL GAS**				
9.01	Trench Excavation	cy	170	$6.00	$1,020
9.02	Dispose of Unsuitable	cy	170	$25.00	$4,250
9.03	Gravel Borrow for Backfill	cy	170	$35.00	$5,950
9.04	Coordination	ls	1	$2,000.00	$2,000
TOTAL	**GAS TRENCH**				**$13,200**
10.0	**36" STORM PIPE REPLACEMENT**				
10.01	Catch Basin inserts	ea	2	$250.00	$500
10.02	Sawcut Concrete Pavement	lf	160	$2.50	$400
10.03	Concrete Pavement Removal	sf	560	$2.50	$1,400
10.04	Remove Existing Damaged Pipe (36")	ls	1	$5,000.00	$5,000
10.05	Install New 36" pipe	lf	60	$120.00	$7,200
10.06	Storm Manhole 54"	ea	1	$3,550.00	$3,550
10.07	Connect to Existing System	ea	2	$800.00	$1,600
10.08	Gravel Borrow for Trench Backfill	cy	110	$35.00	$3,850
10.09	Gravel for pipe bedding	cy	10	$45.00	$450
10.10	Dispose of Unsuitable	cy	120	$25.00	$3,000
TOTAL	**STORM DRAINAGE**				**$27,000**

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
FIBER OPTIC MAPPING AND LINK DESIGN & CONSTRUCTION
MASTER PLAN PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#:
Created: 9/30/16
Updated: 9-30-16
Calc By: Hargis/RM
Check By: DCY

PRELIMINARY

#N/A

ESTIMATE SUMMARY

Item No.	**Description**			**Current Amount**	**Notes**
1.0	Fiber Optic Link Construction			$800,000	
SUBTOTAL				**$800,000**	
Design contingency			25%	$200,000	
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$1,000,000**	
General conditions			10%	$100,000	
General contractor's OH & P			12%	$120,000	
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$1,220,000**	
Consultant Service Fee			25%	$305,000	
Permit Fee - Allowance				$10,000	
DES Project Management & Support			6%	$91,500	
CURRENT PROJECT SUBTOTAL without SALES TAX				**$1,626,500**	
Project Contingency			10%	$162,700	
CURRENT PROJECT TOTAL without SALES TAX				**$1,789,200**	
Escalation (3%/year)		8 years	26.68%	$477,300	
Sales Tax (8.8% of escalated construction cost)			8.8%	$136,000	
ESCALATED PROJECT TOTAL (Year 2024)				**$2,402,500**	

Notes & Assumptions:

1 work scope includes:
1) Mapping existing network system & identifying problems..
2) Design and construction of a link between OB2 to Insurance Building.

2 Assumed native soil is not suitable for utility trench backfill.

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
OLD CAPITOL BUILDING FUEL TANK REPLACEMENT
PLANNING PHASE
OPINION OF PROBABLE PROJECT COSTS

Job#: 212016-012-001
Created: 09/22/2016
Updated: 09/30/2016
Calc By: BTS
Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES; Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Fuel Tank.xls]Summary

ESTIMATE SUMMARY

Item No.	Description			Current Amount
1.0	DEMOLITION			$7,000
2.0	FUEL TANK ABANDONMENT			$10,500
3.0	SITE PAVING			$11,700
4.0	TANK REPLACEMENT			$15,300
SUBTOTAL				**$44,500**
Design contingency			25%	$11,125
CONSTRUCTION SUBTOTAL without GC MARK-UPS				**$55,600**
General conditions			10%	$5,560
General contractor's OH & P			12%	$6,672
CURRENT CONSTRUCTION TOTAL without SALES TAX				**$67,800**
Consultant Service Fee			25%	$17,000
Permit Fee - Allowance				$5,000
DES Project Management			6%	$5,100
CURRENT PROJECT SUBTOTAL without SALES TAX				**$94,900**
Project Contingency			10%	$9,500
CURRENT PROJECT TOTAL without SALES TAX				**$104,400**
Escalation (3%/year)		4 years	12.55%	$13,100
Sales Tax (8.8% of escalated construction cost)			8.8%	$6,700
ESCALATED PROJECT TOTAL (YEAR 2020)				**$124,200**

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill

ReidMiddleton

WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS UTILITY RENEWAL PLAN
OLD CAPITOL BUILDING FUEL TANK REPLACEMENT
PLANNING PHASE
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 212016-012-001
Created: 09/22/2016
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Check By: DCY

PRELIMINARY

H:\21Cp\16\012 DES, Capitol Campus Utility Renewal Plan\$construction_cost\Cost Estimates - 093016\[Fuel Tank.xls]Summary

Item No.	Description	Unit	Quantity	Unit Price	Current Amount
1.0	**DEMOLITION**				
1.01	CB Filter	ea	5	$250.00	$1,250
1.02	Sawcut Concrete Pavement	lf	50	$3.50	$175
1.03	Remove Concrete Pavement	sf	1,300	$3.50	$4,550
1.04	Dispose of Asphalt & Concrete Debris	cy	20	$20.00	$400
1.05	Abandon & Plug Lines	ls	1	$500.00	$500
1.06	Remove Curb & Gutter	lf	30	$5.00	$150
TOTAL DEMOLITION					**$7,000**
2.0	**FUEL TANK ABANDONMENT**				
2.01	Contaminant Exploration	ls	1	$5,000.00	$5,000
2.02	Disconnect tank piping	ls	1	$2,500.00	$2,500
2.03	Pumping and cleaning tank	ls	1	$2,500.00	$2,500
2.04	Sand Fill	ls	1	$500.00	$500
TOTAL EARTHWORK					**$10,500**
3.0	**SITE PAVING**				
3.01	PCC Concrete Sidewalk	sf	300	$7.00	$2,100
3.02	PCC Concrete Pavement	sf	1,000	$9.00	$9,000
3.03	Concrete Curb & Gutter	lf	30	$20.00	$600
TOTAL SITE PAVING					**$11,700**
4.0	**TANK REPLACEMENT**				
4.01	Excavation	cy	20	$6.00	$120
4.02	Dispose of Unsuitable Materials	cy	20	$25.00	$500
4.02	Foundation bedding	cy	5	$45.00	$225
4.03	Gravel Borrow for backfill	cy	12	$35.00	$420
4.04	Tank, 500 gal	ls	1	$6,000.00	$6,000
4.05	Miscellaneous piping	ls	1	$2,500.00	$2,500
4.06	Connect to existing	ls	1	$2,500.00	$2,500
4.07	Electrical Allowance	ls	1	$3,000.00	$3,000
TOTAL SITE ELECTRICAL					**$15,300**

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APPENDIX E

STATE OF WASHINGTON CAPITOL

CAMPUS COMBINED HEAT AND POWER PROJECT

Investment Grade Audit

State of Washington Capitol Campus Combined Heat and Power Project

October 2016

WASHINGTON STATE CAPITOL CAMPUS – OLYMPIA WA
CAMPUS COMBINED HEAT AND POWER PROJECT

PROJECT DEVELOPMENT TEAM

- DEPARTMENT OF ENTERPRISE SERVICES (OWNER / TEAM LEAD)
- UMC ENERGY & ENVIRONMENT (ESCO)
- ZGF ARCHITECTS (PRODUCTION PLANT CONCEPTS)
- WOOD HARBINGER (PRELIMINARY CHP DESIGN)
- BN BUILDERS (PRODUCTION PLANT AND SITE WORK ESTIMATING)
- EC COMPANY (ELECTRICAL ESTIMATING)

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APPENDIX F

NOTES FROM MEETINGS WITH CITY OF OLYMPIA

ReidMiddleton

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File 212016.012.000

WA DEPARTMENT OF ENTERPRISE SERVICES

Capitol Campus Utility Renewal Plan

Meeting Minutes

Date: August 3, 2016, Time: 11:00 AM to 12:00 PM

Location: Olympia City Hall Room

Meeting Attendees:

Name	Organization	Phone #	Email Address
Ding Ye	Reid Middleton	(425) 741-3800	dye@reidmiddleton.com
Ben Sommer	Reid Middleton	(425) 741-3800	bsommer@reidmiddleton.com
Bob Bergstrom	Haozous Engineering	(206) 769-8426	bob.bergstrom@haozous.com
Matthew Miskovic	DES	(360) 407-7951	matthew.miskovic@des.wa.gov
Fran Eide	City of Olympia	(360) 753-8422	feide@ci.olympia.wa.us
Eric Christensen	City of Olympia	(360) 570-3741	echiste@ci.olympia.wa.us
Tiffani King	City of Olympia	(360) 753-8257	tking@ci.olympia.wa.us
Ned Holman	City of Olympia	(360) 753-8711	nholman@ci.olympia.wa.us

1 Meeting Objectives

1.1 Project Introduction: The design team and DES reviewed the project scope and schedule, and project requirements and expectations.

1.2 City Input

2 Project Overview

2.1 Project boundary

2.1.1 The project team outlined the boundaries of the project limits. The scope is limited to East and West Capitol Campus. The team reviewed a board identifying the project boundary limits.

2.2 Utility systems included: Water, Sewer, Stormwater, Irrigation, Electrical

2.3 Project Objectives: Identifying issues and developing improvement plans for the next 10 years on the Capitol Campus.

3 Utility Systems

3.1 Stormwater

3.1.1 There is a new drainage manual for the City. It takes effect in December of 2016. The Consultants mentioned that the hyperlink for Volume V of the manual only contains the table of contents. The City will look into it, but believe this issue was recently resolved.

3.1.2 The Consultant team discussed a couple of DES's proposed improvements on campus. The group discussed the redevelopment project located south of Sid Snyder Avenue SW, between Water Street SW and Capitol Way South. The City expressed their desire for stormwater to be separated from the combined sewer for this project. The combined sewer is at capacity in this area of the City's system.

3.2 Sanitary Sewer

3.2.1 The City stated that there isn't an issue with the system in general.

3.2.2 The City maintains ownership of the mains within Capitol Way near the campus. The main transfers to LOTT's ownership north of the campus.

3.2.3 The City is in favor of any future projects diverting stormwater flow from the combined sewer main.

3.3 Water Main

3.3.1 The Capitol Campus is located within the City's 264-foot pressure zone.

3.3.2 The City identified the separation points between DES and City services on West Capitol Campus. The City stated that there is a 10-inch diameter meter north of the intersection of Columbia Street SW and 11th Avenue SW.

3.3.3 DES has experienced water pressure issues within the building on West Capitol Campus. The Consultants reference the Capitol Campus Domestic Water Pressure Analysis. This report was completed in 2009 by McKinstry. The City requested a copy of this report for their review.

3.3.4 In 2007, a new standpipe was constructed and put into operation. The standpipe is located between the 224 and 264 pressure zones. The standpipe may have caused pressure changes.

3.3.5 The City stated that they do not want any pressure zones with higher than 80 pounds per square inch (PSI).

3.3.6 As part of the City's CIP, the City intends to construct a 16-inch diameter main within the 264 zone. The City does not intend to boost the pressure of the system with the new main.

3.3.7 The City requires 4,000 gallons per minute (GPM) for 4 hours for the Capitol Campus. Flow tests show that the flow is low than this figure. The Consultants requested the Fire Marshall's contact information. The Consultants would like to confirm the flow requirements for the campus.

3.3.8 The Consultant's requested the grid mapping for the City. The Consultant's need the maps south of campus for their review.

3.3.9 The City downloaded and provided the Consultants with a copy of the GIS for the water system.

3.4 Irrigation: The Capitol Campus system is isolated from domestic water. The City does not identify irrigation mains on campus within their GIS mapping.

3.5 Future Improvements of these systems: The Consultant team is in the preliminary stages of planning for the utility systems. Alternatives will be reviewed and assessed for capability with existing DES and City systems. The Consultant team may reach out to City staff for additional information on their system.

4 Stormwater Management Program

4.1 Secondary permittee to City

4.1.1 The City does not inspect or monitor outfalls from the Capitol Campus. It is DES's responsibility as a secondary permittee.

4.1.2 The City representatives will provide their NPDES Coordinator's contact information. The Consultant team may contact him with any questions.

4.2 General discussions of public education & outreach, maintenance, and monitoring coordination and responsibilities

4.3 The City has some differing thresholds in their drainage manual compared to the Department of Ecology. The City recommends the Consultant team is reviews this information.

4.4 The City would like a separate meeting to discuss the drainage system. The City would like to discuss plans for drainage and stormwater management in greater detail. The Consultants will coordinate with the City on the future meeting.

5 Action Items

No.	Action	Responsibility	✓
5.1	Provide the City with the Capitol Campus Domestic Water Pressure Analysis (McKinstry).	RM	
5.2	City to verify the complete version Volume V of their Drainage Design and Erosion Control Manual is downloadable.	City	
5.3	Arrange a separate meeting to discussed drainage improvements and stormwater management	RM/DES/City	
5.4	City to provide NPDES Coordinators contact information	City	

The preceding minutes are Reid Middleton's interpretation of the items discussed and the decisions reached at the meeting. Any person wishing to add or otherwise change the minutes is asked to put comments in writing to Reid Middleton no later than August 22, 2016. Otherwise, the minutes will stand as written.

Prepared by: Benjamin Sommer, Reid Middleton, Inc.

ReidMiddleton

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Everett, WA 98204
425/741-3800 (Fax 425/741-3900)

File No. 212016-012

Washington State Department of Enterprise Services
Capitol Campus Utility Renewal Plan
Project Introduction Meeting
Olympia City Hall Room 207
Thursday, August 11, 11:00 AM to 12:00 PM

Name (please print)	**Organization**	**Phone**	**e-mail**
DING YE	Reid Middleton	425-741-3800	dye@reidmiddleton.com
Fran Erdle	City of Olympia	360.753.8422	ferdle@ci.olympia.wa.us
Eric Christensen	City of Olympia	360.570.3741	echriste@ci.olympia.wa.us
NED Holman	City of Olympia	360-753-8711	nholman@ci.olympia.wa.us
Tiffani King	City of Olympia	360-753-8257	~~st~~tking@ci.olympia.wa.us
Bob Bergstrom PE	Haozous Engr (RM sub)	206-769-8426	Bob.Bergstrom@haozous.com
Ben Sommer	Reid Middleton	425-741-3800	bsommer@reidmiddleton.com
MATT MISKOVIC	WA DES	360.407.7951	MATTHEW.MISKOVIC@DES.WA.GOV
* TimRichardson	City of Olympia	360.753.8749	Trichard@ci.olympia.wa.us (Water)

* NOT IN ATTENDANCE

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WA DEPARTMENT OF ENTERPRISE SERVICES
CAPITOL CAMPUS STORMWATER DRAINAGE SYSTEM IMPROVEMENTS
MEETING MINUTES
September 15, 2016

Attendees:

Name	Phone	Organization
Mark Davis	425-741-3800	Reid Middleton
Ding Ye	425-741-3800	Reid Middleton
Jake Lund	360-753-8152	City of Olympia, Public Works
Tiffani King	360-753-8257	City of Olympia, Planning & Dev
Mathew Miskovic	360-407-7951	Dept. of Enterprise Services

Location: Room 224, Olympia City Hall

Agenda:

See Meeting Agenda attached.

Discussion:

A. Ding Ye (DY) introduced the Capitol campus drainage system focusing mostly on the West Campus. The East Campus discharges to the City drainage system through multiple discharge points; mostly from each building development. DY discussed the three existing stormwater outfalls to Capital Lake and discharge of stormwater in some areas to the existing combined sewer system.
B. Mark Davis (MD) discussed the two proposed projects that may be designed within the next ten years as part of the campus master plan.
C. The first project discussed was the Pritchard Bldg Parking lot site. The stormwater concept design involves collecting and routing stormwater from the redevelopment project to the existing 12” outfall west of the Pritchard Building. The storm pipes have sufficient capacity to handle the additional stormwater based on the preliminary calculations. A portion of the site currently is conveyed to the existing combined sewer system, but this design would divert that area to the existing outfall relieving pressure on the combined sewer system.
D. Jake Lund (JL) confirmed that Capital Lake is a flow control exempt water body and detention is not required for redevelopment within the West campus if sufficient downstream capacity is available.

E. MD discussed the proposed stormwater management at the Newhouse and Visitors Center sites. This included routing stormwater to the existing campus storm system that outfalls to the second outfall location at the northeast corner of the campus. Stormwater that is going to the combined sewer system would be routed to the dedicated storm system relieving pressure on the combined sewer system. The Visitors Center redevelopment site would require detention to attenuate peak flows to allow for adequate capacity of the downstream storm pipes.
F. JL confirmed that Capitol Lake has high phosphorous levels. The use of bioretention with underdrains is not allowed within a quarter mile of Capitol Lake because the filtration media may migrate to the lake system and contribute to the phosphorous high levels. Bioretention can be used on campus redevelopment projects more than a quarter mile from the Lake.
G. JL confirmed that LID to a Flow Control Exempt water body is not required.
H. MD stated that water quality BMPs will be used on the proposed projects.
I. JL stated that any redevelopment project will not be allowed to convey stormwater to the combined sewer system even if it currently discharges to the sewer system. The City wants to separate the stormwater and sewer systems.
J. DY discussed a proposed sanitary sewer rerouting project at the West Capitol Campus. Currently, an 8-inch sewer main servicing the O'Brien Building, the Governor's Mansion, a part of the Legislative Building, the Temple of Justice Building, and a small pump discharge from the Power/Steam Plant convey sewage north to Columbia Street through Water Street and the GA Building parking lot. The instable slope west of the Water Street endangers the sewer main. The proposed project will redirect this sewer main from 12th Ave SW across the large lawn area to the existing 10-inch combined sewer main under the North Diagonal Road. This 10-inch combined sewer main discharges to the combined sewer main in Capitol Way at the intersection of Capitol Way and 11th Ave SW. JL is concerned about the capacity of the sewer main in Capitol Way because the sewer main in Columbia St is not combined with the one in Capitol Way until several blocks north. Redirecting flows from the sewer line in Columbia St will increase loading for the main in Capitol Way. DY said the flow to be redirected is small. The Sid Snyder Way project, finished 2 years ago, alleviated approximately 230 gpm from the combined sewer system. The future Pritchard parking lot project will free up additional capacity. The 1063 Building project will direct a large amount of flow from the combined sewer areas at the campus to the newly created storm outfall as part of the project. JL feels better about the combined sewer system capacity after this explanation.
K. The ongoing 1063 Bldg project was mentioned. The project is proposing a new stormwater discharge to the existing Capital Lake outfall. This project will collect stormwater that was going to the sewer and convey it to the new storm discharge. The new storm system has been designed to convey stormwater from adjacent areas that also include portions of the West Campus lawn area.
L. DY mentioned that the Sid Snyder Way project and the ongoing 1063 Bldg project are diverting stormwater from the combined sewer system to the storm systems, thus increasing capacity in the combined sewer system.

M. JL said a scoping meeting (prior to permit submittal) is required for any project that must adhere to the 9 core requirements of the drainage manual.

Note: Sequence of discussion may differ from recorded notes. Notes are organized to consolidate common items of discussion and decisions.

These minutes are an accurate account of the items discussed to the best of my knowledge. If you observe any discrepancies or have any questions, contact me immediately at 425-741-3800.

Submitted by Mark Davis

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File No. 212013.013

WA DEPARTMENT OF ENTERPRISE SERVICES

Capitol Campus Stormwater Drainage System Improvements

Introduction Meeting Agenda

Date: September 15, 2016, Time: 10:00 AM to 11:00AM

Location: Room 224, Olympia City Hall

MEETING OBJECTIVES:

Introduction of stormwater system improvement plans for the next 10-years and learning about City's opinion and concerns.

DISCUSSION TOPICS

A. Introduction of exiting stormwater drainage systems at the capitol campus.

B. Introduction of proposed developments at the campus.

C. Discuss project improvement options related to site, utility, and drainage design

D. Discuss options and constraints related to additional runoff to combined sewer outfall (CSO)

E. Confirm flow exempt status and phosphorous levels associated with Capital Lake

F. Discuss overall Campus stormwater management program for future redevelopment meeting the requirements of the new Drainage Manual

G. Other issues & topics

ADJOURN

APPENDIX G
1063 BLOCK DRAINAGE REPORT

1063 Capitol Way Block Replacement

Storm Extension and Water Quality Design

1063 Capitol Way South
Olympia, Washington

Drainage Report – Permit Submittal

Prepared by:
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KPFF Consulting Engineers
1601 Fifth Avenue, Suite 1600
Seattle, Washington 98101

KPFF Project No. 113484

June 21, 2016

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List of Figures

Appendices

1. INTRODUCTION

This report documents the storm conveyance system for the proposed utility project that is related to the 1063 Capitol Way Block Replacement Project. This utility project also includes water quality treatment associated with the 1063 project's adjacent roadways.

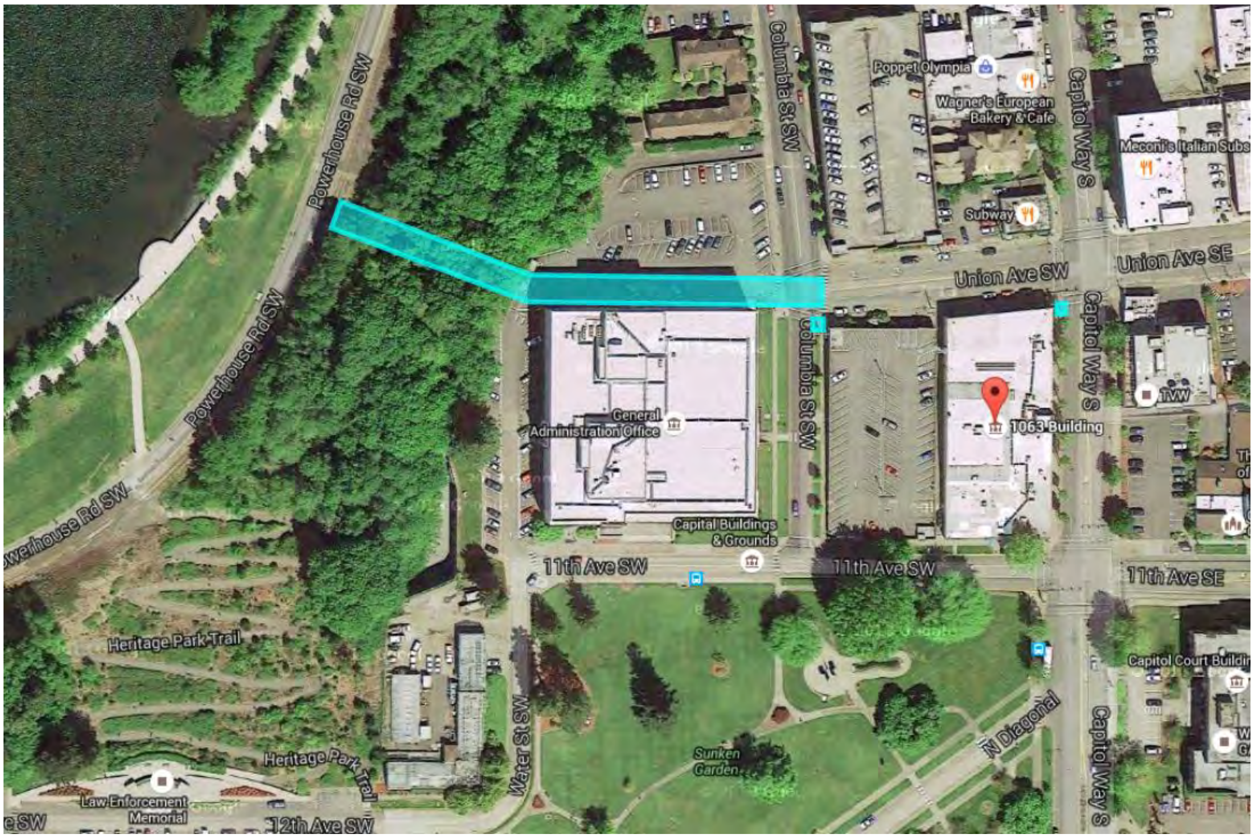


Figure 1-1: Project Site Area

The existing site discharges stormwater to two separate City of Olympia (City) systems. Approximately half of the site drains west to the public storm drain in Columbia Street Southwest, while the remaining eastern half drains to a public combined sewer in Capitol Way South. With the redevelopment of the site, contributing flows to the combined sewer are proposed to be rerouted to a designated storm system. However, in discussions with the City, the storm drain in Columbia Street Southwest is undersized and cannot take additional flows. As a result, the project proposes to install a new conveyance system to the west, within the Union Avenue Southwest alignment, ultimately discharging to an existing 36-inch culvert, which drains into Capitol Lake.

2. PROPOSED CONDITIONS

The proposed storm extension begins at the intersection of Union Avenue SW and Columbia Street Southwest. An 18-inch pipe runs west to a vault located at the northwest corner of the existing GA building. The system then splits into three 12-inch pipes that will be directional bored and connect to another vault at the toe of the slope. A 24-inch pipe runs northwesterly until connecting to an existing 36-inch culvert, which outfalls into Capitol Lake.

The conveyance system is designed to ultimately redirect approximately 7 acres out of the City's systems. At the time of installation, approximately 1.6 acres will be removed from the Capitol Way combined sewer system and approximately 1.1 acres will be removed from the constrained Columbia storm drain. In the future, when DES redevelops the GA building, approximately 4.3 acres will be removed from the constrained Columbia storm system and connect into the vault structure in the GA parking lot.

3. MINIMUM REQUIREMENTS

Since this project is an underground utility project, per the 2009 Drainage Design and Erosion Control Manual for the City of Olympia Volume I (DDECM), Section 2.2 Exemptions, the project is only subject to Minimum Requirement No. 2, Construction Stormwater Pollution Prevention.

However, since the project is moving drainage flows from a combined sewer basin into a designated storm basin on Capitol Way South, Minimum Requirement No. 6 is also required for areas contributing to Catch Basin 4A.

On a voluntary basis, DES is also electing to treat Columbia Street Southwest to meet Minimum Requirement No. 6.

MINIMUM REQUIREMENT NO. 1: PREPARATION OF STORMWATER SITE PLANS

Not applicable; however, civil stormwater plans have been prepared and are included in Appendix A.

MINIMUM REQUIREMENT NO. 2: CONSTRUCTION STORMWATER POLLUTION PREVENTION (SWPP)

Temporary Erosion and Sediment Control measures have been included on the civil stormwater plans. Best Management Practices (BMPs) included are catch basin protection and filter fabric fence. The contractor is responsible to prevent sediment-laden runoff from leaving the construction area.

MINIMUM REQUIREMENT NO. 3: SOURCE CONTROL OF POLLUTION

Not applicable.

MINIMUM REQUIREMENT NO. 4: PRESERVATION OF NATURAL DRAINAGE SYSTEMS AND OUTFALLS

Not applicable; however, the new storm system maintains the downstream receiving water body, Capitol Lake, for the storm basins being redirected and reduces area contributing to the combined sewers—a measure endorsed and encouraged by the City and the Department of Ecology (Ecology).

MINIMUM REQUIREMENT NO. 5: ON-SITE STORMWATER MANAGEMENT, INCLUDING EASEMENTS AND SETBACKS

Not applicable.

MINIMUM REQUIREMENT NO. 6: RUNOFF TREATMENT

Water quality treatment is proposed for two adjacent rights-of-way fronting the 1063 Redevelopment Project. Due to a phosphorus-sensitive downstream system (Capitol Lake) and the arterial classification of Capitol Way South, the following treatment standards need to be addressed:

- Enhanced Treatment
- Phosphorus Control

Treatment is proposed to be provided in two off-line Modular Wetland Systems (MWS) Linear Modular Wetland Facilities/Vaults. These facilities have received Ecology's General Use Level Designation (GULD) for Emerging Technologies for the following types of treatment:

- Basic Treatment
- Phosphorus Treatment
- Enhanced Treatment

Contributing areas to the treatment facilities and sizing calculations are included in Appendix B.

MINIMUM REQUIREMENT NO. 7: FLOW CONTROL

Not applicable.

MINIMUM REQUIREMENT NO. 8: WETLANDS PROTECTION

Not applicable.

MINIMUM REQUIREMENT NO. 9: BASIN/WATERSHED PLANNING

Not applicable.

MINIMUM REQUIREMENT NO. 10: OPERATIONS AND MAINTENANCE

Not applicable.

However, per discussions with the City, the proposed stormwater conveyance system will be operated and maintained by the State Capitol Campus. These items include the following:

- Catch basins
- Vault Structures SE No. 3 and SE No. 4
- Conveyance piping

Maintenance will be in accordance with the 2009 DDECM. Refer to Appendix F for operations and maintenance requirements.

The water quality facilities will be operated and maintained by the City. These items included:

- MWS Linear Wetland Vaults, WQ Vault-W and WQ Vault-E
- Note: No piping or catch basins will be maintained by the City

4. PROPOSED DRAINAGE

CONVEYANCE SYSTEM ANALYSIS AND DESIGN

The project's storm drain system is designed based on the 2009 DDECM and the Washington State's Department of Transportation 2010 Hydraulics Manual M 23-03.03 (HM).

Conveyance calculations are based on the following assumptions:

- Uniform flow and backwater analysis are provided for both the 25-year and 100-year storm events
  - Runoff Flows are based on Rational Method
  - Runoff Coefficients are based on Type D soils, assumed values:
    0.9 for Impervious Areas
    0.22 for Pervious Areas
  - Land coverage was based on survey information, site visits, and assumptions for future developments, refer to Exhibits 1 and 2 in Appendix C for assumptions.
  - 24-hour Precipitation Value:
    4.5-inches for a 25-year 24-hour event
    6-inches for a 100-year 24-hour event
  - Time of Concentration:
    5 minutes minimum for hardscaped areas
    10 minutes for forested areas
  - Tail Water:
    Mean High High Water (MHHW) of 7.16 feet, refer to Exhibit 5 in Appendix C for reference information.
- Minimum slope for pipes is based on maintaining a full-flow self-cleaning velocity of 3 feet per second.
- Conveyance capacity of drainage pipes is based on the Uniform Flow calculations for the 25-year event and the Backwater Calculations for the 100-yr event, for which the HGL is completely contained below the rim elevations of the drainage structures.
- Refer to Exhibit 3 in Appendix C for conveyance structure flow chart and Exhibit 4 in Appendix C for conveyance runoff flow calculations and pipe capacity calculations.

VAULT NO. SE3 HYDRAULIC GRADE LINE REVIEW

Due to the steep slope on the three 12-inch-diameter pipes, a detailed review of the possible hydraulic grade line is provided in Appendix D. This review addresses three possible approaches to evaluate the HGL within Vault No. SE3 for the 100-year event:

- Standard backwater analysis provided in Appendix C, ignoring approach velocity head
- Headwater depth per HW/D nomagraph
- Bernoulli's Energy Equation, two conditions reviewed:
  - Incoming pipe not submerged with max velocity
  - Incoming pipe submerged, with barrel velocity

Appendix A

Project Civil Stormwater Plans

LEGEND

EXISTING

- SET MAG NAIL W/ PLASTIC TAG MARKED "SURVEY MARKER"
- FOUND MONUMENT AS DESCRIBED
- FINISH FLOOR ELEVATION
- CATCH BASIN
- STORM MANHOLE
- SANITARY SEWER CLEANOUT
- SANITARY SEWER MANHOLE
- GAS METER
- GAS VALVE
- LIGHT POLE
- POWER JUNCTION BOX
- POWER TRANSFORMER
- POWER VAULT
- GUY ANCHOR
- POWER POLE
- POWER POLE W/LIGHT
- POWER MANHOLE
- STREET LIGHT
- TRAFFIC SIGNAL
- SPRINKLER HEAD
- FIRE HYDRANT
- WATER METER
- WATER VALVE
- WATER VAULT
- IRRIGATION VALVE BOX
- BOLLARD/POST
- SIGN
- PARKING METER
- DECIDUOUS TREE DIAMETER AS NOTED (SPECIES IF KNOWN)
- TRAFFIC ARROW
- BIKE LANE SYMBOL
- CONC. — CONCRETE
- ABAND — ABANDONED
- X-WALK — CROSS WALK
- DEC. — DECIDUOUS
- ### — SEE SURVEY CONTROL POINT TABLE
- P — UNDERGROUND POWER
- OP — OVERHEAD POWER
- T — UNDERGROUND TELEPHONE
- OT — OVERHEAD TELEPHONE
- FO — FIBER OPTIC
- G — GAS SERVICE
- W — WATER MAIN AND SERVICE
- SS — SANITARY SEWER PIPE
- SD — STORM DRAIN PIPE
- UNK — UNKNOWN BURIED UTILITY
- BUILDING LINE

PROPOSED

- EXISTING TREE TO BE REMOVED
- PROPERTY LINE
- CENTERLINE 1
- DEMOLISH/ABANDON UTILITY
- REMOVE STRIPING
- REMOVE CURB & GUTTER OR VERTICAL CURB
- CONCRETE SIDEWALK REMOVAL
- FULL DEPTH ASPHALT REMOVAL
- SAWCUT LINE
- ONSITE DEMOLITION LIMITS
- GRIND LIMITS
- SIGNIFICANT TREE APPROXIMATE CRITICAL ROOT ZONE
- TEMPORARY DRAINAGE SWALE
- SILT FENCE
- TEMPORARY CONSTRUCTION FENCE
- TOP/BOTTOM OF SLOPE
- CULVERT
- CATCH BASIN PROTECTION
- CHECK DAM
- SUMP PUMP
- SEDIMENT TANK
- STABILIZED CONSTRUCTION ENTRANCE
- 90 — CONTOUR
- XX.XX — SPOT ELEVATION
- X.XX% — SLOPE
- X — CURVE DATA NUMBER
- SIGN
- GRADE BREAK
- OVERLAY LIMIT
- 2 SD — STORM DRAIN LINE
- 5 SD — STORM, FUTURE PIPE (NIC)
- SS — SANITARY SEWER LINE
- W — DOMESTIC WATER LINE
- FS — FIRE SERVICE LINE
- GAS LINE
- PERFORATED PIPE DRAIN
- DUCT BANK
- WATER VAULT
- FIRE HYDRANT
- FIRE DEPARTMENT CONNECTION
- GAS METER
- CATCH BASIN
- SSMH
- CLEANOUT
- VALVE
- PIV
- TEE
- 90° BEND
- CONCRETE SIDEWALK, 4"
- ASPHALT OVERLAY, 2" MINIMUM
- ASPHALT PAVEMENT
- CONCRETE PAVEMENT – DRIVEWAY, 9"
- CONCRETE CURB PER COO STD DETAIL 4-14
- SIDEWALK RAMP
- PAVEMENT STRIPING

GENERAL NOTE

1. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, TRANSPORTATION, SUPPLIES, AND INCIDENTALS REQUIRED TO COMPLETE ALL WORK SHOWN ON THESE DRAWINGS AND TO OBTAIN ACCEPTANCE BY THE CITY OF OLYMPIA.
2. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH LOCAL REGULATIONS AND WITH THE 2014 EDITION OF THE CITY OF OLYMPIA EDDS AND WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION.
3. THE INTENT OF THESE DRAWINGS IS TO PRESCRIBE A COMPLETE WORK. OMISSIONS FROM THE DRAWINGS OF DETAIL OF WORK WHICH ARE NECESSARY TO CARRY OUT THE INTENT OF THE DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR FROM PERFORMING THE OMITTED WORK.
4. ANY PROPOSED ALTERATIONS BY THE CONTRACTOR AFFECTING THE REQUIREMENTS AND INFORMATION IN THESE DRAWINGS SHALL BE IN WRITING AND WILL REQUIRE APPROVAL OF THE ENGINEER AND INSPECTOR.
5. 1 OWNER AND CONTRACTOR SHALL TOGETHER COORDINATE ALL CONSTRUCTION ACTIVITIES WITH ADJACENT PROPERTY OWNERS. DRIVEWAYS AND UTILITY SERVICES SHALL REMAIN ACCESSIBLE AT ALL TIMES.
6. ALL AREAS DISTURBED BEYOND PROPOSED IMPROVEMENTS DURING CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL "PRE-CONSTRUCTION" STATE OR BETTER.
7. CONTRACTOR SHALL DETERMINE OWNER AND CITY OF OLYMPIA RECORD DRAWING REQUIREMENTS FOR BELOW GRADE UTILITIES. CONTRACTOR SHALL SCHEDULE UTILITY OBSERVATIONS BY ENGINEER PRIOR TO BACKFILLING IF ENGINEER APPROVAL OR DOCUMENTATION IS REQUIRED. KPFF WILL NOT CERTIFY/APPROVE RECORD DOCUMENTS OF WORK WE HAVE NOT OBSERVED.
8. 1 CONTRACTOR IS ALERTED TO THE FACT THAT WORK WILL BE ACCOMPLISHED AROUND ENERGIZED PSE AND CAPITOL CAMPUS FACILITIES THAT ARE SERVING EXISTING CUSTOMERS. CONTRACTOR SHALL COORDINATE WITH PSE AND CAMPUS FACILITIES GROUP TO DETERMINE WHICH FACILITIES ARE ENERGIZED AND SHALL IMPLEMENT SAFETY PROCEDURES PER THE ASSOCIATED UTILITY'S REQUIREMENTS. CONTRACTOR SHALL COORDINATE WITH PSE AND CAMPUS FACILITIES GROUP TO ENSURE THAT FACILITIES ARE IN PLACE TO MAINTAIN SERVICE TO CUSTOMERS THROUGHOUT CONSTRUCTION.
9. ALL CONSTRUCTION METHODS AND ACTIVITIES SHALL BE IN ACCORDANCE WITH THE PERMIT, FINAL PLANS, AND SPECIFICATIONS AS APPROVED BY THE CITY OF OLYMPIA. PROTECTION OF THE EXISTING FACILITIES, AND ROW'S SHALL CONSIST OF PERIMETER FENCING, HARD BARRICADES, TRAFFIC CONTROL MEASURES AND DIRECTIONAL SIGNAGE. THE CITY OF OLYMPIA AND ITS REPRESENTATIVES SHALL BE PROVIDED ACCESS TO THE WORK, AND ANY ADDITIONAL INFORMATION AS REQUIRED TO ENSURE COMPLIANCE.

UTILITIES LOCATION

1. SURVEY PROVIDED BY PARAMETRIX, DATED 2015-04-24. CONTRACTOR IS ADVISED TO VERIFY THE EXACT SIZE, DEPTH, AND LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL CALL FOR UNDERGROUND LOCATE AT 1-800-424-5555 PRIOR TO START OF CONSTRUCTION

SURVEY NOTES:

LEGAL DESCRIPTION:
PER OLD REPUBLIC NATIONAL TITLE COMMITMENT FOR TITLE INSURANCE ORDER NO. 167015E, DATED AUGUST 27, 2013.

LOTS 1, 2, 3, 4, 5, 6, 7, 8, 9, AND 10, MACKAY AND BURR'S SUBDIVISION OF BLOCK 81 OF SYLVESTER'S PLAT OF OLYMPIA, AS RECORDED IN VOLUME 8 OF PLATS, PAGE 34.
SITUATE IN THE COUNTY OF THURSTON, STATE OF WASHINGTON.

HORIZONTAL DATUM:
WASHINGTON STATE PLANE COORDINATE SYSTEM 83/91 SOUTH ZONE 4602 PER CITY OF OLYMPIA CONTROL.

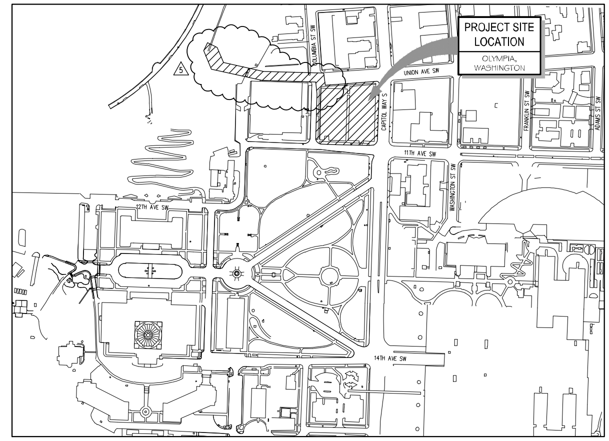
VERTICAL DATUM:
NGVD 29, PER CITY OF OLYMPIA BENCHMARKS:

NO. 1021
FOUND BRASS DISK AT THE NORTHEAST CORNER OF BASE TO ISAAC INGALLS STEVENS MONUMENT ON CAPITOL CAMPUS.
ELEV.=98.06

NO. 1174
FOUND BRASS DISK AT TOP OF CURB 15' WEST OF SOUTHWEST CORNER OF CAPITOL WAY AND UNION AVENUE.
ELEV.=77.44

ABBREVIATIONS

AD	AREA DRAIN	MW	MONITORING WELL
@	AT	N	NORTH/NORTHING
BC	BOTTOM OF CURB	NE	NORTHEAST
BLDG	BUILDING	NO./#	NUMBER
BOC	BOTTOM OF CONDUIT	NTS	NOT TO SCALE
BOV	BOTTOM OF VAULT	NW	NORTHWEST
BP	BACKFLOW PREVENTER	O.C.	ON CENTER
BS	BOTTOM OF STAIR	OWS	OIL WATER SEPARATOR
BW	BOTTOM OF WALL	P.O.C.	POINT OF CONNECTION
CB	CATCH BASIN	PD	PERIMETER DRAIN
CO	CLEAN OUT	PERF	PERFORATED
COO	CITY OF OLYMPIA	PIV	POST INDICATOR VALVE
CONC.	CONCRETE	PL	PROPERTY LINE
CONT.	CONTINUATION	PSE	PUGET SOUND ENERGY
CSBC	CRUSHED SURFACING BASE COURSE	PVC	POLYVINYL CHLORIDE
CL	CENTERLINE	R	RADIUS
DIA./ø	DIAMETER	ROW, R/W	RIGHT OF WAY
DIP	DUCTILE IRON	RT	RIGHT
E	EAST/EASTING	S	SOUTH
EDDS	ENGINEERING DESIGN & DEVELOPMENT STDS	SCH	SCHEDULE
ELEV	ELEVATION	SD	STORM DRAIN
EX, EXIST	EXISTING	SDMH	STORM DRAIN MANHOLE
FD	FOUNDATION DRAIN	SE	SOUTHEAST
FDC	FIRE DEPARTMENT CONNECTION	SHT	SHEET(S)
FFE	FINISH FLOOR ELEVATION	SNS	STREET NAME SIGN
FH	FIRE HYDRANT	SS	SANITARY SEWER
FL	FLOW LINE	SSCO	SANITARY SEWER CLEANOUT
FM	FORCE MAIN	ST	STREET
FT	FOOT/FEET	STA	STATION
GAL	GALLON	STD	STANDARD
GM	GAS METER	SW	SOUTHWEST
H, HORZ.	HORIZONTAL	TC	TOP OF CURB
HH	HANDHOLE	TEMP	TEMPORARY
HP	HIGH POINT	TESC	TEMPORARY EROSION & SEDIMENT CONTROL
IE	INVERT ELEVATION	TS	TOP OF STAIR
IN	INCHES	TW	TOP OF WALL
LF	LINEAR FEET	TYP	TYPICAL
LP	LOW POINT	UD	UNDERDRAIN
LT	LEFT	W	WEST/WATER
MAX	MAXIMUM	W/	WITH
MECH	MECHANICAL	WQ	WATER QUALITY
		WSDOE	WASHINGTON STATE DEPARTMENT OF ECOLOGY
		WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION



VICINITY MAP
N.T.S.

2 3 4 5

CIVIL DRAWING INDEX

DWG NO.	DRAWING TITLE	PERMIT/DR *
C1.00	COVER, LEGEND, & ABBREVIATIONS	#1,#2/2010
C1.10	STANDARD NOTES	#1/04
C2.10	DEMOLITION PLAN	#1/07
C3.10	TESC PLAN	#1/05
C3.50	TESC DETAILS	#1/05
C4.10	GRADING OVERVIEW PLAN	#1/10
C4.20	UNION AVE SW PLAN AND PROFILE	#1/10
C4.21	COLUMBIA ST SW PLAN AND PROFILE	#1/10
C4.22	11TH AVE SW PLAN AND PROFILE	#1/10
C4.23	CAPITOL WAY S PLAN AND PROFILE	#1/10
C4.30	UNION AVENUE SW GRADING ENLARGEMENT PLAN	#1/10
C4.31	11TH AVENUE SW GRADING ENLARGEMENT PLAN	#1/10
C4.40	CURB RAMP DETAILS	#1/10
C4.41	CURB RAMP DETAILS	#1/10
C5.10	UTILITY OVERVIEW PLAN	#1/2010
C5.20	NORTH UTILITY PLAN AND PROFILE	#1/2010
C5.21	SOUTH UTILITY PLAN AND PROFILE	#1/2010
C5.22	PLANTER DRAINAGE PLAN	#1/2010
C5.30	FOUNDATION DRAINAGE PLAN	#1/07
C5.50	UTILITY DETAILS	#1/2010
C5.55	DRAINAGE DETAILS	#1/2010
C5.60	CITY OF OLYMPIA STANDARD WATER & SEWER DETAILS	#1/10
C5.65	CITY OF OLYMPIA STANDARD DRAINAGE DETAILS	#1/10
C5.70	FOUNDATION DRAINAGE DETAILS	#1/07
C6.10	PAVING OVERVIEW PLAN	#1/10
C6.20	CAPITOL WAY S & COLUMBIA ST SW PAVING AND STRIPING PLAN	#1/10
C6.21	UNION AVE SW & 11TH AVE SW PAVING AND STRIPING PLAN	#1/10
C6.60	CITY OF OLYMPIA STANDARD PAVING DETAILS	#1/10
C6.61	CITY OF OLYMPIA STANDARD PAVING DETAILS	#1/10
C7.10	STORM DRAIN PLAN AND PROFILE	#2
C7.11	STORM DRAIN PLAN AND PROFILE	#2
C7.50	WATER QUALITY VAULT DETAILS	#2
C7.51	WATER QUALITY VAULT DETAILS	#2

* INDEX LISTS ALL PROJECT CIVIL DRAWINGS. PROJECT WILL APPLY FOR MULTIPLE PERMITS AND PLANS WILL BE SUBMITTED AS NEEDED. Y INDICATES WHETHER CIVIL PLANS HAVE BEEN SUBMITTED TO CITY OF OLYMPIA FOR PERMIT REVIEW. NUMBER INDICATES DOCUMENT RELEASE OR RFI # THAT PLAN HAS BEEN ISSUED FOR CONSTRUCTION.

#1 = CITY OF OLYMPIA ENGR PERMIT CD# 15-3574
#2 = CITY OF OLYMPIA ENGR PERMIT CD# xx-xxxx

INCLUDED FOR PERMIT SUBMITTAL

DWG NO.	DRAWING TITLE
L7.10	LANDSCAPE RESTORATION PLAN – STORMWATER
SV1	BOUNDARY AND TOPOGRAPHIC SURVEY
SV2	BOUNDARY AND TOPOGRAPHIC SURVEY
SV3	BOUNDARY AND TOPOGRAPHIC SURVEY
SV4	BOUNDARY AND TOPOGRAPHIC SURVEY
SV5	BOUNDARY AND TOPOGRAPHIC SURVEY
SV6	BOUNDARY AND TOPOGRAPHIC SURVEY
SV7	BOUNDARY AND TOPOGRAPHIC SURVEY
SV8	BOUNDARY AND TOPOGRAPHIC SURVEY

APPROVED FOR CONSTRUCTION
BY: ______ Date: ______
APPROVAL EXPIRES: ______

Call 811 two business days before you dig

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ZIMMER GUNSUL FRASCA ARCHITECTS LLP

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1601 5th Ave, Suite 1600
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600 University St., Suite 500
Seattle, WA 98101
T 206-342-9900

ELECTRICAL ENGINEER
Gerber Engineering
307 3rd Ave South, Suite 510
Seattle, WA 98104
T 206-405-3510

LANDSCAPE ARCHITECT
Site Workshop
222 Etruria St., Suite 200
Seattle, Wa 98109
T 206-285-3026

Revisions

	DOC REL 04	7/31/2015
1	DOC REL 05	10/15/2015
2	DOC REL 07	12/18/2015
3	DOC REL 10	3/31/2016
4	RFI 2010	5/20/2016
5		

PERMIT SUBMITTAL

Washington State Department of Enterprise Services

1063 CAPITOL WAY BLOCK REPLACEMENT PROJECT

106 11th Avenue Southwest
Olympia, Washington 98501

Drawing Title

COVER, LEGEND, & ABBREVIATIONS

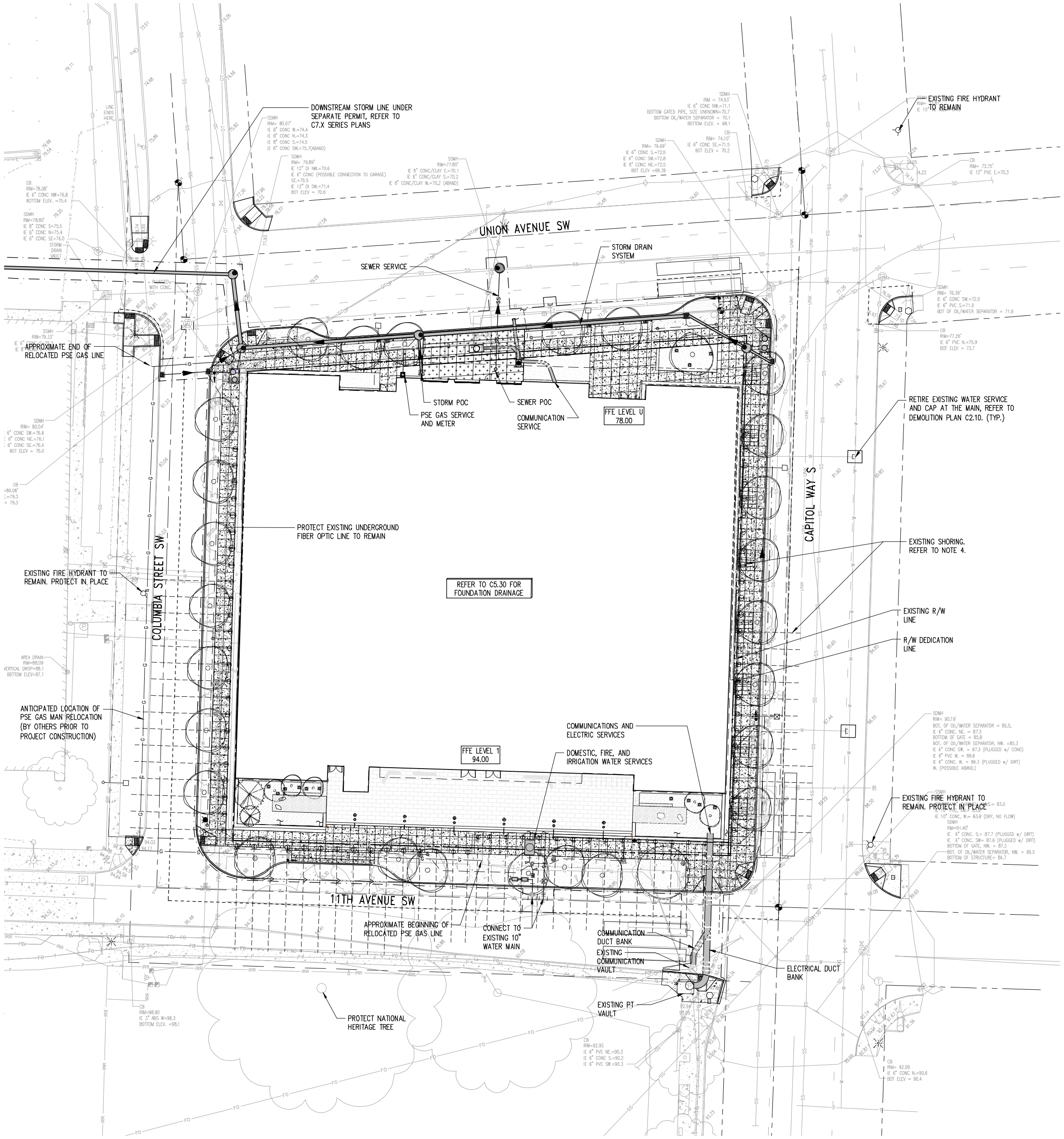
MARK A. VELDEE
STATE OF WASHINGTON
24711
REGISTERED PROFESSIONAL ENGINEER

Date: 21 JUNE, 2016
Job No: 22070
Drawn By: KMB
Checked By: JS

Drawing No.

C1.00

ENGR PERMIT #2



LEGEND

SD	STORM DRAIN LINE
SS	SANITARY SEWER LINE
W	DOMESTIC WATER LINE
FS	FIRE SERVICE LINE
G	GAS LINE
	PERFORATED DRAIN PIPE
	DUCT BANK
	WATER VAULT
	EXISTING FIRE HYDRANT
	PROPOSED FIRE HYDRANT
	FIRE DEPARTMENT CONNECTION, WALL MOUNTED
	GAS METER
	CATCH BASIN
	SSMH
	CLEANOUT
	VALVE
	PIV
	TEE
	90° BEND
BOC	BOTTOM OF CONDUIT
UD	UNDERDRAIN
FD	FOUNDATION DRAIN
PD	PERIMETER DRAIN
	DIRECTION OF FLOW

NOTES

1. REFER TO C5.20 & C5.21 FOR ENLARGED PLANS. FOR PAVING, STRIPING INFORMATION, REFER TO C6.10. FOR HORIZONTAL CONTROL INFORMATION, REFER TO C4.10.
2. REFER TO C5.50–C5.60 FOR UTILITY AND DRAINAGE DETAILS.
3. REFER TO LANDSCAPE AND ELECTRICAL PLANS FOR STREET AND PEDESTRIAN LIGHTING
4. SHORING AND TIEBACKS USED TO EXCAVATE FOR BUILDING STRUCTURE REMAIN BURIED AROUND THE PERIMETER OF THE SITE AS SHOWN ON THE PLANS. SOLDIER PILES SHALL BE CUT TO 4–FT BELOW FINISHED GRADE AND TIEBACKS SHALL BE DISTRESSED.
5. FOR ALL CATCH BASINS, CONTRACTOR SHALL ADD CITY OF OLYMPIA ANTI-DUMPING MESSAGE CURB MARKER PER EDDS CH 5.027.
6. ORIENT ALL LIDS PER PLAN.

Call 811 two business days before you dig

ZGF
ZIMMER GUNSUL FRASCA ARCHITECTS LLP

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Revisions

	DOC REL 10	3/31/2016
1	RFI 2010	5/20/2016

FOR REFERENCE ONLY

PERMIT CD #15-3574

Washington State Department of Enterprise Services

1063 CAPITOL WAY BLOCK REPLACEMENT PROJECT

106 11th Avenue Southwest
Olympia, Washington 98501

Drawing Title

UTILITY OVERVIEW PLAN

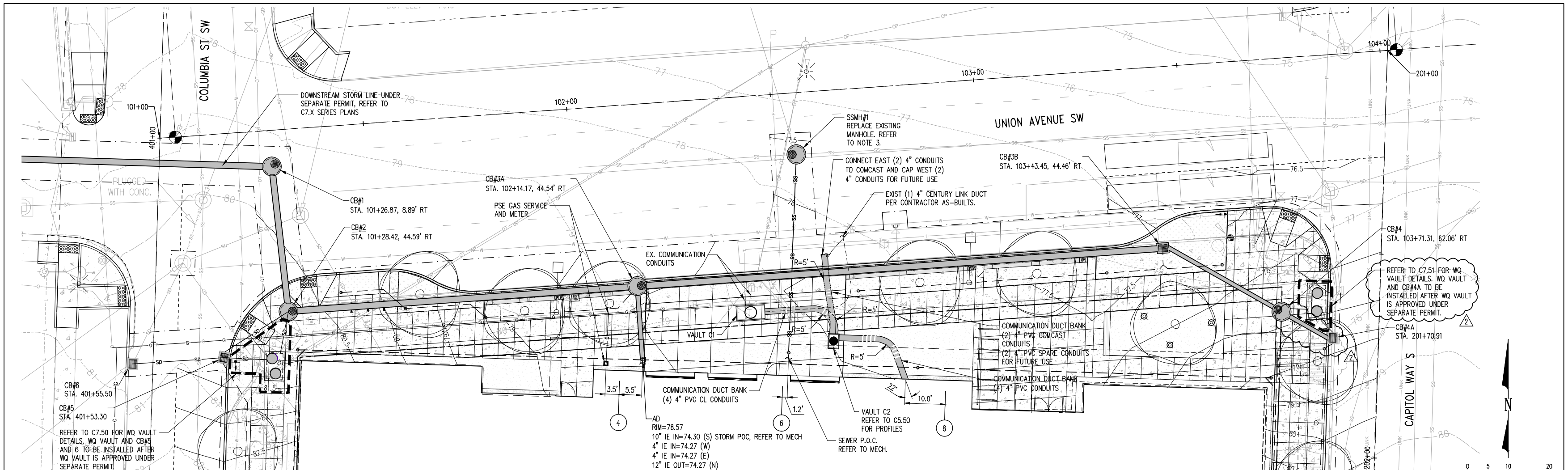
MARK A. VELDEE STATE OF WASHINGTON 24711 REGISTERED PROFESSIONAL ENGINEER

Date: 21 JUNE, 2016
Job No: 22070
Drawn By: KMB
Checked By: JS

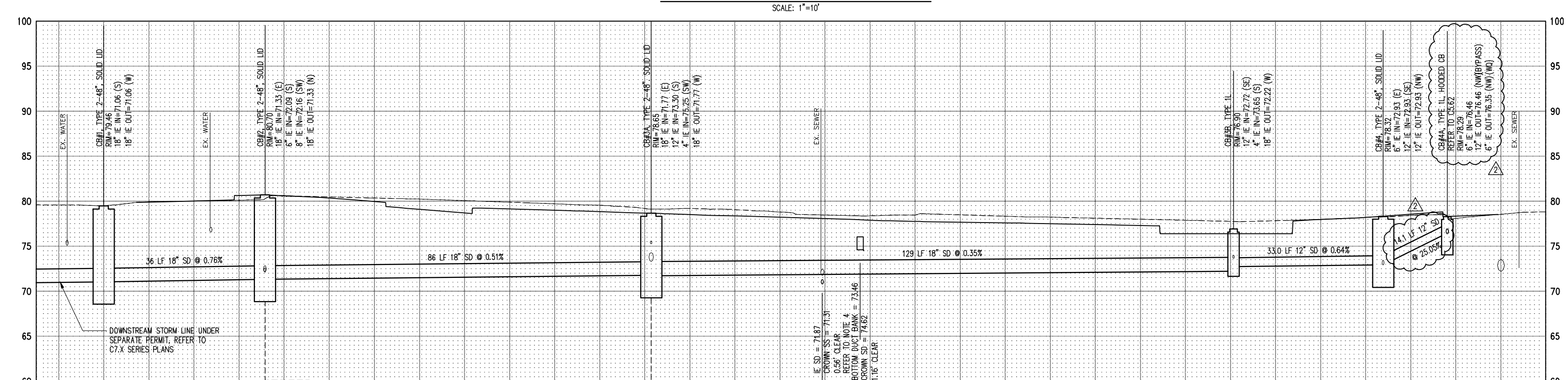
Drawing No.

C5.10

ENGR PERMIT #2



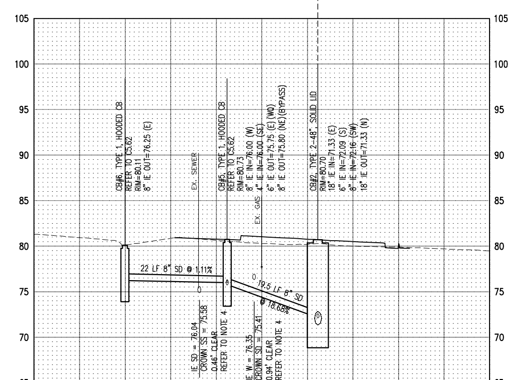
NORTH UTILITY
PLAN
SCALE: 1"=10'



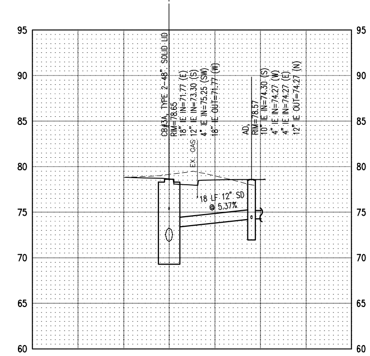
STORM DRAIN
PROFILE
HORIZ: 1"=10', VERT: 1"=5'

NOTES

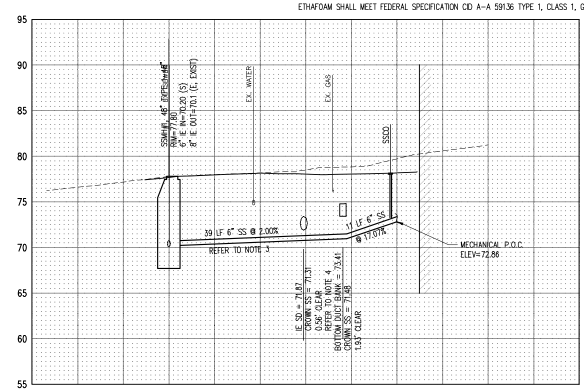
1. UTILITY PROFILES ARE CUT AND STATIONED ALONG HORIZONTAL CENTERLINE OF UTILITY.
2. REFER TO C5.10 FOR GENERAL NOTES AND LEGEND.
3. SEWER PIPE FROM BUILDING TO SSMH #1 SHALL BE OWNED AND MAINTAINED BY THE PROPERTY OWNER. SSMH #1 SHALL BE OWNED AND MAINTAINED BY COO.
4. PROVIDE ETHAFOAM FOR CLEARANCES BETWEEN UTILITIES OF LESS THAN 6-INCHES OR AS NOTED. ETHAFOAM SHALL MEET FEDERAL SPECIFICATION CID A-A 59136 TYPE 1, CLASS 1, GRADE A.



STORM DRAIN
PROFILE
HORIZ: 1"=10', VERT: 1"=5'



STORM DRAIN
PROFILE
HORIZ: 1"=10', VERT: 1"=5'



SEWER SERVICE
PROFILE
HORIZ: 1"=10', VERT: 1"=5'

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Revisions

	DCC/REL 10	3/31/2016
1	RFI 2010	5/20/2016
2		

FOR REFERENCE ONLY
PERMIT CD #15-3574

Washington State Department of Enterprise Services

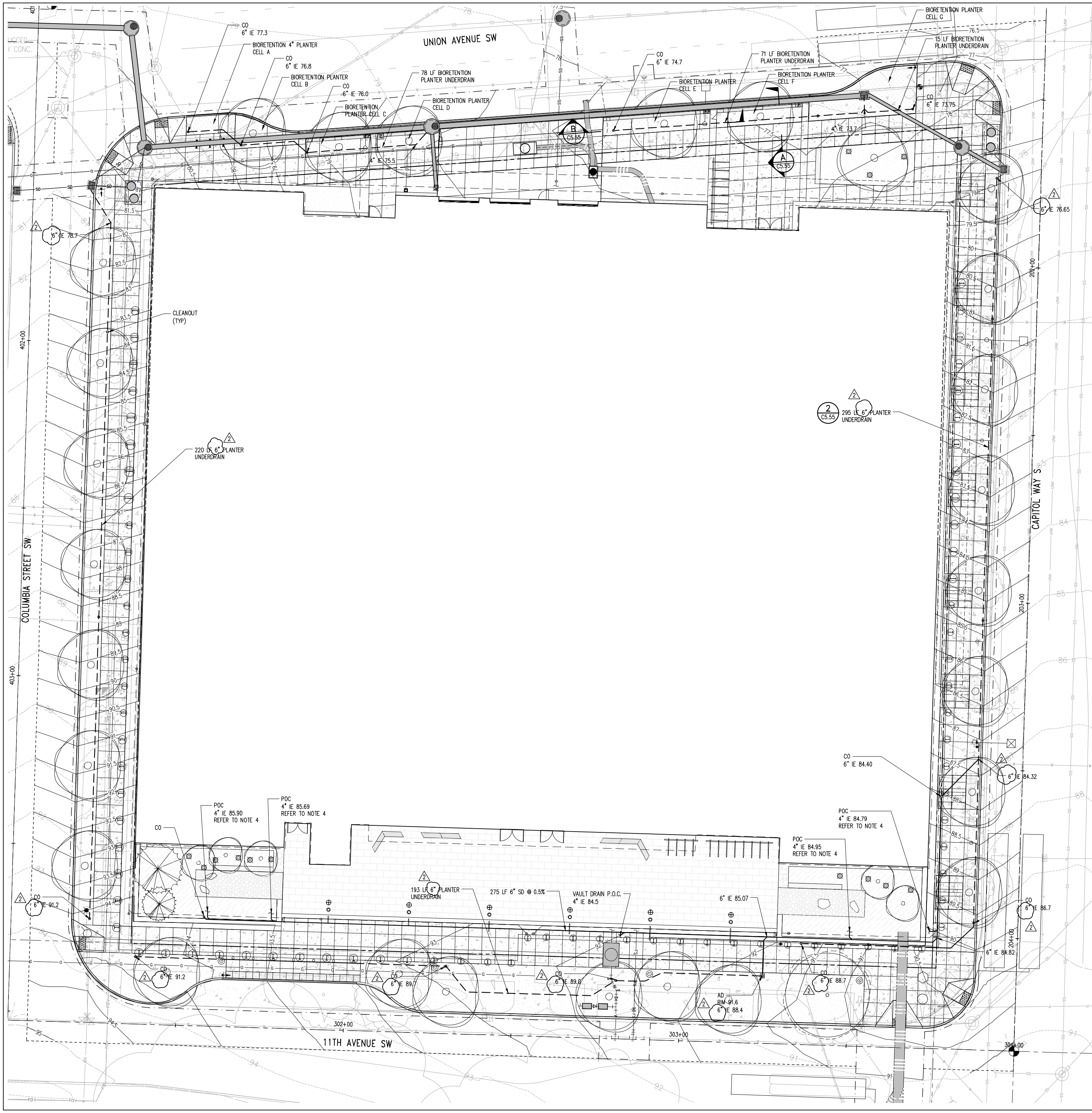
1063 CAPITOL WAY BLOCK REPLACEMENT PROJECT
106 11th Avenue Southwest
Olympia, Washington 98501

Drawing Title
NORTH UTILITY PLAN AND PROFILE

Date:	21 JUNE, 2016
Job No:	22070
Drawn By:	KMB
Checked By:	JS

Drawing No.
C5.20

ENGR PERMIT #2



N

0 5 10 20
1 inch = 10 feet

LEGEND

•	CLEANOUT, CO
— — —	UNDERDRAIN PIPE

NOTES

1. BIORETENTION PLANTER UNDERDRAINS SHALL HAVE 2.5-FT MIN. COVER UNLESS OTHERWISE INDICATED, AND SHALL SLOPE AT 0.5% MIN TO MAINTAIN POSITIVE DRAINAGE.
2. PLANTER UNDERDRAINS SHALL HAVE 2.5-FT MIN. COVER, UNLESS OTHERWISE INDICATED, AND SHALL SLOPE AT 0.5% MIN TO MAINTAIN POSITIVE DRAINAGE.
3. VAULT UNDERDRAINS SHALL SLOPE AT 0.5% MIN. TO MAINTAIN POSITIVE DRAINAGE.
4. CONNECT TO ARCHITECTURAL DRAIN MAT OUTLET.

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Revisions

	DOC REL 10	3/31/2016
1	RFI 2010	5/20/2016
2		

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Washington State Department of Enterprise Services

1063 CAPITOL WAY BLOCK REPLACEMENT PROJECT

106 11th Avenue Southwest
Olympia, Washington 98501

Drawing Title

PLANTER DRAINAGE PLAN

Date:	21 JUNE, 2016
Job No:	22070
Drawn By:	KMB
Checked By:	JS

Drawing No.

C5.22

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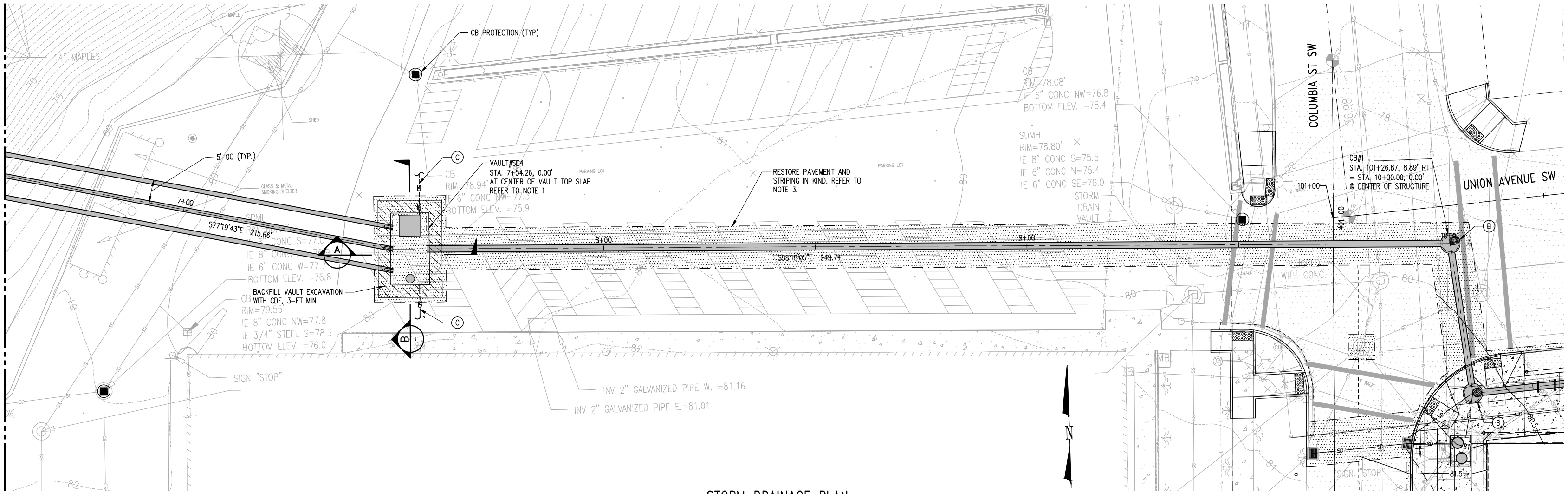
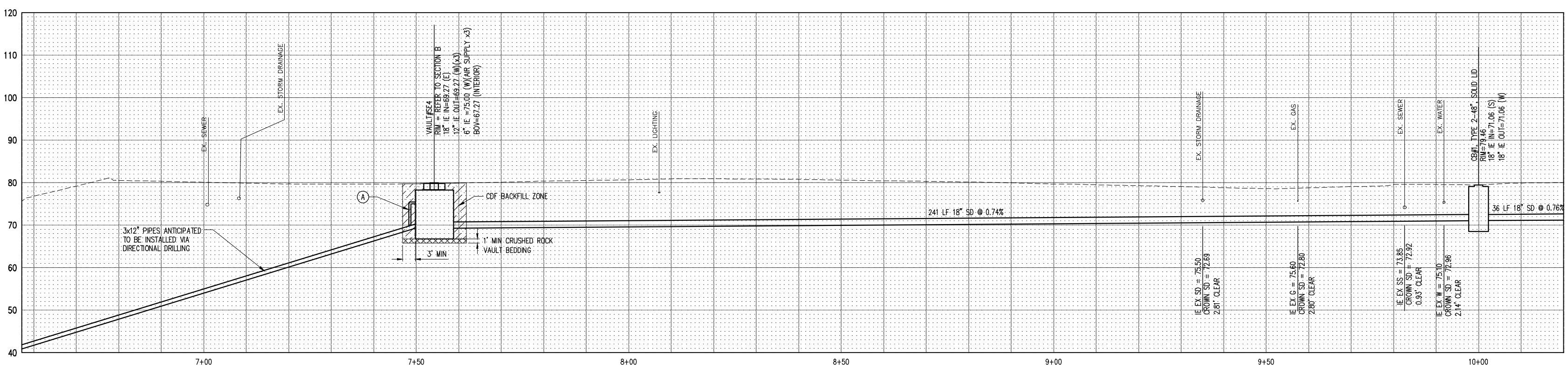
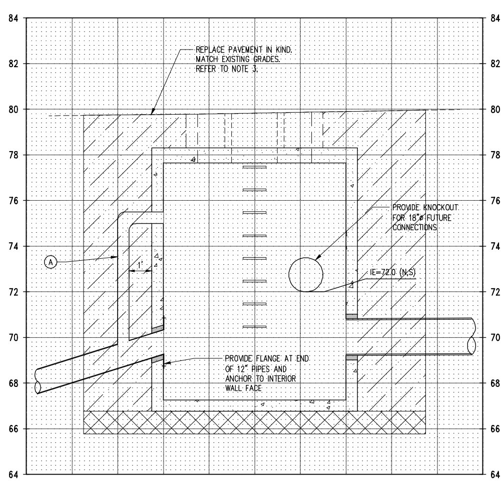


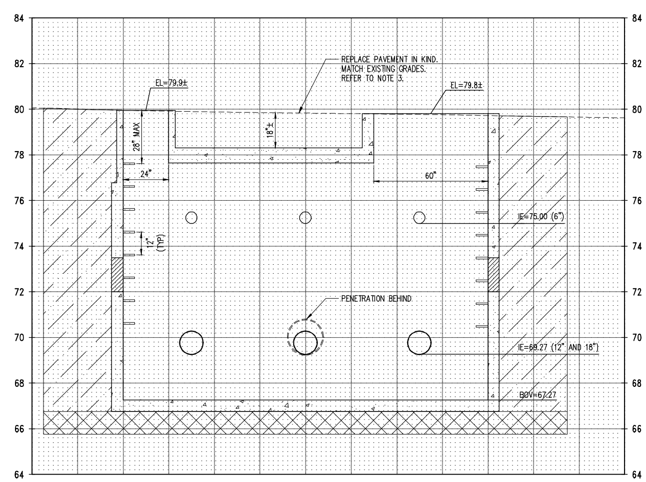
STORM DRAINAGE PLAN
SCALE: 1"=10'



STORM DRAINAGE PROFILE
HORIZ: 1"=10', VERT: 1"=10'



VAULT#SE4 - SECTION A
HORIZ: 1"=2', VERT: 1"=2'



VAULT#SE4 - SECTION B
HORIZ: 1"=2', VERT: 1"=2'

NOTES

1. VAULTS SHALL BE OLD CASTLE PRECAST 816 VAULT AND SHALL BE 8'W x 16'L. DEPTH PER PLAN AND SECTION.
2. PROVIDE 1-5x5 H20 METAL OPEN GRATING AND LOCKING ACCESS HATCH WITH FRAME AND 1-24" ROUND SOLID LOCKING LID AND FRAME FOR VAULT ACCESS. STEPS OR LADDERS SHALL BE PER WSDOT STD PLAN B-30.90-01.
3. PAVEMENT RESTORATION SHALL MATCH EXISTING GRADES.

(A) PROVIDE 6" AIR SUPPLY PIPE (HDPE). CONNECT TO TOP OF OUTLET PIPE 1-FT FROM STRUCTURE WALL.

(B) REFER TO C5.20 FOR STORM SYSTEM INFORMATION, PERMITTED UNDER COO ENGR. PERMIT CD # 15-3574.

(C) PROVIDE KNOCKOUTS FOR FUTURE 18"# PIPE CONNECTIONS. MAX TOTAL ADDITIONAL CONTRIBUTING AREA SHALL BE NO MORE THAN 4.3 ACRES, FOR A MAX TOTAL ADDITIONAL 100-YR FLOW RATE OF 9 CFS.

TESC NOTES

1. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND MODIFYING EROSION CONTROL FACILITIES AS NECESSARY AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT FROM LEAVING THE SITE. ALL BMP'S SHALL CONFORM TO COO, THURSTON COUNTY, AND DOE REQUIREMENTS.
2. CONTRACTOR SHALL PROTECT TEMPORARY STOCK PILES WITH PLASTIC COVERING PER C3.50, DETAIL 7, TO PREVENT EROSION AND GENERATION OF SEDIMENT LADEN RUNOFF.

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Revisions

PERMIT SUBMITTAL

Washington State Department of Enterprise Services

1063 CAPITOL WAY BLOCK REPLACEMENT PROJECT

106 11th Avenue Southwest
Olympia, Washington 98501

Drawing Title

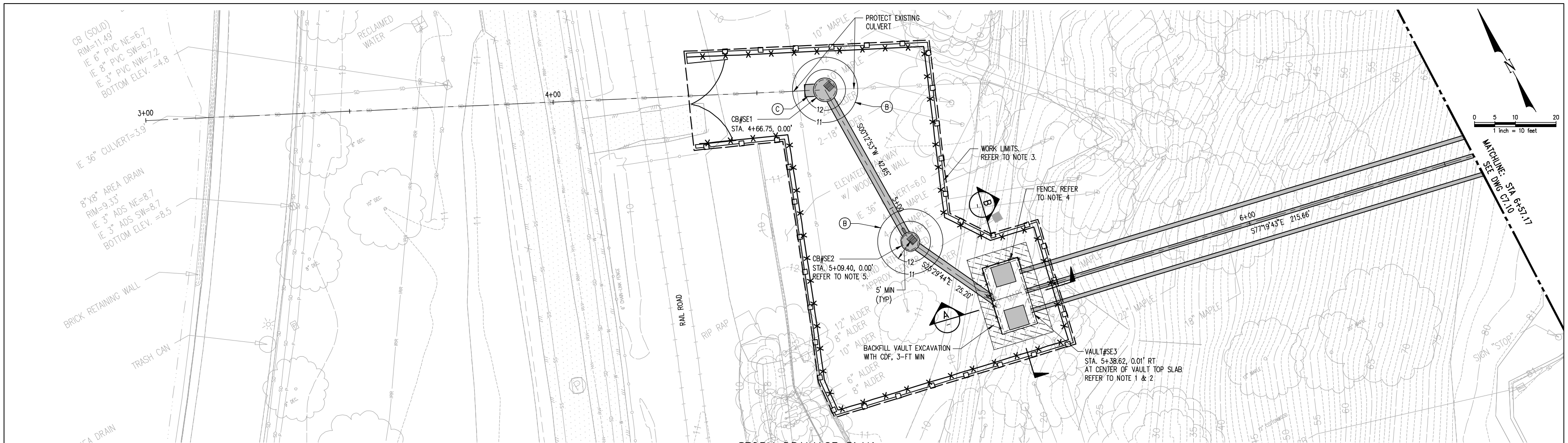
STORM DRAINAGE PLAN AND PROFILE

Date:	21 JUNE, 2016
Job No:	22070
Drawn By:	KMB
Checked By:	JS

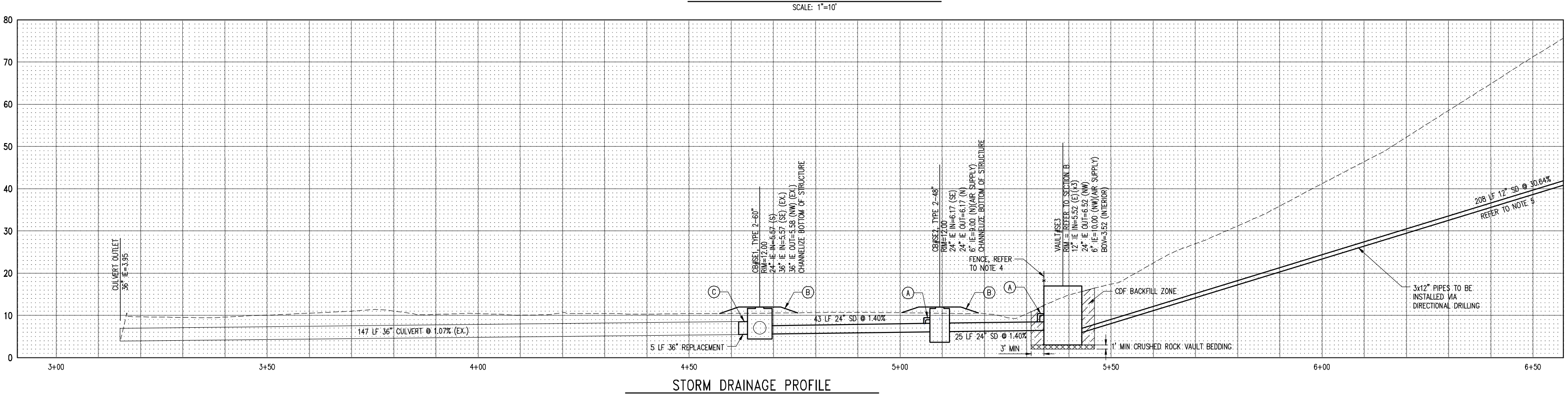
Drawing No.

C7.10

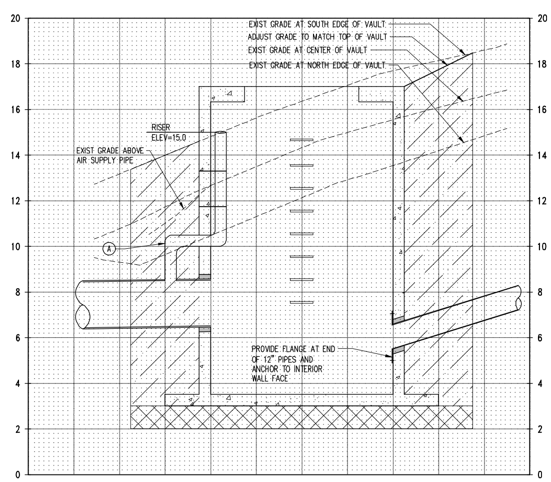
ENGR PERMIT #2



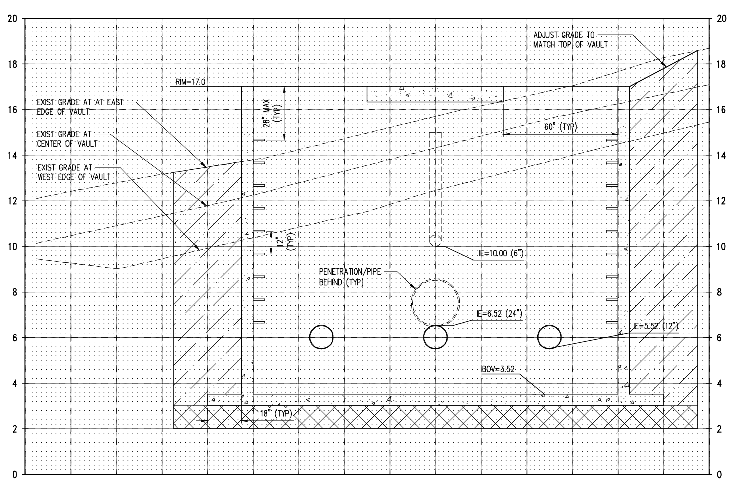
STORM DRAINAGE PLAN
SCALE: 1"=10'



STORM DRAINAGE PROFILE
HORIZ: 1"=10', VERT: 1"=10'



VAULT#SE3 - SECTION A
HORIZ: 1"=2', VERT: 1"=2'



VAULT#SE3 - SECTION B
HORIZ: 1"=2', VERT: 1"=2'

NOTES

1. VAULTS SHALL BE OLD CASTLE PRECAST 816 VAULT AND SHALL BE 8'W x 16'L. DEPTH PER PLAN AND SECTION.
2. PROVIDE 2-5x5 METAL OPEN GRATING AND LOCKING ACCESS HATCHES WITH FRAME FOR VAULT ACCESS. STEPS OR LADDERS SHALL BE PER WSDOT STD PLAN B-30.90-01.
3. RESTORE AND STABILIZE ALL AREAS DISTURBED WITH VAULT, CATCH BASIN, AND PIPE INSTALLATION PER L7.10.
4. PROVIDE FENCING ATTACHED TO VAULT TO PROVIDE PROTECTION WHERE TOP OF VAULT TO FINISHED GRADE IS MORE THAN 30-INCHES. FENCING SHALL BE 42-IN MIN HEIGHT AND SHALL BE CHAIN LINK PER WSDOT STD PLAN L-20.10-03.
5. LENGTH OF PIPE IS LINEAR FOOTAGE OF CENTER PIPE. ACTUAL LENGTHS WILL BE LONGER. PIPE SHALL BE HDPE SDR 11, WITH BUTT WELDED JOINTS.

(A) PROVIDE 6" AIR SUPPLY PIPE (HDPE). CONNECT TO TOP OF OUTLET PIPE 1-FT FROM STRUCTURE WALL.

(B) FILL/MODIFY GRADES TO PROVIDE COVER AT STRUCTURE. 3H:1V MAX SLOPE.

(C) REPLACE EXISTING CULVERT. MATCH SLOPE AND FLOW LINE.

TESC NOTES

1. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND MODIFYING EROSION CONTROL FACILITIES AS NECESSARY AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT FROM LEAVING THE SITE. ALL BMP'S SHALL CONFORM TO COO, THURSTON COUNTY, AND DOE REQUIREMENTS.
2. CONTRACTOR SHALL PROTECT TEMPORARY STOCK PILES WITH PLASTIC COVERING PER C3.50, DETAIL 7, TO PREVENT EROSION AND GENERATION OF SEDIMENT LADEN RUNOFF.

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Washington State Department of Enterprise Services

1063 CAPITOL WAY BLOCK REPLACEMENT PROJECT

106 11th Avenue Southeast
Olympia, Washington 98501

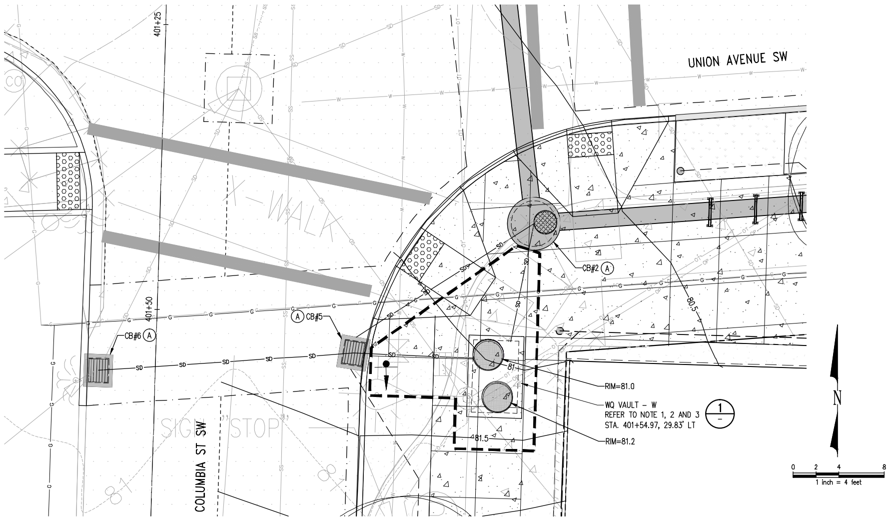
Drawing Title:
STORM DRAINAGE PLAN AND PROFILE

Date:	21 JUNE, 2016
Job No:	22070
Drawn By:	KMB
Checked By:	JS

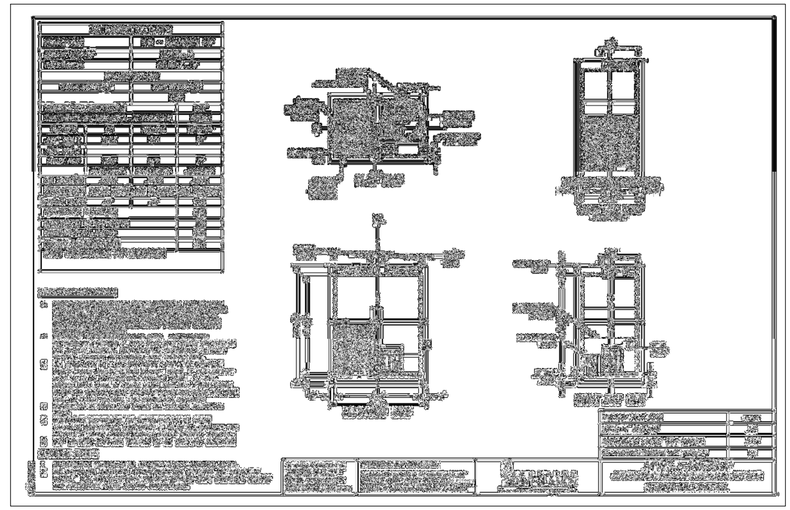
Drawing No.

C7.11

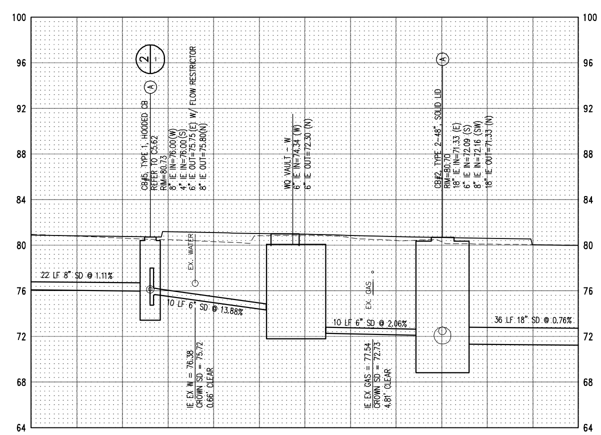
ENGR PERMIT #2



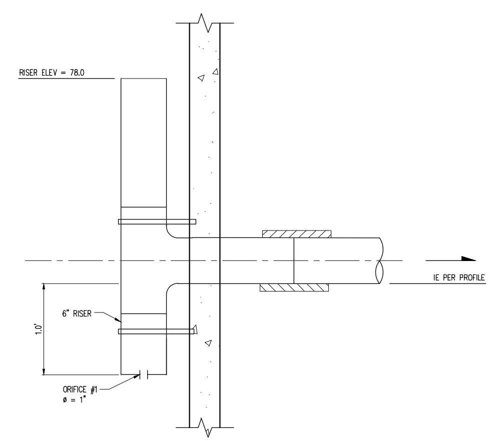
PLAN
SCALE: 1"=4'



WQ VAULT – W
MODULAR WETLAND DETAIL
RECEIVED ON 2016-06-03
1



PROFILE
HORIZ: 1"=4', VERT: 1"=4'



FLOW RESTRICTOR DETAIL
SCALE: 1"=0.5'
2

NOTES

1. CONTRACTOR SHALL INSTALL VAULT PER MANUFACTURER'S REQUIREMENTS AND DETAIL.
2. WATER QUALITY VAULT TO BE MAINTAINED BY CITY OF OLYMPIA. PROPERTY OWNER/DES TO MAINTAIN ALL REMAINING PIPING AND STRUCTURES THAT CONNECT TO THE WATER QUALITY VAULT.
3. RIM ELEVATIONS ARE AT CENTER OF LID. ADJUST LIDS TO BE FLUSH WITH PROPOSED ADJACENT SIDEWALK GRADES.

(A) REFER TO C5.20 FOR STORM SYSTEM INFORMATION, PERMITTED UNDER COO ENGR. PERMIT CD # 15-3574.

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Washington State Department of Enterprise Services

1063 CAPITOL WAY BLOCK REPLACEMENT PROJECT

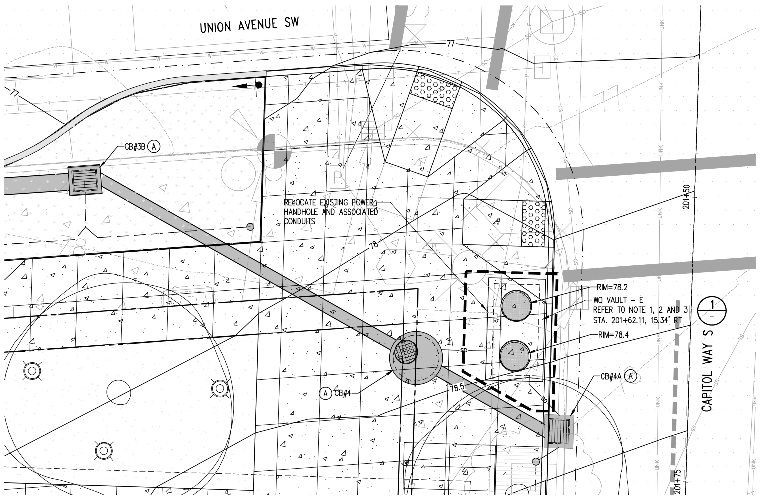
106 11th Avenue Southwest
Olympia, Washington 98501

Drawing Title
WATER QUALITY VAULT DETAILS

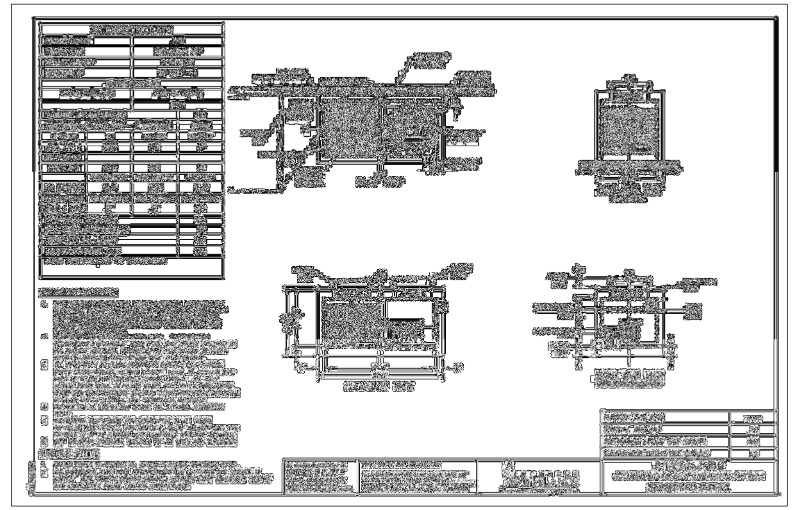
Date:	21 JUNE, 2016
Job No:	22070
Drawn By:	KMB
Checked By:	JS

Drawing No.
C7.50

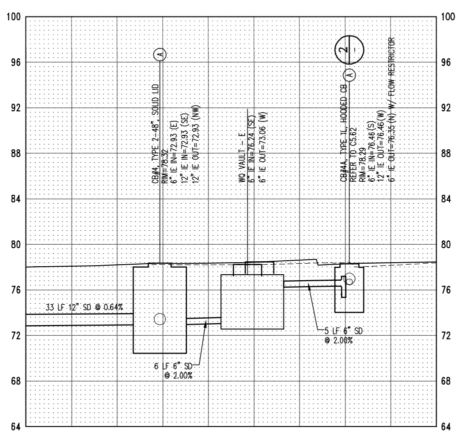
ENGR PERMIT #2



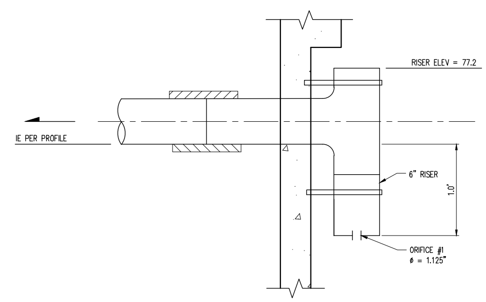
PLAN
SCALE: 1"=4'



WQ VAULT - E
MODULAR WETLAND DETAIL
RECEIVED ON 2016-06-03



PROFILE
HORIZ: 1"=4', VERT: 1"=4'



FLOW RESTRICTOR DETAIL
SCALE: 1"=0.5'

NOTES

1. CONTRACTOR SHALL INSTALL VAULT PER MANUFACTURER'S REQUIREMENTS AND DETAIL.
2. WATER QUALITY VAULT TO BE MAINTAINED BY CITY OF OLYMPIA PROPERTY. OWNER/DES TO MAINTAIN ALL REMAINING PIPING AND STRUCTURES THAT CONNECT TO THE WATER QUALITY VAULT.
3. RIM ELEVATIONS ARE AT CENTER OF LID. ADJUST LIDS TO BE FLUSH WITH PROPOSED ADJACENT SIDEWALK GRADES.

(A) REFER TO C5.20 FOR STORM SYSTEM INFORMATION, PERMITTED UNDER COO ENGR. PERMIT CD # 15-3574.

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Washington State Department of Enterprise Services

1063 CAPITOL WAY BLOCK REPLACEMENT PROJECT

106 11th Avenue Southwest
Olympia, Washington 98501

Drawing Title

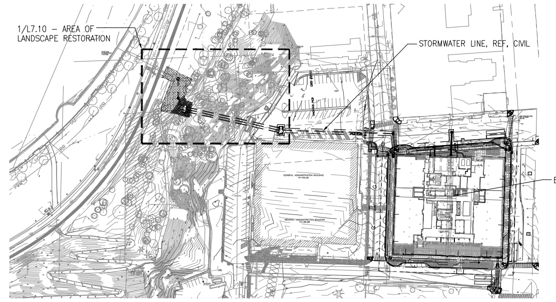
WATER QUALITY VAULT DETAILS

Date:	21 JUNE, 2016
Job No:	22070
Drawn By:	KMB
Checked By:	JS

Drawing No.

C7.51

ENGR PERMIT #2



KEY PLAN
SCALE: 1" = 100'-0"

0 50 100 200 400 FT

LEGEND

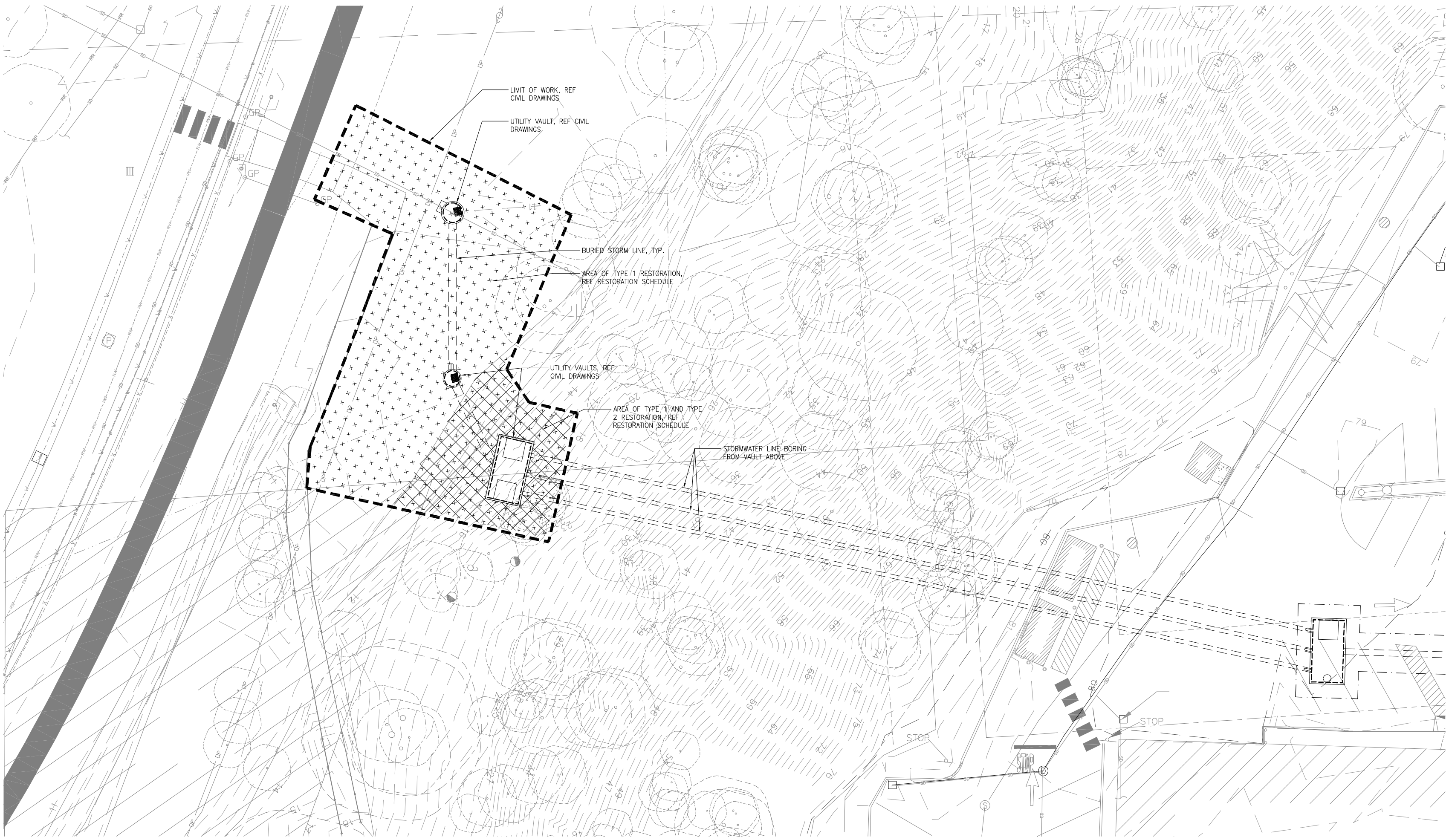
TYPE 1 RESTORATION: PROVIDE HYDROSEED RESTORATION PER WSDOT STANDARD SPECIFICATION 8-01.3 AND 9-14, WITH SEED MIX PER TABLE 4.1.5 "BIORETENTION SEED MIX" IN THE DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON

TYPE 2 RESTORATION: PROVIDE BIODEGRADABLE EROSION CONTROL BLANKET PER WSDOT 9-14.5, AND, 1 GAL GAULTHERIA SHALLON AT 3' O.C., EACH TO BE INSTALLED PRIOR TO HYDROSEED

LIMIT OF WORK LINE

NOTES

1. FOR TESC, REF CIVIL DRAWINGS.
2. AREA OF RESTORATION IS SHOWN IN PLAN AS EXTENDING TO LIMITS OF DISTURBANCE. IF FIELD CONDITIONS CHANGE THAT AREA OF DISTURBANCE, CONTRACTOR TO PROVIDE TYPE 1 AND TYPE 2 RESTORATION, AS REQUIRED TO RESTORE ALL DISTURBED SOILS.



1 LANDSCAPE RESTORATION PLAN - STORMWATER
SCALE: 1" = 10'-0"

0 5 10 20 40 FT

3/24/2015 4:35:20 PM

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Revisions

ENGR PERMIT #2	06/2015

Washington State Department of Enterprise Services

1063 CAPITOL WAY BLOCK REPLACEMENT PROJECT

106 11th Avenue Southwest
Olympia, Washington 98501

Drawing Title

LANDSCAPE RESTORATION PLAN - STORMWATER

STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT
MARK C BRANDS
CERTIFICATE NO. 669

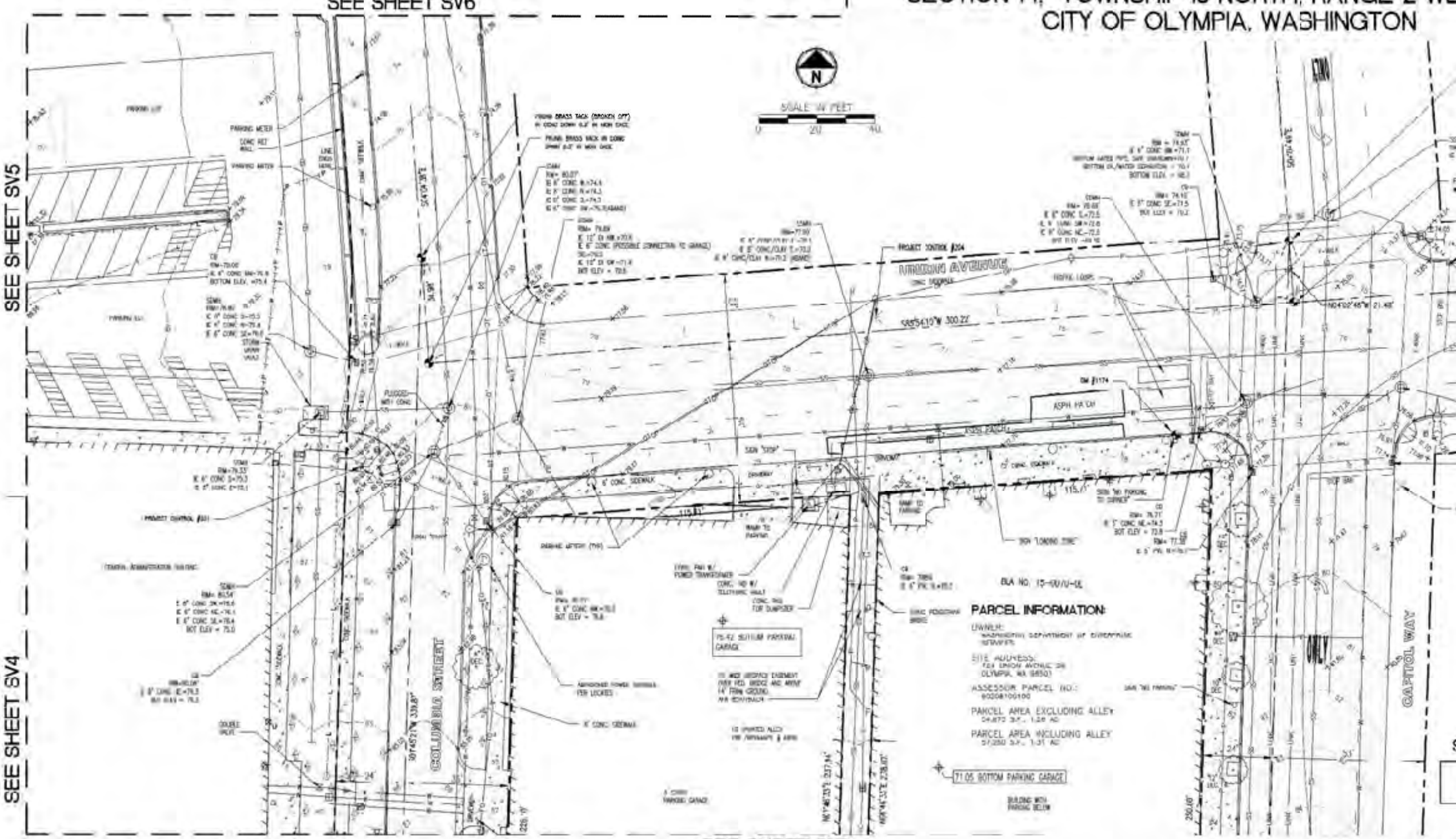
Date:	20 JUNE, 2016
Job No:	22076
Drawn By:	RS, AF
Checked By:	VS

Drawing No.

L7.10

ENGR PERMIT #2

A PORTION OF THE NW 1/4 OF SECTION 23 AND THE SW 1/4 OF SECTION 14, TOWNSHIP 18 NORTH, RANGE 2 WEST, W.M. CITY OF OLYMPIA, WASHINGTON



LEGEND

SET MAG NAIL W/ PLASTIC TAG MARKED "SURVEY MARKER"
FOUND MONUMENT AS DESCRIBED
FINISH FLOOR ELEVATION
CATCH BASIN (SOLID LID)
CATCH BASIN
STORM MANHOLE
SANITARY SEWER CLEANOUT
SANITARY SEWER MANHOLE
AREA DRAIN
GAS METER
GAS VALVE
POWER JUNCTION BOX
POWER TRANSFORMER
POWER VAULT
GUY ANCHOR
POWER POLE
POWER RECEPTACLE
POWER MANHOLE
LIGHT POLE
POWER POLE W/LIGHT
STREET LIGHT
TRAFFIC SIGNAL W/ ARM POLE
TELEPHONE HANDHOLE
TELEPHONE VAULT
TELEPHONE MANHOLE
SPRINKLER HEAD
FIRE HYDRANT
HOSE BIB
FIRE DEPT. CONNECT
WATER METER
WATER VALVE
WATER VAULT
IRRIGATION VALVE BOX
STEAM VENT
SIGN
UNKNOWN VALVE
BOLLARD/POST
PARKING METER
MONITORING WELL
BENCH
DECIDUOUS TREE (DIAMETER & SPECIES IF KNOWN)
CONIFEROUS TREE (DIAMETER & SPECIES IF KNOWN)
TRAFFIC ARROW
BIKE LANE SYMBOL
CONC. CONCRETE
ABAND. ABANDONED
X-WALK CROSS WALK
DEC. DECIDUOUS
C&G CURB AND GUTTER

RIGHT-OF-WAY LINE
MONUMENT CENTERLINE
UNDERGROUND POWER
OVERHEAD POWER
UNDERGROUND TELEPHONE
OVERHEAD TELEPHONE
UNDERGROUND CABLE
UNDERGROUND FIBER OPTIC
UNDERGROUND GAS SERVICE
UNDERGROUND WATER MAIN AND SERVICE
SANITARY SEWER PIPE
STORM DRAIN PIPE
UNKNOWN BURIED UTILITY
BUILDING
TRAIN TRACKS
CHAIN-LINK FENCE
WIRE FENCE
EDGE OF ASPHALT
ABANDONED SEWER
ABANDONED POWER
LIGHT POWER
IRRIGATION LINE
ABANDONED GAS
STEAM
RECLAIMED WATER
CHILLED WATER
LAKE LINE
ASPHALT
CONCRETE

PROJECT CONTROL TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
200	630763.67	1041565.53	95.75	SET MAG NAIL
201	631050.42	1041576.07	90.25	SET MAG NAIL
204	631108.47	1041756.03	76.97	SET MAG NAIL
205	631049.88	1041857.34	77.86	SET MAG NAIL
209	630714.68	1041935.73	83.03	SET MAG NAIL
220	631137.85	1041369.21	79.12	SET MAG NAIL
2050	631264.55	1041065.38	10.29	SET MAG NAIL

UTILITY NOTES:

1. SURFACE UTILITY FACILITIES ARE SHOWN HEREON PER FIELD LOCATED VISIBLE EVIDENCE. THERE MAY BE UTILITIES THAT EXIST ON THIS SITE OTHER THAN THOSE GRAPHICALLY DEPICTED HEREON.

2. UNDERGROUND (BURIED) UTILITIES SHOWN HEREON ARE BASED ON COMBINATIONS OF VISIBLE SURFACE EVIDENCE, PAINT MARKINGS BY A UTILITY LOCATOR AND RECORD DATA. ALL UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE AND, IN SOME CASES, ARE SHOWN AS STRAIGHT LINES BETWEEN FIELD LOCATED SURFACE UTILITY FACILITIES.

3. ALTHOUGH THE LOCATIONS OF UNDERGROUND UTILITIES BASED ON UTILITY LOCATOR MARKINGS ... ACCURACY OF SAID DATA.

4. CALL 1-800-424-5555 BEFORE CONSTRUCTION.

SURVEY NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE SOUTH ZONE NAD83 PER CITY OF OLYMPIA CONTROL.

2. VERTICAL DATUM: NGVD 29, PER CITY OF OLYMPIA BENCHMARK.

NO. 1021
FOUND BRASS DISK AT THE NORTHEAST CORNER OF BASE TO ISAAC INGALLS STEVENS MONUMENT ON CAPITOL CAMPUS.

NO. 1174
FOUND BRASS DISK AT TOP OF CURB 15' WEST OF SOUTHWEST CORNER OF CAPITOL WAY AND UNION AVENUE.

3. SURVEY FEATURES WITHIN THE 1063 BLOCK WERE MAPPED IN SEPTEMBER 2015.

REVISIONS	DATE	BY
1 ADDED UTILITY INFORMATION SURROUNDING 1063 BLOCK	8/24/16	SNS
2 UPDATED STORM OUTFALL AT CAPITAL LAKE FROM ...	11/06/16	JAK

FIELD SURVEY: D. STAFFORD
DRAWN: J. MUNRO / S. SHARPE
CHECKED: J. KEMMITZ
APPROVED: K. CASSOU

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
DATE: 12/01/2015

KATHLEEN D. CASSOU — STATE OF WASHINGTON — PROFESSIONAL LAND SURVEYOR

Parametrix

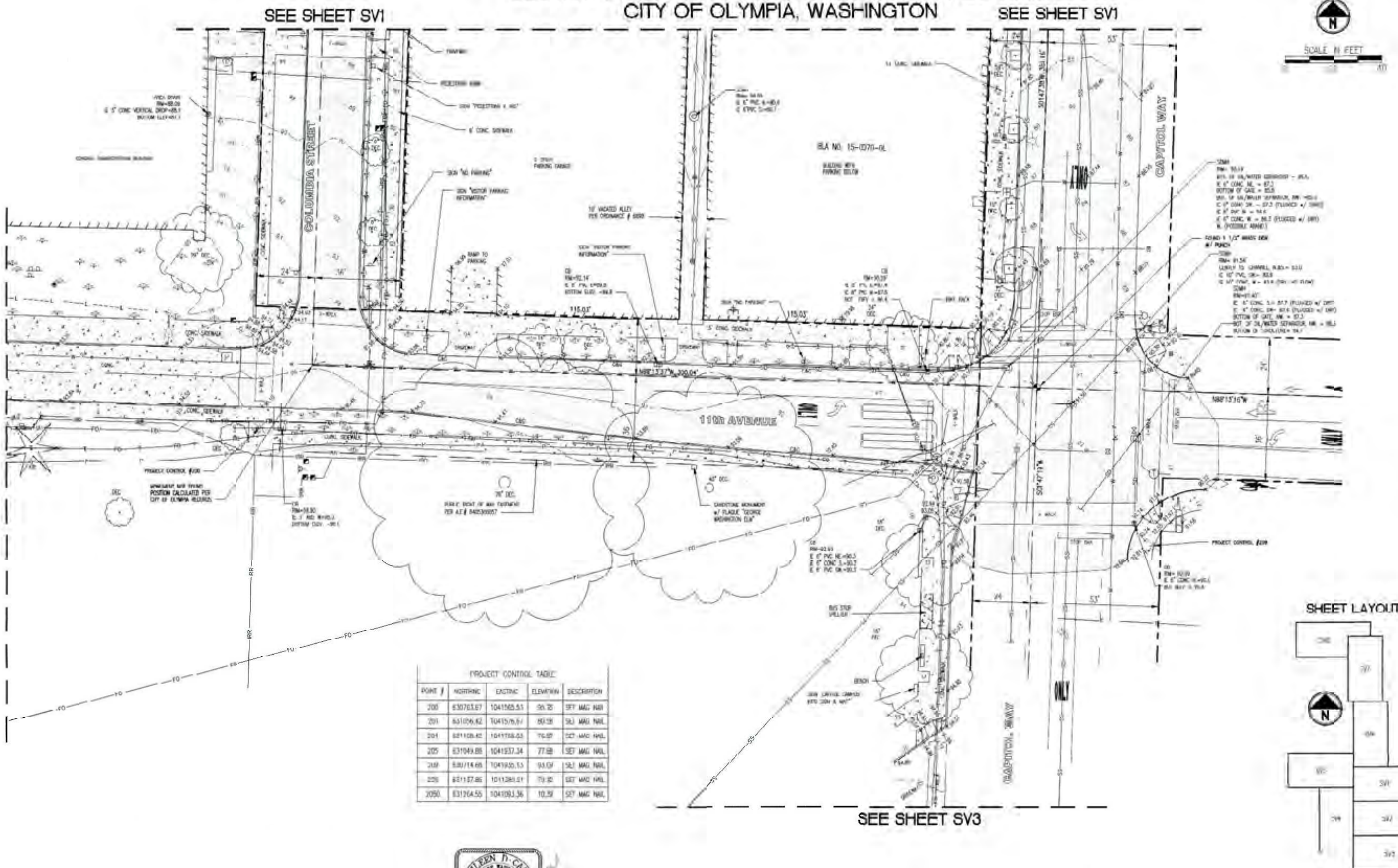
PROJECT NAME:
1063 BLOCK REPLACEMENT SITE SURVEY
FOR
WASHINGTON STATE DEPARTMENT OF ENTERPRISE SERVICES
1500 JEFFERSON STREET SE
OLYMPIA, WA 98504

BOUNDARY AND TOPOGRAPHIC SURVEY

DRAWING NO. 1 OF 8

SV1

A PORTION OF THE NW ¼ OF SECTION 23 AND THE SW ¼ OF SECTION 14, TOWNSHIP 18 NORTH, RANGE 2 WEST, W.M. CITY OF OLYMPIA, WASHINGTON



PROJECT CONTROL TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
200	630703.67	1041565.53	96.75	SET MAG NAIL
201	631056.82	1041576.67	80.58	SET MAG NAIL
204	631106.42	1041758.03	76.97	SET MAG NAIL
205	631049.88	1041937.34	77.68	SET MAG NAIL
208	630714.66	1041936.53	93.07	SET MAG NAIL
206	631137.86	1041281.01	73.10	SET MAG NAIL
2050	631264.55	1041093.36	10.57	SET MAG NAIL

	REVISIONS	DATE	BY
1	ADDED UTILITY INFORMATION SURROUNDING 1063 BLOCK & TOPO INFORMATION N. OF GENERAL ADMIN. BUILDING	9/24/15	SHS
2	UPDATED STORM OUTFALL AT CAPITAL LAKE FROM 24" TO 36"	11/06/15	JMM

FIELD SURVEY: D. STAFFORD
DRAWN: J. MUNRO / S. SHARPE
CHECKED: J. KEMNITZ
APPROVED: K. CASSOU

ONE INCH AT FULL SCALE, IF NOT, SCALE ACCORDINGLY
FILE NAME: 1063 BLK UPDATE-BA
JOB No.: 247-4042-012
DATE: 12/01/2015

Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

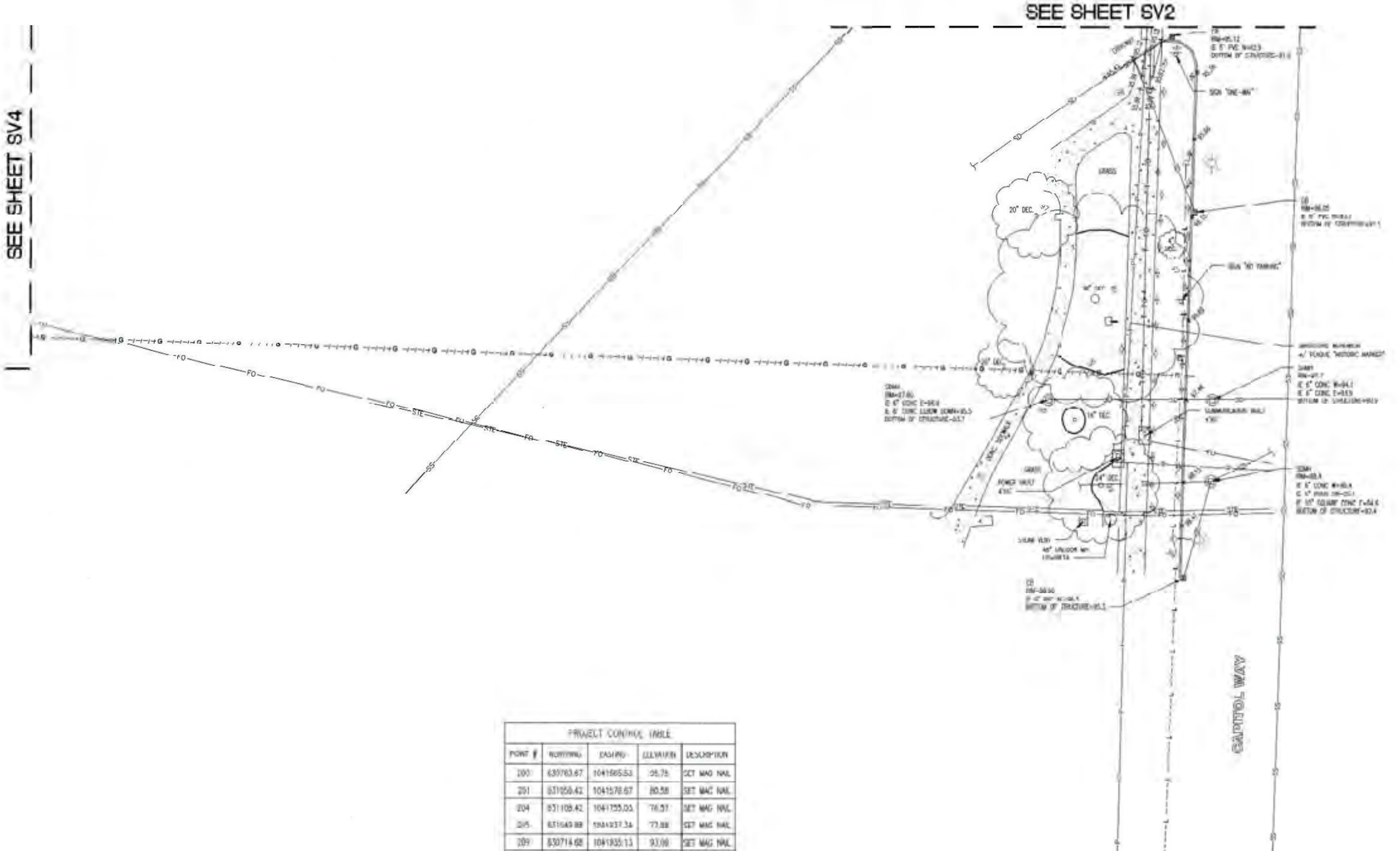
PROJECT NAME: 1503 BLOCK REPLACEMENT SITE SURVEY
FOR
WASHINGTON STATE DEPARTMENT OF ENTERPRISE SERVICES
1500 JEFFERSON STREET SE
OLYMPIA, WA 98504

BOUNDARY AND TOPOGRAPHIC SURVEY

DRAWING NO. 2 OF 8
SV2

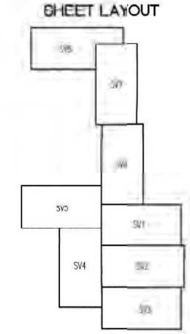
A PORTION OF THE NW ¼ OF SECTION 23 AND THE SW ¼ OF SECTION 14, TOWNSHIP 18 NORTH, RANGE 2 WEST, W.M. CITY OF OLYMPIA, WASHINGTON

SCALE IN FEET 0 20 40



PROJECT CONTROL TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
200	630763.67	1041565.53	95.75	SET MAG NAIL
201	631056.42	1041578.67	80.58	SET MAG NAIL
204	631108.42	1041755.03	76.57	SET MAG NAIL
205	831049.88	1041837.34	77.88	SET MAG NAIL
209	830714.68	1041935.13	93.00	SET MAG NAIL
220	831137.00	1041369.21	79.12	SET MAG NAIL
7050	831164.55	1041001.36	10.74	SET MAG NAIL

SHEET LAYOUT



▷	REASONS	DATE	BY	
1	ADDED UTILITY INFORMATION SURROUNDING 1063 BLOCK	8/24/15	SNS	FIELD SURVEY D. STAFFORD
	& OPD INFORMATION N. OF GENERAL ADMIN. BUILDING			DRAWN J. MUNRO / E. DIAGPC
2	UPDATED STORM OUTFALL AT CAPITAL LAKE FROM	11/06/15	JMM	CHECKED J. KEMNITZ
	24" TO 36"			APPROVED K. CASSOU

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY

FILE NAME 1063 BLK UPDATE-BA

JOB NO. 247-4042-012

DATE 12/01/2015

Parametrix

1019 39TH AVENUE SE, SUITE 100, PUYALLUP, WASHINGTON 98374

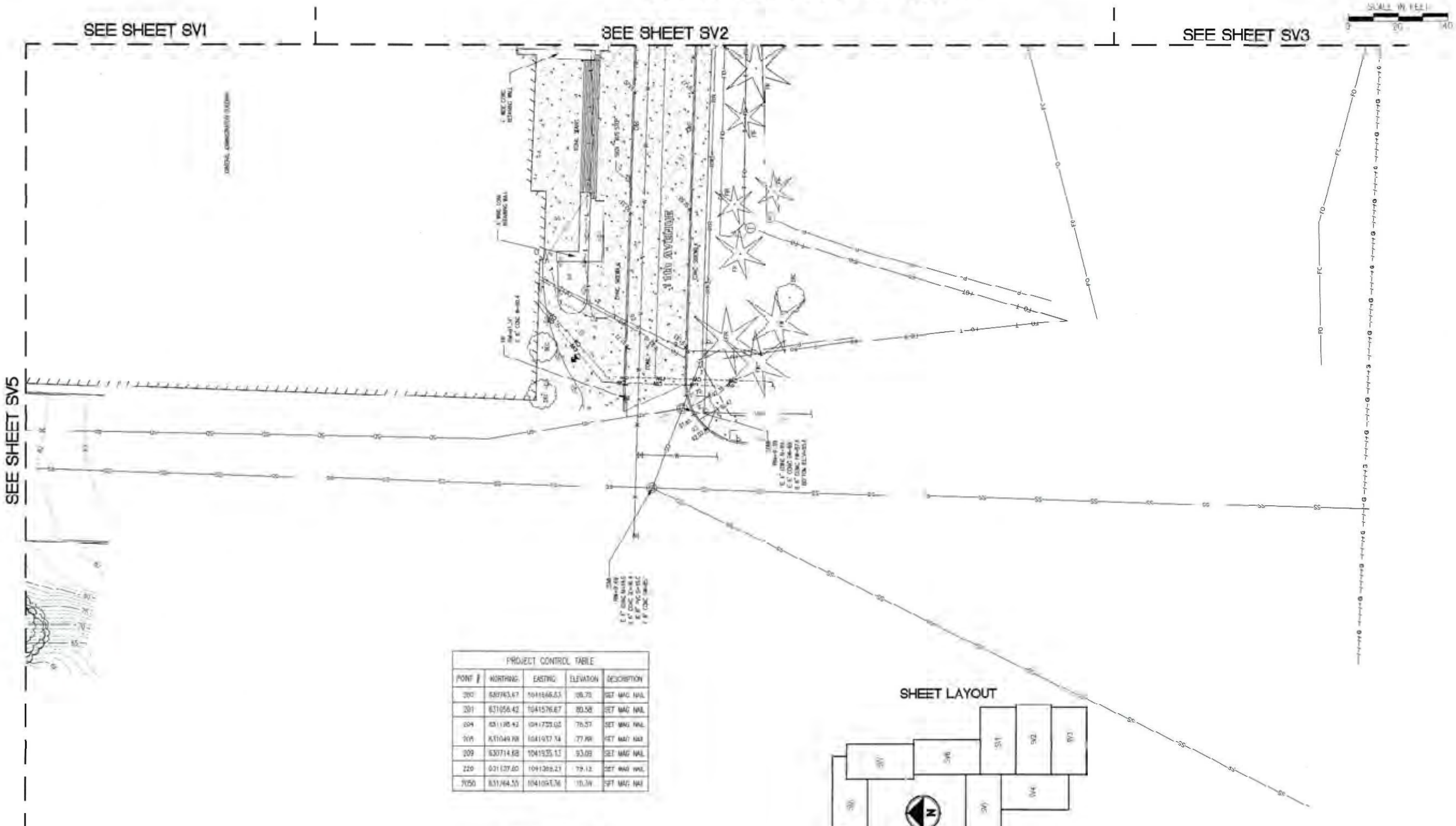
PROJECT NAME
1603 BLOCK REPLACEMENT SITE SURVEY
FOR
WASHINGTON STATE DEPARTMENT OF ENTERPRISE SERVICES
1500 JEFFERSON STREET SE
OLYMPIA, WA 98504

BOUNDARY AND TOPOGRAPHIC SURVEY

DRAWING NO. 3 OF 8

SV3

A PORTION OF THE NW ¼ OF SECTION 23 AND THE SW ¼ OF SECTION 14, TOWNSHIP 18 NORTH, RANGE 2 WEST, W.M. CITY OF OLYMPIA, WASHINGTON



PROJECT CONTROL TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
200	630763.67	1041646.63	106.75	SET MAG NAIL
201	631058.42	1041576.67	80.58	SET MAG NAIL
204	631105.42	1041725.02	76.57	SET MAG NAIL
205	631049.88	1041937.74	77.88	SET MAG NAIL
209	630714.68	1041935.13	93.09	SET MAG NAIL
220	631137.60	1041268.21	79.12	SET MAG NAIL
7050	631/64.55	104109?.76	10.34	SET MAG NAIL

▷	REVISIONS	DATE	BY
1	ADDED UTILITY INFORMATION SURROUNDING 1063 BLOCK & TOPO INFORMATION W. OF GENERAL ADMIN. BUILDING	9/24/15	SHS
2	UPDATED STORM OUTFALL AT CAPITAL LAKE FROM 24" TO 36"	11/06/16	JMM

FIELD SURVEY: D. STAFFORD
DRAWN: J. MUNRO / S. SHARPE
CHECKED: J. KEMNITZ
APPROVED: K. CASSOU

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME: 1063 BLK UPDATE-04
JOB NO.: 247-4042-012
DATE: 12/01/2015

KATHLEEN D. CASSOU — STATE OF WASHINGTON — REGISTERED PROFESSIONAL LAND SURVEYOR — 12/31/16

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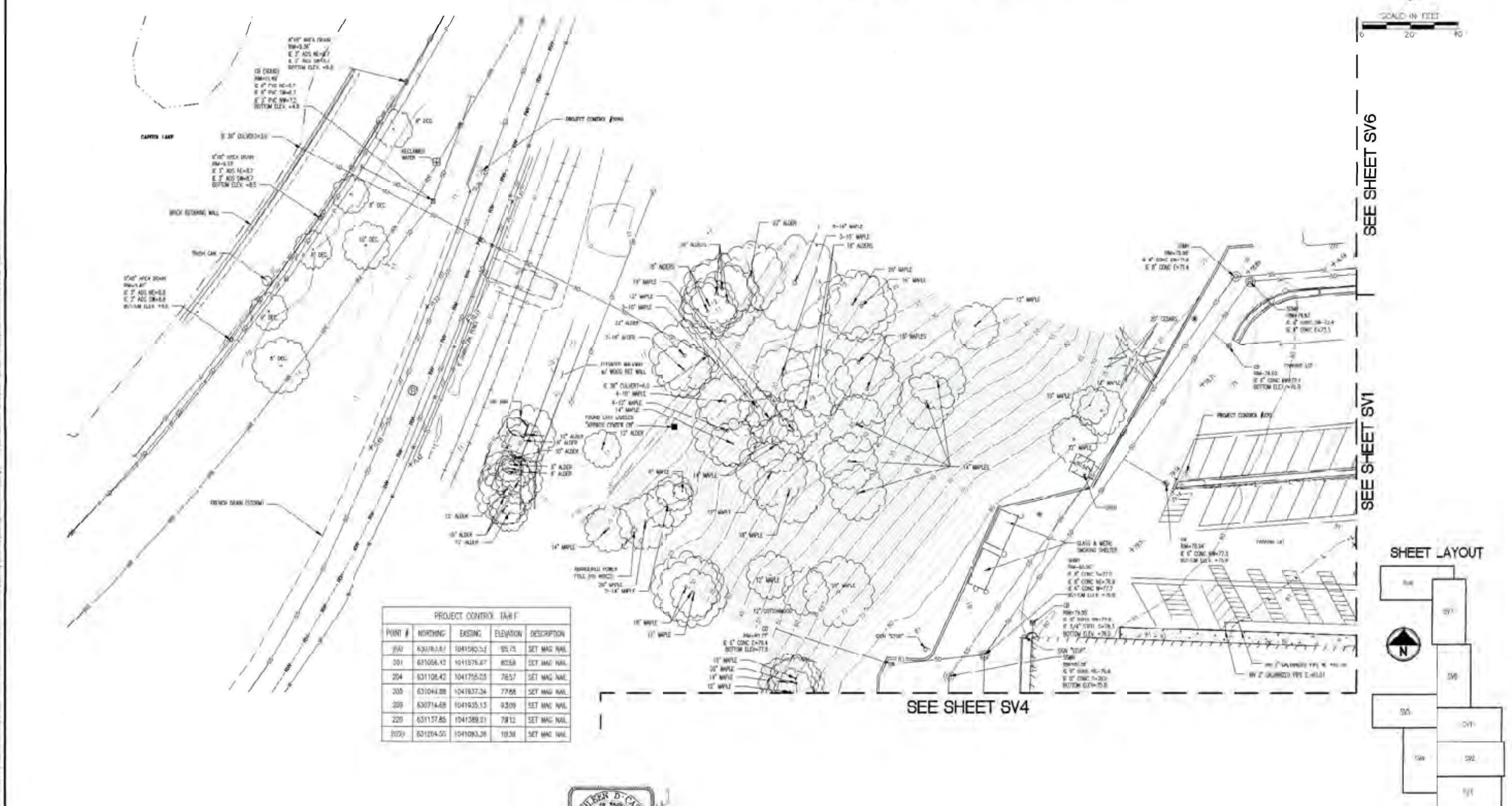
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

PROJECT NAME
1063 BLOCK REPLACEMENT SITE SURVEY
FOR
WASHINGTON STATE DEPARTMENT OF ENTERPRISE SERVICES
1500 JEFFERSON STREET SE
OLYMPIA, WA 98504

BOUNDARY AND TOPOGRAPHIC SURVEY

DRAWING NO.
4 OF 6
SV4

A PORTION OF THE NW 1/4 OF SECTION 23 AND THE SW 1/4 OF SECTION 14, TOWNSHIP 18 NORTH, RANGE 2 WEST, W.M. CITY OF OLYMPIA, WASHINGTON



PROJECT CONTROL TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
2040	630763.87	1041580.53	95.75	SET MAG NAIL
201	631056.43	1041579.87	80.58	SET MAG NAIL
204	631108.42	1041756.03	76.57	SET MAG NAIL
205	631044.88	1041837.34	77.68	SET MAG NAIL
209	630714.68	1041935.13	93.09	SET MAG NAIL
220	631137.85	1041389.21	78.12	SET MAG NAIL
2050	631204.50	1041083.36	10.36	SET MAG NAIL

	REASONS	DATE	BY
1	ADDED UTILITY INFORMATION SURROUNDING 1063 BLOCK & TOPO INFORMATION W. OF GENERAL ADMIN. BUILDING	9/24/15	SHS
2	UPDATED STORM OUTFALL AT CAPITAL LAKE FROM 24" TO 36"	11/30/15	AMM

FIELD SURVEY: D. STAFFORD
DRAWN: J. MUNRO / S. SHARPE
CHECKED: J. KEMMITZ
APPROVED: K. CASSOU

ONE INCH AT FULL SCALE, IF NOT, SCALE ACCORDINGLY
FILE NAME: 1063 BLK. UPDATE. BA
JOB NO.: 247-4042-012
DATE: 12/01/2015

KATHLEEN D. CASSOU — STATE OF WASHINGTON — PROFESSIONAL LAND SURVEYOR

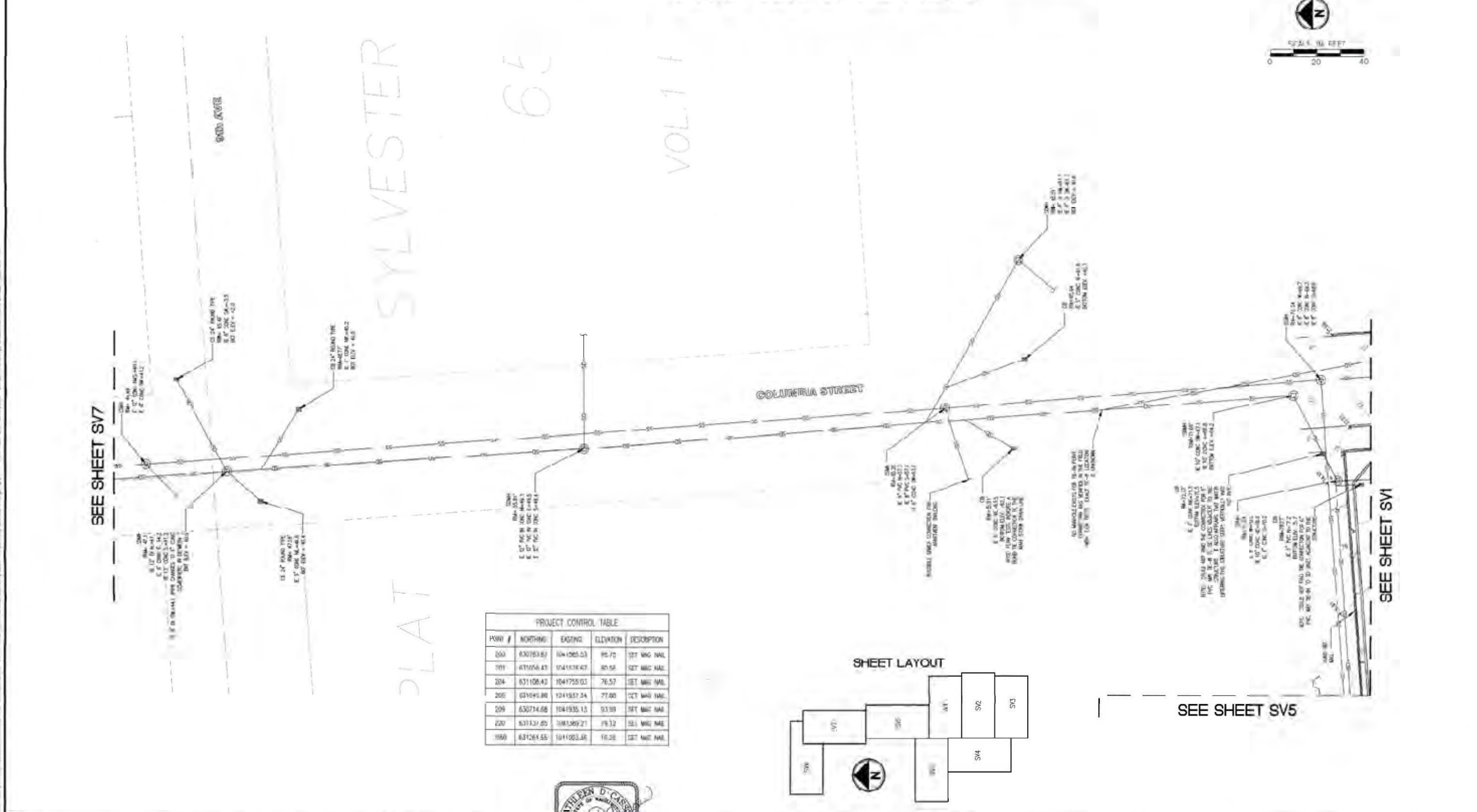
Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

PROJECT NAME
1603 BLOCK REPLACEMENT SITE SURVEY
FOR
WASHINGTON STATE DEPARTMENT OF ENTERPRISE SERVICES
1500 JEFFERSON STREET SE
OLYMPIA, WA 98504

BOUNDARY AND TOPOGRAPHIC SURVEY

DRAWING NO. 5 OF 8
SV5

A PORTION OF THE NW ¼ OF SECTION 23 AND THE SW ¼ OF SECTION 14, TOWNSHIP 18 NORTH, RANGE 2 WEST, W.M. CITY OF OLYMPIA, WASHINGTON



PROJECT CONTROL TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
200	630783.67	1041565.53	95.70	SET MAG NAIL
201	631056.43	1041576.47	80.58	SET MAG NAIL
204	631108.43	1041755.03	76.57	SET MAG NAIL
205	631045.88	1041937.34	77.88	SET MAG NAIL
209	630714.68	1041935.13	93.99	SET MAG NAIL
220	631137.85	1041369.21	79.12	SET MAG NAIL
1960	631264.55	1041093.46	16.38	SET MAG NAIL

	REVISIONS	DATE	BY
1	ADDED UTILITY INFORMATION SURROUNDING 1063 BLOCK	9/24/15	DNS
	& OPO INFORMATION W. OF GENERAL ADMIN. BUILDING		
2	UPDATED STORM OUTFALL AT CAPITAL LAKE FROM	11/06/15	ABM
	24" TO 36"		

FIELD SURVEY: D. STAFFORD
DRAWN: J. MUNRO, / G. SHARPE
CHECKED: J. KEMNITZ
APPROVED: K. CASSOU

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME: 1063 BLK UPDATE-BA
JOB No.: 247-4042-012
DATE: 12/01/2015

KATHLEEN D. CASSOU, STATE OF WASHINGTON, REGISTERED PROFESSIONAL LAND SURVEYOR

Parametrix

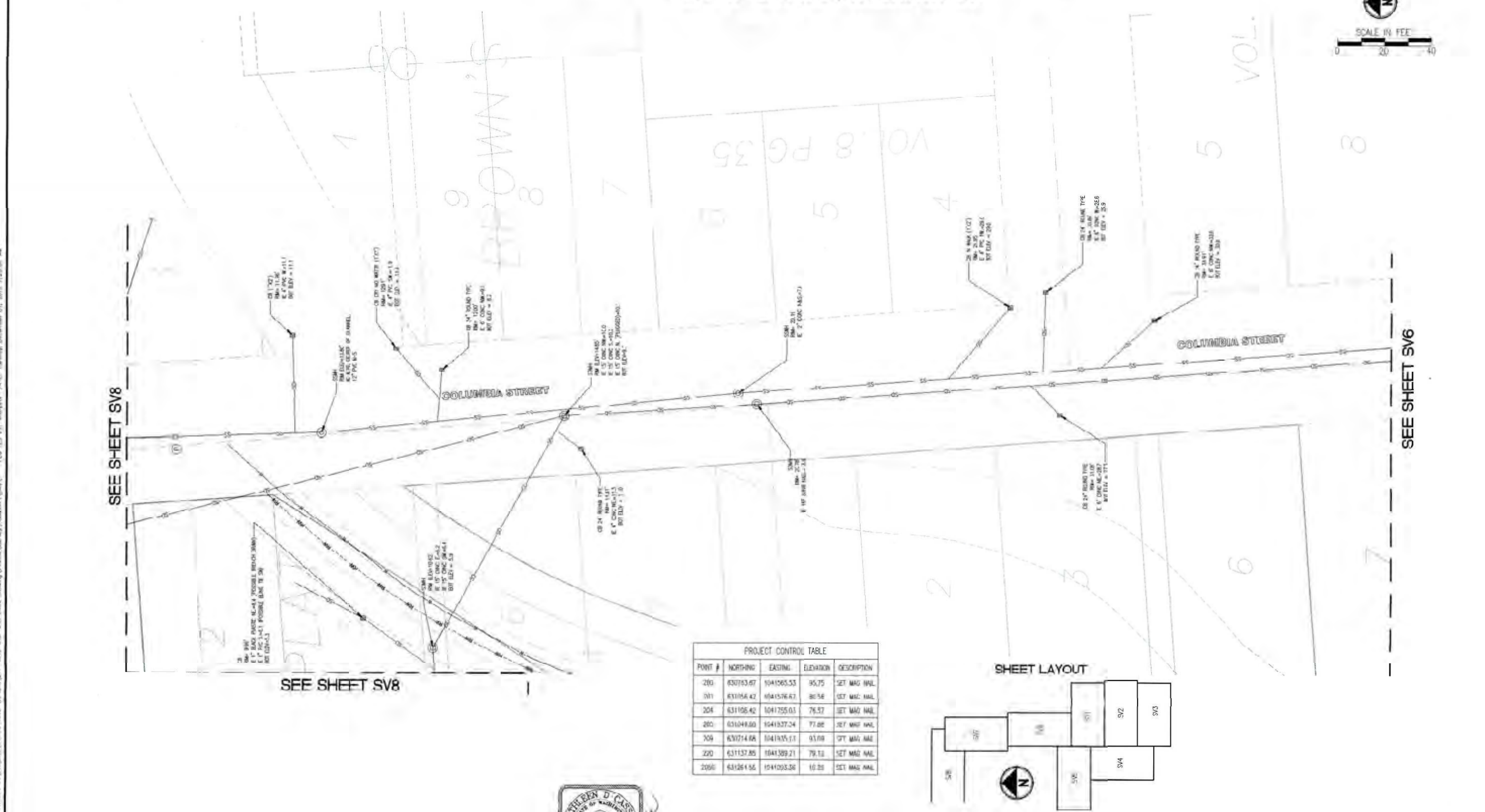
PROJECT NAME: **1603 BLOCK REPLACEMENT SITE SURVEY FOR WASHINGTON STATE DEPARTMENT OF ENTERPRISE SERVICES**
1500 JEFFERSON STREET SE
OLYMPIA, WA 98504

BOUNDARY AND TOPOGRAPHIC SURVEY

DRAWING NO. 6 OF 8

SV6

A PORTION OF THE NW 1/4 OF SECTION 23 AND THE SW 1/4 OF SECTION 14, TOWNSHIP 18 NORTH, RANGE 2 WEST, W.M. CITY OF OLYMPIA, WASHINGTON



PROJECT CONTROL TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
200	630763.67	1041565.53	95.75	SET MAG NAIL
201	631056.42	1041576.67	80.58	SET MAG NAIL
204	631156.42	1041755.03	76.57	SET MAG NAIL
260	631049.60	1041537.24	77.88	SET MAG NAIL
209	630714.68	1041935.11	93.09	SET MAG NAIL
220	631137.85	1041389.21	79.13	SET MAG NAIL
2050	631261.56	1041093.36	10.35	SET MAG NAIL

	REVISIONS	DATE	BY
1	ADDED UTILITY INFORMATION SURROUNDING 1063 BLOCK & TOPO INFORMATION W. OF GENERAL ADMIN. BUILDING	8/04/15	DMC
2	UPDATED STORM OUTFALL AT CAPITAL LAKE FROM 24" TO 36"	11/06/15	JMM

FIELD SURVEY: D. STAFFORD
DRAWN: J. MUNRO / S. SHARPE
CHECKED: J. KEMNITZ
APPROVED: K. CASSOU

ONE INCH AT FULL SCALE
IF NOT, SCALE ACCORDINGLY
FILE NAME: 1063 BLK UPDATE-RA
JOB No.: 247-4042-012
DATE: 12/01/2015

KATHLEEN D. CASSOU — STATE OF WASHINGTON — PROFESSIONAL LAND SURVEYOR
12/3/15

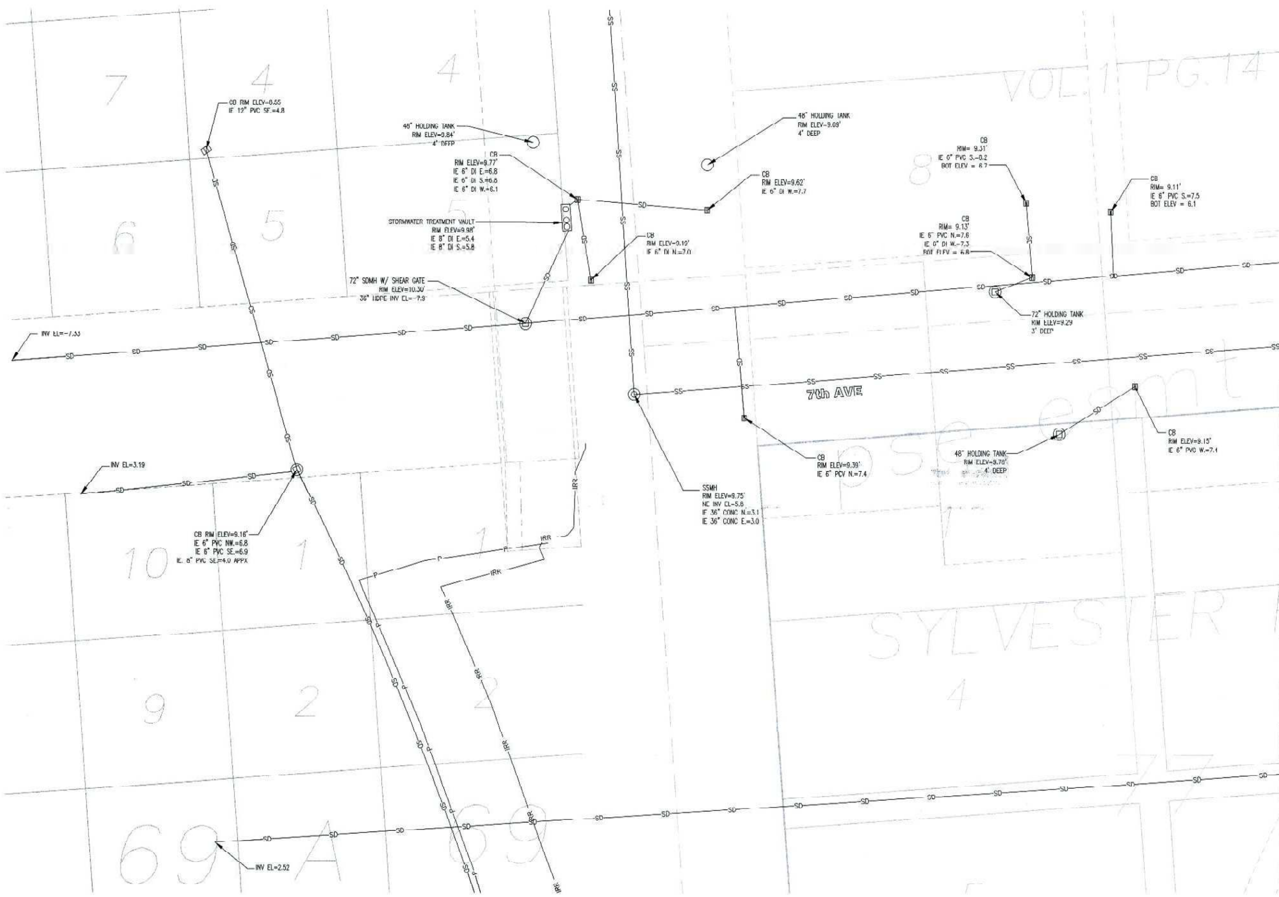
Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES
1019 39TH AVENUE SE, SUITE 100
PUYALLUP, WASHINGTON 98374
www.parametrix.com

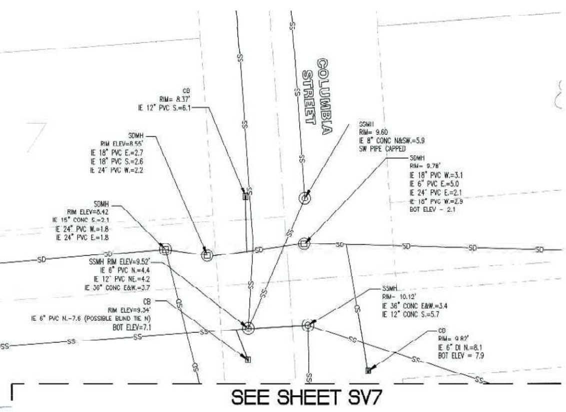
PROJECT NAME
1063 BLOCK REPLACEMENT SITE SURVEY
FOR
WASHINGTON STATE DEPARTMENT OF ENTERPRISE SERVICES
1500 JEFFERSON STREET SE
OLYMPIA, WA 98504

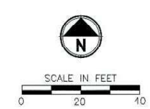
BOUNDARY AND TOPOGRAPHIC SURVEY

DRAWING No. 7 OF 8
SV7

A PORTION OF THE NW ¼ OF SECTION 23 AND THE SW ¼ OF SECTION 14, TOWNSHIP 18 NORTH, RANGE 2 WEST, W.M. CITY OF OLYMPIA, WASHINGTON

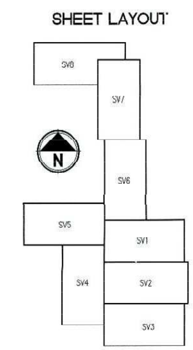






PROJECT CONTROL TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
200	630763.67	1041565.53	95.75	SET MAG NAIL
201	631056.42	1041576.67	80.58	SET MAG NAIL
204	631108.42	1041755.03	76.57	SET MAG NAIL
205	631049.88	1041937.34	77.88	SET MAG NAIL
209	630714.68	1041935.13	93.09	SET MAG NAIL
220	631137.85	1041389.21	79.12	SET MAG NAIL
2050	631264.55	1041093.36	10.30	SET MAG NAIL

SHEET LAYOUT



▷	REVISIONS	DATE	BY
1	ADDED UTILITY INFORMATION SURROUNDING 1063 BLOCK & TOPO INFORMATION W. OF GENERAL ADMIN. BUILDING	9/24/15	SNS
2	UPDATED STORM OUTFALL AT CAPITAL LAKE FROM 24" TO 36"	11/06/15	JMM

FIELD SURVEY: D. STAFFORD
DRAWN: J. MUNRO / S. SHARPE
CHECKED: J. KEMNITZ
APPROVED: K. CASSOU

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME: 1063 BLK UPDATE-BA
JOB No. 247-4042-012
DATE: 12/01/2015

KATHLEEN D. CASSOU, STATE OF WASHINGTON, REGISTERED PROFESSIONAL LAND SURVEYOR, 12/3/15

Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES
1019 39TH AVENUE SE, SUITE 100
PUYALLUP, WASHINGTON 98374
T. 253.604.6600 F. 253.604.6799
www.parametrix.com

PROJECT NAME
1603 BLOCK REPLACEMENT SITE SURVEY
FOR
WASHINGTON STATE DEPARTMENT OF ENTERPRISE SERVICES
1500 JEFFERSON STREET SE
OLYMPIA, WA 98504

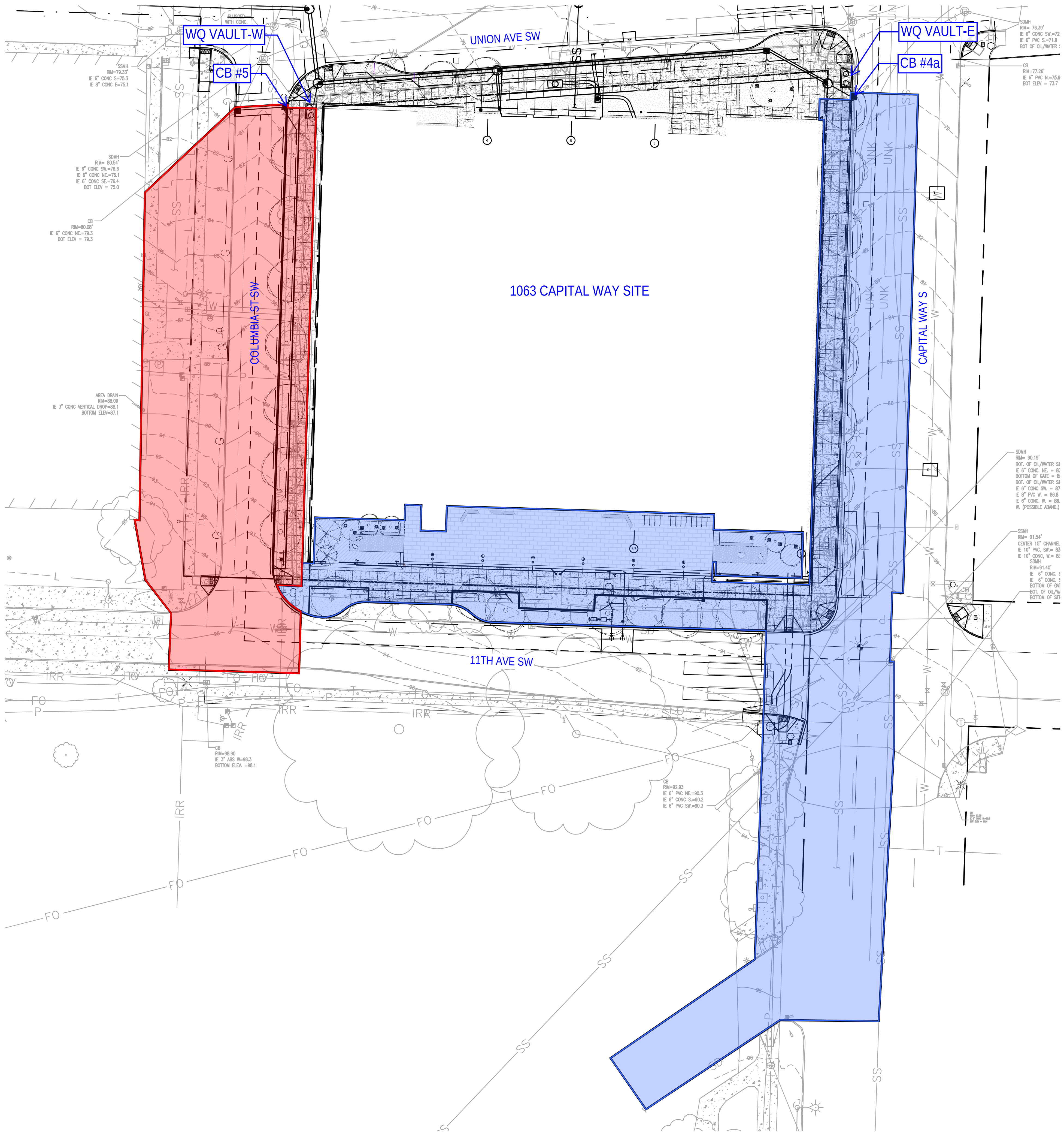
BOUNDARY AND TOPOGRAPHIC SURVEY

DRAWING NO. 8 OF 8
SV8

Appendix B

Water Quality Calculations

1. Basin Map
2. MGS Flood WQ Flow Rate Calculations
3. Flow Restrictor Orifice Sizing



East WQ Basin (CB #4a)
Area: 0.85-ac
WQ Flow: 0.165-cfs

West WQ Basin (CB #5)
Area: 0.46-ac
WQ Flow: 0.051-cfs

FIGURE 1

WATER QUALITY BASIN MAP

SCALE: 1"=50'

X:\113251-113500\113484 (1063 Capitol Way)\Engineer_Drainage Report\Exhibits\Drainage\WQ Basin.dwg

heatherm

Jun 15, 2016 – 12:11pm

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200410007
Run Date: 06/15/2016 11:39 AM

Input File Name: 1063-CB#4a.fld
Project Name: 1063 CB#4a
Analysis Title:
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Timeseries Selected
Climatic Region Number: 6

Full Period of Record Available used for Routing
Precipitation Station : 95005205 Puget West 52 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951052 Puget West 52 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) ***************

********************** WATERSHED DEFINITION ***********************

--------------------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : EX CB#4 ----------

	-------Area(Acres) --------
Till Forest	0.850
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User 2	0.000
Impervious	0.000
Subbasin Total	0.850

--------------------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : CB#4 ----------

	-------Area(Acres) --------
Till Forest	0.000
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User 2	0.000
Impervious	0.850

Subbasin Total 0.850

************************* **LINK DATA** *******************************

----------------------SCENARIO: PREDEVELOPED
Number of Links: 1

Link Name: WQ
Link Type: Copy
Downstream Link: None

************************* **LINK DATA** *******************************

----------------------SCENARIO: POSTDEVELOPED
Number of Links: 1

Link Name: WQ
Link Type: Copy
Downstream Link: None

**********************FLOOD FREQUENCY AND DURATION STATISTICS*******************

----------------------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------------------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

***********Groundwater Recharge Summary *************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: EX CB#4	183.858
Link: WQ	Not Applicable
Total:	183.858

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: CB#4	0.000
Link: WQ	Not Applicable
Total:	0.000

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 1.164 ac-ft/year, Post Developed: 0.000 ac-ft/year

***********Water Quality Facility Data *************

----------------------SCENARIO: PREDEVELOPED

Number of Links: 1

----------------------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: WQ **********

Basic Wet Pond Volume (91% Exceedance): 5699. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 8549. cu-ft

2-Year Discharge Rate : 0.388 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.16 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.09 cfs

***********Compliance Point Results *************

Scenario Predeveloped Compliance Link: WQ
Scenario Postdeveloped Compliance Link: WQ

*** **Point of Compliance Flow Frequency Data** ***
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	3.741E-02	2-Year	0.388
5-Year	5.869E-02	5-Year	0.493
10-Year	7.761E-02	10-Year	0.589
25-Year	9.981E-02	25-Year	0.699
50-Year	0.125	50-Year	0.778
100-Year	0.140	100-Year	0.969
200-Year	0.190	200-Year	0.994

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

**** **Flow Duration Performance** ****

Excursion at Predeveloped 50%Q2 (Must be Less Than 0%): 457.0% FAIL
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than 0%): 2687.3% FAIL
Maximum Excursion from Q2 to Q50 (Must be less than 10%): 99999.0% FAIL
Percent Excursion from Q2 to Q50 (Must be less than 50%): 100.0% FAIL

FLOW DURATION DESIGN CRITERIA: FAIL

**** **LID Duration Performance** ****

Excursion at Predeveloped 8%Q2 (Must be Less Than 0%): 11.0% FAIL
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%): 457.0% FAIL

LID DURATION DESIGN CRITERIA: FAIL

MGS FLOOD
PROJECT REPORT

Program Version: MGSFlood 4.31
Program License Number: 200410007
Run Date: 06/15/2016 11:22 AM

Input File Name: 1063-CB#5.fld
Project Name: 1063 CB#5
Analysis Title:
Comments:

PRECIPITATION INPUT

Computational Time Step (Minutes): 15

Extended Precipitation Timeseries Selected
Climatic Region Number: 6

Full Period of Record Available used for Routing
Precipitation Station : 95005205 Puget West 52 in_5min 10/01/1939-10/01/2097
Evaporation Station : 951052 Puget West 52 in MAP
Evaporation Scale Factor : 0.750

HSPF Parameter Region Number: 1
HSPF Parameter Region Name : USGS Default

********** Default HSPF Parameters Used (Not Modified by User) ***************

********************** WATERSHED DEFINITION ***********************

----------------------SCENARIO: PREDEVELOPED
Number of Subbasins: 1

---------- Subbasin : EX CB#5 ----------

	-------Area(Acres) --------
Till Forest	0.460
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User 2	0.000
Impervious	0.000
Subbasin Total	0.460

---------------------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1

---------- Subbasin : CB#5 ----------

	-------Area(Acres) --------
Till Forest	0.000
Till Pasture	0.000
Till Grass	0.000
Outwash Forest	0.000
Outwash Pasture	0.000
Outwash Grass	0.000
Wetland	0.000
Green Roof	0.000
User 2	0.000
Impervious	0.460

Subbasin Total 0.460

**************************** LINK DATA ******************************

----------------------SCENARIO: PREDEVELOPED
Number of Links: 1

--
Link Name: WQ
Link Type: Copy
Downstream Link: None

**************************** LINK DATA ******************************

----------------------SCENARIO: POSTDEVELOPED
Number of Links: 1

--
Link Name: WQ
Link Type: Copy
Downstream Link: None

**********************FLOOD FREQUENCY AND DURATION STATISTICS*******************

----------------------SCENARIO: PREDEVELOPED
Number of Subbasins: 1
Number of Links: 1

----------------------SCENARIO: POSTDEVELOPED
Number of Subbasins: 1
Number of Links: 1

***********Groundwater Recharge Summary *************
Recharge is computed as input to Perlnd Groundwater Plus Infiltration in Structures

Total Predeveloped Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: EX CB#5	99.499
Link: WQ	Not Applicable
Total:	99.499

Total Post Developed Recharge During Simulation

Model Element	Recharge Amount (ac-ft)
Subbasin: CB#5	0.000
Link: WQ	Not Applicable
Total:	0.000

Total Predevelopment Recharge is Greater than Post Developed
Average Recharge Per Year, (Number of Years= 158)
Predeveloped: 0.630 ac-ft/year, Post Developed: 0.000 ac-ft/year

***********Water Quality Facility Data *************

----------------------SCENARIO: PREDEVELOPED

Number of Links: 1

----------------------SCENARIO: POSTDEVELOPED

Number of Links: 1

********** Link: WQ **********

Basic Wet Pond Volume (91% Exceedance): 3084. cu-ft
Computed Large Wet Pond Volume, 1.5*Basic Volume: 4626. cu-ft

2-Year Discharge Rate : 0.210 cfs

15-Minute Timestep, Water Quality Treatment Design Discharge
On-line Design Discharge Rate (91% Exceedance): 0.09 cfs
Off-line Design Discharge Rate (91% Exceedance): 0.05 cfs

***********Compliance Point Results *************

Scenario Predeveloped Compliance Link: WQ
Scenario Postdeveloped Compliance Link: WQ

*** **Point of Compliance Flow Frequency Data** ***
Recurrence Interval Computed Using Gringorten Plotting Position

Predevelopment Runoff		Postdevelopment Runoff	
Tr (Years)	Discharge (cfs)	Tr (Years)	Discharge (cfs)
2-Year	2.024E-02	2-Year	0.210
5-Year	3.176E-02	5-Year	0.267
10-Year	4.200E-02	10-Year	0.319
25-Year	5.401E-02	25-Year	0.379
50-Year	6.784E-02	50-Year	0.421
100-Year	7.567E-02	100-Year	0.524
200-Year	0.103	200-Year	0.538

** Record too Short to Compute Peak Discharge for These Recurrence Intervals

**** **Flow Duration Performance** ****
Excursion at Predeveloped 50%Q2 (Must be Less Than 0%): 457.0% FAIL
Maximum Excursion from 50%Q2 to Q2 (Must be Less Than 0%): 2687.3% FAIL
Maximum Excursion from Q2 to Q50 (Must be less than 10%): 99999.0% FAIL
Percent Excursion from Q2 to Q50 (Must be less than 50%): 100.0% FAIL

FLOW DURATION DESIGN CRITERIA: FAIL

**** **LID Duration Performance** ****
Excursion at Predeveloped 8%Q2 (Must be Less Than 0%): 11.0% FAIL
Maximum Excursion from 8%Q2 to 50%Q2 (Must be Less Than 0%): 457.0% FAIL

LID DURATION DESIGN CRITERIA: FAIL

---

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project 1063 CAPITAL WAY	by HM	sheet no. 1/2
location OLYMPIA, WA	date 06/17/16	
client		job no.
ORIFICE SIZING FOR WQ VAULTS		

$$Q = C_d A_o \sqrt{2gh}$$

$$\Rightarrow A_o = \frac{Q \cdot C_d}{\sqrt{2gh}}$$

Q = WATER QUALITY FLOW (cfs)
C_d = COEF OF DISCHARGE
= 0.62 (Sharp Edges)
A_o = Orifice Area (ft^2)
g = Gravity = 32.2 ft/sec
h = Hydraulic Head (ft)

Orifice Sizing for CB # 4a to WQ VAULT-E

Q_{WQ} = 0.095-cfs
h = Top of Bypass Pipe − WQ Pipe IE
12" Bypass IE = 76.46'
6" WQ IE = 76.35'

h = 76.46' + 12" − 76.35'
= 1.11'

$$A_o = \frac{0.095 \times 0.62}{\sqrt{2 \times 32.2 \times 1.11}} = 0.006966 ft^2$$

$$A_o = \pi \left(\frac{d}{2}\right)^2$$

d = 0.094-ft X 12
= 1.13 in

$\boxed{\text{CB \# 4a Orifice Size = 1.125-in}}$

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Orifice Sizing for CB#5 to WQ Vault W

$Q_{WQ} = 0.051$-cfs

h= Top of Bypass Pipe – WQ Pipe IE

8" Bypass IE = 75.80'

6" WQ IE = 75.75'

h= 75.80' + 8" – 75.75'

= 0.717'

$$A_o = \frac{0.051 \times 0.62}{\sqrt{2 \times 32.2 \times 0.717}} = 0.00465 \text{ ft}^2$$

$$A_o = \pi\left(\frac{d}{2}\right)^2$$

d= 0.07697 ft x12

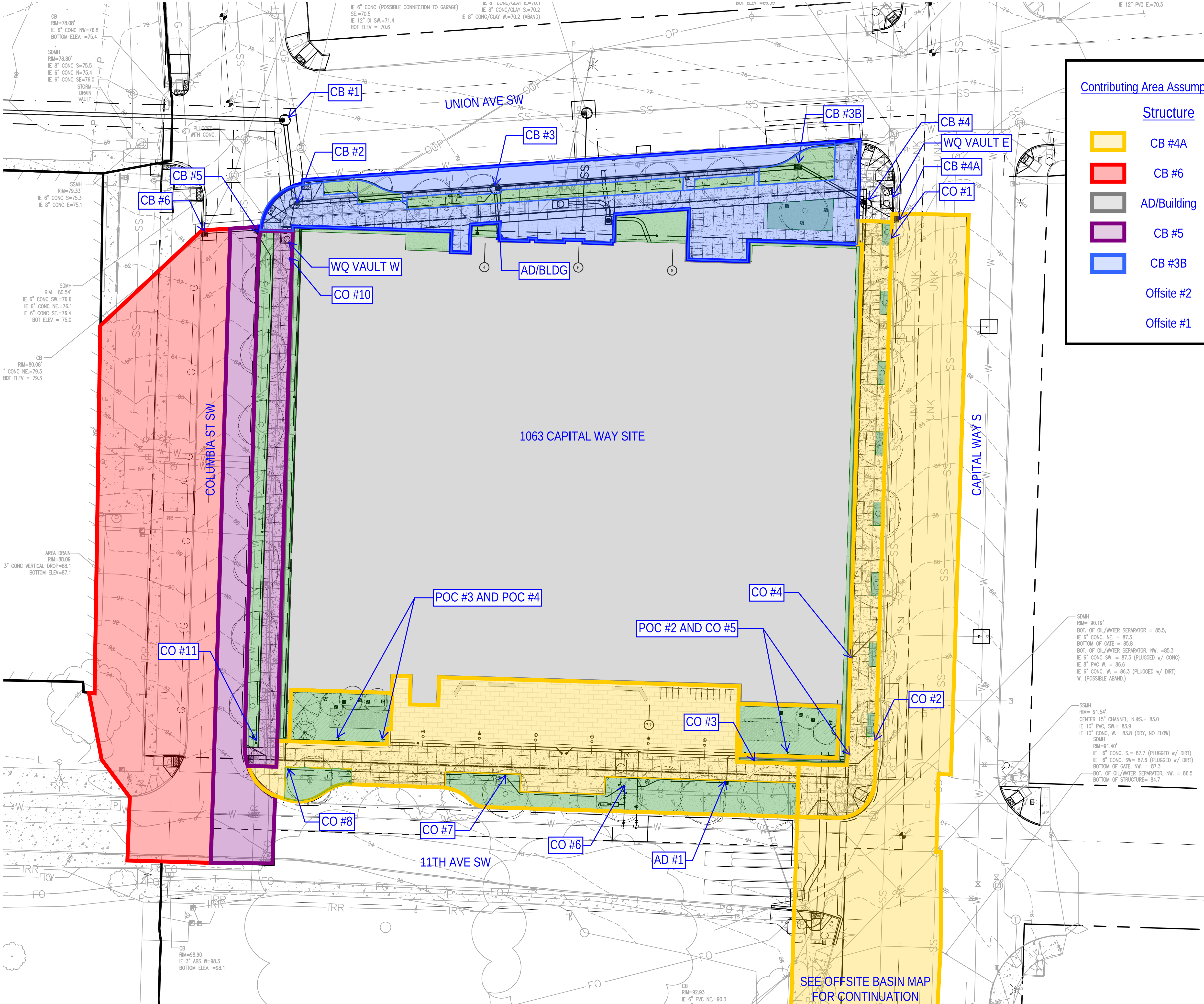
d= 0.923-in

$\boxed{\text{CB\#5 Orifice Size = 1.0-in}}$

Appendix C

Conveyance Calculations

1. On-site Basin Map
2. Off-site Basin Map
3. Conveyance Structure Flow Chart
4. Conveyance and Backwater Calculations
   - 25-year event
   - 100-year event
5. Tailwater Reference Information
6. Precipitation Reference Information



Contributing Area Assumptions:

Structure	Impervious Area	Pervious Area
CB #4A	36,836 sf	5,008 sf
CB #6	14,599 sf	1,289 sf
AD/Building	44,904 sf	2,197 sf
CB #5	3,934 sf	0 sf
CB #3B	6,558 sf	1,312 sf
Offsite #2	153,429 sf	34,440 sf
Offsite #1	0 sf	107,374 sf

FIGURE 2
ONSITE BASIN MAP
SCALE: 1"=40'

X:\113251-113500\113484 (1063 Capitol Way)\Engineer_Drainage Report\Exhibits\Drainage\Conveyance Map.dwg
heatherm
Jun 15, 2016 – 2:34pm

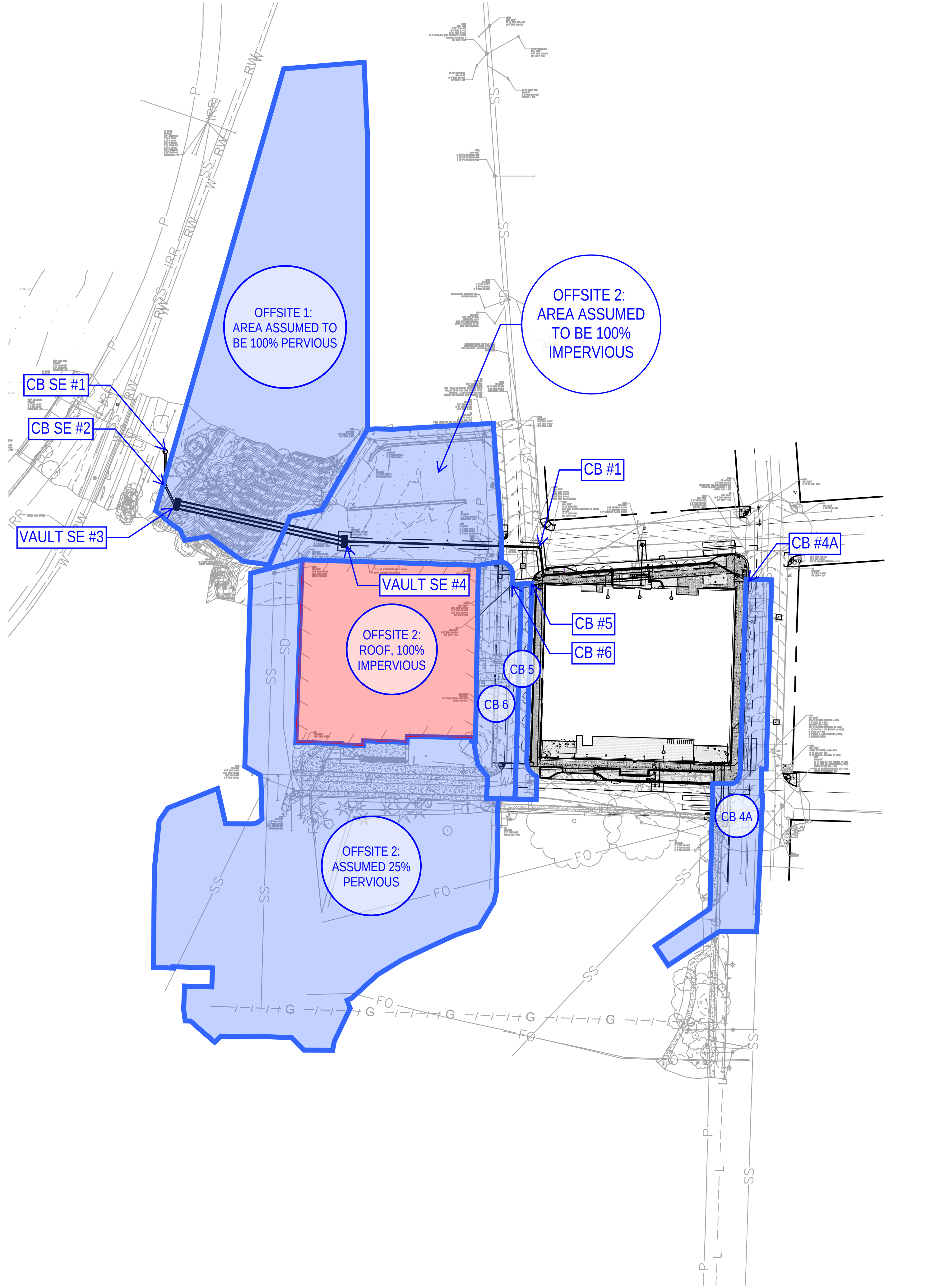


FIGURE 3
OFFSITE BASIN MAP
SCALE: 1"=150'

X:\113251-113500\113484 (1063 Capitol Way)\Engineer_Drainage Report\Exhibits\Drainage\Conveyance Map.dwg heatherm Jun 02, 2016 – 3:40pm

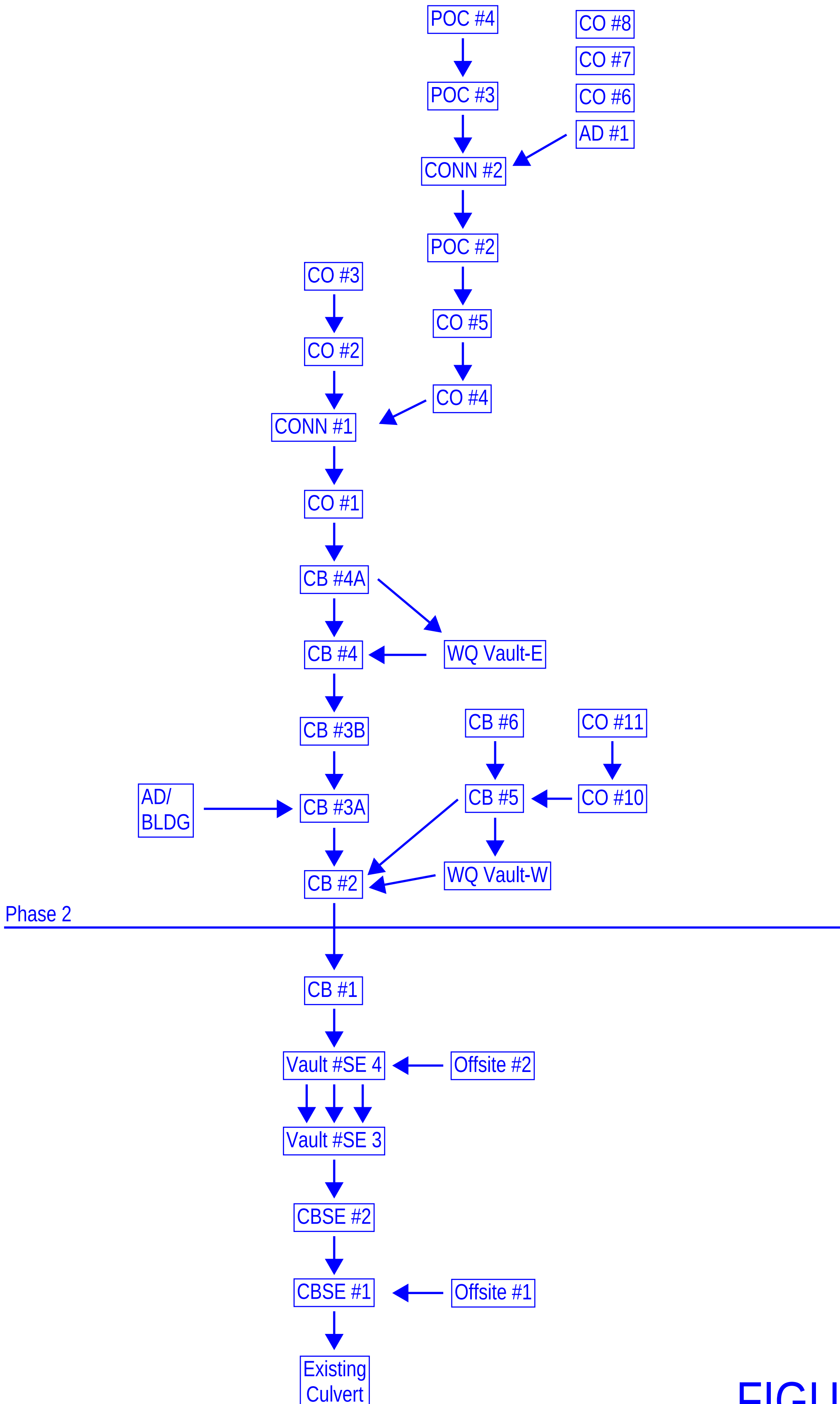


FIGURE 4
STRUCTURE FLOW CHART

1063 Capital Way
KPFF Consulting Engineers
June 2016

Drainage Calculations - Conveyance Check for the 25-year Storm Event

ASSUMPTIONS AND CONSTANTS

Manning's n =	0.012	(per Product Data, 0.010 per DDECMO Vol 1, App 1-F, Table 3 Manning's "n" for Pipes, Plastic/HDPE Pipe)
Pr =	4.5	in. (for 25-yr 24-hr event per WSDOT Isopluvials Maps, www.wsdot.wa.gov/Design/Hydraulics)
m =	6.63	(for 25-year event per WSDOT Hydraulics Manual M 23-03.03, June 2010, Fig 2-5.4A, Index to Rainfall Coeffcients, English Units)
n =	0.477	(for 25-year event per WSDOT Hydraulics Manual M 23-03.03, June 2010, Fig 2-5.4A, Index to Rainfall Coeffcients, English Units)
Tc =	5	minutes (minimum Tc per WSDOT Hydraulics Manual M 23-03.03, June 2010, pg 2-11)
C impervious =	0.90	(per WSDOT Hydraulics Manual M 23-03.03, June 2010, Fig 2-5.2-Runoff Coefficients for RM, pg 2-10 for Pavement and Roof)
C pervious =	0.22	(per WSDOT Hydraulics Manual M 23-03.03, June 2010, Fig 2-5.2-Runoff Coefficients for RM, pg 2-10 for lawn, heavy soil)
V min. allow. =	3.0	ft/s (for Pipes, 2.0 ft/s min per DDECMO Vol 1, App 1-F, pg F-5)
V max. allow. =	30.0	ft/s (for PVC, CMP, DI & Conc Pipes, per DDECMO Vol 1, App 1-F, Table 4 Max Slopes and Velocities, No Max for HDPE)
Min. Cover =	24	in. (per DDECMO Vol 1, App 1-F, pg. F-6)

Layout	Contributing Flow Calculations (Rational Method)									
Structure Number	Impervious Area (sf)	Pervious Area (sf)	Area (acres)	C	Tc (min)	Tf (min)	Tc_{END} (min)	WSDOT I_{25-yr} (in/hr)	Contributing Q (cfs)	Q_{Total} (cfs)
1	2	3	4	5	6	7	8	9	10	11
Phase 1 - Adjacent to Building										
0										
CO #8	6,658 sf	2,763 sf	0.22 ac	0.70	5.0	0.39	5.39	2.97 in/hr	0.45 cfs	0.45 cfs
CO #7	0 sf	0 sf	0.00 ac	0.00	5.0	0.27	5.66	2.90 in/hr	0.00 cfs	0.45 cfs
CO #6	0 sf	0 sf	0.00 ac	0.00	5.0	0.21	5.86	2.85 in/hr	0.00 cfs	0.45 cfs
AD #1	0 sf	0 sf	0.00 ac	0.00	5.0	0.01	5.87	2.85 in/hr	0.00 cfs	0.45 cfs
POC #4	1,224 sf	464 sf	0.04 ac	0.71	5.0	0.11	5.11	3.04 in/hr	0.08 cfs	0.08 cfs
POC #3	1,224 sf	464 sf	0.04 ac	0.71	5.0	1.22	6.33	2.75 in/hr	0.08 cfs	0.16 cfs
Conn #2	0 sf	0 sf	0.00 ac	0.00	5.0	0.19	6.53	2.71 in/hr	0.00 cfs	0.61 cfs
POC #2	1,224 sf	464 sf	0.04 ac	0.71	5.0	0.19	6.72	2.67 in/hr	0.07 cfs	0.68 cfs
CO #5	1,224 sf	464 sf	0.04 ac	0.71	5.0	0.24	6.96	2.63 in/hr	0.07 cfs	0.76 cfs
CO #4	0 sf	0 sf	0.00 ac	0.00	5.0	0.12	7.08	2.61 in/hr	0.00 cfs	0.76 cfs
CB #4A Bypass	0 sf	0 sf	0.00 ac	0.56	5.0	0.01	5.01	3.07 in/hr	0.10 cfs	0.10 cfs
WQ Vault E	0 sf	0 sf	0.00 ac	0.00	5.0	0.01	5.02	3.07 in/hr	0.00 cfs	0.10 cfs
AD/Building	44,904 sf	2,197 sf	1.08 ac	0.87	5.0	0.03	5.03	3.07 in/hr	2.88 cfs	2.88 cfs
CO #11	1,869 sf	1,289 sf	0.07 ac	0.62	5.0	0.46	5.46	2.95 in/hr	0.13 cfs	0.13 cfs
CO #10	0 sf	0 sf	0.00 ac	0.00	5.0	0.01	5.47	2.95 in/hr	0.00 cfs	0.13 cfs
CB #6	12,730 sf	0 sf	0.29 ac	0.90	5.0	0.09	5.09	3.05 in/hr	0.80 cfs	0.80 cfs
CB #5	3,934 sf	0 sf	0.09 ac	0.90	5.0	0.02	5.49	2.94 in/hr	0.24 cfs	1.12 cfs
CB #5 Bypass	0 sf	0 sf	0.00 ac	0.28	5.0	0.01	5.01	3.07 in/hr	0.05 cfs	0.05 cfs
WQ VAULT W	0 sf	0 sf	0.00 ac	0.00	5.0	0.04	5.05	3.06 in/hr	0.00 cfs	0.05 cfs
CO #3	76 sf	69 sf	0.00 ac	0.58	5.0	0.15	5.15	3.03 in/hr	0.01 cfs	0.01 cfs
CO #2	3,298 sf	320 sf	0.08 ac	0.84	5.0	0.12	5.27	3.00 in/hr	0.21 cfs	0.22 cfs
Conn #1	0 sf	0 sf	0.00 ac	0.00	5.0	0.44	7.52	2.53 in/hr	0.00 cfs	0.97 cfs
CO #1	0 sf	0 sf	0.00 ac	0.00	5.0	0.00	7.53	2.53 in/hr	0.00 cfs	0.97 cfs
CB #4A	21,908 sf	0 sf	0.50 ac	0.90	5.0	0.01	7.54	2.53 in/hr	1.15 cfs	2.02 cfs
CB #4	0 sf	0 sf	0.00 ac	0.00	5.0	0.13	7.67	2.51 in/hr	0.00 cfs	2.12 cfs
CB #3B	6,558 sf	1,312 sf	0.18 ac	0.79	5.0	0.57	8.24	2.43 in/hr	0.34 cfs	2.46 cfs
CB #3A	0 sf	0 sf	0.00 ac	0.00	5.0	0.31	8.55	2.38 in/hr	0.00 cfs	5.34 cfs
CB #2	0 sf	0 sf	0.00 ac	0.00	5.0	0.11	8.65	2.37 in/hr	0.00 cfs	6.52 cfs
Phase 2 - Downhill System										
Offsite #2	153,429 sf	34,440 sf	4.31 ac	0.78	10.0	0.06	10.06	2.20 in/hr	7.37 cfs	7.37 cfs
Offsite #1	0 sf	107,374 sf	2.46 ac	0.22	10.0	0.06	10.06	2.20 in/hr	1.20 cfs	1.20 cfs
CB #1	0 sf	0 sf	0.00 ac	0.00	5.0	0.73	9.38	2.28 in/hr	0.00 cfs	6.52 cfs
Vault #SE4	0 sf	0 sf	0.00 ac	0.00	5.0	0.13	10.19	2.19 in/hr	0.00 cfs	4.63 cfs
Vault #SE3	0 sf	0 sf	0.00 ac	0.00	5.0	0.05	10.24	2.19 in/hr	0.00 cfs	13.89 cfs
CB #SE2	0 sf	0 sf	0.00 ac	0.00	5.0	0.08	10.31	2.18 in/hr	0.00 cfs	13.89 cfs
CB #SE1	0 sf	0 sf	0.00 ac	0.00	5.0	0.24	10.55	2.15 in/hr	0.00 cfs	15.08 cfs
Outfall										

1063 Capital Way
KPFF Consulting Engineers
June 2016

ASSUMPTIONS AND CONSTANTS cont.

4	-in Pipe Wall Thickness =	0.5	in. (per HDPE Product Data)
6	-in Pipe Wall Thickness =	0.5	in. (per HDPE Product Data)
8	-in Pipe Wall Thickness =	0.5	in. (per HDPE Product Data)
12	-in Pipe Wall Thickness =	1.3	in. (per HDPE Product Data)
18	-in Pipe Wall Thickness =	2.0	in. (per HDPE Product Data)
24	-in Pipe Wall Thickness =	2.0	in. (per HDPE Product Data)
36	-in Pipe Wall Thickness =	3.0	in. (per HDPE Product Data)
	Min Cover for Plain Conc. Pipe =	1.5	ft. (per WSDOT Hydraulics Manual Tabl .
	Min Cover for Class IV Conc. Pipe =	1.0	ft. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
	Min Cover for Class V Conc. Pipe =	0.5	ft. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
	Project Pavement Thickness =	0.75	ft. (per **XXXXX**)

Layout	Pipe Capacity Calculations															Conveyance Checks				Notes
Structure Number	Inlet Rim Elevation	Outlet Rim Elevation	Inlet Invert Elevation	Outlet Invert Elevation	Pipe Diameter (inches)	Length (feet)	Slope (%)	Velocity, V (ft/s)	Pipe Flow Capacity, Q (cfs)	Inlet Cover (ft)	Outlet Cover (ft)	Structure Diameter (in)	Rim to Invert (ft)	Pipe Type	Pipe Capacity Used (%)	V_{Full} Check	Q Check	Inlet Cover	Outlet Cover	Comments
1	12	13	14	15	16	17	18	21	22	23	24	26	28		29	30	31	32	33	47
Phase 1 - Adjacent to Building																				
0																				
CO #8	94.28	92.86	91.20	89.70	6 in	92.6 ft	1.62%	3.94 ft/s	0.77 cfs	2.5 ft	2.6 ft	-	3.1 ft	Plain	58.1%	OK	OK	OK	OK	
CO #7	92.86	92.31	89.70	89.00	6 in	55.6 ft	1.26%	3.47 ft/s	0.68 cfs	2.6 ft	2.8 ft	-	3.2 ft	Plain	65.9%	OK	OK	OK	OK	
CO #6	92.31	91.60	89.00	88.40	6 in	44.4 ft	1.35%	3.60 ft/s	0.71 cfs	2.8 ft	2.7 ft	-	3.3 ft	Plain	63.6%	OK	OK	OK	OK	
AD #1	91.60	92.43	88.40	85.07	6 in	10.7 ft	31.12%	17.27 ft/s	3.39 cfs	2.7 ft	6.8 ft	-	3.2 ft	Plain	13.3%	OK	OK	OK	OK	
POC #4	93.43	93.45	85.90	85.69	6 in	21.0 ft	1.00%	3.10 ft/s	0.61 cfs	7.0 ft	7.2 ft	48	7.5 ft	Plain	13.8%	OK	OK	OK	OK	
POC #3	93.45	92.43	85.69	85.07	6 in	147.2 ft	0.42%	2.01 ft/s	0.39 cfs	7.2 ft	6.8 ft	48	7.8 ft	Plain	40.6%	Check	OK	OK	OK	
Conn #2	92.43	93.43	85.07	84.95	6 in	25.3 ft	0.49%	2.18 ft/s	0.43 cfs	6.8 ft	7.9 ft	48	7.4 ft	Plain	142.7%	Check	Check	OK	OK	
POC #2	93.43	90.15	84.95	84.82	6 in	25.4 ft	0.49%	2.17 ft/s	0.43 cfs	7.9 ft	4.8 ft	48	8.5 ft	Plain	160.3%	Check	Check	OK	OK	
CO #5	90.15	88.05	84.82	84.40	6 in	43.5 ft	0.97%	3.04 ft/s	0.60 cfs	4.8 ft	3.1 ft	48	5.3 ft	Plain	126.6%	OK	Check	OK	OK	
CO #4	88.05	87.29	84.40	84.32	6 in	15.7 ft	0.51%	2.21 ft/s	0.43 cfs	3.1 ft	2.4 ft	-	3.6 ft	Plain	174.3%	Check	Check	OK	OK	
CB #4A Bypass	78.29	78.20	76.35	76.24	6 in	4.0 ft	2.75%	5.13 ft/s	1.01 cfs	1.4 ft	1.4 ft	-	1.9 ft	Class V	9.4%	OK	OK	Check	Check	
WQ Vault E	78.20	78.32	73.06	72.93	6 in	4.0 ft	3.25%	5.58 ft/s	1.10 cfs	4.6 ft	4.8 ft	48	5.1 ft	Plain	8.7%	OK	OK	OK	OK	
AD/Building	78.57	78.65	74.27	73.30	12 in	18.0 ft	5.39%	11.41 ft/s	8.96 cfs	3.2 ft	4.2 ft	-	4.3 ft	Plain	32.2%	OK	OK	OK	OK	
CO #11	94.17	81.72	91.20	78.70	6 in	207.6 ft	6.02%	7.60 ft/s	1.49 cfs	2.4 ft	2.5 ft	-	3.0 ft	Plain	8.9%	OK	OK	OK	OK	
CO #10	81.72	80.73	78.70	76.00	6 in	11.3 ft	23.89%	15.13 ft/s	2.97 cfs	2.5 ft	4.2 ft	-	3.0 ft	Plain	4.5%	OK	OK	OK	OK	
CB #6	80.11	80.73	76.25	76.00	8 in	22.5 ft	1.11%	3.95 ft/s	1.38 cfs	3.2 ft	4.0 ft	-	3.9 ft	Plain	58.1%	OK	OK	OK	OK	
CB #5	80.73	80.70	75.80	72.16	8 in	18.5 ft	19.66%	16.63 ft/s	5.80 cfs	4.2 ft	7.8 ft	-	4.9 ft	Plain	19.4%	OK	OK	OK	OK	
CB #5 Bypass	80.73	80.70	75.75	73.43	6 in	10.6 ft	21.89%	14.48 ft/s	2.84 cfs	4.4 ft	6.7 ft	-	5.0 ft	Plain	1.8%	OK	OK	OK	OK	
WQ VAULT W	80.70	80.70	72.30	72.09	6 in	10.6 ft	1.98%	4.36 ft/s	0.86 cfs	7.9 ft	8.1 ft	48	8.4 ft	Plain	6.0%	OK	OK	OK	OK	
CO #3	91.73	89.69	88.70	86.70	6 in	53.9 ft	3.71%	5.96 ft/s	1.17 cfs	2.5 ft	2.4 ft	-	3.0 ft	Plain	0.5%	OK	OK	OK	OK	
CO #2	89.69	87.29	86.70	84.32	6 in	49.9 ft	4.77%	6.76 ft/s	1.33 cfs	2.4 ft	2.4 ft	-	3.0 ft	Plain	16.2%	OK	OK	OK	OK	
Conn #1	87.29	78.91	84.32	76.65	6 in	173.3 ft	4.43%	6.51 ft/s	1.28 cfs	2.4 ft	1.7 ft	-	3.0 ft	Class V	76.0%	OK	OK	OK	Check	
CO #1	78.91	78.29	76.65	76.46	6 in	2.3 ft	8.15%	8.84 ft/s	1.74 cfs	1.7 ft	1.3 ft	-	2.3 ft	Class V	56.0%	OK	OK	Check	Check	
CB #4A	78.29	78.32	76.46	72.93	12 in	13.0 ft	27.15%	25.61 ft/s	20.11 cfs	.7 ft	4.3 ft	-	1.8 ft	Check	10.1%	OK	OK	Check	OK	
CB #4	78.32	76.90	72.93	72.72	12 in	31.8 ft	0.66%	3.99 ft/s	3.14 cfs	4.3 ft	3.1 ft	48	5.4 ft	Plain	67.5%	OK	OK	OK	OK	
CB #3B	76.90	78.65	72.22	71.77	18 in	129.3 ft	0.35%	3.80 ft/s	6.71 cfs	3.0 ft	5.2 ft	48	4.7 ft	Plain	36.7%	OK	OK	OK	OK	
CB #3A	78.65	80.70	71.77	71.33	18 in	85.8 ft	0.51%	4.61 ft/s	8.15 cfs	5.2 ft	7.7 ft	48	6.9 ft	Plain	65.5%	OK	OK	OK	OK	
CB #2	80.70	79.46	71.33	71.06	18 in	35.7 ft	0.76%	5.60 ft/s	9.90 cfs	7.7 ft	6.7 ft	48	9.4 ft	Plain	65.9%	OK	OK	OK	OK	
Phase 2 - Downhill System																				
Offsite #2	80.95	79.84	76.90	68.77	18 in	76.9 ft	10.57%	20.94 ft/s	37.00 cfs	2.4 ft	9.4 ft	48	4.1 ft	Plain	19.9%	OK	OK	OK	OK	
Offsite #1	10.00	12.00	6.00	5.57	36 in	40.2 ft	1.07%	10.57 ft/s	74.73 cfs	.8 ft	3.2 ft	60	4.0 ft	Check	1.6%	OK	OK	Check	OK	
CB #1	79.46	79.84	71.06	69.27	18 in	242.2 ft	0.74%	5.54 ft/s	9.78 cfs	6.7 ft	8.9 ft	48	8.4 ft	Plain	66.6%	OK	OK	OK	OK	
Vault #SE4	79.84	14.32	69.27	5.52	12 in	208.6 ft	30.57%	27.17 ft/s	21.34 cfs	9.5 ft	7.7 ft	48	10.6 ft	Plain	21.7%	OK	OK	OK	OK	
Vault #SE3	14.32	12.00	6.52	6.17	24 in	25.5 ft	1.40%	9.22 ft/s	28.96 cfs	5.6 ft	3.7 ft	48	7.8 ft	Plain	48.0%	OK	OK	OK	OK	
CB #SE2	12.00	12.00	6.17	5.57	24 in	42.7 ft	1.40%	9.22 ft/s	28.98 cfs	3.7 ft	4.3 ft	48	5.8 ft	Plain	47.9%	OK	OK	OK	OK	
CB #SE1	12.00	10.00	5.57	3.95	36 in	151.5 ft	1.07%	10.56 ft/s	74.67 cfs	3.2 ft	2.8 ft	60	6.4 ft	Plain	20.2%	OK	OK	OK	OK	
Outfall																				

1063 Capital Way
KPFF Consulting Engineers
June 2016

Drainage Calculations - Conveyance Check for the 100-year Storm Event

ASSUMPTIONS AND CONSTANTS

Manning's n =	0.012	(per Product Data, 0.010 per DDECMO Vol 1, App 1-F, Table 3 Manning's "n" for Pipes, Plastic/HDPE Pipe)
Pr =	6	in. (for 25-yr 24-hr event per WSDOT Isopluvials Maps, www.wsdot.wa.gov/Design/Hydraulics)
m =	8.17	(for 25-year event per WSDOT Hydraulics Manual M 23-03.03, June 2010, Fig 2-5.4A, Index to Rainfall Coeffcients, English Units)
n =	0.48	(for 25-year event per WSDOT Hydraulics Manual M 23-03.03, June 2010, Fig 2-5.4A, Index to Rainfall Coeffcients, English Units)
Tc =	5	minutes (minimum Tc per WSDOT Hydraulics Manual M 23-03.03, June 2010, pg 2-11)
C impervious =	0.90	(per WSDOT Hydraulics Manual M 23-03.03, June 2010, Fig 2-5.2-Runoff Coefficients for RM, pg 2-10 for Pavement and Roof)
C pervious =	0.22	(per WSDOT Hydraulics Manual M 23-03.03, June 2010, Fig 2-5.2-Runoff Coefficients for RM, pg 2-10 for lawn, heavy soil)
V min. allow. =	3.0	ft/s (for Pipes, 2.0 ft/s min per DDECMO Vol 1, App 1-F, pg F-5)
V max. allow. =	30.0	ft/s (for PVC, CMP, DI & Conc Pipes, per DDECMO Vol 1, App 1-F, Table 4 Max Slopes and Velocities, No Max for HDPE)
Min. Cover =	24	in. (per DDECMO Vol 1, App 1-F, pg. F-6)

Layout	Contributing Flow Calculations (Rational Method)									
Structure Number	Impervious Area (sf)	Pervious Area (sf)	Area (acres)	C	Tc (min)	Tf (min)	Tc_{END} (min)	$I_{25\text{-}yr}$ (in/hr)	Contributing Q (cfs)	Q_{Total} (cfs)
1	2	3	4	5	6	7	8	9	10	11
Phase 1 - Adjacent to Building										
0										
0										
CO #8	6,658 sf	2,763 sf	0.22 ac	0.70	5.0	0.39	5.39	3.64 in/hr	0.55 cfs	0.55 cfs
CO #7	0 sf	0 sf	0.00 ac	0.00	5.0	0.27	5.66	3.56 in/hr	0.00 cfs	0.55 cfs
CO #6	0 sf	0 sf	0.00 ac	0.00	5.0	0.21	5.86	3.50 in/hr	0.00 cfs	0.55 cfs
AD #1	0 sf	0 sf	0.00 ac	0.00	5.0	0.01	5.87	3.49 in/hr	0.00 cfs	0.55 cfs
POC #4	1,224 sf	464 sf	0.04 ac	0.71	5.0	0.11	5.11	3.73 in/hr	0.10 cfs	0.10 cfs
POC #3	1,224 sf	464 sf	0.04 ac	0.71	5.0	1.22	6.33	3.37 in/hr	0.09 cfs	0.20 cfs
Conn #2	0 sf	0 sf	0.00 ac	0.00	5.0	0.19	6.53	3.32 in/hr	0.00 cfs	0.75 cfs
POC #2	1,224 sf	464 sf	0.04 ac	0.71	5.0	0.19	6.72	3.27 in/hr	0.09 cfs	0.84 cfs
CO #5	1,224 sf	464 sf	0.04 ac	0.71	5.0	0.24	6.96	3.22 in/hr	0.09 cfs	0.93 cfs
CO #4	0 sf	0 sf	0.00 ac	0.00	5.0	0.12	7.08	3.19 in/hr	0.00 cfs	0.93 cfs
CB #4A Bypass	0 sf	0 sf	0.00 ac	0.56	5.0	0.01	5.01	3.77 in/hr	0.10 cfs	0.10 cfs
WQ Vault E	0 sf	0 sf	0.00 ac	0.00	5.0	0.01	5.02	3.76 in/hr	0.00 cfs	0.10 cfs
AD/Building	44,904 sf	2,197 sf	1.08 ac	0.87	5.0	0.03	5.03	3.76 in/hr	3.53 cfs	3.53 cfs
CO #11	1,869 sf	1,289 sf	0.07 ac	0.62	5.0	0.46	5.46	3.62 in/hr	0.16 cfs	0.16 cfs
CO #10	0 sf	0 sf	0.00 ac	0.00	5.0	0.01	5.47	3.61 in/hr	0.00 cfs	0.16 cfs
CB #6	12,730 sf	0 sf	0.29 ac	0.90	5.0	0.09	5.09	3.74 in/hr	0.98 cfs	0.98 cfs
CB #5	3,934 sf	0 sf	0.09 ac	0.90	5.0	0.02	5.49	3.61 in/hr	0.29 cfs	1.35 cfs
CB #5 Bypass	0 sf	0 sf	0.00 ac	0.28	5.0	0.01	5.01	3.77 in/hr	0.05 cfs	0.05 cfs
WQ VAULT W	0 sf	0 sf	0.00 ac	0.00	5.0	0.04	5.05	3.75 in/hr	0.00 cfs	0.05 cfs
CO #3	76 sf	69 sf	0.00 ac	0.58	5.0	0.15	5.15	3.72 in/hr	0.01 cfs	0.01 cfs
CO #2	3,298 sf	320 sf	0.08 ac	0.84	5.0	0.12	5.27	3.68 in/hr	0.26 cfs	0.26 cfs
Conn #1	0 sf	0 sf	0.00 ac	0.00	5.0	0.44	7.52	3.10 in/hr	0.00 cfs	1.19 cfs
CO #1	0 sf	0 sf	0.00 ac	0.00	5.0	0.00	7.53	3.10 in/hr	0.00 cfs	1.19 cfs
CB #4A	21,908 sf	0 sf	0.50 ac	0.90	5.0	0.01	7.54	3.10 in/hr	1.40 cfs	2.54 cfs
CB #4	0 sf	0 sf	0.00 ac	0.00	5.0	0.13	7.67	3.07 in/hr	0.00 cfs	2.64 cfs
CB #3B	6,558 sf	1,312 sf	0.18 ac	0.79	5.0	0.57	8.24	2.97 in/hr	0.42 cfs	3.06 cfs
CB #3A	0 sf	0 sf	0.00 ac	0.00	5.0	0.31	8.55	2.92 in/hr	0.00 cfs	6.59 cfs
CB #2	0 sf	0 sf	0.00 ac	0.00	5.0	0.11	8.65	2.90 in/hr	0.00 cfs	7.99 cfs
Phase 2 - Downhill System										
Offsite #2	153,429 sf	34,440 sf	4.31 ac	0.78	10.0	0.06	10.06	2.70 in/hr	9.02 cfs	9.02 cfs
Offsite #1	0 sf	107,374 sf	2.46 ac	0.22	10.0	0.06	10.06	2.70 in/hr	1.46 cfs	1.46 cfs
CB #1	0 sf	0 sf	0.00 ac	0.00	5.0	0.73	9.38	2.79 in/hr	0.00 cfs	7.99 cfs
Vault #SE4	0 sf	0 sf	0.00 ac	0.00	5.0	0.13	10.19	2.68 in/hr	0.00 cfs	5.67 cfs
Vault #SE3	0 sf	0 sf	0.00 ac	0.00	5.0	0.05	10.24	2.68 in/hr	0.00 cfs	17.01 cfs
CB #SE2	0 sf	0 sf	0.00 ac	0.00	5.0	0.08	10.31	2.67 in/hr	0.00 cfs	17.01 cfs
CB #SE1	0 sf	0 sf	0.00 ac	0.00	5.0	0.24	10.55	2.64 in/hr	0.00 cfs	18.47 cfs
Outfall										

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KPFF Consulting Engineers
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ASSUMPTIONS AND CONSTANTS cont.

4	-in Pipe Wall Thickness =	0.5	in. (per HDPE Product Data)
6	-in Pipe Wall Thickness =	0.5	in. (per HDPE Product Data)
8	-in Pipe Wall Thickness =	0.5	in. (per HDPE Product Data)
12	-in Pipe Wall Thickness =	1.3	in. (per HDPE Product Data)
18	-in Pipe Wall Thickness =	2.0	in. (per HDPE Product Data)
24	-in Pipe Wall Thickness =	2.0	in. (per HDPE Product Data)
36	-in Pipe Wall Thickness =	3.0	in. (per HDPE Product Data)
	Min Cover for Plain Conc. Pipe =	1.5	ft. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
	Min Cover for Class IV Conc. Pipe =	1.0	ft. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
	Min Cover for Class V Conc. Pipe =	0.5	ft. (per WSDOT Hydraulics Manual Table 8-11.2 (English))
	Project Pavement Thickness =	0.75	ft. (per XXXXX)

Layout	Pipe Capacity Calculations															Conveyance Checks			
Structure Number	Inlet Rim Elevation	Outlet Rim Elevation	Inlet Invert Elevation	Outlet Invert Elevation	Pipe Diameter (inches)	Length (feet)	Slope (%)	Velocity, V (ft/s)	Pipe Flow Capacity, Q (cfs)	Inlet Cover (ft)	Outlet Cover (ft)	Structure Diameter (in)	Rim to Invert (ft)	Pipe Type	Pipe Capacity Used (%)	V_{Full} Check	Q Check	Inlet Cover	Outlet Cover
1	12	13	14	15	16	17	18	21	22	23	24	26	28		29	30	31	32	33
Phase 1 - Adjacent to Building																			
0																			
0																			
CO #8	94.28	92.86	91.20	89.70	6 in	92.6 ft	1.62%	3.94 ft/s	0.77 cfs	2.5 ft	2.6 ft	-	3.1 ft	Plain	71.3%	OK	OK	OK	OK
CO #7	92.86	92.31	89.70	89.00	6 in	55.6 ft	1.26%	3.47 ft/s	0.68 cfs	2.6 ft	2.8 ft	-	3.2 ft	Plain	80.8%	OK	OK	OK	OK
CO #6	92.31	91.60	89.00	88.40	6 in	44.4 ft	1.35%	3.60 ft/s	0.71 cfs	2.8 ft	2.7 ft	-	3.3 ft	Plain	78.0%	OK	OK	OK	OK
AD #1	91.60	92.43	88.40	85.07	6 in	10.7 ft	31.12%	17.27 ft/s	3.39 cfs	2.7 ft	6.8 ft	-	3.2 ft	Plain	16.3%	OK	OK	OK	OK
POC #4	93.43	93.45	85.90	85.69	6 in	21.0 ft	1.00%	3.10 ft/s	0.61 cfs	7.0 ft	7.2 ft	48	7.5 ft	Plain	17.0%	OK	OK	OK	OK
POC #3	93.45	92.43	85.69	85.07	6 in	147.2 ft	0.42%	2.01 ft/s	0.39 cfs	7.2 ft	6.8 ft	48	7.8 ft	Plain	49.7%	Check	OK	OK	OK
Conn #2	92.43	93.43	85.07	84.95	6 in	25.3 ft	0.49%	2.18 ft/s	0.43 cfs	6.8 ft	7.9 ft	48	7.4 ft	Plain	175.0%	Check	Check	OK	OK
POC #2	93.43	84.95	84.95	84.82	6 in	25.4 ft	0.49%	2.17 ft/s	0.43 cfs	7.9 ft	-.4 ft	48	8.5 ft	Check	196.5%	Check	Check	OK	Check
CO #5	90.15	88.05	84.82	84.40	6 in	43.5 ft	0.97%	3.04 ft/s	0.60 cfs	4.8 ft	3.1 ft	48	5.3 ft	Plain	155.2%	OK	Check	OK	OK
CO #4	88.05	87.29	84.40	84.32	6 in	15.7 ft	0.51%	2.21 ft/s	0.43 cfs	3.1 ft	2.4 ft	-	3.6 ft	Plain	213.6%	Check	Check	OK	OK
CB #4A Bypass	78.29	78.20	76.35	76.24	6 in	4.0 ft	2.75%	5.13 ft/s	1.01 cfs	1.4 ft	1.4 ft	-	1.9 ft	Class V	9.4%	OK	OK	Check	Check
WQ Vault E	78.20	78.32	73.06	72.93	6 in	4.0 ft	3.25%	5.58 ft/s	1.10 cfs	4.6 ft	4.8 ft	48	5.1 ft	Plain	8.7%	OK	OK	OK	OK
AD/Building	78.57	78.65	74.27	73.30	12 in	18.0 ft	5.39%	11.41 ft/s	8.96 cfs	3.2 ft	4.3 ft	-	4.3 ft	Plain	39.4%	OK	OK	OK	OK
CO #11	94.17	81.72	91.20	78.70	6 in	207.6 ft	6.02%	7.60 ft/s	1.49 cfs	2.4 ft	2.5 ft	-	3.0 ft	Plain	10.9%	OK	OK	OK	OK
CO #10	81.72	80.73	78.70	76.00	6 in	11.3 ft	23.89%	15.13 ft/s	2.97 cfs	2.5 ft	4.2 ft	-	3.0 ft	Plain	5.5%	OK	OK	OK	OK
CB #6	80.11	80.73	76.25	76.00	8 in	22.5 ft	1.11%	3.95 ft/s	1.38 cfs	3.2 ft	4.0 ft	-	3.9 ft	Plain	71.3%	OK	OK	OK	OK
CB #5	80.73	80.70	75.80	72.16	8 in	18.5 ft	19.66%	16.63 ft/s	5.80 cfs	4.2 ft	7.8 ft	-	4.9 ft	Plain	23.2%	OK	OK	OK	OK
CB #5 Bypass	80.73	80.70	75.75	73.43	6 in	10.6 ft	21.89%	14.48 ft/s	2.84 cfs	4.4 ft	6.7 ft	-	5.0 ft	Plain	1.8%	OK	OK	OK	OK
WQ VAULT W	80.70	80.70	72.30	72.09	6 in	10.6 ft	1.98%	4.36 ft/s	0.86 cfs	7.9 ft	8.1 ft	48	8.4 ft	Plain	6.0%	OK	OK	OK	OK
CO #3	91.73	89.69	88.70	86.70	6 in	53.9 ft	3.71%	5.96 ft/s	1.17 cfs	2.5 ft	2.4 ft	-	3.0 ft	Plain	0.6%	OK	OK	OK	OK
CO #2	89.69	87.29	86.70	84.32	6 in	49.9 ft	4.77%	6.76 ft/s	1.33 cfs	2.4 ft	2.4 ft	-	3.0 ft	Plain	19.9%	OK	OK	OK	OK
Conn #1	87.29	78.91	84.32	76.65	6 in	173.3 ft	4.43%	6.51 ft/s	1.28 cfs	2.4 ft	1.7 ft	-	3.0 ft	Class V	93.1%	OK	OK	OK	Check
CO #1	78.91	78.29	76.65	76.46	6 in	2.3 ft	8.15%	8.84 ft/s	1.74 cfs	1.7 ft	1.3 ft	-	2.3 ft	Class V	68.6%	OK	OK	Check	Check
CB #4A	78.29	78.32	76.46	72.93	12 in	13.0 ft	27.15%	25.61 ft/s	20.11 cfs	.7 ft	4.3 ft	-	1.8 ft	Check	12.6%	OK	OK	Check	OK
CB #4	78.32	76.90	72.93	72.72	12 in	31.8 ft	0.66%	3.99 ft/s	3.14 cfs	4.3 ft	3.1 ft	48	5.4 ft	Plain	84.1%	OK	OK	OK	OK
CB #3B	76.90	78.65	72.22	71.77	18 in	129.3 ft	0.35%	3.80 ft/s	6.71 cfs	3.0 ft	5.3 ft	48	4.7 ft	Plain	45.6%	OK	OK	OK	OK
CB #3A	78.65	80.70	71.77	71.33	18 in	85.8 ft	0.51%	4.61 ft/s	8.15 cfs	5.2 ft	7.8 ft	48	6.9 ft	Plain	80.9%	OK	OK	OK	OK
CB #2	80.70	79.46	71.33	71.06	18 in	35.7 ft	0.76%	5.60 ft/s	9.90 cfs	7.7 ft	6.9 ft	48	9.4 ft	Plain	80.7%	OK	OK	OK	OK
Phase 2 - Downhill System																			
Offsite #2	80.95	79.84	76.90	68.77	18 in	76.9 ft	10.57%	20.94 ft/s	37.00 cfs	2.4 ft	9.5 ft	48	4.1 ft	Plain	24.4%	OK	OK	OK	OK
Offsite #1	10.00	12.00	6.00	5.57	36 in	40.2 ft	1.07%	10.57 ft/s	74.73 cfs	.8 ft	3.4 ft	60	4.0 ft	Check	2.0%	OK	OK	Check	OK
CB #1	79.46	79.84	71.06	69.27	18 in	242.2 ft	0.74%	5.54 ft/s	9.78 cfs	6.7 ft	9.0 ft	48	8.4 ft	Plain	81.7%	OK	OK	OK	OK
Vault #SE4	79.84	14.32	69.27	5.52	12 in	208.6 ft	30.57%	27.17 ft/s	21.34 cfs	9.5 ft	7.8 ft	48	10.6 ft	Plain	26.6%	OK	OK	OK	OK
Vault #SE3	14.32	12.00	6.52	6.17	24 in	25.5 ft	1.40%	9.22 ft/s	28.96 cfs	5.6 ft	3.8 ft	48	7.8 ft	Plain	58.7%	OK	OK	OK	OK
CB #SE2	12.00	12.00	6.17	5.57	24 in	42.7 ft	1.40%	9.22 ft/s	28.98 cfs	3.7 ft	4.4 ft	48	5.8 ft	Plain	58.7%	OK	OK	OK	OK
CB #SE1	12.00	10.00	5.57	3.95	36 in	151.5 ft	1.07%	10.56 ft/s	74.67 cfs	3.2 ft	3.0 ft	60	6.4 ft	Plain	24.7%	OK	OK	OK	OK
Outfall																			

1063 Capital Way
KPFF Consulting Engineers
June 2016

Drainage Calculations - Backwater Analysis for the 25-year Storm Event

ASSUMPTIONS AND CONSTANTS

Manning's n = 0.012 (per Product Data, 0.010 per TCDDECM Vol 1, App 1-F, Table 3 Manning's "n" for Pipes, Plastic/HDPE Pipe)
Inlet Control Analysis = Assumed square edge with headwall
*If Q/(AD^0.5)<=3.5, unsubmerged inlet conditions. If Q/(AD^0.5)>=4.0, submerged conditions (See KCSWDM pg.4-37)

Unsubmerged :
K = 0.0098
M = 2.0

Submerged :
c = 0.0398 (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
Y = 0.67 (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)

Bend Head Loss Coeff., Kb = 1.23 (per KCSWDM Figure 4.2.1.K for 90° Bend at a Manhole, no Special Shaping)
Entrance Loss Coef., Ke = 0.5 (per KCSWDM Table 4.3.1.B for Square-Cut End Concrete Pipe)
g = 32.2 ft/s^2 - acceleration due to gravity

Layout	Pipe Sytem Design							Backwater Calculation							
Structure Number	Design Flow, Q (cfs)	Length (ft)	Pipe Size (in)	"n" Value	Slope (%)	Outlet El (ft)	Inlet Elev (ft)	Q/(AD^0.5)*	Inlet Controlled Condition	$Q^2B_c/(gA_c^3)$	Critical Depth (ft)	Critical Velocity (fps)	Barrel Area (sf)	Barrel Velocity (fps)	Barrel Vel Head (ft)
1	2	3	4	5	6	7	8	9	10	14	15	16	17	18	19
Phase 1 - Adjacent to Building															
0															
0															
CO #8	0.45	92.60	6	0.012	1.62%	89.70	91.20	3.239	Unsubmerged	1.00	0.34	3.15	0.196	2.290	0.0815
CO #7	0.45	55.60	6	0.012	1.26%	89.00	89.70	3.239	Unsubmerged	1.00	0.34	3.15	0.196	2.290	0.0815
CO #6	0.45	44.40	6	0.012	1.35%	88.40	89.00	3.239	Unsubmerged	1.00	0.34	3.15	0.196	2.290	0.0815
AD #1	0.45	10.70	6	0.012	31.12%	85.07	88.40	3.239	Unsubmerged	1.00	0.34	3.15	0.196	2.290	0.0815
POC #4	0.08	21.00	6	0.012	1.00%	85.69	85.90	0.606	Unsubmerged	1.00	0.14	1.82	0.196	0.428	0.0029
POC #3	0.16	147.20	6	0.012	0.42%	85.07	85.69	1.153	Unsubmerged	1.00	0.20	2.19	0.196	0.815	0.0103
Conn #2	0.61	25.30	6	0.012	0.49%	84.95	85.07	4.392	Submerged	1.00	0.40	3.65	0.196	3.106	0.1498
POC #2	0.68	25.40	6	0.012	0.49%	84.82	84.95	4.924	Submerged	1.00	0.42	3.90	0.196	3.482	0.1882
CO #5	0.76	43.50	6	0.012	0.97%	84.40	84.82	5.447	Submerged	1.00	0.44	4.17	0.196	3.851	0.2303
CO #4	0.76	15.70	6	0.012	0.51%	84.32	84.40	5.447	Submerged	1.00	0.44	4.17	0.196	3.851	0.2303
CB #4A Bypass	0.10	4.00	6	0.012	2.75%	76.24	76.35	0.684	Unsubmerged	1.00	0.15	1.88	0.196	0.484	0.0036
WQ Vault E	0.10	4.00	6	0.012	3.25%	72.93	73.06	0.684	Unsubmerged	1.00	0.15	1.88	0.196	0.484	0.0036
AD/Building	2.88	18.00	12	0.012	5.39%	73.30	74.27	3.669	Submerged	1.00	0.73	4.71	0.785	3.669	0.2090
CO #11	0.13	207.60	6	0.012	6.02%	78.70	91.20	0.959	Unsubmerged	1.00	0.18	2.07	0.196	0.678	0.0071
CO #10	0.13	11.30	6	0.012	23.89%	76.00	78.70	0.959	Unsubmerged	1.00	0.18	2.07	0.196	0.678	0.0071
CB #6	0.80	22.50	8	0.012	1.11%	76.00	76.25	2.814	Unsubmerged	1.00	0.42	3.43	0.349	2.298	0.0820
CB #5	1.12	18.50	8	0.012	19.66%	72.16	75.80	3.942	Submerged	1.00	0.50	3.98	0.349	3.219	0.1609
CB #5 Bypass	0.05	10.60	6	0.012	21.89%	73.43	75.75	0.367	Unsubmerged	1.00	0.11	1.58	0.196	0.260	0.0010
WQ VAULT W	0.05	10.58	6	0.012	1.98%	72.09	72.30	0.367	Unsubmerged	1.00	0.11	1.58	0.196	0.260	0.0010
CO #3	0.01	53.90	6	0.012	3.71%	86.70	88.70	0.042	Unsubmerged	1.00	0.04	0.90	0.196	0.030	0.0000
CO #2	0.22	49.90	6	0.012	4.77%	84.32	86.70	1.549	Unsubmerged	1.00	0.23	2.40	0.196	1.095	0.0186
Conn #1	0.97	173.30	6	0.012	4.43%	76.65	84.32	6.996	Submerged	1.00	0.47	5.07	0.196	4.947	0.3800
CO #1	0.97	2.33	6	0.012	8.15%	76.46	76.65	6.996	Submerged	1.00	0.47	5.07	0.196	4.947	0.3800
CB #4A	2.02	13.00	12	0.012	27.15%	72.93	76.46	2.574	Unsubmerged	1.00	0.61	4.05	0.785	2.574	0.1029
CB #4	2.12	31.80	12	0.012	0.66%	72.72	72.93	2.695	Unsubmerged	1.00	0.62	4.13	0.785	2.695	0.1128
CB #3B	2.46	129.30	18	0.012	0.35%	71.77	72.22	1.137	Unsubmerged	1.00	0.59	3.78	1.767	1.393	0.0301
CB #3A	5.34	85.75	18	0.012	0.51%	71.33	71.77	2.469	Unsubmerged	1.00	0.89	4.89	1.767	3.023	0.1419
CB #2	6.52	35.70	18	0.012	0.76%	71.06	71.33	3.011	Unsubmerged	1.00	0.99	5.28	1.767	3.688	0.2112
Phase 2 - Downhill System															
Offsite #2	7.37	76.90	18	0.012	10.57%	68.77	76.90	3.406	Unsubmerged	1.00	1.05	5.57	1.767	4.171	0.2701
Offsite #1	1.20	40.20	36	0.012	1.07%	5.57	6.00	0.098	Unsubmerged	1.00	0.34	2.73	7.069	0.169	0.0004
CB #1	6.52	242.20	18	0.012	0.74%	69.27	71.06	3.011	Unsubmerged	1.00	0.99	5.28	1.767	3.688	0.2112
Vault #SE4	4.63	208.56	12	0.012	30.57%	5.52	69.27	5.894	Submerged	1.00	0.90	6.24	0.785	5.894	0.5395
Vault #SE3	13.89	25.50	24	0.012	1.40%	6.17	6.52	3.126	Unsubmerged	1.00	1.34	6.20	3.142	4.421	0.3034
CB #SE2	13.89	42.70	24	0.012	1.40%	5.57	6.17	3.126	Unsubmerged	1.00	1.34	6.20	3.142	4.421	0.3034
CB #SE1	15.08	151.50	36	0.012	1.07%	3.95	5.57	1.232	Unsubmerged	1.00	1.24	5.48	7.069	2.134	0.0707
Outfall															

1063 Capital Way
KPFF Consulting Engineers
June 2016

Drainage Calculations - Backwater Analysis for the 25-year Storm Event

ASSUMPTIONS AND CONSTANTS

Manning's n = 0.012 (per Product Data, 0.010 per TCDDECM Vol 1, App 1-F, Table 3 Manning's "n" for Pipes, Plastic/HDPE Pipe)
Inlet Control Analysis = Assumed square edge with headwall
*If Q/(AD^0.5)<=3.5, unsubmerged inlet conditions. If Q/(AD^0.5)>=4.0, submerged conditions (See KCSWDM pg.4-37)
Unsubmerged : Submerged :
K = 0.0098 c = 0.0398
M = 2.0 Y = 0.67 (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
Bend Head Loss Coeff., Kb = 1.23 (per KCSWDM Figure 4.2.1.K fc (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
Entrance Loss Coef., Ke = 0.5 (per KCSWDM Table 4.3.1.B for Square-Cut End Concrete Pipe)
g = 32.2 ft/s2 - acceleration due to gravity

Layout															Checks	
Structure Number	TW Elev (ft)	Hydraulic Radius (ft)	Friction Loss (ft)	Entrance HGL Elev (ft)	Entrance Head Loss (ft)	Exit Head Loss (ft)	Outlet Control Elev (ft)	Inlet Control Elev* (ft)	Inlet or Outlet Controlled?	Approach Velocity Head (ft)	Bend Head Loss (ft)	Junction Loss Coeff., Kj	Junction Head Loss (ft)	HW Elev (ft)	CB Rim Elev (ft)	Overtopping Check	Clearance btwn Rim and HGL (ft)
1	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Phase 1 - Adjacent to Building																	
0																	
0																	
CO #8	90.16	0.125	0.5007	90.66	0.0407	0.0815	90.78	91.74	Inlet	0.000	0.0000	0.00	0.0000	91.74	94.28	OK	2.54
CO #7	89.46	0.125	0.3006	89.76	0.0407	0.0815	89.88	90.24	Inlet	0.081	0.0000	0.00	0.0000	90.16	92.86	OK	2.70
CO #6	88.79	0.125	0.2401	89.03	0.0407	0.0815	89.15	89.54	Inlet	0.081	0.0000	0.00	0.0000	89.46	92.31	OK	2.85
AD #1	88.11	0.125	0.0579	88.17	0.0407	0.0815	88.29	88.87	Inlet	0.081	0.0000	0.00	0.0000	88.79	91.60	OK	2.81
POC #4	88.22	0.125	0.0040	88.23	0.0014	0.0029	88.23	86.09	Outlet	0.000	0.0000	0.00	0.0000	88.23	93.43	OK	5.20
POC #3	88.11	0.125	0.1008	88.21	0.0052	0.0103	88.23	85.97	Outlet	0.003	0.0000	0.00	0.0000	88.22	93.45	OK	5.23
Conn #2	87.54	0.125	0.2515	87.79	0.0749	0.1498	88.01	85.79	Outlet	0.081	0.1002	0.95	0.0776	88.11	92.43	OK	4.32
POC #2	87.09	0.125	0.3173	87.40	0.0941	0.1882	87.69	85.76	Outlet	0.150	0.0000	0.00	0.0000	87.54	93.43	OK	5.89
CO #5	86.26	0.125	0.6650	86.93	0.1152	0.2303	87.28	85.74	Outlet	0.188	0.0000	0.00	0.0000	87.09	90.15	OK	3.06
CO #4	85.91	0.125	0.2400	86.15	0.1152	0.2303	86.49	85.32	Outlet	0.230	0.0000	0.00	0.0000	86.26	88.05	OK	1.79
CB #4A Bypass	73.91	0.125	0.0010	73.92	0.0018	0.0036	73.92	76.55	Inlet	0.000	0.0000	0.00	0.0000	76.55	78.29	OK	1.74
WQ Vault E	73.91	0.125	0.0010	73.91	0.0018	0.0036	73.92	73.26	Outlet	0.004	0.0000	0.00	0.0000	73.91	78.20	OK	4.29
AD/Building	73.52	0.250	0.0993	73.62	0.1045	0.2090	73.93	75.45	Inlet	0.000	0.0000	0.00	0.0000	75.45	78.57	OK	3.12
CO #11	78.89	0.125	0.0985	78.98	0.0036	0.0071	78.99	91.44	Inlet	0.000	0.0000	0.00	0.0000	91.44	94.17	OK	2.73
CO #10	76.62	0.125	0.0054	76.63	0.0036	0.0071	76.64	78.89	Inlet	0.007	0.0000	0.00	0.0000	78.89	81.72	OK	2.83
CB #6	76.62	0.167	0.0835	76.71	0.0410	0.0820	76.83	76.90	Inlet	0.000	0.0000	0.00	0.0000	76.90	80.11	OK	3.21
CB #5	72.94	0.167	0.1347	73.08	0.0804	0.1609	73.32	76.59	Inlet	0.082	0.1008	0.13	0.0106	76.62	80.73	OK	4.11
CB #5 Bypass	72.94	0.125	0.0007	72.94	0.0005	0.0010	72.94	75.85	Inlet	0.000	0.0000	0.00	0.0000	75.85	80.73	OK	4.88
WQ VAULT W	72.94	0.125	0.0007	72.94	0.0005	0.0010	72.94	72.45	Outlet	0.001	0.0000	0.00	0.0000	72.94	80.70	OK	7.76
CO #3	87.02	0.125	0.0000	87.02	0.0000	0.0000	87.02	88.74	Inlet	0.000	0.0000	0.00	0.0000	88.74	91.73	OK	2.99
CO #2	85.91	0.125	0.0617	85.97	0.0093	0.0186	86.00	87.02	Inlet	0.000	0.0000	0.00	0.0000	87.02	89.69	OK	2.67
Conn #1	77.56	0.125	4.3707	81.93	0.1900	0.3800	82.50	85.62	Inlet	0.230	0.2833	1.04	0.2385	85.91	87.29	OK	1.38
CO #1	76.87	0.125	0.0588	76.93	0.1900	0.3800	77.50	77.94	Inlet	0.380	0.0000	0.00	0.0000	77.56	78.91	OK	1.35
CB #4A	73.91	0.250	0.0353	73.95	0.0514	0.1029	74.10	77.25	Inlet	0.380	0.0000	0.00	0.0000	76.87	78.29	OK	1.42
CB #4	73.51	0.250	0.0947	73.60	0.0564	0.1128	73.77	73.88	Inlet	0.103	0.1265	0.04	0.0040	73.91	78.32	OK	4.41
CB #3B	73.52	0.375	0.0600	73.58	0.0151	0.0301	73.62	73.05	Outlet	0.113	0.0000	0.00	0.0000	73.51	76.90	OK	3.39
CB #3A	72.94	0.375	0.1874	73.13	0.0710	0.1419	73.34	73.12	Outlet	0.209	0.2571	0.61	0.1276	73.52	78.65	OK	5.13
CB #2	72.40	0.375	0.1161	72.51	0.1056	0.2112	72.83	72.88	Inlet	0.161	0.1979	0.16	0.0258	72.94	80.70	OK	7.76
Phase 2 - Downhill System																	
Offsite #2	71.39	0.375	0.3199	71.71	0.1351	0.2701	72.12	78.52	Inlet	0.000	0.0000	0.00	0.0000	78.52	80.95	OK	2.43
Offsite #1	7.42	0.750	0.0001	7.42	0.0002	0.0004	7.42	6.44	Outlet	0.000	0.0000	0.00	0.0000	7.42	10.00	OK	2.58
CB #1	71.39	0.375	0.7876	72.18	0.1056	0.2112	72.50	72.61	Inlet	0.211	0.0000	0.00	0.0000	72.40	79.46	OK	7.06
Vault #SE4	8.10	0.250	2.9705	11.07	0.2697	0.5395	11.88	71.17	Inlet	0.270	0.3323	0.60	0.1614	71.39	79.84	OK	8.45
Vault #SE3	7.98	0.500	0.0813	8.06	0.1517	0.3034	8.51	8.64	Inlet	0.539	0.0000	0.00	0.0000	8.10	14.32	OK	6.22
CB #SE2	7.42	0.500	0.1361	7.56	0.1517	0.3034	8.01	8.28	Inlet	0.303	0.0000	0.00	0.0000	7.98	12.00	OK	4.02
CB #SE1	7.16	0.750	0.0656	7.23	0.0354	0.0707	7.33	7.30	Outlet	0.303	0.3732	0.07	0.0212	7.42	12.00	OK	4.58
Outfall																	

1063 Capital Way
KPFF Consulting Engineers
June 2016

Drainage Calculations - Backwater Analysis for the 100-year Storm Event

ASSUMPTIONS AND CONSTANTS

Manning's n = 0.012 (per Product Data, 0.010 per TCDDECM Vol 1, App 1-F, Table 3 Manning's "n" for Pipes, Plastic/HDPE Pipe)
Inlet Control Analysis = Assumed square edge with headwall
*If Q/(AD^0.5)<=3.5, unsubmerged inlet conditions. If Q/(AD^0.5)>=4.0, submerged conditions (See KCSWDM pg.4-37)

Unsubmerged :
K = 0.0098
M = 2

Submerged :
c = 0.0398 (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
Y = 0.67 (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)

Bend Head Loss Coeff., Kb = 1.23 (per KCSWDM Figure 4.2.1.K for 90° Bend at a Manhole, no Special Shaping)
Entrance Loss Coef., Ke = 0.5 (per KCSWDM Table 4.3.1.B for Square-Cut End Concrete Pipe)
g = 32.2 ft/s^2 - acceleration due to gravity

Layout	Pipe Sytem Design							Backwater Calculation							
Structure Number	Design Flow, Q (cfs)	Length (ft)	Pipe Size (in)	"n" Value	Slope (%)	Outlet El (ft)	Inlet Elev (ft)	Q/(AD^0.5)*	Inlet Controlled Condition	$Q^2B_c/(gA_c^3)$	Critical Depth (ft)	Critical Velocity (fps)	Barrel Area (sf)	Barrel Velocity (fps)	Barrel Vel Head (ft)
1	2	3	4	5	6	7	8	9	10	14	15	16	17	18	19
Phase 1 - Adjacent to Building															
0															
0															
CO #8	0.55	92.60	6	0.012	1.62%	89.70	91.20	3.971	Submerged	1.00	0.38	3.46	0.196	2.808	0.1225
CO #7	0.55	55.60	6	0.012	1.26%	89.00	89.70	3.971	Submerged	1.00	0.38	3.46	0.196	2.808	0.1225
CO #6	0.55	44.40	6	0.012	1.35%	88.40	89.00	3.971	Submerged	1.00	0.38	3.46	0.196	2.808	0.1225
AD #1	0.55	10.70	6	0.012	31.12%	85.07	88.40	3.971	Submerged	1.00	0.38	3.46	0.196	2.808	0.1225
POC #4	0.10	21.00	6	0.012	1.00%	85.69	85.90	0.743	Unsubmerged	1.00	0.16	1.93	0.196	0.525	0.0043
POC #3	0.20	147.20	6	0.012	0.42%	85.07	85.69	1.413	Unsubmerged	1.00	0.22	2.33	0.196	0.999	0.0155
Conn #2	0.75	25.30	6	0.012	0.49%	84.95	85.07	5.385	Submerged	1.00	0.43	4.14	0.196	3.808	0.2251
POC #2	0.84	25.40	6	0.012	0.49%	84.82	84.95	6.036	Submerged	1.00	0.45	4.49	0.196	4.268	0.2829
CO #5	0.93	43.50	6	0.012	0.97%	84.40	84.82	6.677	Submerged	1.00	0.46	4.88	0.196	4.721	0.3461
CO #4	0.93	15.70	6	0.012	0.51%	84.32	84.40	6.677	Submerged	1.00	0.46	4.88	0.196	4.721	0.3461
CB #4A Bypass	0.10	4.00	6	0.012	2.75%	76.24	76.35	0.684	Unsubmerged	1.00	0.15	1.88	0.196	0.484	0.0036
WQ Vault E	0.10	4.00	6	0.012	3.25%	72.93	73.06	0.684	Unsubmerged	1.00	0.15	1.88	0.196	0.484	0.0036
AD/Building	3.53	18.00	12	0.012	5.39%	73.30	74.27	4.499	Submerged	1.00	0.80	5.23	0.785	4.499	0.3143
CO #11	0.16	207.60	6	0.012	6.02%	78.70	91.20	1.176	Unsubmerged	1.00	0.20	2.21	0.196	0.832	0.0107
CO #10	0.16	11.30	6	0.012	23.89%	76.00	78.70	1.176	Unsubmerged	1.00	0.20	2.21	0.196	0.832	0.0107
CB #6	0.98	22.50	8	0.012	1.11%	76.00	76.25	3.451	Unsubmerged	1.00	0.47	3.74	0.349	2.818	0.1233
CB #5	1.35	18.50	8	0.012	19.66%	72.16	75.80	4.720	Submerged	1.00	0.55	4.39	0.349	3.854	0.2306
CB #5 Bypass	0.05	10.60	6	0.012	21.89%	73.43	75.75	0.367	Unsubmerged	1.00	0.11	1.58	0.196	0.260	0.0010
WQ VAULT W	0.05	10.58	6	0.012	1.98%	72.09	72.30	0.367	Unsubmerged	1.00	0.11	1.58	0.196	0.260	0.0010
CO #3	0.01	53.90	6	0.012	3.71%	86.70	88.70	0.051	Unsubmerged	1.00	0.04	0.94	0.196	0.036	0.0000
CO #2	0.26	49.90	6	0.012	4.77%	84.32	86.70	1.899	Unsubmerged	1.00	0.26	2.57	0.196	1.343	0.0280
Conn #1	1.19	173.30	6	0.012	4.43%	76.65	84.32	8.576	Submerged	1.00	0.49	6.11	0.196	6.064	0.5710
CO #1	1.19	2.33	6	0.012	8.15%	76.46	76.65	8.576	Submerged	1.00	0.49	6.11	0.196	6.064	0.5710
CB #4A	2.54	13.00	12	0.012	27.15%	72.93	76.46	3.237	Unsubmerged	1.00	0.68	4.45	0.785	3.237	0.1627
CB #4	2.64	31.80	12	0.012	0.66%	72.72	72.93	3.358	Unsubmerged	1.00	0.70	4.52	0.785	3.358	0.1751
CB #3B	3.06	129.30	18	0.012	0.35%	71.77	72.22	1.414	Unsubmerged	1.00	0.67	4.04	1.767	1.731	0.0465
CB #3A	6.59	85.75	18	0.012	0.51%	71.33	71.77	3.046	Unsubmerged	1.00	0.99	5.31	1.767	3.731	0.2161
CB #2	7.99	35.70	18	0.012	0.76%	71.06	71.33	3.691	Submerged	1.00	1.09	5.78	1.767	4.521	0.3174
Phase 2 - Downhill System															
Offsite #2	9.02	76.90	18	0.012	10.57%	68.77	76.90	4.168	Submerged	1.00	1.16	6.14	1.767	5.104	0.4046
Offsite #1	1.46	40.20	36	0.012	1.07%	5.57	6.00	0.119	Unsubmerged	1.00	0.37	2.87	7.069	0.207	0.0007
CB #1	7.99	242.20	18	0.012	0.74%	69.27	71.06	3.691	Submerged	1.00	1.09	5.78	1.767	4.521	0.3174
Vault #SE4	5.67	208.56	12	0.012	30.57%	5.52	69.27	7.219	Submerged	1.00	0.95	7.38	0.785	7.219	0.8092
Vault #SE3	17.01	25.50	24	0.012	1.40%	6.17	6.52	3.828	Submerged	1.00	1.49	6.79	3.142	5.414	0.4552
CB #SE2	17.01	42.70	24	0.012	1.40%	5.57	6.17	3.828	Submerged	1.00	1.49	6.79	3.142	5.414	0.4552
CB #SE1	18.47	151.50	36	0.012	1.07%	3.95	5.57	1.509	Unsubmerged	1.00	1.38	5.84	7.069	2.613	0.1060
Outfall															

1063 Capital Way
KPFF Consulting Engineers
June 2016

Drainage Calculations - Backwater Analysis for the 100-year Storm Event

ASSUMPTIONS AND CONSTANTS

Manning's n = 0.012 (per Product Data, 0.010 per TCDDECM Vol 1, App 1-F, Table 3 Manning's "n" for Pipes, Plastic/HDPE Pipe)
Inlet Control An Assumed square edge with headwall
*If Q/(AD^0.5)<=3.5, unsubmerged inlet conditions. If Q/(AD^0.5)>=4.0, submerged conditions (See KCSWDM pg.4-37)

Unsubmerged : K = 0.0098; M = 2
Submerged : c = 0.0398; Y = 0.67 (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
Bend Head Loss Coeff., Kb = 1.23 (per KCSWDM Figure 4.2.1.K fc (per KCSWDM Table 4.3.1.A for Circular Concrete Pipe - Square Edge with Headwall Equation Form 1)
Entrance Loss Coef., Ke = 0.5 (per KCSWDM Table 4.3.1.B for Square-Cut End Concrete Pipe)
g = 32.2 ft/s2 - acceleration due to gravity

Layout																Checks		Notes
Structure Number	TW Elev (ft)	Hydraulic Radius (ft)	Friction Loss (ft)	Entrance HGL Elev (ft)	Entrance Head Loss (ft)	Exit Head Loss (ft)	Outlet Control Elev (ft)	Inlet Control Elev* (ft)	Inlet or Outlet Controlled?	Approach Velocity Head (ft)	Bend Head Loss (ft)	Junction Loss Coeff., Kj	Junction Head Loss (ft)	HW Elev (ft)	CB Rim Elev (ft)	Overtopping Check	Clearance btwn Rim and HGL (ft)	Comments
1	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	50
Phase 1 - Adjacent to Building																		
0																		
0																		
CO #8	90.94	0.125	0.7526	91.69	0.0612	0.1225	91.87	91.84	Outlet	0.000	0.0000	0.00	0.0000	91.87	94.28	OK	2.41	
CO #7	90.42	0.125	0.4519	90.87	0.0612	0.1225	91.06	90.35	Outlet	0.122	0.0000	0.00	0.0000	90.94	92.86	OK	1.92	
CO #6	90.00	0.125	0.3609	90.36	0.0612	0.1225	90.54	89.65	Outlet	0.122	0.0000	0.00	0.0000	90.42	92.31	OK	1.89	
AD #1	89.85	0.125	0.0870	89.94	0.0612	0.1225	90.12	88.97	Outlet	0.122	0.0000	0.00	0.0000	90.00	91.60	OK	1.60	
POC #4	90.02	0.125	0.0060	90.03	0.0021	0.0043	90.03	86.12	Outlet	0.000	0.0000	0.00	0.0000	90.03	93.43	OK	3.40	
POC #3	89.85	0.125	0.1515	90.00	0.0078	0.0155	90.03	86.01	Outlet	0.004	0.0000	0.00	0.0000	90.02	93.45	OK	3.43	
Conn #2	88.99	0.125	0.3780	89.37	0.1126	0.2251	89.71	85.98	Outlet	0.122	0.1506	0.95	0.1166	89.85	92.43	OK	2.58	
POC #2	88.32	0.125	0.4769	88.79	0.1414	0.2829	89.22	86.00	Outlet	0.225	0.0000	0.00	0.0000	88.99	93.43	OK	4.44	
CO #5	87.08	0.125	0.9994	88.08	0.1731	0.3461	88.60	86.04	Outlet	0.283	0.0000	0.00	0.0000	88.32	90.15	OK	1.83	
CO #4	86.55	0.125	0.3607	86.91	0.1731	0.3461	87.43	85.62	Outlet	0.346	0.0000	0.00	0.0000	87.08	88.05	OK	0.97	
CB #4A Bypass	75.59	0.125	0.0010	75.59	0.0018	0.0036	75.60	76.55	Inlet	0.000	0.0000	0.00	0.0000	76.55	78.29	OK	1.74	
WQ Vault E	75.59	0.125	0.0010	75.59	0.0018	0.0036	75.60	73.26	Outlet	0.004	0.0000	0.00	0.0000	75.59	78.20	OK	2.61	
AD/Building	75.15	0.250	0.1494	75.30	0.1572	0.3143	75.77	75.72	Outlet	0.000	0.0000	0.00	0.0000	75.77	78.57	OK	2.80	
CO #11	78.91	0.125	0.1480	79.06	0.0054	0.0107	79.08	91.47	Inlet	0.000	0.0000	0.00	0.0000	91.47	94.17	OK	2.70	
CO #10	76.82	0.125	0.0081	76.82	0.0054	0.0107	76.84	78.92	Inlet	0.011	0.0000	0.00	0.0000	78.91	81.72	OK	2.81	
CB #6	76.82	0.167	0.1256	76.94	0.0616	0.1233	77.13	77.01	Outlet	0.000	0.0000	0.00	0.0000	77.13	80.11	OK	2.98	
CB #5	74.28	0.167	0.1931	74.47	0.1153	0.2306	74.82	76.77	Inlet	0.123	0.1516	0.13	0.0159	76.82	80.73	OK	3.91	
CB #5 Bypass	74.28	0.125	0.0007	74.28	0.0005	0.0010	74.28	75.85	Inlet	0.000	0.0000	0.00	0.0000	75.85	80.73	OK	4.88	
WQ VAULT W	74.28	0.125	0.0007	74.28	0.0005	0.0010	74.28	72.45	Outlet	0.001	0.0000	0.00	0.0000	74.28	80.70	OK	6.42	
CO #3	87.07	0.125	0.0001	87.07	0.0000	0.0000	87.07	88.75	Inlet	0.000	0.0000	0.00	0.0000	88.75	91.73	OK	2.98	
CO #2	86.55	0.125	0.0928	86.64	0.0140	0.0280	86.68	87.07	Inlet	0.000	0.0000	0.00	0.0000	87.07	89.69	OK	2.62	
Conn #1	77.86	0.125	6.5686	84.43	0.2855	0.5710	85.28	86.11	Inlet	0.346	0.4257	1.04	0.3584	86.55	87.29	OK	0.74	
CO #1	76.85	0.125	0.0883	76.93	0.2855	0.5710	77.79	78.43	Inlet	0.571	0.0000	0.00	0.0000	77.86	78.91	OK	1.05	
CB #4A	75.59	0.250	0.0558	75.65	0.0814	0.1627	75.89	77.42	Inlet	0.571	0.0000	0.00	0.0000	76.85	78.29	OK	1.44	
CB #4	75.14	0.250	0.1470	75.28	0.0875	0.1751	75.55	74.05	Outlet	0.163	0.2001	0.03	0.0051	75.59	78.32	OK	2.73	
CB #3B	75.15	0.375	0.0927	75.24	0.0233	0.0465	75.31	73.17	Outlet	0.175	0.0000	0.00	0.0000	75.14	76.90	OK	1.76	
CB #3A	74.28	0.375	0.2854	74.56	0.1081	0.2161	74.89	73.33	Outlet	0.314	0.3866	0.61	0.1903	75.15	78.65	OK	3.50	
CB #2	73.54	0.375	0.1745	73.71	0.1587	0.3174	74.19	73.14	Outlet	0.231	0.2836	0.16	0.0360	74.28	80.70	OK	6.42	
Phase 2 - Downhill System																		
Offsite #2	72.20	0.375	0.4790	72.67	0.2023	0.4046	73.28	78.86	Inlet	0.000	0.0000	0.00	0.0000	78.86	80.95	OK	2.09	
Offsite #1	7.66	0.750	0.0002	7.66	0.0003	0.0007	7.66	6.49	Outlet	0.000	0.0000	0.00	0.0000	7.66	10.00	OK	2.34	
CB #1	72.20	0.375	1.1835	73.38	0.1587	0.3174	73.86	72.87	Outlet	0.317	0.0000	0.00	0.0000	73.54	79.46	OK	5.92	
Vault #SE4	8.20	0.250	4.4559	12.66	0.4046	0.8092	13.87	71.86	Inlet	0.405	0.4976	0.60	0.2415	72.20	79.84	OK	7.64	
Vault #SE3	8.20	0.500	0.1219	8.32	0.2276	0.4552	9.01	9.01	Inlet	0.809	0.0000	0.00	0.0000	8.20	16.70	OK	8.50	
CB #SE2	7.66	0.500	0.2041	7.87	0.2276	0.4552	8.55	8.66	Inlet	0.455	0.0000	0.00	0.0000	8.20	12.00	OK	3.80	
CB #SE1	7.16	0.750	0.0984	7.26	0.0530	0.1060	7.42	7.52	Inlet	0.455	0.5599	0.07	0.0317	7.66	12.00	OK	4.34	
Outfall																		

Jenifer Clapham

From:	Kathleen Cassou [KCassou@parametrix.com]
Sent:	Thursday, October 22, 2015 11:35 AM
To:	Jenifer Clapham
Cc:	eddie.kung@zgf.com; victoria.buker@sellen.com; Jie Sheng; Taylor, Jonathan (DES)
Subject:	RE: 1063 - Capitol Lake OHWM
Attachments:	Capitol Lake Elevation Conversion.pdf; Capitol Lake Elevations.pdf

Good Morning Jenifer,

Please find attached two tables. The first table is the one you sent out last night, with an equation for getting from MLLW to MSL, which is very close to NGVD29, the datum our project survey is on. Per the latest City of Olympia adjustment, subtract 8.01' from MLLW to get MSL or NGVD29, and vice versa.

Don't be confused by the parenthetical numbers. That does not mean negative numbers, rather it refers to numbers from calculated elevations (see the footnote).

The second attachment is an excerpt from one of the publications I sent out yesterday, which was a 2007 report by Moffat and Nichol. Their table shows straight NGVD29 elevations for some of the same locations as the first table. You'll not some small differences, probably because - 1), they may not have taken into account the City's most recent "8.01" adjustment or 2), there is a slight difference between MSL and NGVD29, but for most purposes, they are considered the same.

At any rate, I think this is about as close as we can get to a reasonable translation. Please let me know of you need further assistance.

Kathleen

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Kathleen Cassou, PLS, CFedS
Regional Land Surveyor
253.604.6764 | desk
360.280.7426 | cell
kcassou@parametrix.com

From: Jenifer Clapham [mailto:Jenifer.Clapham@kpff.com]
Sent: Wednesday, October 21, 2015 6:08 PM
To: Taylor, Jonathan (DES) <jon.taylor@des.wa.gov>; Kathleen Cassou <KCassou@parametrix.com>
Cc: eddie.kung@zgf.com; victoria.buker@sellen.com; Jie Sheng <Jie.Sheng@kpff.com>
Subject: RE: 1063 - Capitol Lake OHWM

Thanks Jon, this information is helpful, especially the attachment. Kathleen, can you provide a conversion for the datums listed in the attachment provided by Jon and Nathaniel to the project survey datum?
Thanks,
Jenifer

Jenifer Clapham, PE | O 206.622.5822 D 206.926.0549

All elevations in this report are given relative to NGVD29, the National Geodetic Vertical Datum of 1929. NGVD29 is close to Mean Sea Level (MSL) – in Olympia, Mean Sea Level is approximately one foot above NGVD29. It is common for elevations in Olympia to be quoted relative to NGVD29, although it is often stated that the elevations are relative to MSL. Table 1 gives a number of elevations, including tidal elevations in Budd Inlet, relative to NGVD29.

Table 1. Tidal and Other Elevations Relative to NGVD29

Item / Quantity	Elevation (feet, NGVD29)
Highest Observed Tide in Budd Inlet (12/15/1977) *	+10.54
Mean Higher High Water (MHHW)	+7.16
Mean Sea Level (MSL)	+0.96
NGVD29 Datum	0.00
Mean Lower Low Water	-7.40
Lowest Observed Tide in Budd Inlet *	-11.73
Summer Lake Levels	+6 to +7
Winter Lake Levels	+4.5 to +5.5
Top of Arc of Statehood	+10.9
Lowest Point in Downtown Olympia (7th and Columbia)	+8.4
Deschutes Parkway along the North Basin	+12 to +14
Capitol Lake Dam: Gate Sill	-7.2
Capitol Lake Dam: 5th Avenue Road Deck at Dam	+16 to +17

* NOAA measured tides in Budd Inlet only for the period April 1977 to March 1978. These were the extreme tides observed during that period, and the high tide was exceptionally high. However, it is possible higher tides have occurred since 1977.

1.4 Climate Change

Two effects of climate change are considered here: the potential for increases in the mean sea level and the potential for increases in the peak flow from the Deschutes River.

The University of Washington Climate Impacts Group and the Washington State Department of Ecology (2008) provides estimates of future increases in mean sea level as shown in Table 2.

Table 2. Estimates of Washington (Puget Sound) Sea Level Change

	Increase Relative to 1980-1999 Average	
Estimate	**By 2050**	**By 2100**
Very Low	3”	6”
Medium	6”	13”
Very High	22”	50”

In order to capture the range of variability over the next 50 years, this report considers increases of 6 inches, 12 inches, and 24 inches (0.5 feet, 1.0 foot, and 2.0 feet) relative to 1980-1999 average conditions. The tides used in the modeling are based on the 1983-2001 tidal epoch, the latest epoch used by NOAA. The period 1983-2001 is sufficiently close to the period 1980-1999 (mid-points three years apart) that the increases shown in Table 2 can reasonably be taken relative to the 1983-2001 epoch.

Deschutes Estuary Feasibility Study, Phase 3

Engineering Design and Cost Estimates

FINAL REPORT

Prepared for:

Washington Department of Fish and Wildlife

Prepared By:

MOFFATT & NICHOL

710 Second Ave, Suite 720
Seattle, WA 98104
Tel: (206) 622-0222 • Fax: (206) 622-4764

In Association With:

EDAW, Inc • GeoEngineers

February 9, 2007

2. Estuarine Hydrodynamics

2.1 Introduction

The purpose of this section is to summarize the estuarine hydrodynamics and sediment transport anticipated in the restored Deschutes Estuary, with emphasis on those aspects of the hydrodynamics that will affect the infrastructure surrounding Capitol Lake. The engineering response to these hydrodynamics is discussed in Section 3.

2.2 Daily Tidal Fluctuations

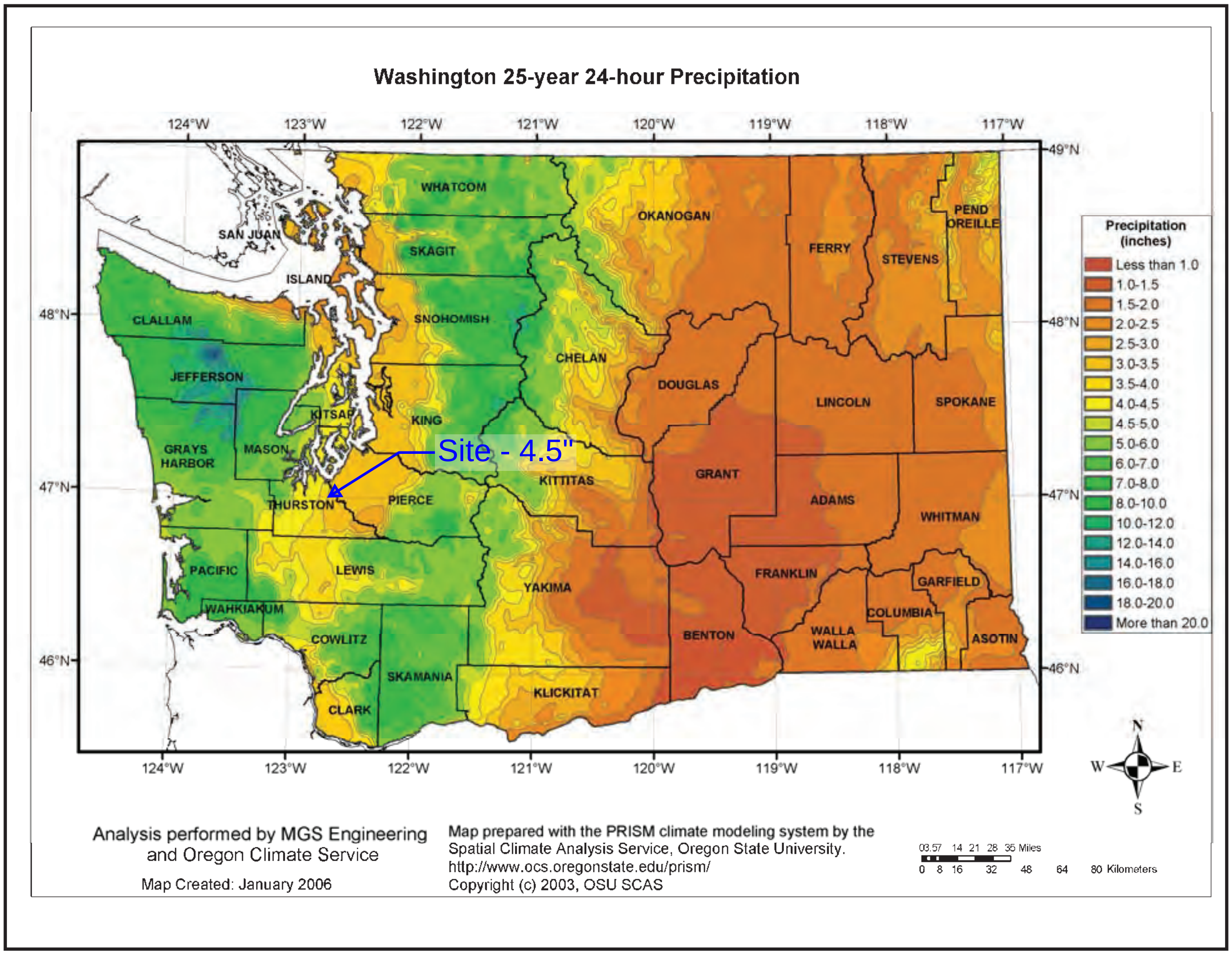
The most immediate and obvious effect of restoring Capitol Lake to tidal flow will be the replacement of a stable water level within the lake by a water level that fluctuates tidally, driven by the tides in Budd Inlet. These tides are mixed semidiurnal, meaning that there are two unequal low and high tides each day. The tidal datums for Olympia, Budd Inlet are presented in Table 1 (NOAA 2006). This report gives all elevation values relative to the NGVD29 datum, which is close to mean sea level.

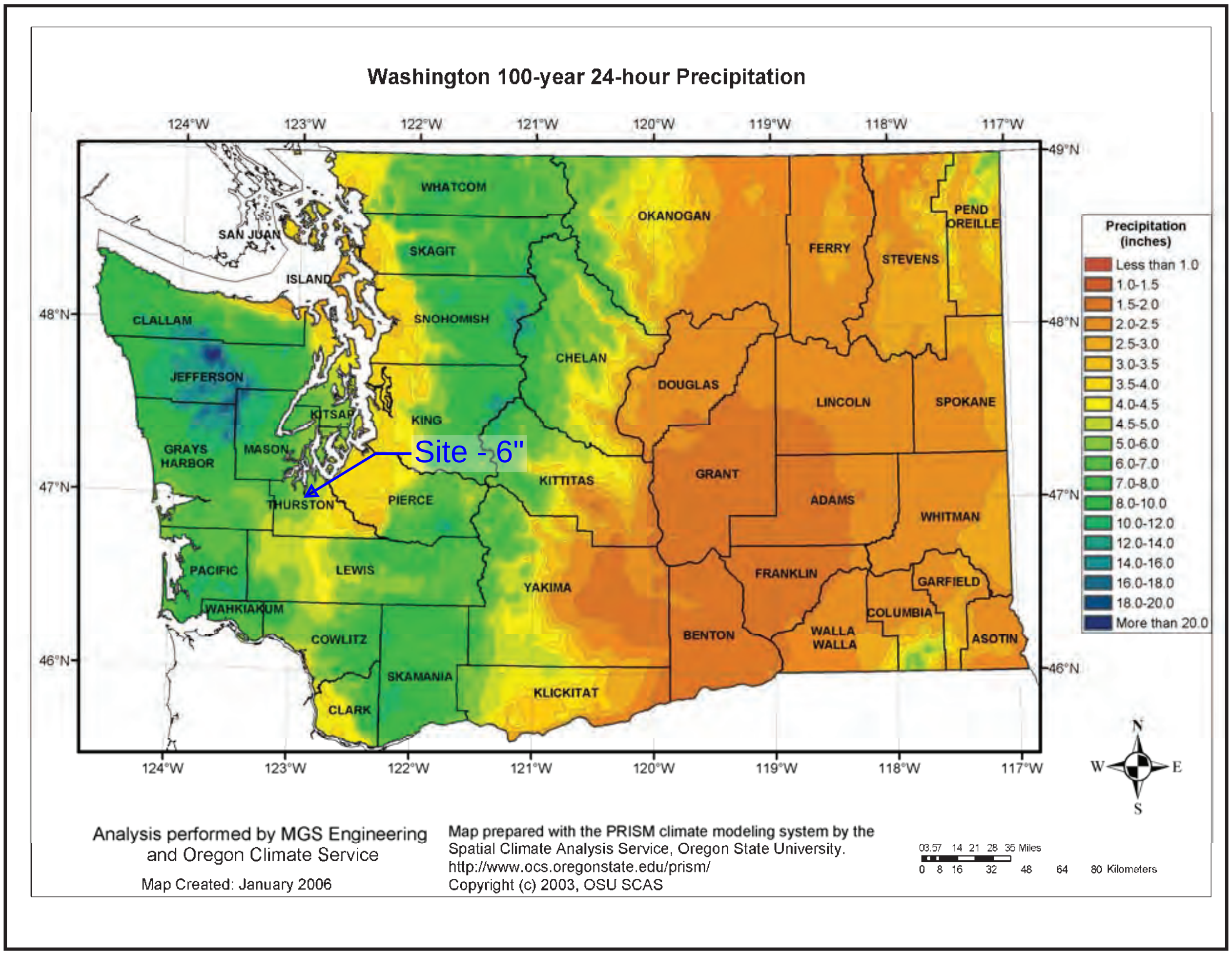
Table 1: Tidal Datums for Budd Inlet (1983-2001 epoch)

Datum Plane	Feet, MLLW	Feet, NGVD29
Highest Observed Tide (12/15/1977)	17.94	10.54
Mean Higher High Water (MHHW)	14.56	7.16
Mean High Water (MHW)	13.55	6.15
Mean Tide Level (MTL)	8.31	0.91
National Geodetic Vertical Datum of 1929 (NGVD29)	7.40	0.00
Mean Low Water (MLW)	3.07	-4.33
Mean Lower Low Water (MLLW)	0.00	-7.40
Lowest Observed Tide (1/2/1977)	-4.33	-11.73

The tidal fluctuations in Budd Inlet will drive similar tidal fluctuations within the restored Deschutes Estuary. Hydrodynamic modeling (USGS 2006) showed that the water levels within the restored estuary will be controlled by the tides, responding very little to river flows except during major flooding events. Figure 1 shows inundation curves for the restored estuary (i.e., the fraction of time that different elevations are inundated) based on the tidal fluctuations within Budd Inlet.

At high tide (e.g., MHHW) the entire lake basin will be inundated, with water levels slightly higher than they are now: current lake management targets an elevation of 6.22 feet NGVD 29 during the summer and 5.26 feet NGVD during the winter (URS Group and Dewberry 2003). At low tide, based on the current bathymetry, flow within the South Basin and the southern part of the Middle Basin will be confined to the main channel. In contrast, much of the North Basin, particularly its eastern half (near Heritage Park), will remain inundated throughout the tidal cycle – more than one-half of the North Basin has a bottom elevation of -8 to -10 feet NGVD 29 (see the contours in Exhibit 1). The inundation frequency in the North Basin in particular will change as the bathymetry of the restored estuary evolves, as described in Section 2.3.


Washington 25-year 24-hour Precipitation
124°W
123°W
122°W
121°W
120°W
119°W
118°W
117°W
49°N
48°N
47°N
46°N
WHATCOM
OKANOGAN
PEND OREILLE
SAN JUAN
SKAGIT
FERRY
STEVENS
ISLAND
CLALLAM
SNOHOMISH
CHELAN
JEFFERSON
DOUGLAS
LINCOLN
SPOKANE
KITSAP
KING
GRAYS HARBOR
MASON
Site - 4.5"
KITTITAS
GRANT
THURSTON
PIERCE
ADAMS
WHITMAN
PACIFIC
LEWIS
FRANKLIN
GARFIELD
YAKIMA
WAHKIAKUM
COLUMBIA
COWLITZ
BENTON
WALLA WALLA
ASOTIN
SKAMANIA
KLICKITAT
CLARK
Precipitation (inches)
Less than 1.0
1.0-1.5
1.5-2.0
2.0-2.5
2.5-3.0
3.0-3.5
3.5-4.0
4.0-4.5
4.5-5.0
5.0-6.0
6.0-7.0
7.0-8.0
8.0-10.0
10.0-12.0
12.0-14.0
14.0-16.0
16.0-18.0
18.0-20.0
More than 20.0
N
W
E
S
Analysis performed by MGS Engineering and Oregon Climate Service
Map Created: January 2006
Map prepared with the PRISM climate modeling system by the Spatial Climate Analysis Service, Oregon State University.
http://www.ocs.oregonstate.edu/prism/
Copyright (c) 2003, OSU SCAS
0 3.5 7 14 21 28 35 Miles
0 8 16 32 48 64 80 Kilometers


Washington 100-year 24-hour Precipitation
124°W
123°W
122°W
121°W
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SNOHOMISH
CLALLAM
CHELAN
JEFFERSON
DOUGLAS
LINCOLN
SPOKANE
KITSAP
KING
GRAYS HARBOR
MASON
Site - 6"
GRANT
KITTITAS
THURSTON
PIERCE
ADAMS
WHITMAN
PACIFIC
LEWIS
FRANKLIN
GARFIELD
YAKIMA
WAHKIAKUM
COLUMBIA
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Precipitation (inches)
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4.0-4.5
4.5-5.0
5.0-6.0
6.0-7.0
7.0-8.0
8.0-10.0
10.0-12.0
12.0-14.0
14.0-16.0
16.0-18.0
18.0-20.0
More than 20.0
N
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S
Analysis performed by MGS Engineering and Oregon Climate Service
Map Created: January 2006
Map prepared with the PRISM climate modeling system by the Spatial Climate Analysis Service, Oregon State University.
http://www.ocs.oregonstate.edu/prism/
Copyright (c) 2003, OSU SCAS
0 8 16 32 48 64 80 Kilometers

Appendix D

Hydraulic Grade Line Calculations

1. HGL Calculations
2. HW/D Nomagraph
3. FlowMaster Calculations

HGL Calculations

Thursday, June 16, 2016   1:16 PM

Three approaches used for evaluating the HGL in Vault SE3. Max elevation used to set vault rim or air gap pipe IE.

<u>1. Standard Backwater Analysis</u>

-Refer to attached calculations

HW Elev = 8.20   However, due to vault volume and submerged upstream pipe, approach velocity assumed to be “0”.

HW = Max Elevation between Outlet or Inlet Control Elevation

= 9.01’ Elev

<u>2. Headwater Depth per Nomagraph</u>

-Refer to attached Figure

Ø = 24-in
Q = 17.01-cfs

$\frac{HW}{D}$ = 1.27   2.54' HW

IE = 6.52' +2.54'   9.06' HW

<u>3. Energy Grade Line per Bernoulli's Equation</u>

-Two Sceneries Reviewed:

a. Energy in 12" dia pipe if outlet is not submerged
b. Energy in 12" dia pipe is a submerged conditions*

* max elevation calculated is Approach 1 and 2

Bernoulli's:

$$E = \frac{p}{\gamma} + y + \frac{}{2}$$

a. p = 0 = Open Channel Flow
   y = 4.20" = 0.35' = Depth of flow per attached FlowMaster Calculation
   V = 23.0 ft/sec per attached FlowMaster Calculation

$$E = 0.35 + \frac{23.9}{2x32.2} = 8.56 = \text{HW}$$

EGL Elev = 8.56 + 12" IE
HGL = 8.56 + 5.52 = 14.08'

Assume all energy converts to depth

b. p = Negligible
   y = Max HW Elev calculated in Approach 1 and 2 = 9.06'
   A = 0.785-sf
   Q = 5.67-cfs

$$= \frac{Q}{\text{A}} = \frac{5.67}{0.785} = 7.2\ ft/s$$

$$E = 9.06 + \frac{7.2}{2x32.2} = 9.87 = \text{HW}$$

Assume all energy converts to depth

---

1. HW Elev = 9.0'
2. HW Elev = 9.1'

3a. HW Elev = 14.1'

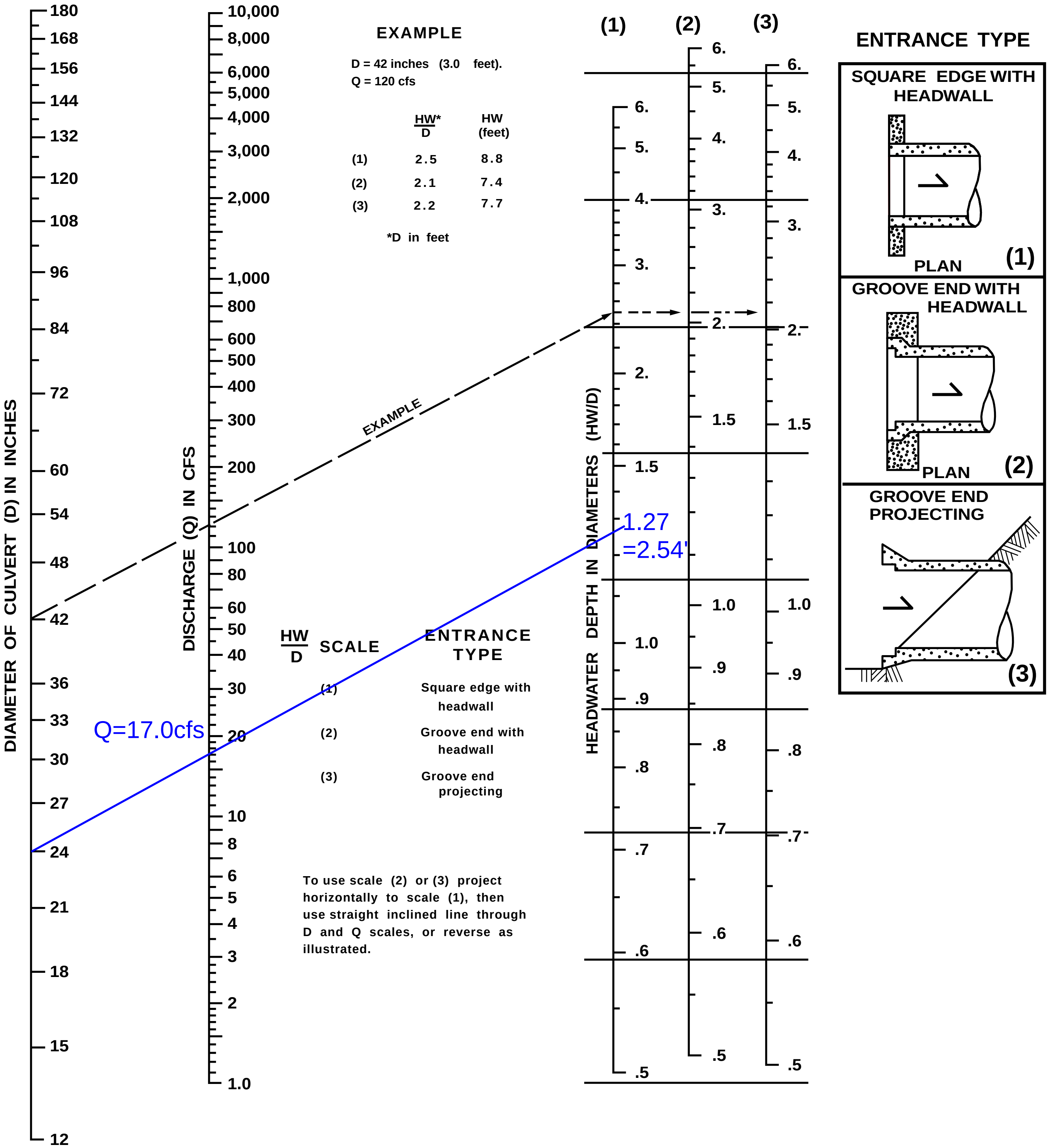
3b. HW Elev = 9.9'

3a is most conservative elevation.

Rim is 16.7' ≤ 14.1', therefore overtopping is not anticipated

3a is highly conservative. 3b is next most conservative approach. Elevation of air supply pipe set at elevation 10.5' minimum.

FIGURE 4.3.1.B
HEADWATER DEPTH FOR SMOOTH INTERIOR PIPE CULVERTS WITH INLET CONTROL



Vault SE 3 - 3x12"

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	30.64000	%
Diameter	12.00	in
Discharge	5.67	ft³/s

Results

Normal Depth	0.35	ft
Flow Area	0.25	ft²
Wetted Perimeter	1.27	ft
Hydraulic Radius	0.19	ft
Top Width	0.96	ft
Critical Depth	0.95	ft
Percent Full	35.2	%
Critical Slope	0.01867	ft/ft
Velocity	22.99	ft/s
Velocity Head	8.21	ft
Specific Energy	8.56	ft
Froude Number	7.98	
Maximum Discharge	22.98	ft³/s
Discharge Full	21.36	ft³/s
Slope Full	0.02158	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	1.45	ft
Length	208.00	ft
Number Of Steps	100	

GVF Output Data

Upstream Depth	0.95	ft
Profile Description	Composite S1 -> S2	
Profile Headloss	63.23	ft
Average End Depth Over Rise	119.76	%
Normal Depth Over Rise	35.17	%
Downstream Velocity	7.22	ft/s

Vault SE 3 - 3x12"

GVF Output Data

Upstream Velocity	7.38	ft/s
Normal Depth	0.35	ft
Critical Depth	0.95	ft
Channel Slope	30.64000	%
Critical Slope	0.01867	ft/ft

Appendix E

Buoyancy Calculations

1. Buoyancy Calculations
2. USACE Factor of Safety Reference Information
3. Old Castle Vault Cut Sheet for Weight

2016-06-16
1063
Buoyancy Check of Vault #SE3

Vault per attached 816 Vault

= 35,900 + 19250
= 55,150 lbs

Displaced Water

± 11' elev. = Lowest Ground Elev. at vault
± 2' elev = Bottom of Vault Structure.

Δ = 9' of displaced water

Volume = 9' × 9' wide × 17' long
= 1,400 cf

BF = 1,400 × 62.4
= ± 87,500 lbs

Vault < Water ∴ Floats.

Extend base by x' to resist uplift

Δ = 87,500 - 55,150 = ± 32,500 lbs

32,000 = 90 × 52' × x' × 9'

↑ CDF ↑ Vault perimeter ↑ depth of CDF

x' = 0.8' × 1.5
↑ Factor of Safety

= 1.2' => 1.5'

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

CECW-ED

ETL 1110-2-307

Technical Letter
No. 1110-2-307

20 August 1987

Engineering and Design
FLOTATION STABILITY CRITERIA FOR
CONCRETE HYDRAULIC STRUCTURES

Distribution Restriction Statement

Approved for public release; distribution is unlimited.

U = Uplift forces acting on the base of the structure. The uplift forces should be calculated in accordance with References 3a and 3b.

W_s = Weight of surcharge water above top surface of the structure which is totally controlled by gravity flow.

When calculating SF_f, the vertical resistance mobilized by friction along the exterior faces of the structure should be neglected. The basic assumptions and general derivation of flotation safety factor are given in Enclosure 1.

6. Flotation Stability Criteria. Concrete hydraulic structures should be designed to have the following minimum flotation safety factors:

Loading Conditions	Minimum SF_f
Construction	1.3
Normal Operation	1.5
Unusual Operation	1.3
Scheduled Maintenance (e.g., structure dewatered with normal tailwater or normal lower pool)	1.3
Extreme Maintenance (e.g., structure dewatered with maximum tailwater or maximum lower pool)	1.1

Any relaxation of these values will be accomplished only with the approval of HQUSACE (CEEC-ED) and should be justified by a comprehensive study of the piezometric pressure data and engineering properties of the structure, foundation and backfill.

7. Design Examples. Design examples for calculating the flotation safety factors are contained in Enclosure 2.

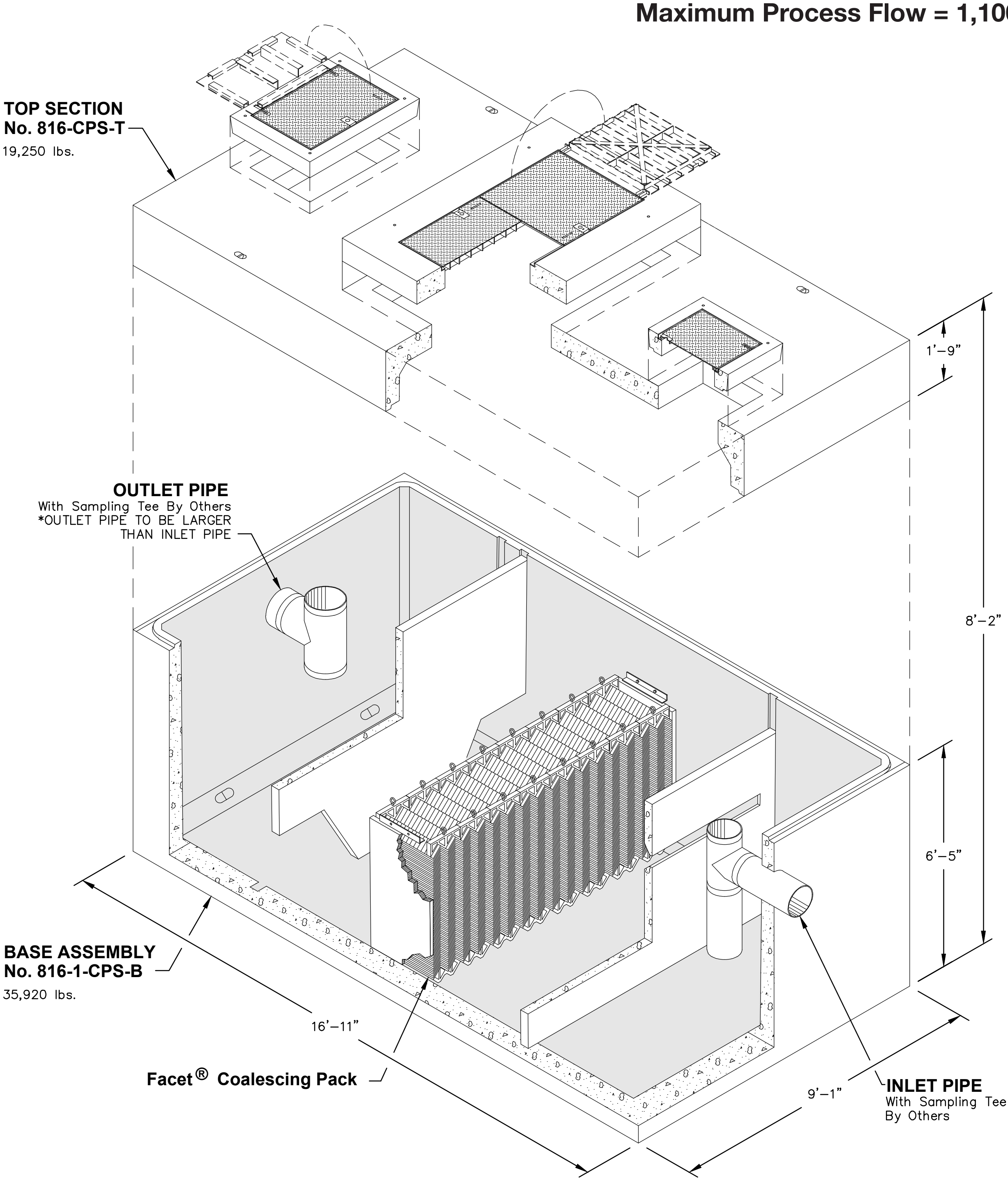
FOR THE COMMANDER:

2 Enclosures

WILLIAM N. McCORMICK, JR.
Chief, Engineering Division
Directorate of Engineering & Construction

816-1-CPS OIL WATER SEPARATOR

Projected Plate Area = 1,184 Sq/ft
Maximum Process Flow = 1,100 GPM



FOR DETAILS, SEE REVERSE >>

Items Shown Are Subject To Change Without Notice
Issue Date: August 2012

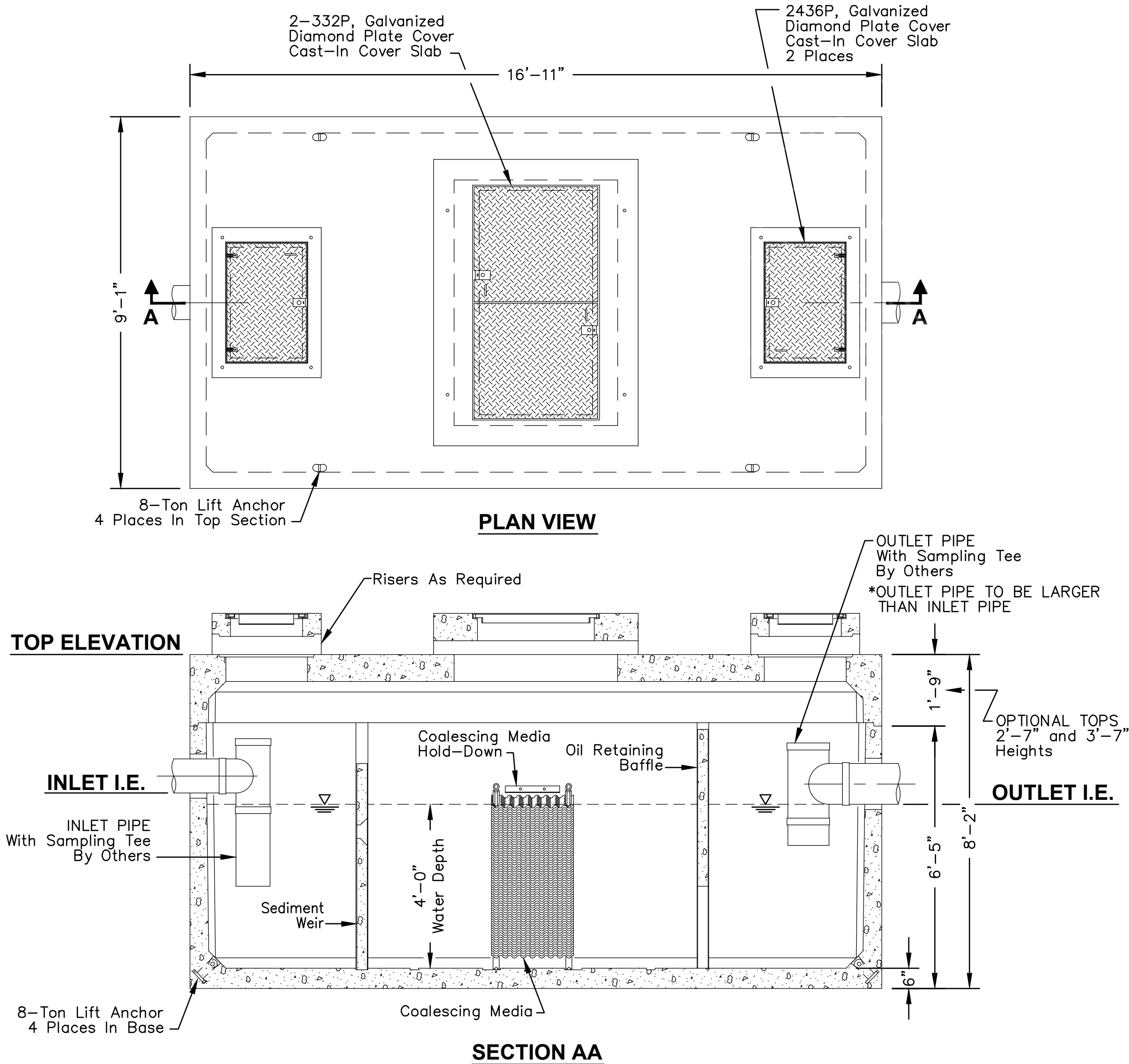
Mailing Address
PO Box 588
Auburn, WA 98071

Phone: 800-892-1538
Fax: 253-735-4201
Email: opauburn@oldcastle.com

opauburn.com

816-1-CPS

Projected Plate Area = 1,184 Sq/ft **Maximum Process Flow = 1,100 GPM**



STRUCTURAL NOTES:
1. Concrete: 28 Day Compressive Strength f'c= 7000 psi
2. Rebar: ASTM A–615 Grade 60
3. Mesh: ASTM A–185 Grade 65
4. Design: ACI–318–05 Building Code
   ASTM C–890 "Minimum Structural Design Loading For Underground Precast Concrete Water and Wastewater Structures"
5. Loads: HS–20 Truck Wheel w/ 30% Impact Per AASHTO

GENERAL NOTES:
1. All Baffles and Weirs To Be Precast Concrete
2. Static Water Depth = 4'–0"
3. Contractor to:
   Supply and Install All Piping & Sampling Tees
   Grout In All Pipes
   Fill With Clean Water Prior To "Start–Up" Of System
   Verify All Blockout Sizes and Locations

INFORMATION NEEDED:
Top Of Separator Elevation:
Inlet Pipe Size:
Inlet Pipe Elevation:
Outlet Pipe Size:
Outlet Pipe Elevation:

BASIC DESIGN INFORMATION:
INFLUENT CHARACTERISTICS:
Oil Specific Gravity: 0.88
Operating Temperature: 50°
Influent Oil Concentration: 100 ppm
Mean Oil Droplet Size: 130 Microns
0.033 ft/min Oil Rise Rate
Designed Per Washington State Department Of Ecology

FLOW RATE	EFFLUENT QUALITY	100% COLLECTED SIZE
292 GPM	10 ppm	60 Micron

SCALE: 1/4" = 1'-0"

Appendix F

Operation and Maintenance Requirements

A. Catch Basin and Storm Water Vault

Description: An underground concrete, water-receiving structure, rectangular or circular in shape with a slotted grate on top to accept water, or a solid, rectangular or circular, cover. Water may also enter/exit through pipes visible in the sidewalls of the basin.

Inspected (Date/By Whom)	Problem	Conditions to Look For	Required Action	Completion Date (√)
	Function	**Ponding water above basin** – Trash, vegetation, or debris is blocking grate to basin by more than 10%.	Remove all trash, vegetation, and debris in the vicinity of the catch basin grate.	
		Debris in Basin – Trash or debris that exceeds 1/3 the depth from the bottom of the basin to invert of the lowest pipe in or out of the basin. Any debris floating in the basin.	Vacuum all trash or debris from the catch basin.	
		Inlet/Outlet pipe clogged – Trash or debris blocks any portion of the inlet or outlet pipe.	Jet rod all trash and debris from all pipes.	
	Structural	**Concrete Wall/Top Slab** – Concrete wall/top slab has holes larger than 2" or cracks wider than ¼", which results in water running through the walls, which support the frame and grate/cover, rather than running through the grate.	Repair concrete walls/top slab so that it is free from holes and cracks.	
		Dislocation – Frame not sitting flush on concrete wall, i.e., separation of more than ¾" of the frame from the top of the concrete wall.	Repair so frame is sitting flush on top of the concrete wall.	
		Cracks – Cracks in basin walls, base, or around pipes wider than ½", any evidence of soil particles or water entering basin through cracks, plant growth inside basin, or professional maintenance judgment.	Replace or repair to design standards.	
		Settlement/Misalignment – Basin has settled more than 1" or has rotated more than 2" out of alignment.	Reset basin.	
		Ladder Rungs – Ladder is unsafe due to missing rungs, misalignment, rust, or cracks.	Replace ladder in accordance with WSDOT Standard Plans.	
	Hazards	**Fire** – Presence of chemicals such as oil, gasoline, etc.	Contain flammable chemicals and contact Ecology's SW Region Spill Response Unit at (360) 407-6300. Contact local fire dept. for life threatening or hazardous circumstances.	

		Pollution – Presence of any chemical pollutants.	Remove contaminant chemicals and dispose of in accordance with local fire dept. and Ecology standards.	
		Safety – Grate opening greater than 7/8" or missing members.	Replace grate.	
		Missing/Cracked Cover	Install new cover/grate.	
	Disrepair	**Locking Mechanism** – Grate locking mechanism missing or cannot be opened by one person with proper tools.	Repair or replace locking mechanism so that it can be opened with proper tools. Clean threads on bolts and frame used to lock grate.	
		Stubborn Cover – Cannot be opened with 80 lbs. of lift.	Clean around frame, remove any debris.	

Notes:

B. Flow Restrictor

Definition: A facility such as a Flow Restrictor Oil Pollution (FROP) control device or a T section with a specifically sized orifice(s) to control release rates. Usually located in a Type II Catch Basin/Control Manhole; designated as "CS","CSCB", or "CSMH" on a site plan. There may be a vertical culvert at the outlet ("T") with additional elbow orifice inlets.

Inspected (Date/By Whom)	Problem	Conditions to Look For	Required Action	Completion Date (√)
	Function	**Debris Buildup** – Trash and debris is less than 1½ feet (18") from the bottom of the flow restrictor. Floating debris that may block orifices or overflow device.	Remove all trash, sediment, and debris.	
	Disrepair	**Instability** – Flow restrictor is not securely attached to manhole wall (outlet pipe structure should support at least 1,000 lbs. of up or down pressure); and/or structure is not in upright position (allow up to 10% from plumb). (Structure is usually secured with banding material.)	Repair structure to be securely attached to wall so that outlet pipe supports at least 1,000 lbs. of up or down pressure; ensure that outlet pipe is in correct position.	
		Leaks – Connections to outlet pipe are not watertight and show signs of rust or deteriorated grout. Cleanout grate is not watertight or is missing.	Repair connections to the outlet pipe or cleanout gate so that they are watertight; repair or replace structure so that it works as designed.	
		Deterioration – Any holes, other than designed holes, in the structure.	Repair holes so that the structure has no holes other than those designed.	
		Cleanout Gate – Gate cannot be moved up or down by one maintenance person.	Repair gate so that it moves up and down easily and is watertight.	
		Cleanout Gate Operating Mechanism – Chain, rod, or handle attached to gate is missing or damaged (must be accessible from street level).	Repair or replace chain or rod so that it in place and works as designed.	
		Corroded Cleanout Gate – Gate is rusted over 50% of its surface area and/or is not watertight.	Refinish or replace gate to meet design standards.	
		Orifice Plate – Control device is not working properly due to missing, out of place, or bent orifice plate; or secondary orifice elbows have become loosened from structure.	Repair or replace orifice plate so that it is in place and works as designed.	

Notes:

E. Pipe/Culvert

Definition: A pipe of varying diameter. May be constructed of concrete pipe (PCCP), corrugated metal pipe (CMP), or smooth wall high-density polyethylene pipe (HDPP).

Inspected (Date/By Whom)	Problem	Conditions to Look For	Required Action	Completion Date (√)
	Function	**Blockages** – Accumulated sediment, vegetation, or debris that exceeds 20% of the diameter of the pipe, or significantly reduces free movement of water through pipes.	Remove all sediment, vegetation, and debris, so water flows freely through pipes.	
		Damaged Pipe – Any dent that decreases the cross section area of pipe by more than 20%.	Repair or replace pipe.	
		Erosion – Slope erosion over 2" deep where cause of damage is still present or where there is potential for continued erosion.	Restore slopes by using appropriate erosion control measures(s): Ex. Rock reinforcement, planting of grass, or soil compaction.	
	Structural	**Corrosion** – Rust is causing more than 50% deterioration to any part of the pipe.	Refinish or replace pipe.	
		Askew – Visibly misaligned pipe joints.	Reset/connect affected pipe.	
		Cover – Pipe has been unearthed by excavation or buried by inappropriate dumping.	Restore to original condition.	
		Damage – Any cracks or tears 1" or longer in the pipe.	Repair or replace pipe.	

Notes:

N. Landscaping

Inspected (Date/By Whom)	Problem	Conditions to Look For	Required Action	Completion Date (√)
	Aesthetic Quality	**Weeds** – Weeds growing in more than 20% of the landscaped area.	Remove all weeds from the landscaped area. **	
		Poisonous Vegetation – Vegetation to include tansy, poison oak, stinging nettles, devils club, etc.	Remove Poisonous vegetation. **	
		Trash/Litter – Accumulation of paper, cans, bottles, and other trash.	Remove/Clear area of trash and dispose of properly.	
		Damage – Trees and shrubs have been spilt or broken on more than 25% of total foliage on plant; trees and shrubs have been knocked over or their root ball has been exposed.	Remove/Prune back broken or spilt limbs. Replant tree if more than 50% is severely damaged; replant in accordance with proper landscaping practice. Provide adequate support for trees.	
		Erosion – Noticeable rills are seen in landscaped areas.	Identify cause of erosion and take preventive measures to stop further erosion. Repair, fill, contour, seed, and thatch eroded areas.	
	Hazard	**Trees** – Trees or their limbs are potential hazard to neighboring property's structures.	Remove any hazardous trees or limbs and remove them from the facility site.	

**** Do not use chemical agents without obtaining guidance from Thurston County Health Department – 754-4111.**

Notes:

Inspection Frequencies

Asset	Preferred Month	Interval
Type I & Type II Catch Basin		Annually
Flow Restrictor	June – September	Annually
Debris Barrier	June – September	Annually
Energy Dissipater	June – September	Annually
Pipe		Annually
Ditch	March – April October – November	Semi-annually
Fencing		Biannually
Access Road		Annually
R/D Ponds (including Infiltration)	May – October	Annually
R/D Vaults		Annually
Wet Vaults		Biannually
Bioswales	March – April October – November	Semi-annually
Wet Ponds	August – October	Annually
Infiltration (not including Ponds)		Biannually
Landscaping	March – April September – October	Semi-annually

APPENDIX H

CONCEPTUAL LANDSCAPING PLAN AND GUIDELINES

MITHŪN

Seattle
Mithun/Pier 56
1201 Alaskan Way #200
Seattle, WA 98101
(206) 623 3344

San Francisco
Mithun/Solomon
660 Market Street #300
San Francisco, CA 94101
(415) 956 0688

mithun.com

Memorandum

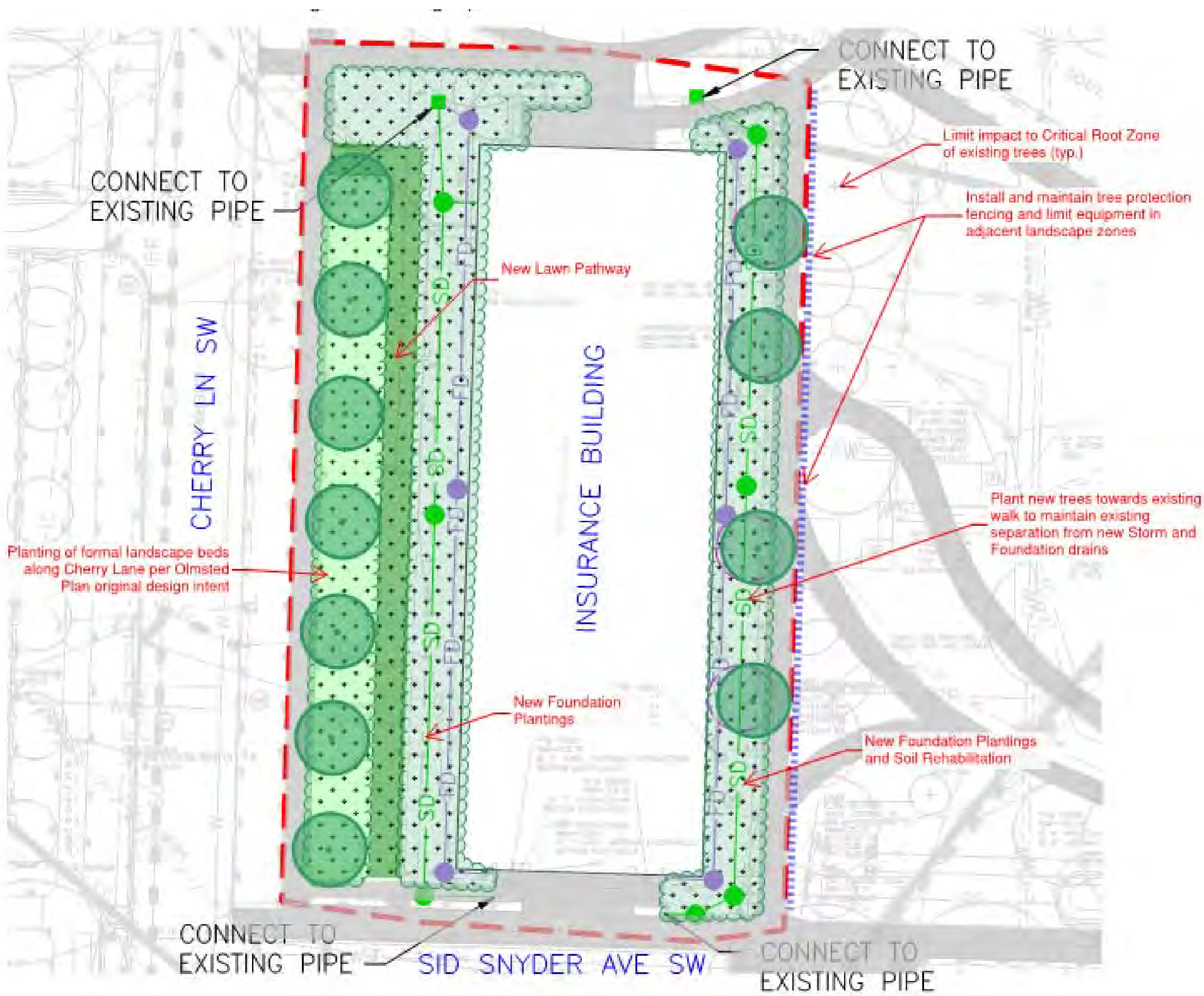
To:	Ding Ye Reid Middleton	Date:	09.20.16
		Project #:	1623300
From:	Jason King	Project:	Capitol Campus Utility Renewal Plan
cc:	Deb Guenther		
Re:	Insurance Building - Landscape Notes		

The Utility Renewal Plan identifies key infrastructure replacement projects on the grounds of the Capitol Campus in Olympia. The Insurance Building is a significant asset to the original Capitol Group, both architecturally and as a key site feature transitioning from the Greensward to the Formal landscaping adjacent to the Legislative Building. Thus, through this opportunity to preserve and improve the character of this important location on campus in relationship to the overall site master plan, a number of important strategies should be considered.

The following narrative does not propose an explicit design, but identifies key elements that should be incorporated in restoration of the site landscaping impacted by the foundation and roof drain renewal of the Insurance Building and adjacent site areas. It also outlines best practices for minimizing future maintenance issues and protection of key assets such as existing trees. A summary of recommendations includes:

- Provide adequate separation of new plantings from new storm and footing drain lines to avoid root penetration issues.
- Route Storm Drains and locate cleanouts, catch basins and other elements to allow future access for maintenance with minimal disruption to plantings
- Provide tree protection fencing during construction, and limit impact to Critical Root Zones (CRZ) of existing trees to remain
- Establish foundation plantings, lawn pathway, and planted formal edge along Cherry Lane per <u>2008 West Capitol Campus: Olmsted Brothers' Master Planning & Landscaping Washington State Capitol Grounds</u>
- Plant new trees (Cornus varieties) as recommended in the <u>2009 Capitol Campus Historic Landscape Preservation Master Plan</u>
- Identify removal of invasive species (Horsetail) and soil remediation concurrent with <u>2015 West Capitol Campus Drainage Master Plan</u>

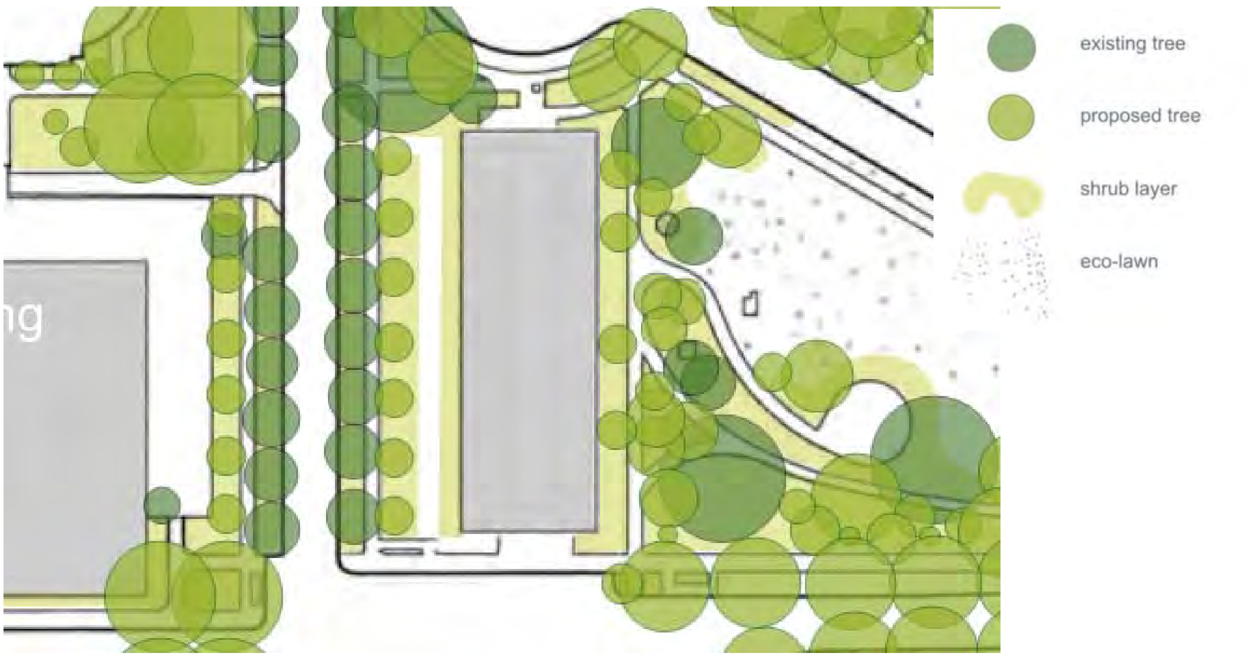
Recommended Landscape Improvements



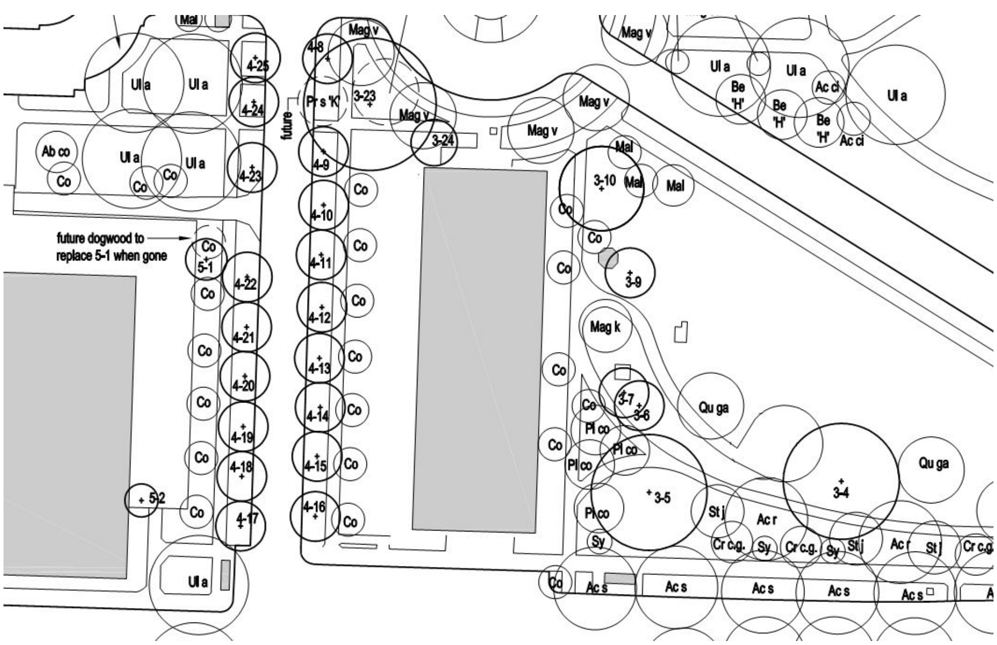
Context for Landscape Improvements

Rather than simple repair, the Insurance Building landscaping requires a higher degree of analysis, due to the location as part of the critical core landscape of the West Capitol Campus. As outlined in the 2006 Master Plan and reinforced in subsequent planning efforts, the straight restoration of the Olmsted plan is not the overall goal. However, the context of historical landscape does influence the future plans for campus landscape development and every effort should be made to achieve the goals of the original plan. The following narrative provides additional context, resources, graphics and support that illustrates an integrated landscape approach that can meet all of the historic and current campus objectives along with the goals of Utility renewal efforts.

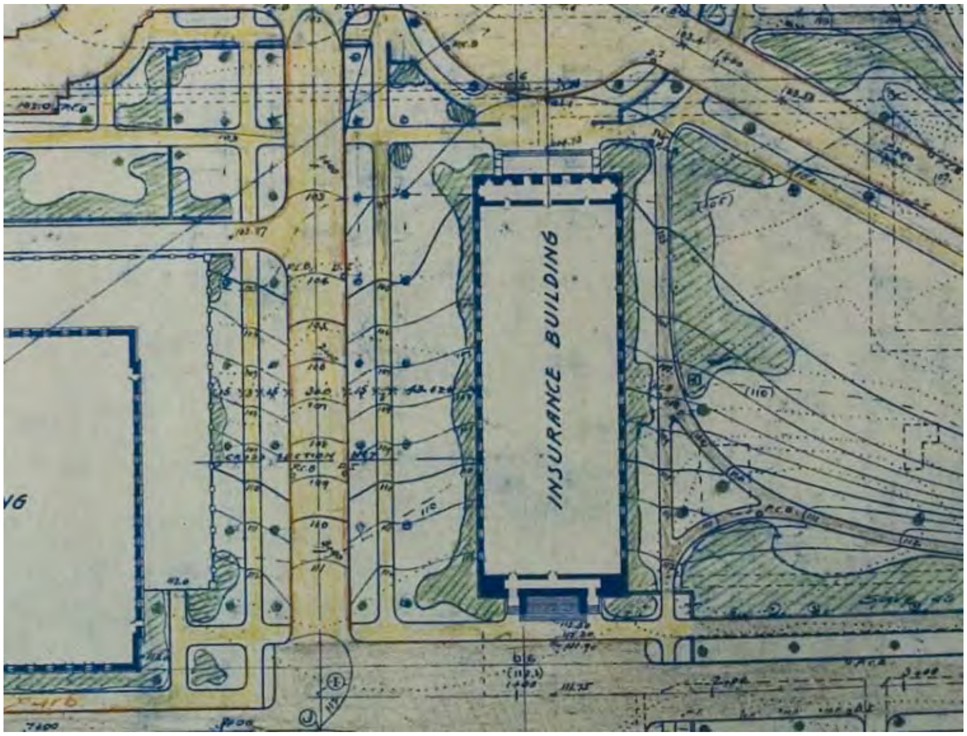
The 2009 Capitol Campus Historic Landscape Preservation Master Plan included guidance on the incorporation of new trees and shrub layers into the campus. The diagrams include proposed shrubs layers (outlined in light green) which define a 'grass path' along the west of the building area which separates less formal foundation plantings from more formal street plantings.

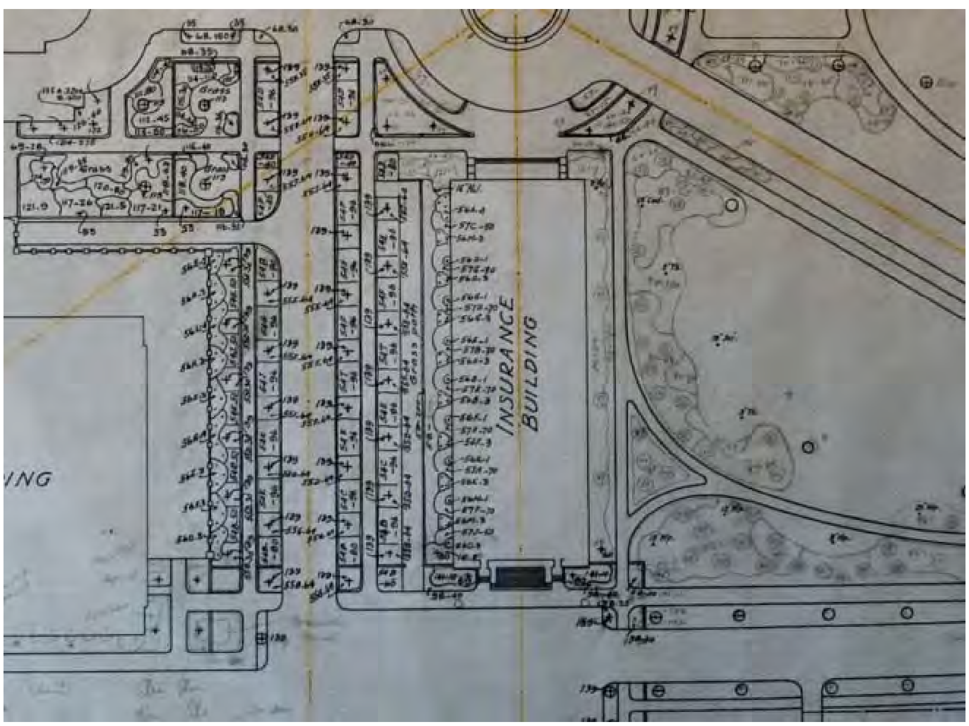


This excerpt from the Large Tree Layer Plan shows the locations of proposed trees to be planted adjacent to the insurance building. The original Olmsted planting plan identified Cornus nuttalii, however due to disease issues, more robust species were identified as suitable replacements (identified with **Co** on the plans), including such disease resistant varieties as Cornus 'Starlight', C. 'Venus', or C. 'Eddie's White Wonder'.

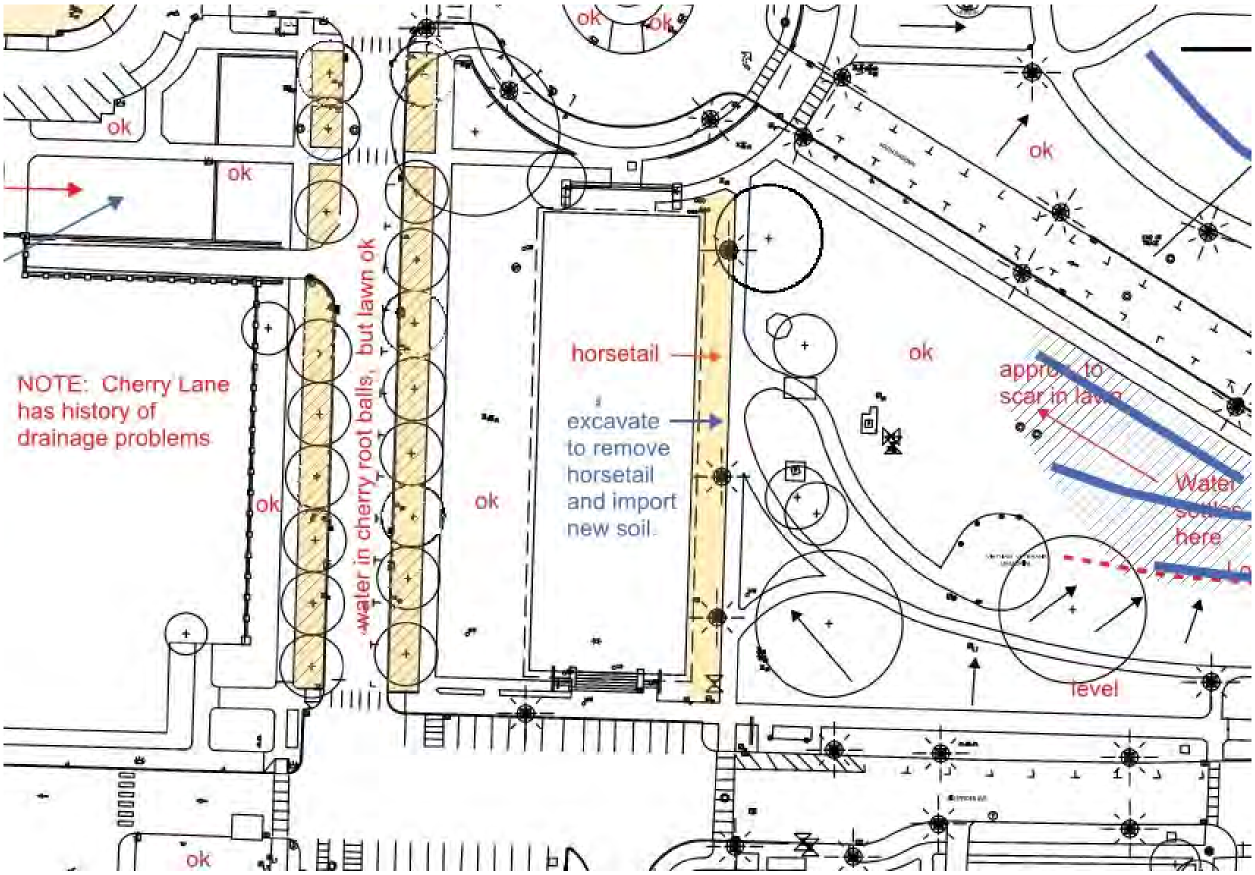


There are many additional resources include in the <u>West Capitol Campus: Olmsted Brothers' Master Planning & Landscaping Washington State Capitol Grounds</u> report from 2008, including original planting plans, and plant lists. This formalizes the arrangement of planting beds adjacent to the building and shows the formal garden beds (square beds to the West) and tree planting associated along what is now Cherry Lane to the west.





The renewal also provides a chance to address some key elements that were identified in the 2015 Drainage Master Plan, including removal and eradication of invasives, namely Horestail, along the east side of the building, along with soil replacement. Efforts should be taken to eliminate issues of standing water associated with new landscaping provided by this project.



These key elements provide a summary of key issues and resources for restoration of the landscaping for the Insurance Building. A more detailed design and review process, along with coordination with Campus maintenance will be necessary to assure the plant meets the intention of the historic campus while addressing the current needs.

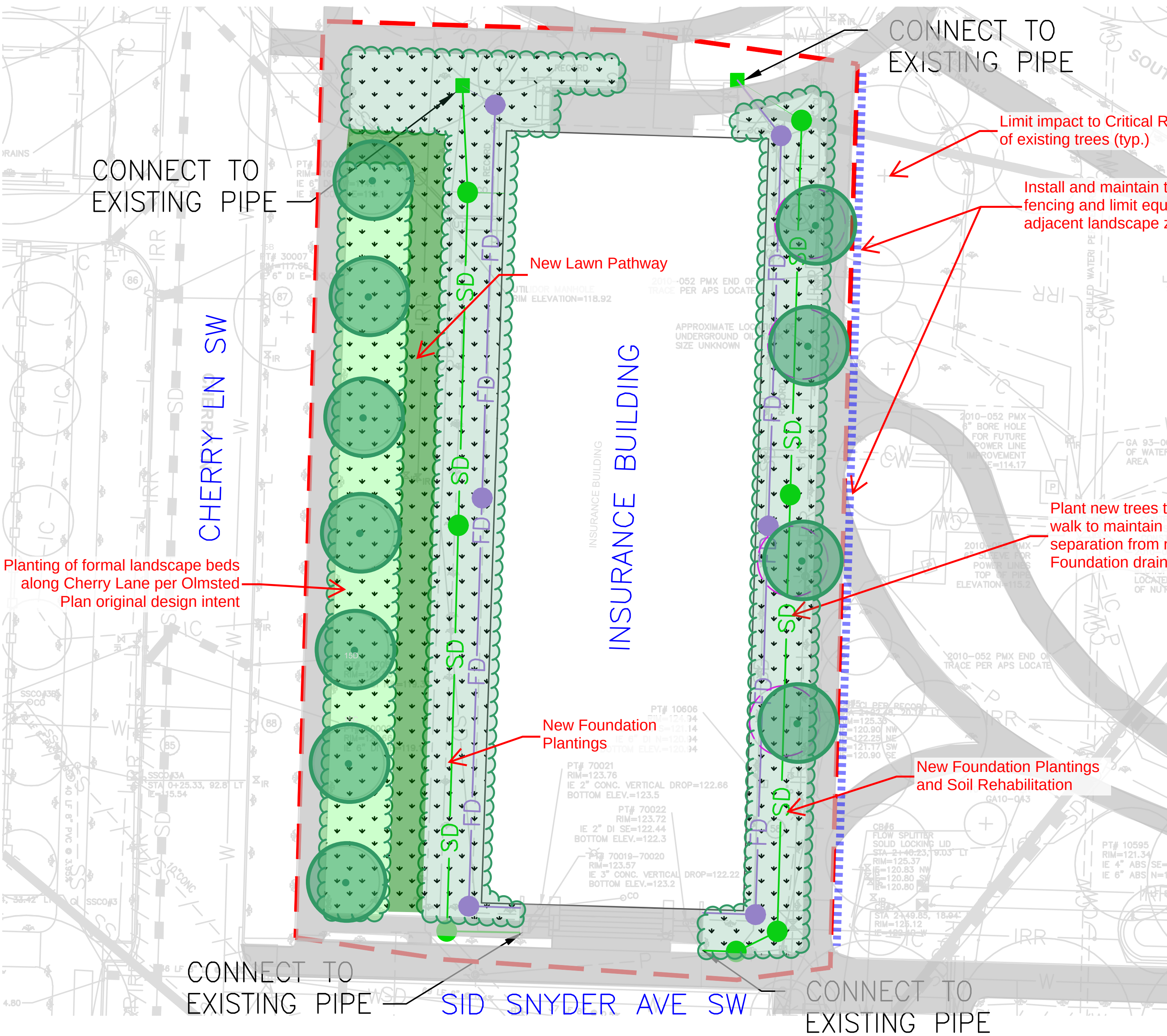
Attachments:

1. Detailed landscape concept markup notes to Insurance Building Foundation/Roof Drains Plan

INSURANCE BUILDING FOUNDATION/ROOF DRAINS

Project Description

- The foundation and roof drains are failing. These system load moisture around the foundation of the building. Leakage into the basement is a common occurrence.
- Replace existing foundation drains. Install new piping, backfill material, waterproof barrier, cleanouts, and catch basins. Reconnect to existing storm drainage system.
- Replace existing roof drain. Install scrubbers, downspouts, below grade piping, cleanouts, and catch basins. Reconnect to existing storm drainage system.



Cost Summary

Current Construction Total without Sales Tax	$220,000
Consultant Service Fee	$55,000
Permit Fee - Allowance	$1,500
DES Project Management	$13,800
Project Contingency	$29,000
Escalation (3% / year)	$73,400
Sales Tax (8.7% of escalated construction cost)	$23,500
Escalated Project Total	$416,200

Legend

- Project Boundary
- Cleanout
- Catch Basin Type 1
- Catch Basin Type 2
- SD — Storm Drainage
- FD — Footing Drain
- Landscape Restoration
- Future Tree - Historic landscape preservation plan

Plant Cornus to complement original Olmsted Plan: C. 'Starlight', 'Venus', 'Eddie's White Wonder' or other disease resistant cultivars

N

SCALE IN FEET

40 0 40 80

ReidMiddleton

CAPITOL CAMPUS UTILITY RENEWAL PLAN | (2016-919B(2))

09/13/2016 1:49pm I:\21\2016\012 Capitol Campus Utility Renewal Plan\Work-BTS\1612-WEST CAMPUS - SKETCHES.dwg

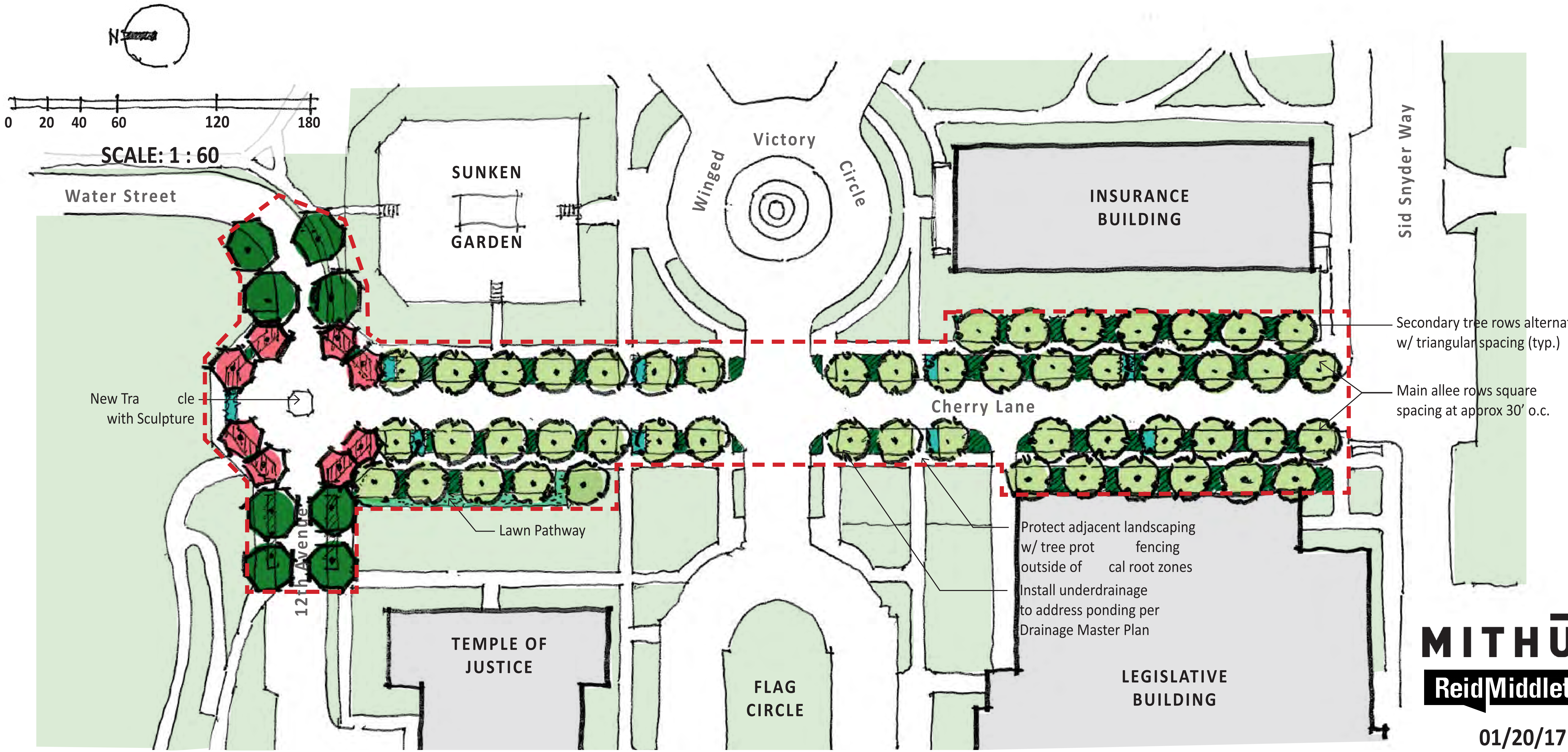
Cherry Lane Landscape Improvements

Project Narrative

The Cherry Lane improvements will integrate the replacement of vegeta along the length of the stree y upgrades.New tra cle will restore original design intent, surrou wering trees, con o a restored street tree plan g 12th Avenue. Cherry Lane will re-establish a double row of Dogwoods per original plan, with formal beds providing a vibrant from door to the Legisla e Building and including a formal lawn pathway adjacent to the Temple of Jus . Design will help gate drainage issues that in ee health, and incorporate bioreten areas to manage stormwat . Future design and installa of new plan to be guided by the Capitol Campus Landscape Preserva Master Plan (2009 Re e resources in the West Capitol Campus: Olmsted Brothers' Master Planning & Landscaping Washington State Capitol Grounds (2008 Report).

Legend

- Plant Cornus to complement original Olmsted Plan *C. 'Starlight', 'Venus', 'Eddie's White Wonder' or other disease resistant cultivars*
- Plant Tilia to complement original Olmsted Plan *select appropirate disease resistant cultivars*
- Plant Crataegus to complement original Olmsted Plan *select appropirate disease resistant cultivars*
- Formal Landscape Beds per Olmsted Plan original design intent - reference and adapt plans to match rhythm and incorporate bioreten
- Lawn path per Olmsted Plan original design intent
- Incorporate bioreten areas into formal beds and tra cle plan



MITHUN

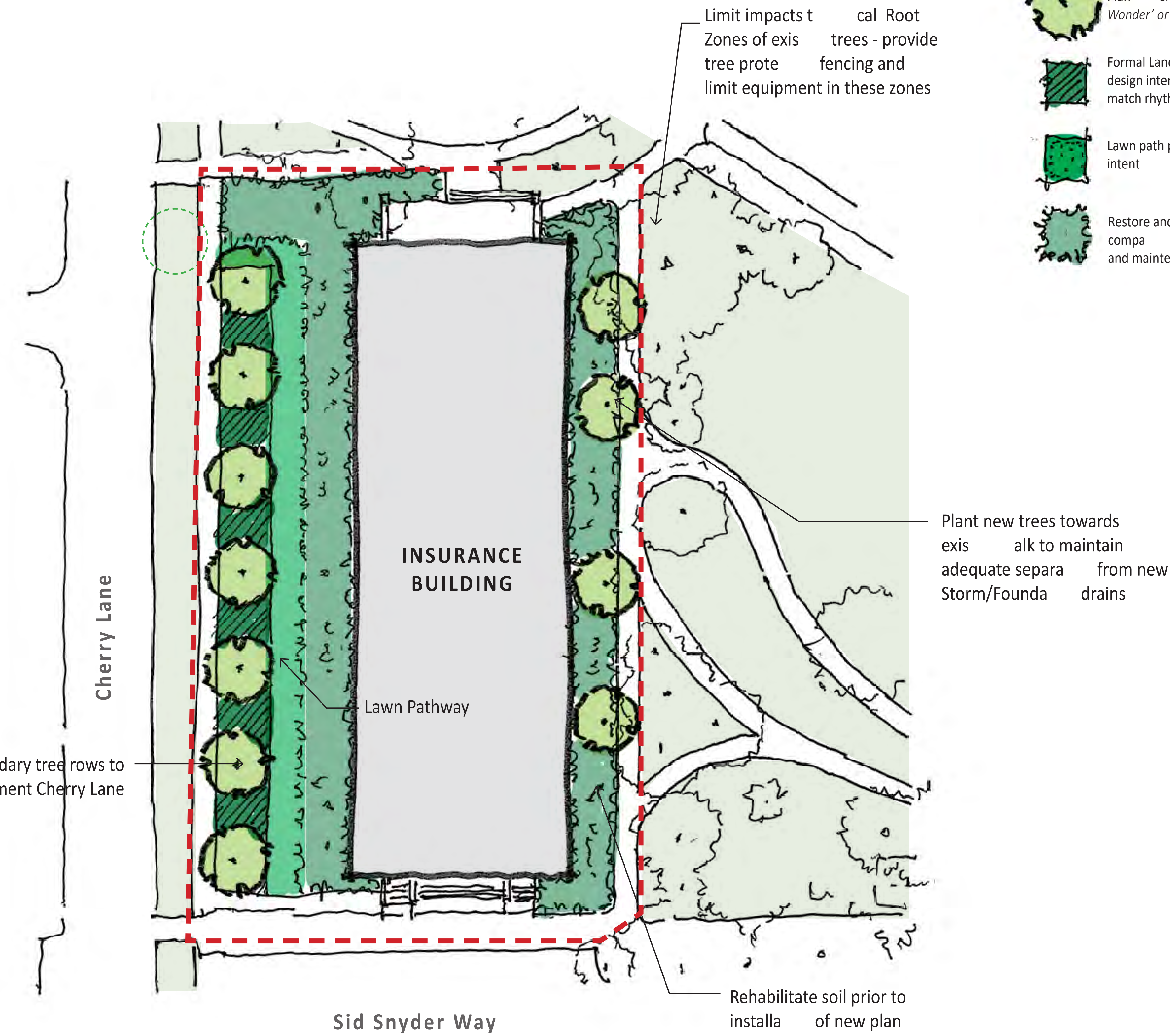
ReidMiddleton

01/20/17

Insurance Building Landscape Improvements

Project Narrative

The Insurance building drainage improvements, in on t g building water intrusion issues, will solve perennial issues with poor drainage that will aid the health of new plan ovements will integrate the replacement of vegeta along the perimeter of the building, replacing exis vegeta impacted during cons . This includes new Dogwoods on the east frontage, and begin to restore Cherry Lane plan y a double row of Dogwoods per original plan, and developing formal beds along with the lawn pathway that was part of the original design intent. Future design and installa of new plan o be guided by the Capitol Campus Landscape Preserva Master Plan (2009 Re e resources in the West Capitol Campus: Olmsted Brothers' Master Planning & Landscaping Washington State Capitol Grounds (2008 Report).



Legend

- Plant Cornus to complement original Olmsted Plan *C. 'Starlight', 'Venus', 'Eddie's White Wonder' or other disease resistant cultivars*
- Formal Landscape Beds per Olmsted Plan original design intent - reference and adapt plans to match rhythm and incorporate bioreten
- Lawn path per Olmsted Plan original design intent
- Restore and replace founda plan compa with the original campus plan and maintenance goals.

N

0 10 20 30 40 80 120

SCALE: 1 : 40

MITHŪN

ReidMiddleton

01/20/17

South Capitol Parking Lot Landscape Improvements

Project Narrative

The South Capitol Parking Lot is immediately adjacent to the Legisla e Building, and provides a visible conne between the building, parking areas, and the sou s of campus. In plan the entry from the east and the curved zone to the south allows for a formal allee of Elms as recommended in the original plan econ a of parking areas will allow for retr t bioreten areas at south entry and adjacent to the inter at Cherry Lane and Sid Snyder. These areas will be planted with formal plan cluding color to match the design intent of landscape areas within the Capitol Group. Restora of plan a in other areas impacted b y improvements will ed compa plant materials and design to integrate with campus. Future design and installa of new plan o be guided by the Capitol Campus Landscape Preserva Master Plan (2009 Re e resources in the West Capitol Campus: Olmsted Brothers' Master Planning & Landscaping Washington State Capitol Grounds (2008 Report).

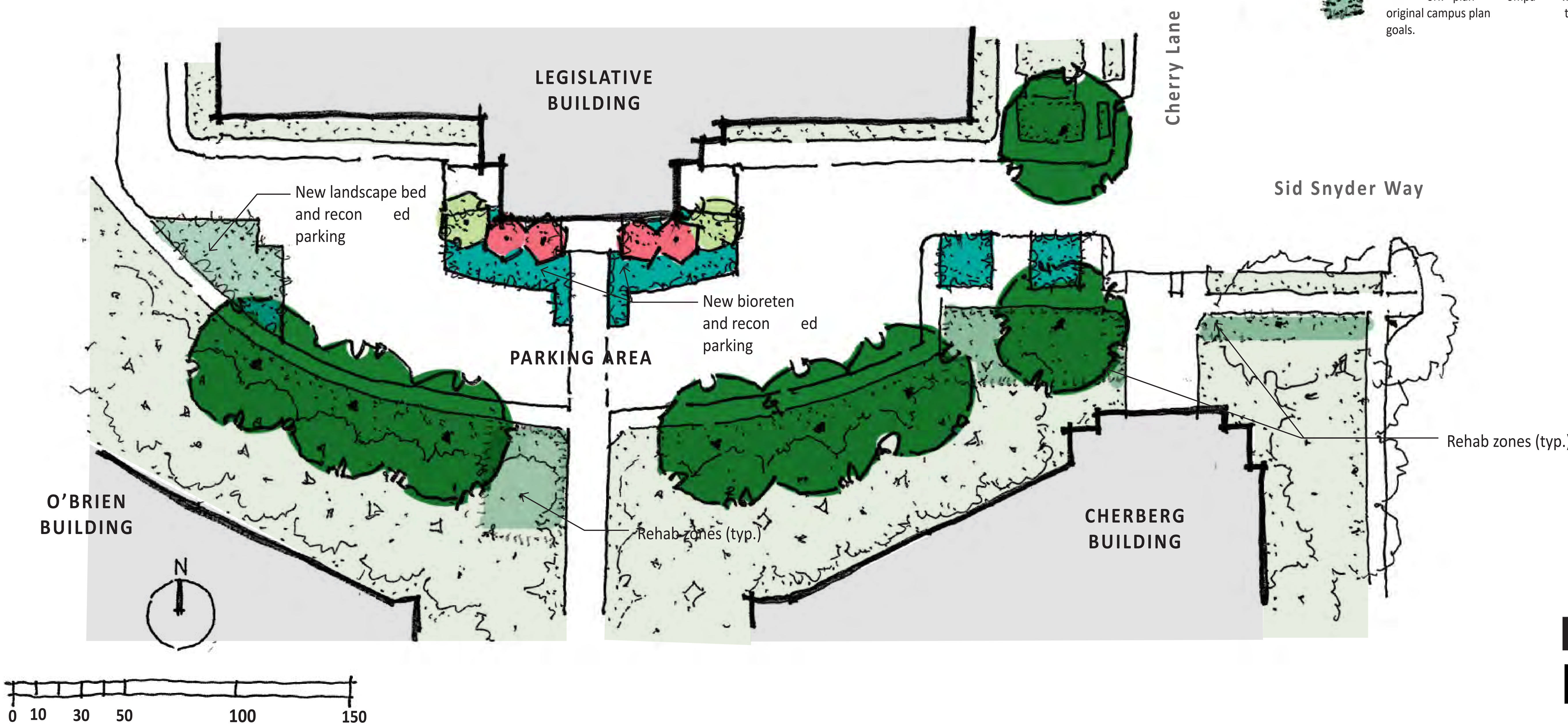
Legend

Plant Ulmus americana. Per Landscape Preserva Plan: New Elms must be Dutch Elm Disease (DED) resistance sele : *'Princeton' or other sub such as 'Accolade', 'Danada Charm', U. parviflora 'Alle', 'Homestead', or Zelkova serrata 'Halka'.*

Small sc wering accent trees at entries - compa with bioreten and matching original design intent of campus plan.

Bioreten plan ange in formal pa ern and include color to re t schemes near Capitol Group

Restore and replace landscaping impacted by ork - plan ompa with the original campus plan tenance goals.



SCALE: 1 : 50

MITHŪN

ReidMiddleton

01/20/17