

Project Title: WA 02 – Fort Lawton Project Support Services
 Subject: Fort Lawton Memorandum and Basis of Design for Class 5 Budgetary Estimate
 To: Seattle Public Utilities
 From: Davido Consulting Group c/o Erik Davido, PE and Ben Iddins, PE
 Date: November 4, 2022

1 INTRODUCTION

The City of Seattle is facilitating redevelopment of the Fort Lawton Army Reserve Center (Fort Lawton) on Parcel #102503-9334. The Redevelopment plan creates new quality affordable housing for low-income households and people who have experienced homelessness as well as increased lands dedicated to parks and open space on a nearly 32-acre parcel within Discovery Park.

Davido Consulting Group, Inc. (DCG) was tasked with preparing preliminary design layout options, up to two (2) each, for water, stormwater, and wastewater as well as evaluating grading on-site and right-of-way/road improvements for the purpose of creating an American Association for Cost Engineers (AACE) Class 5 budgetary estimate. DCG has years of experience working within Seattle and routinely works with private developers in the Seattle area allowing DCG to be in a unique position for this project by balancing their knowledge of the City of Seattle standard engineering plans, specifications, and guidelines with private development design and cost estimating approaches.

The project parcel is shown in Figure 1 and is bordered by W Lawton St and 36th Ave W to the north and east, respectively, with Texas way spanning through the site along the west portion of the parcel.



Figure 1 Fort Lawton Redevelopment Parcel

2 BASIS OF DESIGN & SITE LAYOUT OPTIONS

The following subsections describe the grading, stormwater, water, wastewater, and roadway improvement options evaluated for the Fort Lawton redevelopment. Please see the accompanying schematic plans attached in Appendix A and the associated budgetary estimates included in Appendix B for additional information.

2.1 ON-SITE EARTHWORK

The existing topography on-site slopes from south to north with an average relief of approximately 6.5%. Geologic hazards including steep slopes and erosion and seismic hazards are present in areas throughout the site. A preliminary geotechnical report previously prepared for the parcel and USGS mapping show that the site generally consists of gravelly, sandy, loam. For the redevelopment, the general approach for grading is separated into two tiers; one area for the multi-purpose athletic fields and associated parking lot, and one area for the new affordable housing. The grading design intent was to generally flatten each tier while maintaining existing grades along Texas way and matching existing grades as much as possible to reduce the cut and fill required. A slight slope (approximately 1.0% to the north and 1.0% to the east) was maintained for the athletic field area. A maximum 7' height wall separates the field and the parking lot area; the parking lot area slopes at approximately 4.0% - 5.0% to the north and 3.5% - 4.0% to the east. A slope of approximately 5.0% to the north and 4.0% to the east was maintained within the low-income housing area. A maximum 15' height wall separates the affordable housing area from the existing maintenance building.

See Appendix A for the proposed grading layout and cut/fill quantities.

2.2 STORMWATER

2.2.1 Applicability of Minimum Requirements

This project is subject to the requirements of the 2021 City of Seattle Code and Stormwater Manual ("Manual"). The proposed project totals approximately 16 acres of new plus replaced hard surfacing within a public combined sewer drainage basin. Therefore, Comprehensive Drainage Review, On-Site Stormwater Management (OSM) Best Management Practices (BMPs), and Peak Flow Control are required. Water quality treatment is not required per Section 4.4.4 of Volume 1 of the Manual.

2.2.2 Stormwater Basis of Design

Existing stormwater infrastructure, including catch basins, maintenance holes and conveyance pipes, are located within the project limits and drain to the north, servicing existing buildings and facilities, and eventually connect to the combined King County service line north of the project site within W Commodore Way via an 18" storm pipe. For the redevelopment, existing drainage infrastructure on-site will be removed and new drainage infrastructure constructed throughout the project site as needed to support the development.

Two stormwater layout options were created, each meeting the minimum requirements described in Section 2.2.1. In the layout option in which infiltration is infeasible (Option 1, below), the On-site List Approach is used to meet OSM BMP requirements. In the layout option in which infiltration is feasible

(Option 2, below), the On-Site Performance Standard is used to meet OSM BMP requirements. In both layouts, Western Washington Hydrology Modeling Software (WWHM2012) was utilized to model the stormwater BMPs and facilities to ensure compliance with the Peak Flow Control standard. The two layouts are described in the following sections. See Appendix A for the storm layout sheets.

2.2.3 Stormwater Site Layout Option 1: Detention Vault with Non-infiltrating Bioretention Planters

This option assumes that infiltration is infeasible at the site and therefore utilizes non-infiltrating bioretention planters (BPs) to meet the OSM BMP requirement for all hard surfaces including roof areas, at-grade pavement areas, and the multi-purpose athletic field area. Using a BP sizing factor of 1.2% of the contributing area as specified in the Manual, the total required BP footprint for the development is 1,152 SF, 2,370 SF, and 1,898 SF for the roof areas, sidewalk & roads, and multi-purpose athletic field area, respectively.

In addition to the BPs, this option includes a traditional detention vault used to meet the Peak Flow Control standard. All overflows from the BPs will be routed to the detention vault prior to stormwater leaving the site. A WWHM2012 model was created and a minimum vault size of 100' L x 80' W x 8' H is required. The detention vault will include a controlled outlet which will ultimately discharge to the combined King County service line within W Commodore Way.

2.2.4 Stormwater Site Layout Option 2: Infiltration Vault with Permeable Pavement

This option assumes a 1 in/hr design infiltration rate is available at the site and therefore utilizes permeable pavement surfacing (PPS) for all pavements (sidewalks, walkways, and roadways/parking lots) within the affordable housing area, for a total area of approximately 6.9 acres (this includes the multi-purpose athletic fields which were modeled as functionally equivalent to PPS in accordance with the Manual). All stormwater collected from the proposed roof and driveway areas onsite will be routed to an infiltration vault which will infiltrate and detain stormwater and will include a controlled outlet which will ultimately discharge to the combined King County service line within W Commodore Way.

The WWHM2012 model was created utilizing the assumed 1 in/hr design infiltration rate. The WWHM2012 model shows that 100% of the rain falling directly onto the PPS will be infiltrated within the native subgrade. Also included in the WWHM2012 model is the resulting size of the infiltration vault in order for the developed site to meet the OSM BMP requirement and Peak Flow Control standard. The required infiltration vault size is approximately 100' L x 60' W x 8' H.

2.3 WATER

2.3.1 Water Basis of Design & Site Layout Options

Existing water infrastructure (water main, pump station, meters, fire hydrants, etc.) is located within the project limits, primarily along Texas Way servicing the existing maintenance building, Veterans Affairs (VA) building, and cemetery. For the redevelopment (preliminary layout provided by Seattle Public Utilities), most existing water infrastructure will be removed and replaced with 12" main within Texas Way, looping and connecting the system between 36th Ave W and the intersection of W Lawton St and 40th Ave W. 8" branches of water main are included to provide fire and domestic capabilities to existing facilities.

The two water layouts are very similar with the exception of one stretch of main, as described in the following bullet points. See Appendix A for the water layout sheet.

- Reuse Existing 12" Water Main Segment – an approximate 430' segment of existing 12" water main that runs between the affordable housing and parking lot will be reused.
- Remove and Replace Existing 12" Water Main Segment – the above mentioned segment will be removed and replaced with new 12" water main.

Further water system investigation and system modeling should be conducted and may result in reduced water system improvements and cost savings (see Section 5.3 for recommendations for additional assessment).

2.4 WASTEWATER

2.4.1 Wastewater Basis of Design

Existing wastewater infrastructure (8" pipe, laterals, maintenance holes etc.) is located within the project limits draining to the north and provides service for existing buildings and facilities on-site. Wastewater from the site is currently conveyed to the combined King County service line within W Commodore Way via an 8" line. For the redevelopment, existing wastewater infrastructure will be removed and new drainage infrastructure constructed throughout the project site as needed to support the development. Some wastewater infrastructure from upstream and off-site areas contribute to the on-site wastewater conveyance system and it is assumed those services would need to remain connected in the redeveloped condition.

Two potential wastewater layouts are described in the following sections. See Appendix A for the sewer layout sheets.

2.4.2 Wastewater Site Layout Option 1: Reline Existing Wastewater Services

This option utilizes existing wastewater infrastructure where possible by relining existing wastewater pipes on the site and reusing existing maintenance holes to the maximum extent feasible. Additionally, this option minimizes the length of new sewer main throughout the site and instead utilizes numerous 6" side sewers which can each accommodate up to 8 townhouse or rowhouse units. Wastewater and collected stormwater discharging from the site will combine at the northern property line and collectively drain to the combined sewer in W Commodore Way via a relined 18" storm pipe; a new maintenance hole will also be installed at the downstream end. The existing 8" sewer line connected to the combined sewer in W Commodore Way will be abandoned.

2.4.3 Wastewater Site Layout Option 2: Replace Existing Wastewater Services

This option assumes all existing wastewater infrastructure on the site is in substandard condition and therefore will need to be replaced. New 8" sewer pipe and new maintenance holes will be installed throughout the project area. Sewer pipe locations in the roadway are more traditionally located (i.e. center of road throughout the development) resulting in shorter stretches of side sewers for each unit. Wastewater and collected stormwater discharging from the site will combine at the northern property line and collectively drain to the combined sewer main in W Commodore Way via a 24" pipe burst (pipe burst the existing 18" pipe to 24"); a new

maintenance hole will also be installed at the downstream end. The existing 8" sewer line connected to the combined sewer main in W Commodore Way will be abandoned.

3 ROW IMPROVEMENTS

3.1 BASIS OF DESIGN

The project triggers half-street right-of-way (ROW) improvements for the sections of public ROW fronting the parcel along with full-width street improvements for Texas Way which spans through the site. The Seattle Department of Transportation (SDOT) provided preliminary roadway cross sections for roads fronting the parcel (36th Ave W and W Lawton St) and for Texas Way. This results in approximately 2,450 LF, 1,300 LF, and 3,370 LF of improvements on 36th Ave W, W Lawton St, and Texas Way, respectively.

See Appendix A for the cross sections provided by SDOT.

3.1.1 36th Ave W

36th Ave W consists of a 60' ROW width and is currently classified as a neighborhood yield street in Seattle's Streets Illustrated mapping. An existing asphalt road runs approximately 2,450 LF along 36th Ave W fronting the project site. Between the existing western roadway edge and western property line (running the entire length of the road) is approximately 22' of landscape area with a dense coverage of existing trees; based on the cross section provided by SDOT, it is assumed that this tree and landscape area is to remain. The proposed project will trigger half street frontage improvements along 36th Ave W (roadway, curb/gutter/sidewalk) following SDOT's Right of Way Opening and Restoration Rules and following Seattle Standard Plan 401 for residential pavement sections. A wall (approximately 5' in height) is included, offset 2' from the back of the sidewalk, in the design and budgetary estimate to separate the proposed sidewalk from the existing landscape area to remain; further structural and geotechnical analysis should be conducted to better determine wall heights. Note that formal streets illustrated review and deviations may be needed for proposed cross section elements (i.e. omittance of landscape strip between roadway and sidewalk). For most of 36th Ave W fronting the site, there is a combined sewer main in the road; ROW drainage collection is included within the budgetary estimate and is assumed to drain to this main. For the northernmost segment of 36th Ave W that intersects with W Lawton (where there is no combined main) it is assumed that drainage can be routed and can connect to the lateral from the project site that drains to the King County Main within W Commodore Way.

3.1.2 W Lawton St

W Lawton St consists of a 30' ROW width and is currently classified as a neighborhood yield street in Seattle's Streets Illustrated mapping. Note that Seattle's Streets Illustrated mapping states that the minimum required ROW width for a neighborhood yield street is 40'. An existing asphalt road runs a total length of approximately 1,300 LF along W Lawton St fronting the project site except for an approximate 160' stretch of road near the western portion of the frontage where there is a gap between two roadways due to elevation differences; this area contains landscape and stairs and is classified as a steep slope and potential slide area within Seattle GIS mapping. From the

intersection of 36th Ave W and W Lawton St to the current edge of pavement, the road is approximately 1,110 LF. SCL power poles with street lighting are also located along the southern edge of the existing roadway and are likely to be impacted by the required street improvements and therefore are assumed to be relocated. Two options were evaluated for this stretch of frontage improvements, as described in the following:

- Provide half-street frontage improvements along the full stretch of W Lawton St frontage, including connecting 36th Ave W to 40th Ave W where the existing landscape and stair climb is located. For this approximately 160' stretch of road, a new two-lane roadway is included along with 8' height walls due to the change in elevation in this area.
- Provide half-street frontage improvements from 36th Ave W to the gap and install a cul-de-sac to provide vehicular turnaround at the end of the dead-end street.

The proposed project will trigger half street frontage improvements along W Lawton St (roadway, curb/gutter/landscape strip/sidewalk) following SDOT Right of Way Opening and Restoration Rules and following Seattle Standard Plan 401 for residential pavement sections. A wall (approximately 5' in height) is included with the design and budgetary estimate separating the proposed sidewalk from the existing landscape area to the south of the improvements; further structural and geotechnical analysis should be conducted to better determine wall heights. Note that for the option that constructs a road throughout the entirety of the frontage, an 8' height wall (approximate average) is included for this segment. Further investigation regarding the soil conditions and stability analysis should be conducted by a geotechnical engineer in the steep slope and potential slide area to further develop costs associated with walls. It is assumed that drainage can be routed to and can connect to the lateral from the project site that drains to the King County Main within W Commodore Way.

Note that the existing ROW width is 30' wide and the SDOT ROW width for improvements is 52' wide. It is assumed that future 5' dedications will be required on the north and south property lines with an additional ~9' easement on either side for sidewalk installation.

3.1.3 Texas Way

Texas Way is not currently mapped within Seattle's Streets Illustrated mapping but consists of an approximately 30' wide section; this road is to be improved into a 66' public arterial road with bicycle lanes and transit use including transit stops and amenities. The existing asphalt road with sidewalk runs approximately 3,370 LF along Texas Way. The proposed project will trigger full street improvements along Texas Way (roadway, curb/gutter/landscape strip/sidewalk) following SDOT Right of Way Opening and Restoration Rules and following Seattle Standard Plan 402 for arterial pavement sections. A wall (approximately 5' in height) is included in the design and budgetary estimate on both sides of the roadway separating the proposed sidewalk from the existing grades; further structural and geotechnical analysis should be conducted to better determine wall heights. Note that with the preliminary building layout image provided by SPU, a proposed 66' cross section will likely require modifications to the proposed building layout. Additionally, note that horizontal and vertical geometry will need to meet requirements for an arterial street. Current horizontal curves may not meet standards for arterial design speed and alignment; the location of the roadway may need adjustment.

4 BUDGETARY ESTIMATE

An AACE Class 5 budgetary estimate was prepared for the summarized preliminary system layout options discussed in the above sections. The estimate includes construction costs with a 25% contingency and a range of soft costs (permitting/design/other) and includes separate operations and maintenance costs. Costs were derived from recent private project experience/contractor coordination, RSMeans construction cost estimating software, and professional judgement. An accuracy range of -30% to +50% was utilized for this level of design.

Electrical supply costs for overhead power lines and underground power lines options were provided by Seattle City Light and pre-marked up electrical supply construction costs inserted in the cost summary. The road and electrical supply construction costs were allocated to each development zone based on the development zone area proportion of the total area.

See Sections 5 for exclusions, assumptions, & recommendations which aid in items covered and excluded by the budgetary estimate. See Appendix B for the budgetary estimate sheets.

5 EXCLUSIONS, ASSUMPTIONS, & RECOMMENDATIONS

The following sections are a comprehensive list of items excluded, assumed in the plan development and budgetary estimate.

5.1 EXCLUSIONS

The following is a list of items excluded from the design and budgetary estimate, including but not limited to:

- Demolition of existing structures (i.e. existing buildings)
- Existing maintenance building refurbishing and parking lot resurfacing
- Hazardous material mitigation (soil or demolished materials)
- Building construction
- Landscaping within private property (i.e. planting/soil amendment of construction disturbed surfaces)
- SCL utility infrastructure layout (although costs have been provided by SCL)
- Drainage and underdrain pipe for the Multi-Purpose Athletic Field
- No restrooms facilities associated/near the Multi-Purpose Athletic Field
- Construction facilities (i.e. portables)
- Bonds & insurance

5.2 ASSUMPTIONS & NOTES

The following is a comprehensive list of assumptions and notes that were used throughout the design and cost estimation which includes but is not limited to:

- Construction budgetary estimate is for 2023 construction. Applicable scaling factors to be used for future construction date

- No public main extensions will be required within the ROW (36th Ave W or W Lawton St)
 - Drainage collected from the majority of road improvements along 36th Ave W will be able to connect to the existing combined main in 36th Ave W.
 - Drainage collected from road improvements along W Lawton St/northernmost area of 36th Ave W will be able to connect to the existing lateral from the project site that connects to the King County main within W Commodore Way.
- King County will approve the relined/burst connection to the King County main in W Commodore Way
 - It is acceptable for storm and sewer to connect at the property line and drain to the King County main
- Although not shown in the project plans, Texas Way includes storm infrastructure installation/facilities
- Project budgetary estimate was prepared/designed as a private development project
 - Prevailing wages, local labor workforce requirements, LEED requirements, and bond/insurance were not included in the budgetary estimate
 - Shop (Union) costs were used to estimate unit prices within the budgetary estimate
- Site excavated soils are to be used for fill on-site including utility trenches
 - Import bedding material/fill is to be used for utility trenches within the ROW
 - Standard excavation for trench/pipe installation (i.e. no hard rock or over excavation)
 - Site soils generally consist of sandy clay/loam
- For construction, Texas Way will be closed from south edge of parcel to westerly edge of parcel.
 - However, there will be temporary road/access to serve the VA Building and maintenance building
- All on-site drainage and wastewater pipe were to be estimated as privately owned and therefore may be PVC. Note that ductile iron pipe will result in approximately 45% increase for associated pipe costs
 - Water pipes/fittings/hydrants were assumed to be ductile iron pipe.
- Sewer pipes that are proposed for relining are in suitable condition for relining
- There is an existing bus stop on Texas Way. The bus is to be rerouted and the temporary traffic control is not included with the estimate
- Construction project haul is within 8-10 miles of project location
- Roadway dedications/easements will be required on W Lawton for the SDOT proposed roadway cross section
- The Texas Way roadway through the project site is 66' wide. Please note the distance between the apartment building and rowhouse apartments measured from face to face is about this same distance
- Project dewatering is not required (i.e. groundwater elevations won't affect construction).
- Erosion and sediment control is estimated for earthwork/road construction costs and the drainage construction costs
- Operations and maintenance was estimated using RSMMeans and professional judgement and is for the first year after construction only. If using for cost projecting, utilize yearly

inflation costs as well as allowance for increased maintenance over time for aging infrastructure; perhaps 5% every 5 years

5.3 RECOMMENDATIONS FOR ADDITIONAL ASSESSMENT

The following is a comprehensive list to aid in the refinement and assessment of further design and cost analyses which includes but is not limited to:

- Utility locator
 - Further analysis on sewer system on-site and from off-site/upstream that may contribute to on-site system
 - Further analysis on storm system on-site and from off-site/upstream that may contribute to on-site system
- Topographic survey compliant with SDOT Street Improvement Permit level of requirements
- Anticipated water demand for all new/existing building units and fire flow
 - Water system modeling to determine minimum water main pipe size
 - Further analysis on layout to determine if connector/branch lines can be eliminated
 - Further analysis on water meter requirements and comparison between individual meters vs. larger master meters
- Geotechnical analysis and associated report
 - Infiltration testing
 - § Infiltration testing results could alter stormwater BMP/flow control approach and sizing
- Additional stormwater modeling:
 - For refinement of vault sizing
 - For pipe conveyance capacity
- Sewer CCTV/evaluation to determine existing pipe condition
- There may be creative alternatives to keeping poles along project frontage (particularly W Lawton St) in their existing locations via “bulbing” curbs. Further SDOT/SCL determination required
- Investigation into existing reported ponding issues around storm/sewer service lines on-site/near site
- Further investigation/grading refinement for abandoning existing DWW on-site (particularly water main) instead of trenching and removing
- Investigation into cost associated with booster pump station removal
- Existing traffic use and proposed traffic use study/evaluation
- ROW Tree/exceptional tree removal and mitigation review and analysis
- Refinement of proposed road cross sections. Streets illustrated review and deviations may be needed for proposed cross sections.
 - A ROW variance request on W Lawton St should be filed and reviewed for the cul-de-sac

- The ROW walls to be constructed along W Lawton, 36th Ave W, and Texas Way may be in tree critical root zones. Further analysis on tree retention/requirements by an arborist is needed

6 REFERENCES

City of Seattle, 2019. *Fort Lawton Army Reserve Center Redevelopment Plan: Attachment 1, Version 2*. September 2022.

City of Seattle, 2021. *City of Seattle Stormwater Code*. October 2022.

City of Seattle, 2021. *City of Seattle Stormwater Manual*. October 2022.

City of Seattle, 2022. *DSO Water & Sewer Map ArcGIS web application*. Retrieved November 4, 2022, from https://gisrevprxy.seattle.gov/wab_ext/DSOResearch_Ext/

City of Seattle, 2022. *Map of Proposed Fort Lawton Redevelopment*. September 2022.

City of Seattle, 2022. *Proposed Fort Lawton Roadway Circulation Plan*. September 2022.

Fort Lawton Army Reserve Center FEIS, 2018. *Additional Charts and Diagrams*. September 2022.

Fort Lawton Army Reserve Center FEIS, 2018. *Chapter 3: Affected Environment, Impacts, Alternatives, Mitigation Measures and Significant Unavoidable Adverse Impacts*. September 2022.

Gordian, 2022. *RSMMeans Data*. Retrieved November 4, 2022 from <https://www.rsmeansonline.com/>

MIG|SvR, 2017. *Fort Lawton Talaris FEIS: 3.12 Utilities*. September 2022.

Natural Resources Conservation Service (NRCS), July 31, 2017. *Web Soil Survey*. Retrieved November 4, 2022 from <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Puget Sound LIDAR Consortium (PSLC), September 17, 2021. *Puget Sound LIDAR Consortium*. Retrieved November 4, 2022 from <https://pugetsoundlidar.ess.washington.edu/>

U.S. Army Reserve Center, 2022. *BRAC Site Rough Depiction of As-Is Conditions*. July 2022.

U.S. Army Reserve Center, 2022. *Existing Water System & Required Changes*. July 5, 2022.

7 APPENDICES

APPENDIX A – BASIS OF ESTIMATE CIVIL LAYOUTS

APPENDIX B – BUDGETARY ESTIMATE

APPENDIX C – AREA CALCULATIONS & WWHM MODELING REPORT

APPENDIX A – BASIS OF ESTIMATE CIVIL LAYOUTS

EXTENTS OF NEW PRIVATE ROADWAY AND PARKING LOT. ACCESS TO PRIVATE ROAD OFF TEXAS WAY TO BE FROM CITY OF SEATTLE STANDARD 430A DRIVEWAYS

LENGTH OF IMPROVEMENTS: 2,450 LF

APPROXIMATE LIMITS OF "MULTI-PURPOSE ATHLETIC FIELD" DEVELOPMENT ZONE FOR BUDGETARY ESTIMATE 6.5 ACRES

APPROXIMATE LIMITS OF "CEMETERY" DEVELOPMENT ZONE FOR BUDGETARY ESTIMATE 3.5 ACRES

APPROXIMATE LIMITS OF "MAINTENANCE BUILDING" DEVELOPMENT ZONE FOR BUDGETARY ESTIMATE 5.5 ACRES

APPROXIMATE LIMITS OF "AFFORDABLE HOUSING" DEVELOPMENT ZONE FOR BUDGETARY ESTIMATE 7.5 ACRES

TEXAS WAY LENGTH OF IMPROVEMENTS: 3,370 LF

EXTENTS OF ROADWAY RECONSTRUCTION & IMPROVEMENT (TYP)

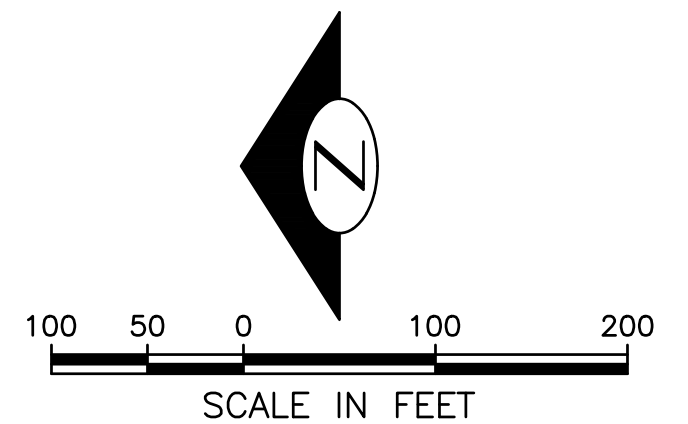
W LAWTON ST LENGTH OF IMPROVEMENTS: 1,300 LF

SHEET INDEX

SHEET NO.	DWG NO.	TITLE
1	C-01	COVER SHEET
2	C-02	EX CONTOUR PLAN & PROPOSED GRADING SECTION
3	C-03	STORM LAYOUT - OPTION 1 (DETENTION VAULT W/ BIORETENTION PLANTERS)
4	C-04	STORM LAYOUT - OPTION 2 (INFILTRATION VAULT W/ PERMEABLE PAVEMENT)
5	C-05	WATER LAYOUT
6	C-06	SEWER LAYOUT - OPTION 1 (RELIN EX WASTEWATER SERVICES)
7	C-07	SEWER LAYOUT - OPTION 2 (REPLACE EX WASTEWATER SERVICES)
8	C-08	ROADWAY SECTIONS

FORT LAWTON REDEVELOPMENT

- ① CATHOLIC HOUSING SERVICES SENIOR SUPPORTIVE HOUSING APARTMENTS
- ② CATHOLIC HOUSING SERVICES SENIOR WORKFORCE HOUSING ROWHOUSES
- ③ HABITAT FOR HUMANITY AFFORDABLE TOWNHOMES
- ④ HABITAT FOR HUMANITY AFFORDABLE ROWHOUSES
- ⑤ SEATTLE PARKS AND RECREATION USES
- ⑥ RE-USE PARKS MAINTENANCE FACILITY



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COVER SHEET



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INITIALS AND DATE		INITIALS AND DATE	
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ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE CITY OF SEATTLE STANDARD PLANS AND SPECIFICATIONS AND OTHER DOCUMENTS CALLED FOR IN SECTION 0-02.3 OF THE PROJECT MANUAL.

PRELIMINARY

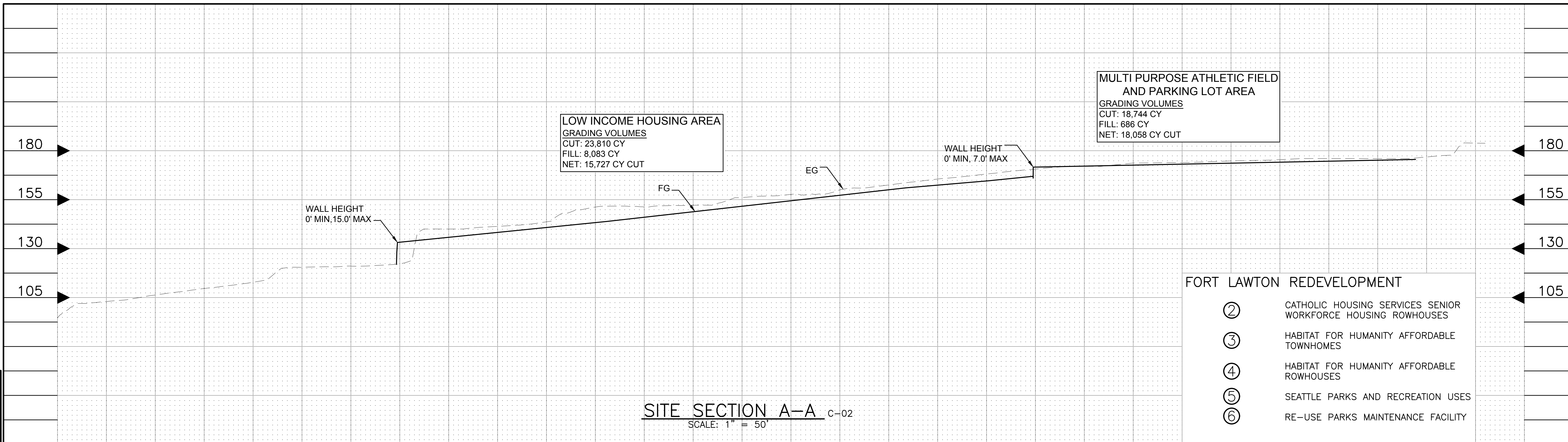
Seattle Public Utilities
ORDINANCE NO. PW NO.
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WA 02 - FORT LAWTON
PROJECT SUPPORT SERVICES

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C-01	
SHEET	1 OF 8

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© 2022 Microsoft Corporation © 2022 Mylar



VAULT SERIAL #	DATE	MARK	NATURE	MADE	CHK'D	REV'D



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EX CONTOUR PLAN & PROPOSED GRADING SECTION



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PRELIMINARY

Seattle Public Utilities

ORDINANCE NO. PW NO.

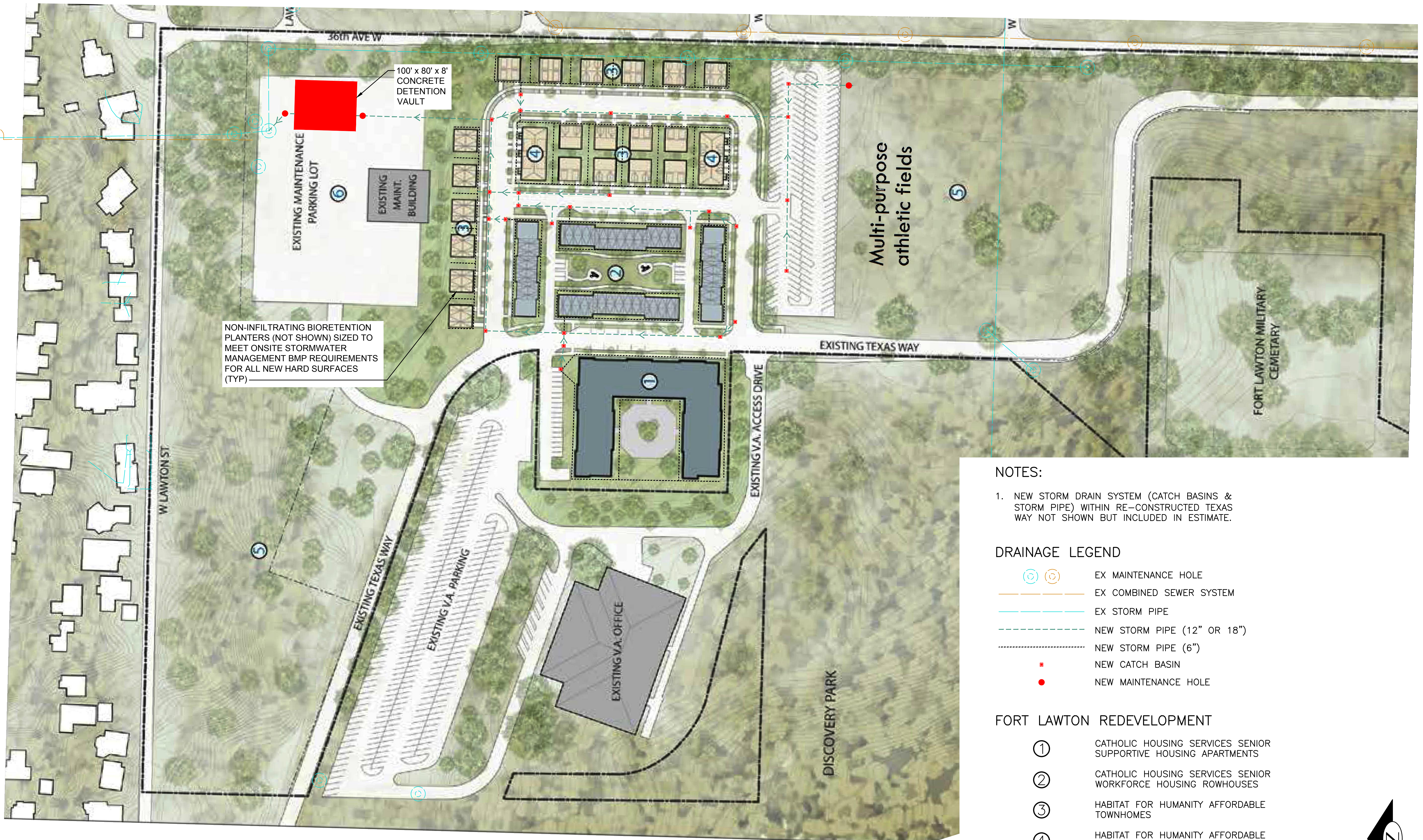
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WA 02 - FORT LAWTON PROJECT SUPPORT SERVICES

JOB #	PC
	CO
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	C-02
SHEET	2 OF 8

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NOTES:

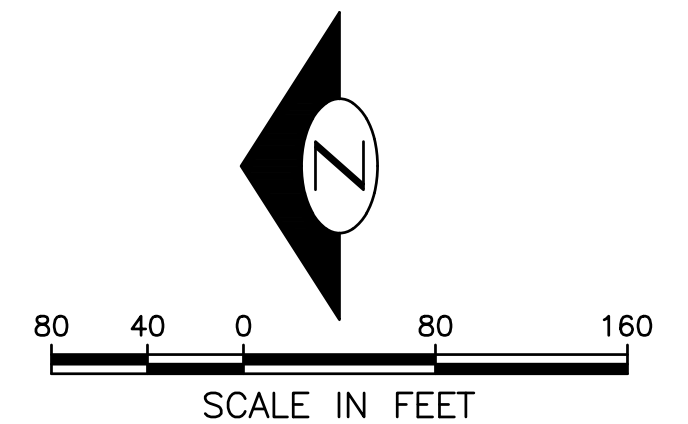
1. NEW STORM DRAIN SYSTEM (CATCH BASINS & STORM PIPE) WITHIN RE-CONSTRUCTED TEXAS WAY NOT SHOWN BUT INCLUDED IN ESTIMATE.

DRAINAGE LEGEND

- EX MAINTENANCE HOLE
- EX COMBINED SEWER SYSTEM
- EX STORM PIPE
- NEW STORM PIPE (12" OR 18")
- NEW STORM PIPE (6")
- NEW CATCH BASIN
- NEW MAINTENANCE HOLE

FORT LAWTON REDEVELOPMENT

- ① CATHOLIC HOUSING SERVICES SENIOR SUPPORTIVE HOUSING APARTMENTS
- ② CATHOLIC HOUSING SERVICES SENIOR WORKFORCE HOUSING ROWHOUSES
- ③ HABITAT FOR HUMANITY AFFORDABLE TOWNHOMES
- ④ HABITAT FOR HUMANITY AFFORDABLE ROWHOUSES
- ⑤ SEATTLE PARKS AND RECREATION USES
- ⑥ RE-USE PARKS MAINTENANCE FACILITY



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STORM LAYOUT – OPTION 1 (DETENTION VAULT W/ BIORETENTION PLANTERS)



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INITIALS AND DATE		INITIALS AND DATE	
DESIGNED JL,BW	CHECKED ED	REVIEWED: DES. SDOT	CONST. PROJ. MGR.
DRAWN MH	CHECKED BI	RECEIVED	REVISED AS BUILT

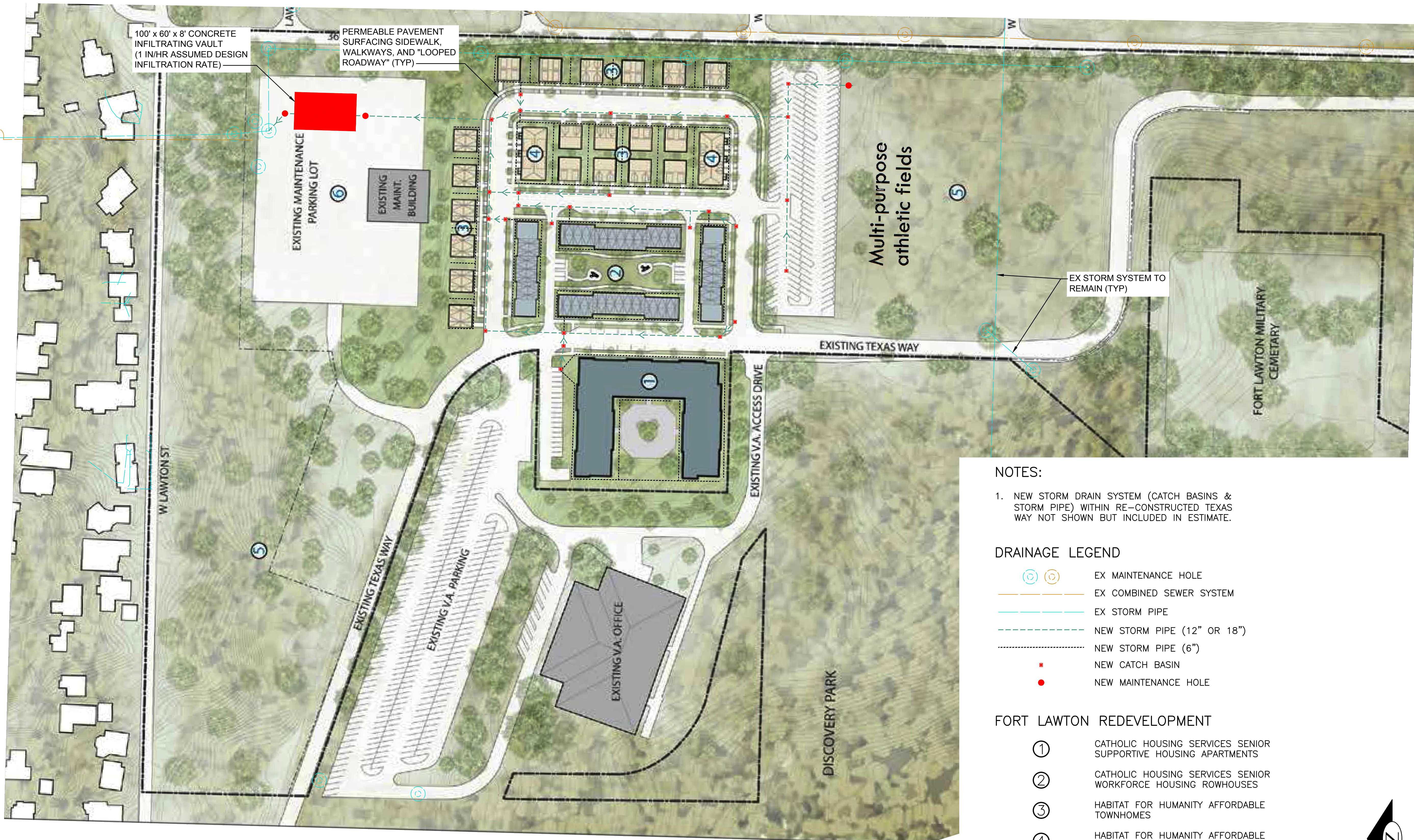
PRELIMINARY

ORDINANCE NO. PW NO.
 SCALE: H. 1"=80'

**WA 02 – FORT LAWTON
 PROJECT SUPPORT
 SERVICES**

JOB #	PC CO
VPI #	C-03
SHEET	3 OF 8

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100' x 60' x 8' CONCRETE INFILTRATING VAULT (1 IN/HR ASSUMED DESIGN INFILTRATION RATE)

PERMEABLE PAVEMENT SURFACING SIDEWALK, WALKWAYS, AND "LOOPED ROADWAY" (TYP)

EX STORM SYSTEM TO REMAIN (TYP)

NOTES:

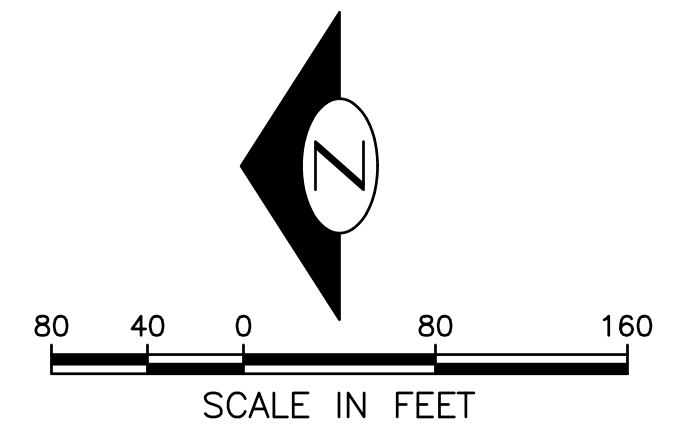
1. NEW STORM DRAIN SYSTEM (CATCH BASINS & STORM PIPE) WITHIN RE-CONSTRUCTED TEXAS WAY NOT SHOWN BUT INCLUDED IN ESTIMATE.

DRAINAGE LEGEND

- EX MAINTENANCE HOLE
- EX COMBINED SEWER SYSTEM
- EX STORM PIPE
- NEW STORM PIPE (12" OR 18")
- NEW STORM PIPE (6")
- NEW CATCH BASIN
- NEW MAINTENANCE HOLE

FORT LAWTON REDEVELOPMENT

- ① CATHOLIC HOUSING SERVICES SENIOR SUPPORTIVE HOUSING APARTMENTS
- ② CATHOLIC HOUSING SERVICES SENIOR WORKFORCE HOUSING ROWHOUSES
- ③ HABITAT FOR HUMANITY AFFORDABLE TOWNHOMES
- ④ HABITAT FOR HUMANITY AFFORDABLE ROWHOUSES
- ⑤ SEATTLE PARKS AND RECREATION USES
- ⑥ RE-USE PARKS MAINTENANCE FACILITY



NOT FOR CONSTRUCTION

STORM LAYOUT – OPTION 2 (INFILTRATION VAULT W/ PERMEABLE PAVEMENT)



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 DEPARTMENT OF FINANCE & ADMINISTRATIVE SERVICES
 SEATTLE, WASHINGTON 20

BY:
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INITIALS AND DATE		INITIALS AND DATE	
DESIGNED JL,BW	CHECKED ED	REVIEWED: DES. SDOT	CONST. PROJ. MGR.
DRAWN MH	CHECKED BI	RECEIVED	REVISED AS BUILT

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE CITY OF SEATTLE STANDARD PLANS AND SPECIFICATIONS AND OTHER DOCUMENTS CALLED FOR IN SECTION 0-02.3 OF THE PROJECT MANUAL.

PRELIMINARY

Seattle Public Utilities

ORDINANCE NO. PW NO.

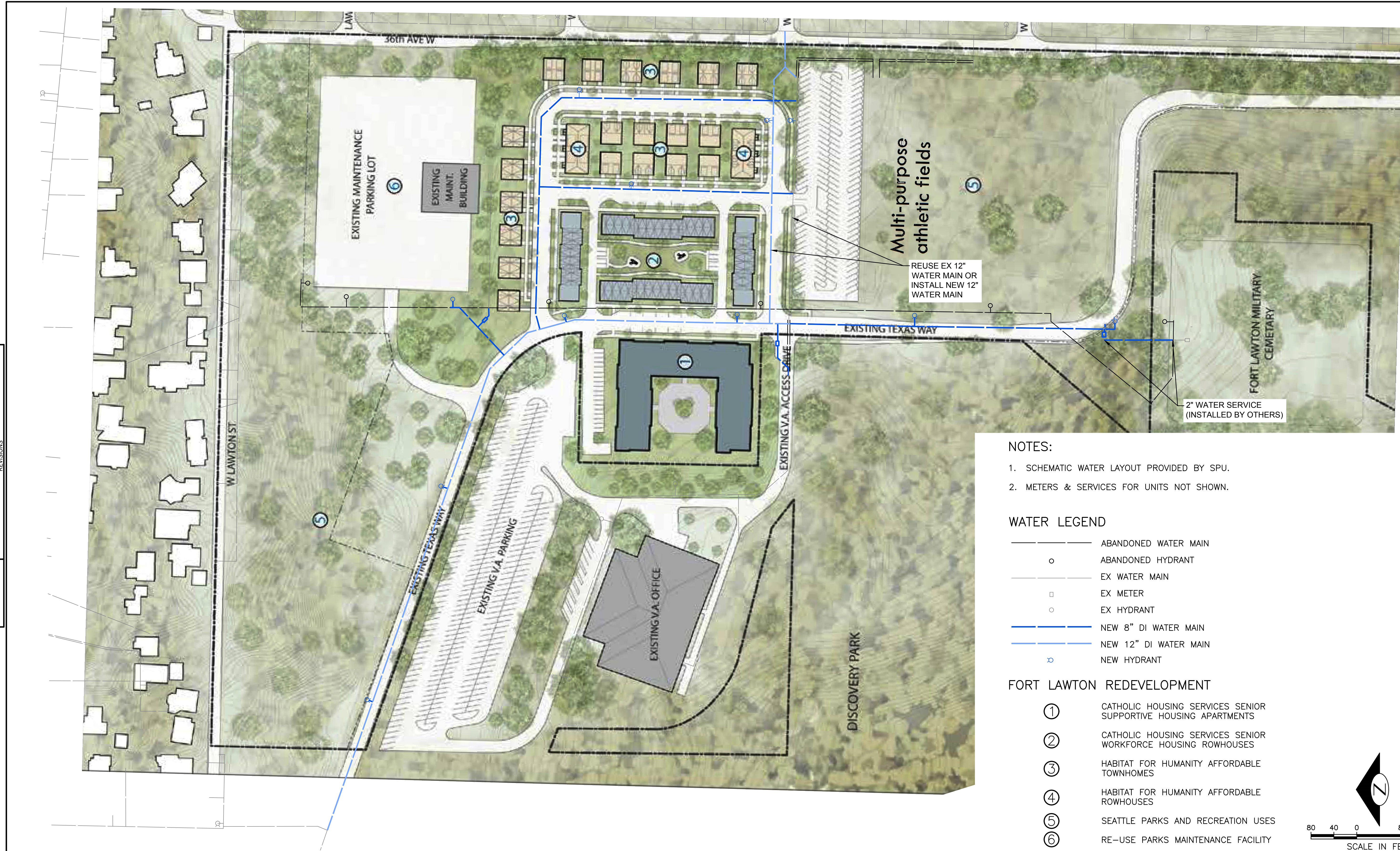
SCALE: H. 1"=80'

WA 02 – FORT LAWTON PROJECT SUPPORT SERVICES

JOB #	PC CO
VPI #	C-04
SHEET	4 OF 8

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VAULT SERIAL #	DATE	MARK	NATURE OF REVISIONS	MADE BY	CHKD	REV'D



NOTES:

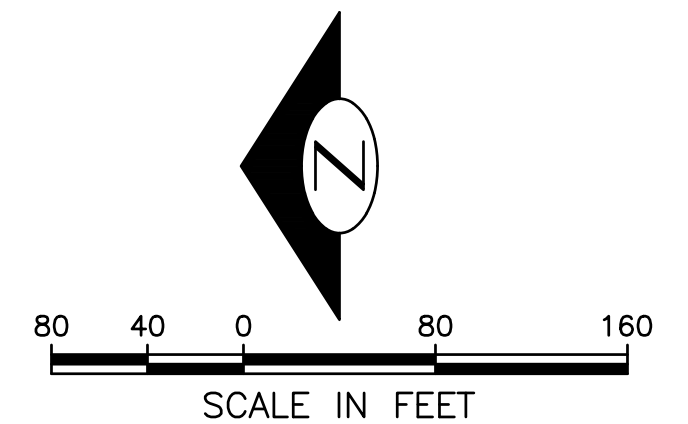
1. SCHEMATIC WATER LAYOUT PROVIDED BY SPU.
2. METERS & SERVICES FOR UNITS NOT SHOWN.

WATER LEGEND

- ABANDONED WATER MAIN
- ABANDONED HYDRANT
- - - EX WATER MAIN
- EX METER
- EX HYDRANT
- NEW 8" DI WATER MAIN
- NEW 12" DI WATER MAIN
- ⊗ NEW HYDRANT

FORT LAWTON REDEVELOPMENT

- ① CATHOLIC HOUSING SERVICES SENIOR SUPPORTIVE HOUSING APARTMENTS
- ② CATHOLIC HOUSING SERVICES SENIOR WORKFORCE HOUSING ROWHOUSES
- ③ HABITAT FOR HUMANITY AFFORDABLE TOWNHOMES
- ④ HABITAT FOR HUMANITY AFFORDABLE ROWHOUSES
- ⑤ SEATTLE PARKS AND RECREATION USES
- ⑥ RE-USE PARKS MAINTENANCE FACILITY



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WATER LAYOUT



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PRELIMINARY

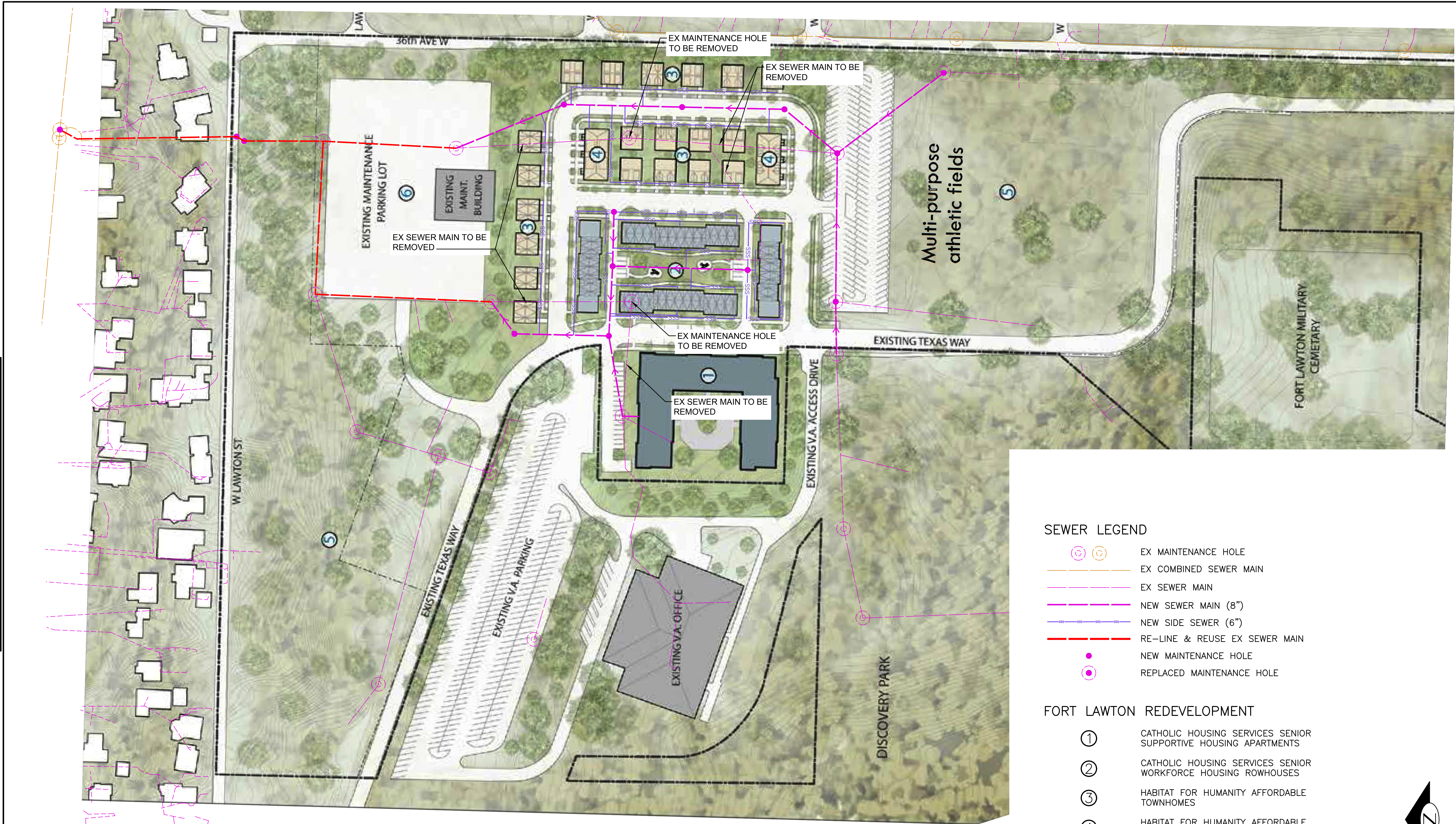
ORDINANCE NO. _____ PW NO. _____
 SCALE: H. 1"=80'

**WA 02 – FORT LAWTON
 PROJECT SUPPORT
 SERVICES**

JOB #	PC CO
VPI #	C-05
SHEET	5 OF 8

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VAULT SERIAL #	DATE	MARK	NATURE	MADE	CHK'D	REV'D
			REVISIONS			

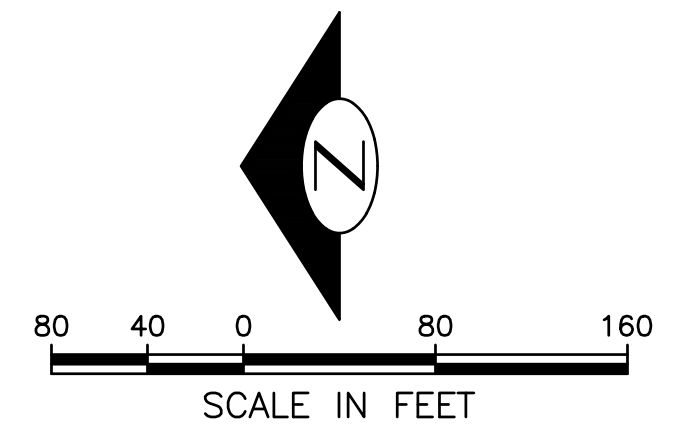


SEWER LEGEND

- EX MAINTENANCE HOLE
- EX COMBINED SEWER MAIN
- EX SEWER MAIN
- NEW SEWER MAIN (8")
- NEW SIDE SEWER (6")
- RE-LINE & REUSE EX SEWER MAIN
- NEW MAINTENANCE HOLE
- REPLACED MAINTENANCE HOLE

FORT LAWTON REDEVELOPMENT

- ① CATHOLIC HOUSING SERVICES SENIOR SUPPORTIVE HOUSING APARTMENTS
- ② CATHOLIC HOUSING SERVICES SENIOR WORKFORCE HOUSING ROWHOUSES
- ③ HABITAT FOR HUMANITY AFFORDABLE TOWNHOMES
- ④ HABITAT FOR HUMANITY AFFORDABLE ROWHOUSES
- ⑤ SEATTLE PARKS AND RECREATION USES
- ⑥ RE-USE PARKS MAINTENANCE FACILITY



NOT FOR CONSTRUCTION

SEWER LAYOUT – OPTION 1 (RELIN EX WASTEWATER SERVICES)



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DRAWN MH	CHECKED BI	RECEIVED	REVISED AS BUILT

PRELIMINARY

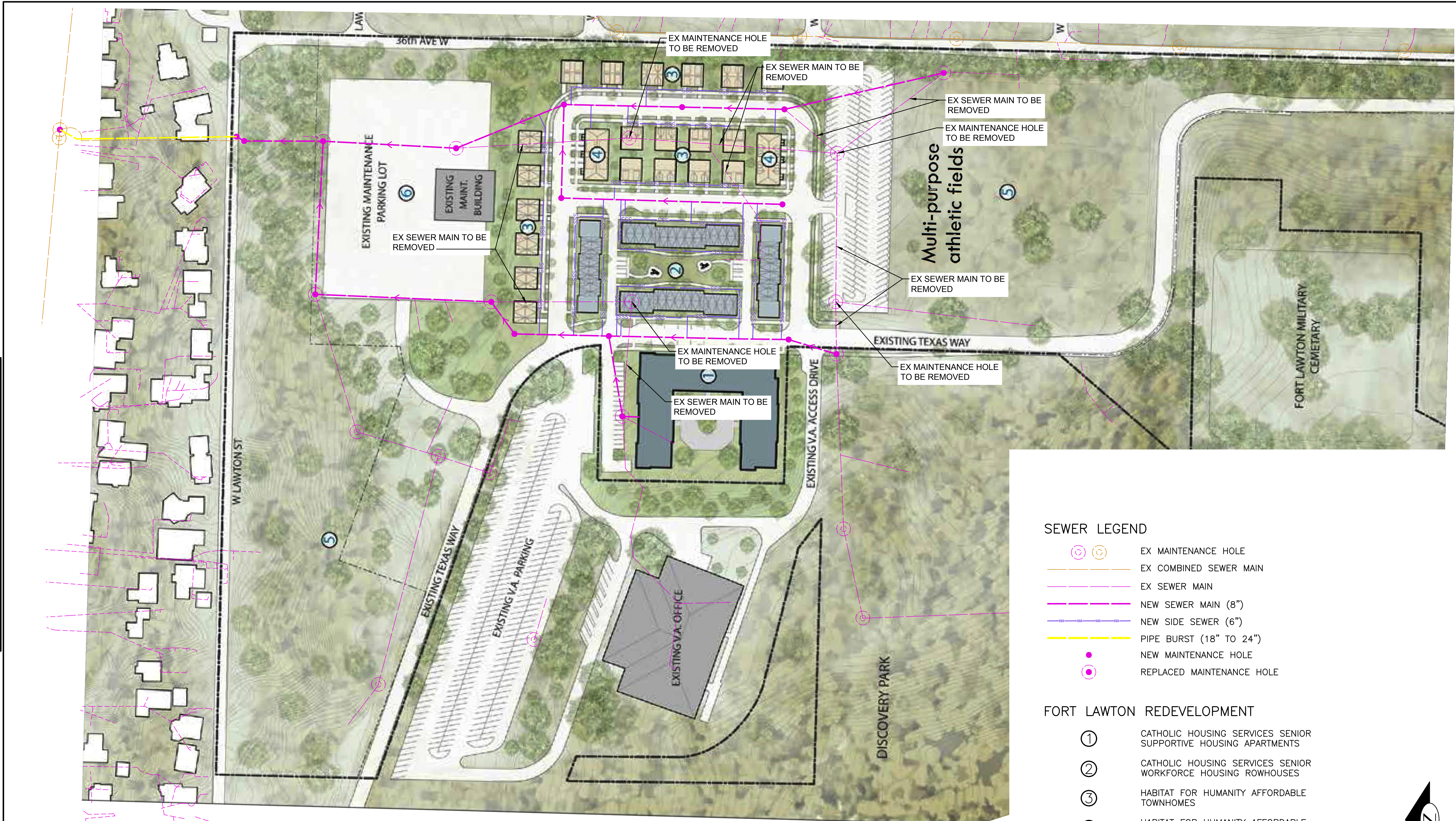
Seattle Public Utilities
 ORDINANCE NO. _____ PW NO. _____
 SCALE: H. 1"=80'

WA 02 – FORT LAWTON PROJECT SUPPORT SERVICES

JOB #	PC CO
VPI #	C-06
SHEET	6 OF 8

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VAULT SERIAL #	DATE	MARK	NATURE	MADE	CHK'D	REV'D

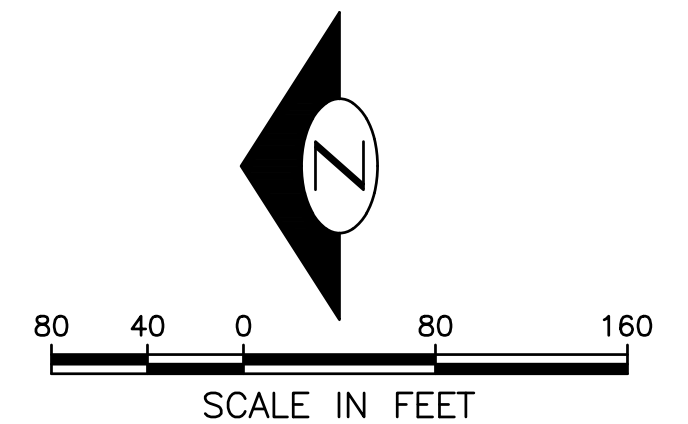


SEWER LEGEND

- EX MAINTENANCE HOLE
- EX COMBINED SEWER MAIN
- EX SEWER MAIN
- NEW SEWER MAIN (8")
- NEW SIDE SEWER (6")
- PIPE BURST (18" TO 24")
- NEW MAINTENANCE HOLE
- REPLACED MAINTENANCE HOLE

FORT LAWTON REDEVELOPMENT

- ① CATHOLIC HOUSING SERVICES SENIOR SUPPORTIVE HOUSING APARTMENTS
- ② CATHOLIC HOUSING SERVICES SENIOR WORKFORCE HOUSING ROWHOUSES
- ③ HABITAT FOR HUMANITY AFFORDABLE TOWNHOMES
- ④ HABITAT FOR HUMANITY AFFORDABLE ROWHOUSES
- ⑤ SEATTLE PARKS AND RECREATION USES
- ⑥ RE-USE PARKS MAINTENANCE FACILITY



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SEWER LAYOUT – OPTION 2 (REPLACE EX WASTEWATER SERVICES)



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DRAWN MH	CHECKED BI	RECEIVED	REVISED AS BUILT

PRELIMINARY

Seattle Public Utilities
 ORDINANCE NO. PW NO.
 SCALE: H. 1"=80'

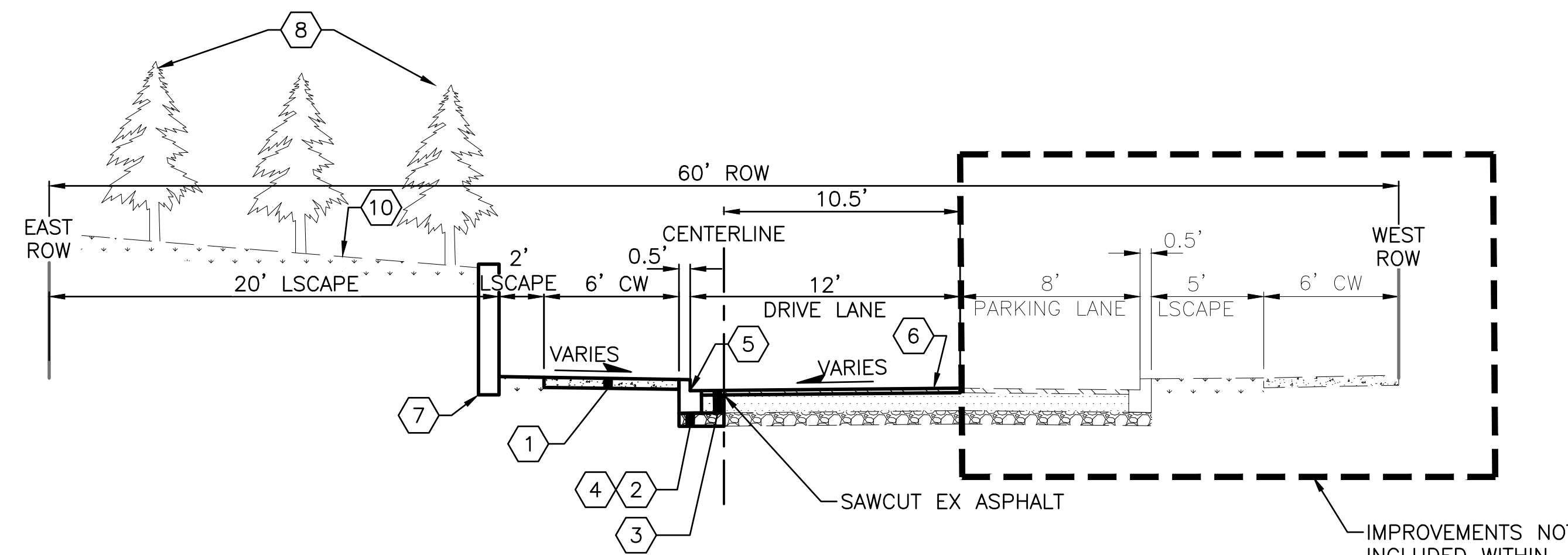
WA 02 – FORT LAWTON PROJECT SUPPORT SERVICES

JOB #	PC CO
VPI #	C-07
SHEET	7 OF 8

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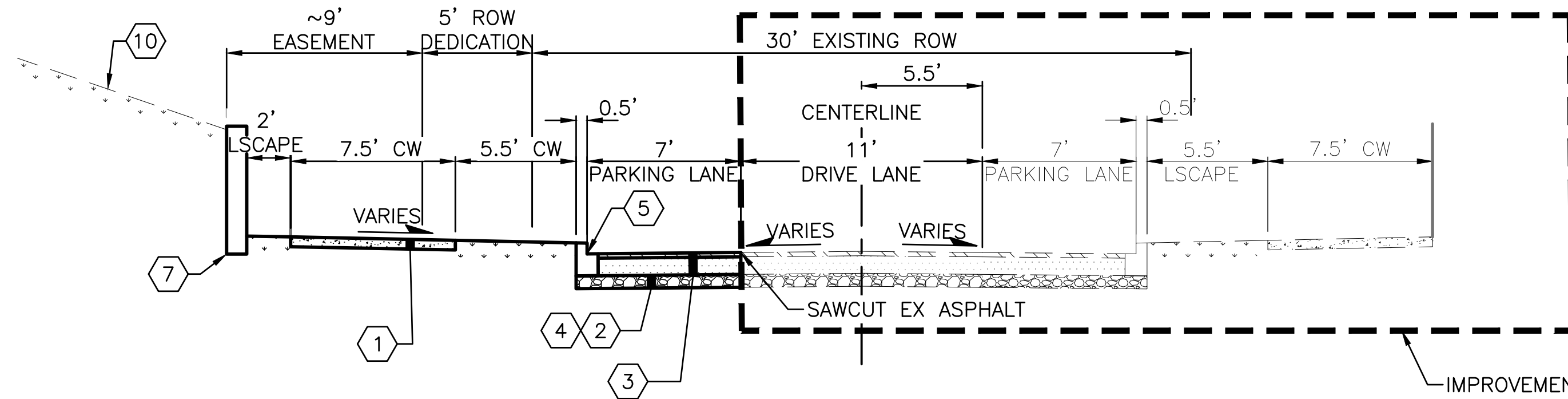
CONSTRUCTION NOTES

- ① CEMENT CONC SIDEWALK PER STD PLAN 420
- ② 6" MNRL AGG TYPE 2
- ③ 2" HMA CL 1/2" OVER 6" HMA CL 1"
- ④ COMMON EXCAVATION AS NECESSARY TO ESTABLISH NEW SUBGRADE
- ⑤ TYPE 410B CURB AND GUTTER
- ⑥ GRIND AND OVERLAY
- ⑦ APPROX 5' HEIGHT WALL. WALL HEIGHT MAY VARY ALONG ROADWAY
- ⑧ PRESERVE EXISTING TREES (TYP)
- ⑨ 2" HMA CL 1/2" OVER 11" HMA CL 1"
- ⑩ APPROX EXISTING GRADE & SLOPE (VARIES)
- ⑪ APPROX 5' HEIGHT WALL. WALL HEIGHT AND LOCATION/NECESSITY MAY VARY ALONG ROADWAY



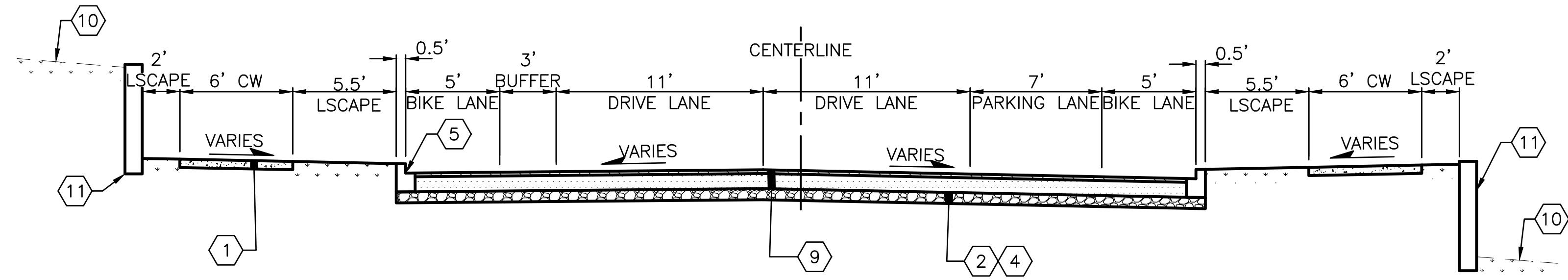
36TH AVE W STREET SECTION DIMENSIONS PROVIDED BY SDOT AND ARE PRELIMINARY. ROADWAY SECTIONS ARE SUBJECT TO STREETS ILLUSTRATED DEVIATION APPROVALS

36TH AVE W ROADWAY SECTION A-A C-01
SCALE: 1" = 5'



W LAWTON ST STREET SECTION DIMENSIONS BASED ON 52'-ROW FOR NEW NON-ARTERIAL STREETS AS PROVIDED BY SDOT AND ARE PRELIMINARY. ROADWAY SECTIONS ARE SUBJECT TO STREETS ILLUSTRATED DEVIATION APPROVALS

W LAWTON ST ROADWAY SECTION B-B C-01
SCALE: 1" = 5'



TEXAS WAY STREET SECTION DIMENSIONS PROVIDED BY SDOT AND ARE PRELIMINARY. ROADWAY SECTIONS ARE SUBJECT TO STREETS ILLUSTRATED DEVIATION APPROVALS

ARTERIAL ROADWAY LIGHT LEVEL STANDARDS ARE REQUIRED TO BE MET. THE NUMBER OF POLES/LUMINAIRES MAY BE MORE THAN CURRENTLY EXIST

TEXAS WAY ROADWAY SECTION C-C C-01
SCALE: 1" = 5'



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ROADWAY SECTIONS



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DRAWN MH	CHECKED BI	RECEIVED	REVISED AS BUILT
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PRELIMINARY

Seattle Public Utilities
ORDINANCE NO. PW NO.
SCALE: H. 1"=5'


WA 02 - FORT LAWTON PROJECT SUPPORT SERVICES


PC	CO
VPI #	C-08
SHEET	8 OF 8

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VAULT SERIAL #	DATE	MARK	NATURE	MADE	CHK'D	REV'D

APPENDIX B – BUDGETARY ESTIMATE

Basis of Estimate-Before or at Stage Gate 2									
**Note this BOE is for estimating the Total Cost Projection									
Title	Fort Lawton Project Support Services, November 14, 2022, AACE Class 5								
1. Project Information: 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">* Activity Name/Number</td> <td style="width: 50%; padding: 5px;">WA 02 - Fort Lawton Project Support Services</td> </tr> <tr> <td style="padding: 5px;">* LOB Representative and Project Manager</td> <td style="padding: 5px;">Davido Consulting Group, Inc. c/o Erik Davido, PE</td> </tr> <tr> <td style="padding: 5px;">* Cost estimator</td> <td style="padding: 5px;">Jack Lasley, PE & Brian Wise</td> </tr> <tr> <td style="padding: 5px;">* Estimate Reviewer(s)</td> <td style="padding: 5px;">Erik Davido, PE & Ben Iddins, PE</td> </tr> </table>	* Activity Name/Number	WA 02 - Fort Lawton Project Support Services	* LOB Representative and Project Manager	Davido Consulting Group, Inc. c/o Erik Davido, PE	* Cost estimator	Jack Lasley, PE & Brian Wise	* Estimate Reviewer(s)	Erik Davido, PE & Ben Iddins, PE
* Activity Name/Number	WA 02 - Fort Lawton Project Support Services								
* LOB Representative and Project Manager	Davido Consulting Group, Inc. c/o Erik Davido, PE								
* Cost estimator	Jack Lasley, PE & Brian Wise								
* Estimate Reviewer(s)	Erik Davido, PE & Ben Iddins, PE								
2. Project Objectives	The City of Seattle is facilitating redevelopment of the Fort Lawton Army Reserve Center. The Redevelopment plan creates new quality affordable housing for low-income households and people who have experienced homelessness as well as increased lands dedicated to parks and open space on a nearly 32-acre parcel within Discovery Park.								
3. Project Scope	Davido Consulting Group, Inc. (DCG) was tasked with preparing preliminary design layout options, up to two (2) each, for water, stormwater, and wastewater as well as evaluating grading on-site and right-of-way/road improvements for the purpose of creating an American Association for Cost Engineers (AACE) Class 5 cost estimate.								
4. Location	The Fort Lawton Army Reserve Center is located adjacent to Discovery Park in Seattle, WA. The Parcel (Parcel #102503-9334) is bordered by W Lawton St and 36th Ave W to the north and east, respectively, with Texas Way spanning through the site along the west portion of the parcel.								
5. Schedule	The Estimated Phasing Schedule is included as a separate attachment.								
6. Labor Resourcing Strategy	Unknown								
7. Construction Contracting Strategy	Contracting strategy is unknown.								
8. Conceptual Design	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">* Design Assumptions</td> <td style="width: 50%; padding: 5px;">See Section 5.2 of the Technical Memorandum prepared by Davido Consulting Group, Inc. for Design Assumptions</td> </tr> <tr> <td style="padding: 5px;">* Conceptual drawing/sketch</td> <td style="padding: 5px;">0% Design</td> </tr> <tr> <td style="padding: 5px;">* Specifications (if applicable)</td> <td style="padding: 5px;">NA</td> </tr> </table>	* Design Assumptions	See Section 5.2 of the Technical Memorandum prepared by Davido Consulting Group, Inc. for Design Assumptions	* Conceptual drawing/sketch	0% Design	* Specifications (if applicable)	NA		
* Design Assumptions	See Section 5.2 of the Technical Memorandum prepared by Davido Consulting Group, Inc. for Design Assumptions								
* Conceptual drawing/sketch	0% Design								
* Specifications (if applicable)	NA								
9. Basis of Quantity:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">* Take-off by LOB</td> <td style="width: 50%; padding: 5px;"><input type="checkbox"/></td> </tr> <tr> <td style="padding: 5px;">* Take-off by Engineering</td> <td style="padding: 5px;"><input type="checkbox"/></td> </tr> <tr> <td style="padding: 5px;">* Take-off by SPU Consultant</td> <td style="padding: 5px;"><input checked="" type="checkbox"/></td> </tr> </table> <p style="text-align: right; margin-top: 5px;">*Please explain if more than 2 boxes checked</p>	* Take-off by LOB	<input type="checkbox"/>	* Take-off by Engineering	<input type="checkbox"/>	* Take-off by SPU Consultant	<input checked="" type="checkbox"/>		
* Take-off by LOB	<input type="checkbox"/>								
* Take-off by Engineering	<input type="checkbox"/>								
* Take-off by SPU Consultant	<input checked="" type="checkbox"/>								

Basis of Estimate-Before or at Stage Gate 2	
Title	Fort Lawton Project Support Services, November 14, 2022, AACE Class 5
10. Basis of Labor, Materials & Equipment Pricing (aka Unit Price) 	<ul style="list-style-type: none"> * Historical unit costs (aka Cost Model) 51M - 157M * Similar completed project * Engineering Judgment * Semi-detailed unit costs
11. Allowance For Indeterminates:	25%
12. Sales Tax	<ul style="list-style-type: none"> * Sales Tax Applicable 10.25% * Sales Tax Not Applicable Work in the municipally owned Right of Way is exempt from sales tax. Work associated with 36th Ave W, W Lawton St, and Texas Way are exempt from sales tax.
13. SPU Field Crew Costs/Misc Hard Costs	Unknown
14. Soft Cost	<ul style="list-style-type: none"> * From SPU CEG N/A * Not from SPU CEG To provide a Low Range and High Range cost estimate, 30% and 50% were used to calculate the soft costs for the low and high range respectively. The high range percentage is in line with the 49% that Table 4-3 of the CEG for large drainage or wastewater projects (TCP>\$5M) uses.
15. Property Acquisition Cost	The Fort Lawton Army Reserve Center was declared surplus to the United States needs in accordance with the Defense Base Closure and Realignment Act of 1990, as amended, and the 2005 Base Closure and Realignment Commission Report, as approved. Seattle has the opportunity to acquire this roughly 32-acre parcel, largely for free and below-market rates.
16. Contingency Reserve	<ul style="list-style-type: none"> * From SPU CEG Recommended Range Not included. The project was to estimate as a private developer. * Not from SPU CEG N/A
17. Management Reserve	<ul style="list-style-type: none"> * From SPU CEG Not included. The project was to estimate as a private developer. * Not from SPU CEG N/A
18. Inflation	<ul style="list-style-type: none"> * Yes N/A * No N/A
19. Escalation Adjustment	<ul style="list-style-type: none"> * Yes N/A * No N/A
20. Other Assumptions:	See Section 5 of the Technical Memorandum prepared by Davido Consulting Group, Inc. for a list of exclusions and assumptions that were used throughout the design and cost estimation.
21. Exceptions:	See Section 5 of the Technical Memorandum prepared by Davido Consulting Group, Inc. for a list of exclusions and assumptions that were used throughout the design and cost estimation.

22. Risks	See Section 5 of the Technical Memorandum prepared by Davido Consulting Group, Inc. for a list of additional assesments for consideration.	
23. Basis of Estimate Reviews and Bechmarking	<ul style="list-style-type: none"> * How/Why Estimate Has Changed * Benchmarking * Attachments 	<p style="text-align: center;">< Enter text here ></p> <p style="text-align: center;">< Enter text here ></p> <p style="text-align: center;">< Enter any link or supporting text here ></p>

The Fort Lawton Redevelopment Plan will be approved and implemented over an estimated eight years. Project construction will begin after property conveyance, zoning reclassification, and other approvals, likely in 2021. Actual buildout will depend on funding availability.

Estimated Phasing Schedule	
Year	Activity
2019	<ul style="list-style-type: none"> • Rezone for portion of site approved by City Council • Submission, review, and approval of applications by U.S. Department of Housing and Urban Development (HUD) and U.S. Army • Surveys and platting • Applications for property conveyances
2020	<ul style="list-style-type: none"> • Public benefit conveyance of parcel for homeless and self-help ownership housing by HUD • Public benefit conveyance of parcels for parks uses by the U.S. Department of Interior (National Parks Services) to Seattle Parks and Recreation • Potential public benefit conveyance of ~ 6-acre parcel for parks use by the U.S. Department of Education Service to Seattle Public Schools (SPS); or if public benefit conveyance is not possible, public benefit conveyance to Seattle Parks and Recreation • Negotiated sale of parcel for affordable rental housing by U.S. Army • Pre-development activity and infrastructure planning
2021-2026	<ul style="list-style-type: none"> • Finish demolition • Complete development of multi-purpose athletic fields • Affordable housing funding applications, MUP and building permits, construction, lease-up, and sale

Project Info:

Project Name: WA 02 - Fort Lawton Project Support Services
 Owner: Seattle Public Utilities
 Date: 12/2/2022
 Project PM: Erik Davido & Ben Iddins

Description: Summary of Earthwork, Site Grading, Utilities, Road/Frontage, and SCL Improvement Costs

Opinion of Construction Costs Including Tax w/ No Soft Cost Mark-ups or Contingency								
Development Zone	On-site Earthwork and Roads Options		Stormwater Options		Water Options		Wastewater Options	
	Earthwork incl. detention vault*	Earthwork incl. infiltration vault*	Infiltration vault w/ permeable pavement*	Detention vault w/ non-infiltrating bioretention planters*	Reuse Ex 12" water main segment	Remove and replace Ex 12" water main segment	Reline ex wastewater services	Replace ex wastewater services
Maintenance Building	\$671,246	\$506,270	\$1,028,764	\$1,277,216	\$369,698	\$369,698	\$388,849	\$809,580
Affordable Housing	\$7,886,772	\$4,444,768	\$3,949,402	\$2,639,484	\$1,027,956	\$1,157,001	\$600,463	\$606,579
Multi-purpose Athletic Field	\$3,113,376	\$3,113,376	\$136,076	\$136,076	\$267,169	\$330,563	\$196,472	\$192,116
Cemetery	\$0	\$0	\$0	\$0	\$8,340	\$8,340	\$0	\$0
Subtotal:	\$11,671,394	\$8,064,413	\$5,114,242	\$4,052,777	\$1,673,164	\$1,865,602	\$1,185,784	\$1,608,276

*Note: On-Site Earthwork and Roads Options & Stormwater Options are not mutually exclusive. Options must be packaged together when determining high and low cost.

Opinion of Construction Costs Including Tax w/ No Soft Cost Mark-ups or Contingency								
Development Zone	Road and Frontage (% Based on Development Zone Area)							
	W Lawton St (Cul-de-Sac Option) %	W Lawton St (Cul-de-Sac Option) \$	W Lawton St (Connected Rd Option) %	W Lawton St (Connected Rd Option) \$	36th Ave W %	36th Ave W \$	Texas Way %	Texas Way \$
Maintenance Building	24%	\$550,670	24%	\$721,445	24%	\$831,935	24%	\$3,501,714
Affordable Housing	33%	\$750,914	33%	\$983,789	33%	\$1,134,457	33%	\$4,775,064
Multi-purpose Athletic Field	28%	\$650,792	28%	\$852,617	28%	\$983,196	28%	\$4,138,389
Cemetery	15%	\$350,427	15%	\$459,102	15%	\$529,413	15%	\$2,228,363
Subtotal:		\$2,302,803		\$3,016,953		\$3,479,002		\$14,643,530

Opinion of Construction Costs Including Tax w/ No Soft Cost Mark-ups or Contingency - Costs from SCL				
Development Zone	Power (% Based on Development Zone Area)			
	Overhead Lines %	Overhead Lines \$	Underground %	Underground \$
Maintenance Building	24%	\$1,580,087	24%	\$2,874,414
Affordable Housing	33%	\$2,154,664	33%	\$3,919,656
Multi-purpose Athletic Field	28%	\$1,867,376	28%	\$3,397,035
Cemetery	15%	\$1,005,510	15%	\$1,829,173
Subtotal:		\$6,607,637		\$12,020,277

Development Zone	Opinion of All Above Construction Costs Incl. SCL				Soft Costs				Subtotal % Costs	
	Subtotal Construction Costs		Subtotal w/ Contingency		Permitting Fees		Design and Other Soft Costs		Low Range	High Range
	Low Range	High Range	Low Range	High Range	5%	10%	30%	50%		
			25%	25%						
Maintenance Building	\$8,757,986	\$11,057,249	\$10,947,483	\$13,821,561	\$547,374	\$1,382,156	\$3,284,245	\$6,910,781	\$3,831,619	\$8,292,937
Affordable Housing	\$18,837,689	\$23,102,802	\$23,547,111	\$28,878,502	\$1,177,356	\$2,887,850	\$7,064,133	\$14,439,251	\$8,241,489	\$17,327,101
Multi-purpose Athletic Field	\$11,352,846	\$13,143,368	\$14,191,058	\$16,429,210	\$709,553	\$1,642,921	\$4,257,317	\$8,214,605	\$4,966,870	\$9,857,526
Cemetery	\$4,122,053	\$5,054,391	\$5,152,566	\$6,317,988	\$257,628	\$631,799	\$1,545,770	\$3,158,994	\$1,803,398	\$3,790,793
Subtotal:	\$43,070,575	\$52,357,810	\$53,838,218	\$65,447,262	\$2,691,911	\$6,544,726	\$16,151,465	\$32,723,631	\$18,843,376	\$39,268,357

Development Zone	Subtotal Pre-Accuracy Range		Accuracy Range		Opinion of Total Construction and Soft Cost		Operations and Maintenance*	
	Low Range	High Range	Low Range	High Range	Low Range	High Range	Low Range	High Range
			-30%	50%				
Maintenance Building	\$14,779,102	\$22,114,498	-\$4,433,731	\$11,057,249	\$10,345,371	\$33,171,748		
Affordable Housing	\$31,788,600	\$46,205,604	-\$9,536,580	\$23,102,802	\$22,252,020	\$69,308,406	25%	50%
Multi-purpose Athletic Field	\$19,157,928	\$26,286,736	-\$5,747,378	\$13,143,368	\$13,410,550	\$39,430,103		
Cemetery	\$6,955,965	\$10,108,782	-\$2,086,789	\$5,054,391	\$4,869,175	\$15,163,172		
Subtotal:	\$72,682,000	\$104,716,000	-\$21,804,000	\$52,358,000	\$50,877,000	\$157,073,000	\$83,938	\$100,725

*Note: operations and maintenance costs are estimated for the first year. If using for cost projecting, utilize yearly inflation costs as well as allowance for increased maintenance over time for aging infrastructure; perhaps 5% every 5 years.

Project Info:

Project Name: WA 02 - Fort Lawton Project Support Services
Owner: Seattle Public Utilities
Date: 12/1/2022
Project PM: Erik Davido & Ben Iddins
Description: This On-site Earthwork estimates calculate earthwork associated with the detention vault.

Earth Work and Interior Road Items - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
Maintenance Building							
1	Excavation for storm vault	CY	\$ 14.00	3,370	\$ 47,185.19	\$ 4,836.48	\$ 52,021.67
2	Soil haul and dispose	CY	\$ 68.00	2,370	\$ 161,185.19	\$ 16,521.48	\$ 177,706.67
3	Surfacing/asphalt patch over detention vault	SF	\$ 30.00	8,400	\$ 252,000.00	\$ 25,830.00	\$ 277,830.00
4	Erosion and Sediment Control	%	15%	1	\$ 69,055.56	\$ 7,078.19	\$ 76,133.75
5	Mobilization	%	15%	1	\$ 79,413.89	\$ 8,139.92	\$ 87,553.81
	TOTAL				\$ 608,839.81	\$ 62,406.08	\$ 671,245.90
Affordable Housing							
1	Site cut (incl. truck loading)	CY	\$ 25.00	23,810	\$ 595,250.00	\$ 61,013.13	\$ 656,263.13
2	Site fill (incl. compaction)	CY	\$ 18.00	8,083	\$ 145,494.00	\$ 14,913.14	\$ 160,407.14
3	Soil haul and dispose	CY	\$ 68.00	15,727	\$ 1,069,436.00	\$ 109,617.19	\$ 1,179,053.19
4	Grading and contouring	SF	\$ 1.00	311,000	\$ 311,000.00	\$ 31,877.50	\$ 342,877.50
5	Cast in place 10' avg height retaining wall (incl. excavation and backfill)	LF	\$ 694.00	460	\$ 319,240.00	\$ 32,722.10	\$ 351,962.10
6	Roadway improvements (affordable housing interior road)	LF	\$ 980.00	1,900	\$ 1,862,000.00	\$ 190,855.00	\$ 2,052,855.00
7	Parking Lot	SF	\$ 20.00	55,334	\$ 1,106,680.00	\$ 113,434.70	\$ 1,220,114.70
8	Erosion and Sediment Control	%	15%	1	\$ 811,365.00	\$ 83,164.91	\$ 894,529.91
9	Mobilization	%	15%	1	\$ 933,069.75	\$ 95,639.65	\$ 1,028,709.40
	TOTAL				\$ 7,153,534.75	\$ 733,237.31	\$ 7,886,772.06
Multi-purpose Athletic Field							
1	Site cut (incl. truck loading)	CY	\$ 25.00	18,744	\$ 468,600.00	\$ 48,031.50	\$ 516,631.50
2	Site fill (incl. compaction)	CY	\$ 18.00	686	\$ 12,348.00	\$ 1,265.67	\$ 13,613.67
3	Soil haul and dispose	CY	\$ 68.00	18,058	\$ 1,227,944.00	\$ 125,864.26	\$ 1,353,808.26
4	Grading and contouring	SF	\$ 1.00	258,100	\$ 258,100.00	\$ 26,455.25	\$ 284,555.25
5	Cast in place 6' avg height retaining wall (incl. excavation and backfill)	LF	\$ 374.00	450	\$ 168,300.00	\$ 17,250.75	\$ 185,550.75
6	Erosion and Sediment Control	%	15%	1	\$ 320,293.80	\$ 32,830.11	\$ 353,123.91
7	Mobilization	%	15%	1	\$ 368,337.87	\$ 37,754.63	\$ 406,092.50
	TOTAL				\$ 2,823,923.67	\$ 289,452.18	\$ 3,113,375.85
Cemetery							
1	XXXXX						
	TOTAL						

Project Total					\$ 10,586,298.23	\$ 1,085,095.57	\$ 11,671,393.80
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Project Info:**Project Name:** WA 02 - Fort Lawton Project Support Services**Owner:** Seattle Public Utilities**Date:** 12/1/2022**Project PM:** Erik Davido & Ben Iddins**Description:** This On-site Earthwork estimates calculate earthwork associated with the infiltration vault.

Earth Work and Interior Road Items - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
Maintenance Building							
1	Excavation for storm vault	CY	\$ 14.00	2,667	\$ 37,333.33	\$ 3,826.67	\$ 41,160.00
2	Soil haul and dispose	CY	\$ 68.00	1,778	\$ 120,888.89	\$ 12,391.11	\$ 133,280.00
3	Surfacing/asphalt patch over detention vault	SF	\$ 30.00	6,300	\$ 189,000.00	\$ 19,372.50	\$ 208,372.50
4	Erosion and Sediment Control	%	15%	1	\$ 52,083.33	\$ 5,338.54	\$ 57,421.88
5	Mobilization	%	15%	1	\$ 59,895.83	\$ 6,139.32	\$ 66,035.16
	TOTAL				\$ 459,201.39	\$ 47,068.14	\$ 506,269.53
Affordable Housing							
1	Site cut (incl. truck loading)	CY	\$ 25.00	23,810	\$ 595,250.00	\$ 61,013.13	\$ 656,263.13
2	Site fill (incl. compaction)	CY	\$ 18.00	8,083	\$ 145,494.00	\$ 14,913.14	\$ 160,407.14
3	Soil haul and dispose	CY	\$ 68.00	15,727	\$ 1,069,436.00	\$ 109,617.19	\$ 1,179,053.19
4	Grading and contouring	SF	\$ 1.00	311,000	\$ 311,000.00	\$ 31,877.50	\$ 342,877.50
5	Cast in place 10' avg height retaining wall (incl. excavation and backfill)	LF	\$ 694.00	460	\$ 319,240.00	\$ 32,722.10	\$ 351,962.10
6	Roadway improvements (affordable housing interior road)	LF	\$ 320.00	1,900	\$ 608,000.00	\$ 62,320.00	\$ 670,320.00
7	Erosion and Sediment Control	%	15%	1	\$ 457,263.00	\$ 46,869.46	\$ 504,132.46
8	Mobilization	%	15%	1	\$ 525,852.45	\$ 53,899.88	\$ 579,752.33
	TOTAL				\$ 4,031,535.45	\$ 413,232.38	\$ 4,444,767.83
Multi-purpose Athletic Field							
1	Site cut (incl. truck loading)	CY	\$ 25.00	18,744	\$ 468,600.00	\$ 48,031.50	\$ 516,631.50
2	Site fill (incl. compaction)	CY	\$ 18.00	686	\$ 12,348.00	\$ 1,265.67	\$ 13,613.67
3	Soil haul and dispose	CY	\$ 68.00	18,058	\$ 1,227,944.00	\$ 125,864.26	\$ 1,353,808.26
4	Grading and contouring	SF	\$ 1.00	258,100	\$ 258,100.00	\$ 26,455.25	\$ 284,555.25
5	Cast in place 6' avg height retaining wall (incl. excavation and backfill)	LF	\$ 374.00	450	\$ 168,300.00	\$ 17,250.75	\$ 185,550.75
6	Erosion and Sediment Control	%	15%	1	\$ 320,293.80	\$ 32,830.11	\$ 353,123.91
7	Mobilization	%	15%	1	\$ 368,337.87	\$ 37,754.63	\$ 406,092.50
	TOTAL				\$ 2,823,923.67	\$ 289,452.18	\$ 3,113,375.85
Cemetery							
1	XXXXX						
	TOTAL						
Project Total					\$ 7,314,660.51	\$ 749,752.70	\$ 8,064,413.21

Project Info:

Project Name: WA 02 - Fort Lawton Project Support Services
Owner: Seattle Public Utilities
Date: 12/1/2022
Project PM: Erik Davido & Ben Iddins
Description: This storm option proposes no infiltration. A detention vault is used for flow control with non-infiltrating bioretention planters used for on-site stormwater management.

Storm Items - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
Maintenance Building							
1	Remove drain pipe incl. excavation	LS	\$ 1,020.00	1	\$ 1,020.00	\$ 104.55	\$ 1,124.55
2	Remove structure (CB/MH) incl. haul	LS	\$ 624.00	1	\$ 624.00	\$ 63.96	\$ 687.96
3	Type 2 catch basin (8' depth) incl. excavation and backfill	EA	\$ 4,539.00	2	\$ 9,078.00	\$ 930.50	\$ 10,008.50
4	18" PVC inc. trench and backfill	LF	\$ 110.00	275	\$ 30,250.00	\$ 3,100.63	\$ 33,350.63
5	Stormwater detention vault (excl. excavation)	CF	\$ 13.00	64,000	\$ 832,000.00	\$ 85,280.00	\$ 917,280.00
6	Connect to existing MH	LS	\$ 3,000.00	1	\$ 3,000.00	\$ 307.50	\$ 3,307.50
7	Erosion and Sediment Control	%	15%	1	\$ 131,395.80	\$ 13,468.07	\$ 144,863.87
8	Mobilization	%	15%	1	\$ 151,105.17	\$ 15,488.28	\$ 166,593.45
	TOTAL				\$ 1,158,472.97	\$ 118,743.48	\$ 1,277,216.45
Affordable Housing							
1	Remove drain pipe incl. excavation	LS	\$ 68,000.00	1	\$ 68,000.00	\$ 6,970.00	\$ 74,970.00
2	Remove structure (CB/MH) incl. haul	LS	\$ 18,096.00	1	\$ 18,096.00	\$ 1,854.84	\$ 19,950.84
3	Adjust ex utility to finished grade	EA	\$ 450.00	2	\$ 900.00	\$ 92.25	\$ 992.25
4	Type 1 catch basin (4' depth) incl. excavation and backfill	EA	\$ 2,590.00	22	\$ 56,980.00	\$ 5,840.45	\$ 62,820.45
5	6" PVC incl. trench and backfill	LF	\$ 30.00	5,840	\$ 175,200.00	\$ 17,958.00	\$ 193,158.00
6	12" PVC inc. trench and backfill	LF	\$ 85.00	1,260	\$ 107,100.00	\$ 10,977.75	\$ 118,077.75
7	18" PVC inc. trench and backfill	LF	\$ 110.00	590	\$ 64,900.00	\$ 6,652.25	\$ 71,552.25
8	6" cleanout w/ associated bends and install	EA	\$ 450.00	90	\$ 40,500.00	\$ 4,151.25	\$ 44,651.25
9	Area drain incl. excavation and backfill	EA	\$ 800.00	40	\$ 32,000.00	\$ 3,280.00	\$ 35,280.00
10	Non-infiltrating bioretention planter	SF	\$ 230.00	5,420	\$ 1,246,600.00	\$ 127,776.50	\$ 1,374,376.50
11	Erosion and Sediment Control	%	15%	1	\$ 271,541.40	\$ 27,832.99	\$ 299,374.39
12	Mobilization	%	15%	1	\$ 312,272.61	\$ 32,007.94	\$ 344,280.55
	TOTAL				\$ 2,394,090.01	\$ 245,394.23	\$ 2,639,484.24
Multi-purpose Athletic Field							
1	Remove drain pipe incl. excavation	LS	\$ 27,540.00	1	\$ 27,540.00	\$ 2,822.85	\$ 30,362.85
2	Remove structure (CB/MH) incl. haul	LS	\$ 7,488.00	1	\$ 7,488.00	\$ 767.52	\$ 8,255.52
3	Adjust ex utility to finished grade	EA	\$ 450.00	2	\$ 900.00	\$ 92.25	\$ 992.25
4	Type 1 catch basin (4' depth) incl. excavation and backfill	EA	\$ 2,590.00	4	\$ 10,360.00	\$ 1,061.90	\$ 11,421.90
5	Type 2 catch basin (8' depth) incl. excavation and backfill	EA	\$ 4,539.00	1	\$ 4,539.00	\$ 465.25	\$ 5,004.25
6	12" PVC inc. trench and backfill	LF	\$ 85.00	500	\$ 42,500.00	\$ 4,356.25	\$ 46,856.25
7	Erosion and Sediment Control	%	15%	1	\$ 13,999.05	\$ 1,434.90	\$ 15,433.95
8	Mobilization	%	15%	1	\$ 16,098.91	\$ 1,650.14	\$ 17,749.05
	TOTAL				\$ 123,424.96	\$ 12,651.06	\$ 136,076.02
Cemetery							
1	XXXXX						
	TOTAL				\$ -	\$ -	\$ -
Project Total					\$ 3,675,987.94	\$ 376,788.76	\$ 4,052,776.70

Project Info:

Project Name: WA 02 - Fort Lawton Project Support Services
Owner: Seattle Public Utilities
Date: 12/1/2022
Project PM: Erik Davido & Ben Iddins
Description: This storm option proposes infiltration. An infiltrating detention vault is used for flow control with permeable pavement surfacing used for all walkways/sidewalks in the affordable housing area for on-site stormwater management.

Storm Items - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
Maintenance Building							
1	Remove drain pipe incl. excavation	LS	\$ 1,020.00	1	\$ 1,020.00	\$ 104.55	\$ 1,124.55
2	Remove structure (CB/MH) incl. haul	LS	\$ 624.00	1	\$ 624.00	\$ 63.96	\$ 687.96
3	Type 2 catch basin (8' depth) incl. excavation and backfill	EA	\$ 4,539.00	2	\$ 9,078.00	\$ 930.50	\$ 10,008.50
4	Storm sedimentation/pretreatment facility	EA	\$ 100,000.00	1	\$ 100,000.00	\$ 10,250.00	\$ 110,250.00
5	18" PVC inc. trench and backfill	LF	\$ 110.00	275	\$ 30,250.00	\$ 3,100.63	\$ 33,350.63
6	Infiltrating stormwater detention vault (excl. excavation)	CF	\$ 11.70	48,000	\$ 561,600.00	\$ 57,564.00	\$ 619,164.00
7	Connect to existing MH	LS	\$ 3,000.00	1	\$ 3,000.00	\$ 307.50	\$ 3,307.50
8	Erosion and Sediment Control	%	15%	1	\$ 105,835.80	\$ 10,848.17	\$ 116,683.97
9	Mobilization	%	15%	1	\$ 121,711.17	\$ 12,475.39	\$ 134,186.56
	TOTAL				\$ 933,118.97	\$ 95,644.69	\$ 1,028,763.66
Affordable Housing							
1	Remove drain pipe incl. excavation	LS	\$ 68,000.00	1	\$ 68,000.00	\$ 6,970.00	\$ 74,970.00
2	Remove structure (CB/MH) incl. haul	LS	\$ 18,096.00	1	\$ 18,096.00	\$ 1,854.84	\$ 19,950.84
3	Adjust ex utility to finished grade	EA	\$ 450.00	2	\$ 900.00	\$ 92.25	\$ 992.25
4	Type 1 catch basin (4' depth) incl. excavation and backfill	EA	\$ 2,590.00	22	\$ 56,980.00	\$ 5,840.45	\$ 62,820.45
5	6" PVC incl. trench and backfill	LF	\$ 30.00	5,840	\$ 175,200.00	\$ 17,958.00	\$ 193,158.00
6	12" PVC inc. trench and backfill	LF	\$ 85.00	1,260	\$ 107,100.00	\$ 10,977.75	\$ 118,077.75
7	18" PVC inc. trench and backfill	LF	\$ 110.00	590	\$ 64,900.00	\$ 6,652.25	\$ 71,552.25
8	6" cleanout w/ associated bends and install	EA	\$ 450.00	90	\$ 40,500.00	\$ 4,151.25	\$ 44,651.25
9	Area drain incl. excavation and backfill	EA	\$ 800.00	40	\$ 32,000.00	\$ 3,280.00	\$ 35,280.00
10	Permeable surfacing incl. aggregate and leveling	SF	\$ 15.00	143,000	\$ 2,145,000.00	\$ 219,862.50	\$ 2,364,862.50
11	Erosion and Sediment Control	%	15%	1	\$ 406,301.40	\$ 41,645.89	\$ 447,947.29
12	Mobilization	%	15%	1	\$ 467,246.61	\$ 47,892.78	\$ 515,139.39
	TOTAL				\$ 3,582,224.01	\$ 367,177.96	\$ 3,949,401.97
Multi-purpose Athletic Field							
1	Remove drain pipe incl. excavation	LS	\$ 27,540.00	1	\$ 27,540.00	\$ 2,822.85	\$ 30,362.85
2	Remove structure (CB/MH) incl. haul	LS	\$ 7,488.00	1	\$ 7,488.00	\$ 767.52	\$ 8,255.52
3	Adjust ex utility to finished grade	EA	\$ 450.00	2	\$ 900.00	\$ 92.25	\$ 992.25
4	Type 1 catch basin (4' depth) incl. excavation and backfill	EA	\$ 2,590.00	4	\$ 10,360.00	\$ 1,061.90	\$ 11,421.90
5	Type 2 catch basin (8' depth) incl. excavation and backfill	EA	\$ 4,539.00	1	\$ 4,539.00	\$ 465.25	\$ 5,004.25
6	12" PVC inc. trench and backfill	LF	\$ 85.00	500	\$ 42,500.00	\$ 4,356.25	\$ 46,856.25
7	Erosion and Sediment Control	%	15%	1	\$ 13,999.05	\$ 1,434.90	\$ 15,433.95
8	Mobilization	%	15%	1	\$ 16,098.91	\$ 1,650.14	\$ 17,749.05
	TOTAL				\$ 123,424.96	\$ 12,651.06	\$ 136,076.02
Cemetery							
1	XXXXX						
	TOTAL				\$ -	\$ -	\$ -
Project Total					\$ 4,638,767.94	\$ 475,473.71	\$ 5,114,241.65

Project Info:

Project Name: WA 02 - Fort Lawton Project Support Services
Owner: Seattle Public Utilities
Date: 12/1/2022
Project PM: Erik Davido & Ben Iddins
Description: This water option assumes the reuse of existing 12" water main pipe between near the affordable housing area and the multi-purpose athletic field.

Water Items - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
Maintenance Building							
1	Remove water main incl. trench and backfill	LF	\$ 36.00	455	\$ 16,380.00	\$ 1,678.95	\$ 18,058.95
2	Remove fire hydrant excl. haul	EA	\$ 818.00	2	\$ 1,636.00	\$ 167.69	\$ 1,803.69
3	8" water main incl. trench and backfill	LF	\$ 135.00	170	\$ 22,950.00	\$ 2,352.38	\$ 25,302.38
4	12" water main incl. trench and backfill	LF	\$ 210.00	950	\$ 199,500.00	\$ 20,448.75	\$ 219,948.75
5	Fire hydrant (fittings and assembly)	EA	\$ 7,050.00	1	\$ 7,050.00	\$ 722.63	\$ 7,772.63
6	8" gate valve	EA	\$ 4,340.00	1	\$ 4,340.00	\$ 444.85	\$ 4,784.85
7	Thrust block (8" dia)	EA	\$ 125.00	5	\$ 625.00	\$ 64.06	\$ 689.06
8	8" water main tee fitting	EA	\$ 1,466.00	1	\$ 1,466.00	\$ 150.27	\$ 1,616.27
9	8" 45 or 90 degree bend fitting	EA	\$ 880.00	2	\$ 1,760.00	\$ 180.40	\$ 1,940.40
10	12" water main tee fitting	EA	\$ 2,932.00	1	\$ 2,932.00	\$ 300.53	\$ 3,232.53
11	12" 45 or 90 degree bend fitting	EA	\$ 1,700.00	1	\$ 1,700.00	\$ 174.25	\$ 1,874.25
12	Water meter (8" combo)	EA	\$ 28,000.00	1	\$ 28,000.00	\$ 2,870.00	\$ 30,870.00
13	Connect to existing service	EA	\$ 2,000.00	1	\$ 2,000.00	\$ 205.00	\$ 2,205.00
14	Thrust block (12" dia)	EA	\$ 250.00	5	\$ 1,250.00	\$ 128.13	\$ 1,378.13
15	Mobilization	%	15%	1	\$ 43,738.35	\$ 4,483.18	\$ 48,221.53
	TOTAL				\$ 335,327.35	\$ 34,371.05	\$ 369,698.40
Affordable Housing							
1	Remove water main incl. trench and backfill	LF	\$ 36.00	590	\$ 21,240.00	\$ 2,177.10	\$ 23,417.10
2	Remove fire hydrant excl. haul	EA	\$ 818.00	2	\$ 1,636.00	\$ 167.69	\$ 1,803.69
3	1-2" water service incl. trench and backfill	LF	\$ 67.50	2,000	\$ 135,000.00	\$ 13,837.50	\$ 148,837.50
4	Water meter (1")	EA	\$ 640.00	152	\$ 97,280.00	\$ 9,971.20	\$ 107,251.20
5	8" water main incl. trench and backfill	LF	\$ 135.00	1,250	\$ 168,750.00	\$ 17,296.88	\$ 186,046.88
6	12" water main incl. trench and backfill	LF	\$ 210.00	550	\$ 115,500.00	\$ 11,838.75	\$ 127,338.75
7	Fire hydrant (fittings and assembly)	EA	\$ 7,050.00	6	\$ 42,300.00	\$ 4,335.75	\$ 46,635.75
8	8" gate valve	EA	\$ 4,340.00	4	\$ 17,360.00	\$ 1,779.40	\$ 19,139.40
9	Thrust block (8" dia)	EA	\$ 125.00	8	\$ 1,000.00	\$ 102.50	\$ 1,102.50
10	8" water main tee fitting	EA	\$ 1,466.00	1	\$ 1,466.00	\$ 150.27	\$ 1,616.27
11	8" 45 or 90 degree bend fitting	EA	\$ 880.00	4	\$ 3,520.00	\$ 360.80	\$ 3,880.80
12	12" gate valve	EA	\$ 10,083.00	11	\$ 110,913.00	\$ 11,368.58	\$ 122,281.58
13	Thrust block (12" dia)	EA	\$ 250.00	17	\$ 4,250.00	\$ 435.63	\$ 4,685.63
14	12" water main tee fitting	EA	\$ 2,932.00	8	\$ 23,456.00	\$ 2,404.24	\$ 25,860.24
15	12" 45 or 90 degree bend fitting	EA	\$ 1,700.00	3	\$ 5,100.00	\$ 522.75	\$ 5,622.75
16	Water meter (8" combo) - VA building	EA	\$ 28,000.00	1	\$ 28,000.00	\$ 2,870.00	\$ 30,870.00
17	Water meter (8" combo)	EA	\$ 28,000.00	1	\$ 28,000.00	\$ 2,870.00	\$ 30,870.00
18	Connect to existing service	EA	\$ 2,000.00	3	\$ 6,000.00	\$ 615.00	\$ 6,615.00
19	Mobilization	%	15%	1	\$ 121,615.65	\$ 12,465.60	\$ 134,081.25
	TOTAL (Reuse existing 12" Option)				\$ 932,386.65	\$ 95,569.63	\$ 1,027,956.28
Multi-purpose Athletic Field							
1	Remove water main incl. trench and backfill	LF	\$ 36.00	1,100	\$ 39,600.00	\$ 4,059.00	\$ 43,659.00
2	Remove fire hydrant excl. haul	EA	\$ 818.00	1	\$ 818.00	\$ 83.85	\$ 901.85
3	Remove/abandon ex pump station	LS	\$ 50,000.00	1	\$ 50,000.00	\$ 5,125.00	\$ 55,125.00
4	8" water main incl. trench and backfill	LF	\$ 135.00	580	\$ 78,300.00	\$ 8,025.75	\$ 86,325.75
5	Fire hydrant (fittings and assembly)	EA	\$ 7,050.00	3	\$ 21,150.00	\$ 2,167.88	\$ 23,317.88
6	8" gate valve	EA	\$ 4,340.00	2	\$ 8,680.00	\$ 889.70	\$ 9,569.70
7	Thrust block (8" dia)	EA	\$ 125.00	3	\$ 375.00	\$ 38.44	\$ 413.44
8	8" water main tee fitting	EA	\$ 1,466.00	1	\$ 1,466.00	\$ 150.27	\$ 1,616.27
9	8" 45 or 90 degree bend fitting	EA	\$ 880.00	0	\$ -	\$ -	\$ -
10	12" gate valve	EA	\$ 10,083.00	1	\$ 10,083.00	\$ 1,033.51	\$ 11,116.51
11	Thrust block (12" dia)	EA	\$ 250.00	1	\$ 250.00	\$ 25.63	\$ 275.63
12	Mobilization	%	15%	1	\$ 31,608.30	\$ 3,239.85	\$ 34,848.15
	TOTAL				\$ 242,330.30	\$ 24,838.86	\$ 267,169.16
Cemetery							
1	Remove water main incl. trench and backfill	LF	\$ 36.00	160	\$ 5,760.00	\$ 590.40	\$ 6,350.40
2	Remove fire hydrant excl. haul	EA	\$ 818.00	1	\$ 818.00	\$ 83.85	\$ 901.85
3	Mobilization	%	15%	1	\$ 986.70	\$ 101.14	\$ 1,087.84
	TOTAL				\$ 7,564.70	\$ 775.38	\$ 8,340.08
Project Total					\$ 1,517,609.00	\$ 155,554.92	\$ 1,673,163.92

Project Info:

Project Name: WA 02 - Fort Lawton Project Support Services
Owner: Seattle Public Utilities
Date: 12/1/2022
Project PM: Erik Davido & Ben Iddins
Description: This water option assumes new water main pipe throughout the site.

Water Items - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
Maintenance Building							
1	Remove water main incl. trench and backfill	LF	\$ 36.00	455	\$ 16,380.00	\$ 1,678.95	\$ 18,058.95
2	Remove fire hydrant excl. haul	EA	\$ 818.00	2	\$ 1,636.00	\$ 167.69	\$ 1,803.69
3	8" water main incl. trench and backfill	LF	\$ 135.00	170	\$ 22,950.00	\$ 2,352.38	\$ 25,302.38
4	12" water main incl. trench and backfill	LF	\$ 210.00	950	\$ 199,500.00	\$ 20,448.75	\$ 219,948.75
5	Fire hydrant (fittings and assembly)	EA	\$ 7,050.00	1	\$ 7,050.00	\$ 722.63	\$ 7,772.63
6	8" gate valve	EA	\$ 4,340.00	1	\$ 4,340.00	\$ 444.85	\$ 4,784.85
7	Thrust block (8" dia)	EA	\$ 125.00	5	\$ 625.00	\$ 64.06	\$ 689.06
8	8" water main tee fitting	EA	\$ 1,466.00	1	\$ 1,466.00	\$ 150.27	\$ 1,616.27
9	8" 45 or 90 degree bend fitting	EA	\$ 880.00	2	\$ 1,760.00	\$ 180.40	\$ 1,940.40
10	12" water main tee fitting	EA	\$ 2,932.00	1	\$ 2,932.00	\$ 300.53	\$ 3,232.53
11	12" 45 or 90 degree bend fitting	EA	\$ 1,700.00	1	\$ 1,700.00	\$ 174.25	\$ 1,874.25
12	Water meter (8" combo)	EA	\$ 28,000.00	1	\$ 28,000.00	\$ 2,870.00	\$ 30,870.00
13	Connect to existing service	EA	\$ 2,000.00	1	\$ 2,000.00	\$ 205.00	\$ 2,205.00
14	Thrust block (12" dia)	EA	\$ 250.00	5	\$ 1,250.00	\$ 128.13	\$ 1,378.13
15	Mobilization	%	15%	1	\$ 43,738.35	\$ 4,483.18	\$ 48,221.53
	TOTAL				\$ 335,327.35	\$ 34,371.05	\$ 369,698.40
Affordable Housing							
1	Remove water main incl. trench and backfill	LF	\$ 36.00	1,020	\$ 36,720.00	\$ 3,763.80	\$ 40,483.80
2	Remove fire hydrant excl. haul	EA	\$ 818.00	2	\$ 1,636.00	\$ 167.69	\$ 1,803.69
3	1-2" water service incl. trench and backfill	LF	\$ 67.50	2,000	\$ 135,000.00	\$ 13,837.50	\$ 148,837.50
4	Water meter (1")	EA	\$ 640.00	152	\$ 97,280.00	\$ 9,971.20	\$ 107,251.20
5	8" water main incl. trench and backfill	LF	\$ 135.00	1,250	\$ 168,750.00	\$ 17,296.88	\$ 186,046.88
6	12" water main incl. trench and backfill	LF	\$ 210.00	980	\$ 205,800.00	\$ 21,094.50	\$ 226,894.50
7	Fire hydrant (fittings and assembly)	EA	\$ 7,050.00	6	\$ 42,300.00	\$ 4,335.75	\$ 46,635.75
8	8" gate valve	EA	\$ 4,340.00	4	\$ 17,360.00	\$ 1,779.40	\$ 19,139.40
9	Thrust block (8" dia)	EA	\$ 125.00	8	\$ 1,000.00	\$ 102.50	\$ 1,102.50
10	8" water main tee fitting	EA	\$ 1,466.00	1	\$ 1,466.00	\$ 150.27	\$ 1,616.27
11	8" 45 or 90 degree bend fitting	EA	\$ 880.00	4	\$ 3,520.00	\$ 360.80	\$ 3,880.80
12	12" gate valve	EA	\$ 10,083.00	11	\$ 110,913.00	\$ 11,368.58	\$ 122,281.58
13	Thrust block (12" dia)	EA	\$ 250.00	17	\$ 4,250.00	\$ 435.63	\$ 4,685.63
14	12" water main tee fitting	EA	\$ 2,932.00	8	\$ 23,456.00	\$ 2,404.24	\$ 25,860.24
15	12" 45 or 90 degree bend fitting	EA	\$ 1,700.00	3	\$ 5,100.00	\$ 522.75	\$ 5,622.75
16	Water meter (8" combo) - VA building	EA	\$ 28,000.00	1	\$ 28,000.00	\$ 2,870.00	\$ 30,870.00
17	Water meter (8" combo)	EA	\$ 28,000.00	1	\$ 28,000.00	\$ 2,870.00	\$ 30,870.00
18	Connect to existing service	EA	\$ 2,000.00	1	\$ 2,000.00	\$ 205.00	\$ 2,205.00
19	Mobilization	%	15%	1	\$ 136,882.65	\$ 14,030.47	\$ 150,913.12
	TOTAL (New 12" Option)				\$ 1,049,433.65	\$ 107,566.95	\$ 1,157,000.60
Multi-purpose Athletic Field							
1	Remove water main incl. trench and backfill	LF	\$ 36.00	1,100	\$ 39,600.00	\$ 4,059.00	\$ 43,659.00
2	Remove fire hydrant excl. haul	EA	\$ 818.00	1	\$ 818.00	\$ 83.85	\$ 901.85
3	Remove/abandon ex pump station	LS	\$ 100,000.00	1	\$ 100,000.00	\$ 10,250.00	\$ 110,250.00
4	8" water main incl. trench and backfill	LF	\$ 135.00	580	\$ 78,300.00	\$ 8,025.75	\$ 86,325.75
5	Fire hydrant (fittings and assembly)	EA	\$ 7,050.00	3	\$ 21,150.00	\$ 2,167.88	\$ 23,317.88
6	8" gate valve	EA	\$ 4,340.00	2	\$ 8,680.00	\$ 889.70	\$ 9,569.70
7	Thrust block (8" dia)	EA	\$ 125.00	3	\$ 375.00	\$ 38.44	\$ 413.44
8	8" water main tee fitting	EA	\$ 1,466.00	1	\$ 1,466.00	\$ 150.27	\$ 1,616.27
9	8" 45 or 90 degree bend fitting	EA	\$ 880.00	0	\$ -	\$ -	\$ -
10	12" gate valve	EA	\$ 10,083.00	1	\$ 10,083.00	\$ 1,033.51	\$ 11,116.51
11	Thrust block (12" dia)	EA	\$ 250.00	1	\$ 250.00	\$ 25.63	\$ 275.63
12	Mobilization	%	15%	1	\$ 39,108.30	\$ 4,008.60	\$ 43,116.90
	TOTAL				\$ 299,830.30	\$ 30,732.61	\$ 330,562.91
Cemetery							
1	Remove water main incl. trench and backfill	LF	\$ 36.00	160	\$ 5,760.00	\$ 590.40	\$ 6,350.40
2	Remove fire hydrant excl. haul	EA	\$ 818.00	1	\$ 818.00	\$ 83.85	\$ 901.85
3	Mobilization	%	15%	1	\$ 986.70	\$ 101.14	\$ 1,087.84
	TOTAL				\$ 7,564.70	\$ 775.38	\$ 8,340.08
Project Total					\$ 1,692,156.00	\$ 173,445.99	\$ 1,865,601.99

Project Info:

Project Name: WA 02 - Fort Lawton Project Support Services
Owner: Seattle Public Utilities
Date: 12/1/2022
Project PM: Erik Davido & Ben Iddins
Description: This sewer option proposes to reline existing service pipes and reuse existing maintenance holes to the maximum extent feasible. Additionally, the shortest amount of sewer main is extended under the roads and service laterals are "spaghetted". Sewer and storm drainage from the site will be combined at the northern property line (and existing 8" service abandoned) and collectively drain to the combined sewer via a new relined pipe.

Sewer Items - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
Maintenance Building							
1	Abandon sewer pipe	LS	\$ 10,200.00	1	\$ 10,200.00	\$ 1,045.50	\$ 11,245.50
2	Maintenance hole (8' depth) incl. excavation and backfill	EA	\$ 4,560.00	2	\$ 9,120.00	\$ 934.80	\$ 10,054.80
3	8" PVC incl. trench and backfill	LF	\$ 80.00	15	\$ 1,200.00	\$ 123.00	\$ 1,323.00
4	8" pipe lining (incl. video inspection and cleaning)	LF	\$ 134.00	935	\$ 125,290.00	\$ 12,842.23	\$ 138,132.23
5	18" pipe lining (incl. video inspection and cleaning)	LF	\$ 225.00	300	\$ 67,500.00	\$ 6,918.75	\$ 74,418.75
6	Sewer Bypass	LS	\$ 75,000.00	1	\$ 75,000.00	\$ 7,687.50	\$ 82,687.50
7	Maintenance hole incl. excavation, shoring, backfill, and connect	LS	\$ 20,000.00	1	\$ 20,000.00	\$ -	\$ 20,000.00
8	Mobilization	%	15%	1	\$ 46,246.50	\$ 4,740.27	\$ 50,986.77
	TOTAL				\$ 354,556.50	\$ 34,292.04	\$ 388,848.54
Affordable Housing							
1	Remove sewer pipe incl. excavation	LS	\$ 49,470.00	1	\$ 49,470.00	\$ 5,070.68	\$ 54,540.68
2	Remove structure (MH) incl. haul	LS	\$ 1,248.00	1	\$ 1,248.00	\$ 127.92	\$ 1,375.92
3	Maintenance hole (8' depth) incl. excavation and backfill	EA	\$ 4,560.00	8	\$ 36,480.00	\$ 3,739.20	\$ 40,219.20
4	6" PVC incl. trench and backfill	LF	\$ 40.00	3,910	\$ 156,400.00	\$ 16,031.00	\$ 172,431.00
5	8" PVC incl. trench and backfill	LF	\$ 80.00	1,500	\$ 120,000.00	\$ 12,300.00	\$ 132,300.00
6	6" cleanout w/ associated bends and install	EA	\$ 500.00	70	\$ 35,000.00	\$ 3,587.50	\$ 38,587.50
7	Sewer Bypass	LS	\$ 75,000.00	1	\$ 75,000.00	\$ 7,687.50	\$ 82,687.50
8	Mobilization	%	15%	1	\$ 71,039.70	\$ 7,281.57	\$ 78,321.27
	TOTAL				\$ 544,637.70	\$ 55,825.36	\$ 600,463.06
Multi-purpose Athletic Field							
1	Remove sewer pipe incl. excavation	LS	\$ 19,210.00	1	\$ 19,210.00	\$ 1,969.03	\$ 21,179.03
2	Remove structure (MH) incl. haul	LS	\$ 1,872.00	1	\$ 1,872.00	\$ 191.88	\$ 2,063.88
3	Maintenance hole (8' depth) incl. excavation and backfill	EA	\$ 4,560.00	3	\$ 13,680.00	\$ 1,402.20	\$ 15,082.20
4	8" PVC incl. trench and backfill	LF	\$ 80.00	565	\$ 45,200.00	\$ 4,633.00	\$ 49,833.00
5	Sewer Bypass	LS	\$ 75,000.00	1	\$ 75,000.00	\$ 7,687.50	\$ 82,687.50
6	Mobilization	%	15%	1	\$ 23,244.30	\$ 2,382.54	\$ 25,626.84
	TOTAL				\$ 178,206.30	\$ 18,266.15	\$ 196,472.45
Cemetery							
1	XXXXX				\$ -	\$ -	\$ -
	TOTAL				\$ -	\$ -	\$ -
Project Total					\$ 1,077,400.50	\$ 108,383.55	\$ 1,185,784.05

Project Name: WA 02 - Fort Lawton Project Support Services
Owner: Seattle Public Utilities
Date: 12/1/2022
Project PM: Erik Davido & Ben Iddins
Description: This sewer option proposes all new 8" service pipes and new maintenance holes. Main locations in the roadway are more traditionally located. Sewer and storm drainage from the site will be combined at the northern property line (and existing 8" service abandoned) and collectively drain to the combined sewer via a new 18" to 24" pipe burst.

Sewer Items - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
Maintenance Building							
1	Abandon sewer pipe	LS	\$ 10,200.00	1	\$ 10,200.00	\$ 1,045.50	\$ 11,245.50
2	Remove sewer pipe incl. excavation	LS	\$ 34,850.00	1	\$ 34,850.00	\$ 3,572.13	\$ 38,422.13
3	Remove structure (MH) incl. haul	LS	\$ 3,120.00	1	\$ 3,120.00	\$ 319.80	\$ 3,439.80
4	Maintenance hole (8' depth) incl. excavation and backfill	EA	\$ 4,560.00	8	\$ 36,480.00	\$ 3,739.20	\$ 40,219.20
5	8" PVC incl. trench and backfill	LF	\$ 80.00	1,200	\$ 96,000.00	\$ 9,840.00	\$ 105,840.00
6	18" to 24" pipe burst	LF	\$ 1,215.00	300	\$ 364,500.00	\$ 37,361.25	\$ 401,861.25
7	Sewer Bypass	LS	\$ 75,000.00	1	\$ 75,000.00	\$ 7,687.50	\$ 82,687.50
8	Maintenance hole incl. excavation, shoring, backfill, and connectio	LS	\$ 20,000.00	1	\$ 20,000.00	\$ -	\$ 20,000.00
9	Mobilization	%	15%	1	\$ 96,022.50	\$ 9,842.31	\$ 105,864.81
	TOTAL				\$ 736,172.50	\$ 73,407.68	\$ 809,580.18
Affordable Housing							
1	Remove sewer pipe incl. excavation	LS	\$ 49,470.00	1	\$ 49,470.00	\$ 5,070.68	\$ 54,540.68
2	Remove structure (MH) incl. haul	LS	\$ 1,872.00	1	\$ 1,872.00	\$ 191.88	\$ 2,063.88
3	Maintenance hole (8' depth) incl. excavation and backfill	EA	\$ 4,560.00	8	\$ 36,480.00	\$ 3,739.20	\$ 40,219.20
4	6" PVC incl. trench and backfill	LF	\$ 40.00	3,740	\$ 149,600.00	\$ 15,334.00	\$ 164,934.00
5	8" PVC incl. trench and backfill	LF	\$ 80.00	1,700	\$ 136,000.00	\$ 13,940.00	\$ 149,940.00
6	6" cleanout w/ associated bends and install	EA	\$ 500.00	60	\$ 30,000.00	\$ 3,075.00	\$ 33,075.00
7	Sewer Bypass	LS	\$ 75,000.00	1	\$ 75,000.00	\$ 7,687.50	\$ 82,687.50
8	Mobilization	%	15%	1	\$ 71,763.30	\$ 7,355.74	\$ 79,119.04
	TOTAL				\$ 550,185.30	\$ 56,393.99	\$ 606,579.29
Multi-purpose Athletic Field							
1	Remove sewer pipe incl. excavation	LS	\$ 35,870.00	1	\$ 35,870.00	\$ 3,676.68	\$ 39,546.68
2	Remove structure (MH) incl. haul	LS	\$ 2,496.00	1	\$ 2,496.00	\$ 255.84	\$ 2,751.84
3	Maintenance hole (8' depth) incl. excavation and backfill	EA	\$ 4,560.00	2	\$ 9,120.00	\$ 934.80	\$ 10,054.80
4	8" PVC incl. trench and backfill	LF	\$ 80.00	363	\$ 29,040.00	\$ 2,976.60	\$ 32,016.60
5	Sewer Bypass	LS	\$ 75,000.00	1	\$ 75,000.00	\$ 7,687.50	\$ 82,687.50
6	Mobilization	%	15%	1	\$ 22,728.90	\$ 2,329.71	\$ 25,058.61
	TOTAL				\$ 174,254.90	\$ 17,861.13	\$ 192,116.03
Cemetery							
1	XXXXX						
	TOTAL						
Project Total					\$ 1,460,612.70	\$ 147,662.80	\$ 1,608,275.50

Project Info:**Project Name:** WA 02 - Fort Lawton Project Support Services**Owner:** Seattle Public Utilities**Date:** 12/1/2022**Project PM:** Erik Davido & Ben Iddins**Description:** This ROW Improvements option assumes standard frontage improvements and that West Lawton St will remain as a dead end street; a cul-de-sac will be The improvements at the dead end are assumed to be a typical cul-de-sac at the dead end.

ROW Improvements - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
West Lawton St							
1	Frontage improvements (remove ex. and install half street improvements)	LF	\$ 1,500.00	1,140	\$ 1,710,000.00	\$0.00	\$ 1,710,000.00
2	ADA ramp (incl. install)	EA	\$ 7,500.00	2	\$ 15,000.00	\$0.00	\$ 15,000.00
3	Right-of-way tree (2-1/2" - 3" cal.)	EA	\$ 250.00	65	\$ 16,250.00	\$0.00	\$ 16,250.00
4	Erosion and Sediment Control	%	15%	1	\$ 261,187.50	\$0.00	\$ 261,187.50
5	Mobilization	%	15%	1	\$ 300,365.63	\$0.00	\$ 300,365.63
	TOTAL				\$ 2,302,803.13	\$ -	\$ 2,302,803.13
36th Ave W							
1	Frontage improvements (remove ex. and install half street improvements)	LF	\$ 1,012.50	2,450	\$ 2,480,625.00	\$0.00	\$ 2,480,625.00
2	ADA ramp (incl. install)	EA	\$ 7,500.00	20	\$ 150,000.00	\$0.00	\$ 150,000.00
3	Right-of-way tree (2-1/2" - 3" cal.)	EA	\$ 250.00	0	\$ -	\$0.00	\$ -
4	Erosion and Sediment Control	%	15%	1	\$ 394,593.75	\$0.00	\$ 394,593.75
5	Mobilization	%	15%	1	\$ 453,782.81	\$0.00	\$ 453,782.81
	TOTAL				\$ 3,479,001.56	\$ -	\$ 3,479,001.56
Texas Way							
1	Roadway improvements (remove ex. and install full street improvements) incl. two retaining walls	LF	\$ 3,640.00	850	\$ 3,094,000.00	\$0.00	\$ 3,094,000.00
2	Roadway improvements (remove ex. and install full street improvements) incl. one retaining wall	LF	\$ 3,202.50	1,535	\$ 4,915,837.50	\$0.00	\$ 4,915,837.50
3	Roadway improvements (remove ex. and install full street improvements)	LF	\$ 2,765.00	985	\$ 2,723,525.00	\$0.00	\$ 2,723,525.00
4	ADA ramp (incl. install)	EA	\$ 7,500.00	30	\$ 225,000.00	\$0.00	\$ 225,000.00
5	Right-of-way tree (2-1/2" - 3" cal.)	EA	\$ 250.00	337	\$ 84,250.00	\$0.00	\$ 84,250.00
6	Bus stop	EA	\$ 30,000.00	1	\$ 30,000.00	\$0.00	\$ 30,000.00
7	Erosion and Sediment Control	%	15%	1	\$ 1,660,891.88	\$0.00	\$ 1,660,891.88
8	Mobilization	%	15%	1	\$ 1,910,025.66	\$0.00	\$ 1,910,025.66
	TOTAL				\$ 14,643,530.03	\$ -	\$ 14,643,530.03
Project Total					\$ 20,425,334.72	\$ -	\$ 20,425,334.72

Project Info:

Project Name: WA 02 - Fort Lawton Project Support Services
Owner: Seattle Public Utilities
Date: 12/1/2022
Project PM: Erik Davido & Ben Iddins
Description: This ROW Improvements option assumes standard frontage improvements and that the West Lawton St will be connected through the existing dead end.

ROW Improvements - Cost Estimate							
Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost	Tax	Total
West Lawton St							
1	Frontage improvements (remove ex. and install half street improvements)	LF	\$ 1,500.00	1,140	\$ 1,710,000.00	\$0.00	\$ 1,710,000.00
2	Frontage improvements (remove ex. and install full street improvements)	LF	\$ 3,375.00	160	\$ 540,000.00	\$0.00	\$ 540,000.00
3	ADA ramp (incl. install)	EA	\$ 7,500.00	2	\$ 15,000.00	\$0.00	\$ 15,000.00
4	Right-of-way tree (2-1/2" - 3" cal.)	EA	\$ 250.00	65	\$ 16,250.00	\$0.00	\$ 16,250.00
5	Erosion and Sediment Control	%	15%	1	\$ 342,187.50	\$0.00	\$ 342,187.50
6	Mobilization	%	15%	1	\$ 393,515.63	\$0.00	\$ 393,515.63
	TOTAL (New Road)				\$ 3,016,953.13	\$ -	\$ 3,016,953.13
36th Ave W							
1	Frontage improvements (remove ex. and install half street improvements)	LF	\$ 1,012.50	2,450	\$ 2,480,625.00	\$0.00	\$ 2,480,625.00
2	ADA ramp (incl. install)	EA	\$ 7,500.00	20	\$ 150,000.00	\$0.00	\$ 150,000.00
3	Right-of-way tree (2-1/2" - 3" cal.)	EA	\$ 250.00	0	\$0.00	\$0.00	\$0.00
4	Erosion and Sediment Control	%	15%	1	\$ 394,593.75	\$0.00	\$394,593.75
5	Mobilization	%	15%	1	\$ 453,782.81	\$0.00	\$ 453,782.81
	TOTAL				\$ 3,479,001.56	\$ -	\$ 3,479,001.56
Texas Way							
1	Roadway improvements (remove ex. and install full street improvements) incl. two retaining walls	LF	\$ 3,640.00	850	\$ 3,094,000.00	\$0.00	\$ 3,094,000.00
2	Roadway improvements (remove ex. and install full street improvements) incl. one retaining wall	LF	\$ 3,202.50	1,535	\$ 4,915,837.50	\$0.00	\$ 4,915,837.50
3	Roadway improvements (remove ex. and install full street improvements)	LF	\$ 2,765.00	985	\$ 2,723,525.00	\$0.00	\$ 2,723,525.00
4	ADA ramp (incl. install)	EA	\$ 7,500.00	30	\$ 225,000.00	\$0.00	\$ 225,000.00
5	Right-of-way tree (2-1/2" - 3" cal.)	EA	\$ 250.00	337	\$ 84,250.00	\$0.00	\$ 84,250.00
6	Bus stop	EA	\$ 30,000.00	1	\$ 30,000.00	\$0.00	\$ 30,000.00
7	Erosion and Sediment Control	%	15%	1	\$ 1,660,891.88	\$0.00	\$ 1,660,891.88
8	Mobilization	%	15%	1	\$ 1,910,025.66	\$0.00	\$ 1,910,025.66
	TOTAL				\$ 14,643,530.03	\$ -	\$ 14,643,530.03
Project Total					\$ 21,139,484.72	\$ -	\$ 21,139,484.72

Construction Contract Amount Spreadsheet

FORT LAWTON DEVELOPMENT of LOW INCOME HOUSING

Project Name: UG
 Project ID: N/A
 Project Phase: PLANNING/BUDGETARY
 Cost Estimator(s): ALEX KARAKHANOV/Yonas Tesfamichael
 Est. Reviewer(s): ANDREW STRONG
 Date: 11/30/2022

Item	Bid Item	Bid Item Description	Quantity	Unit	Unit Price	Unit Price Extension
1	107005	SAFETY AND HEALTH PROGRAM	14.00	MO	\$ 2,740.00	\$ 38,360
2	107007	CONTRACTOR'S ON SITE ELECTRICAL LEAD	560.00	HR	\$ 160.00	\$ 89,600
3	107101	CRITICAL PATCH SCHEDULE UPDATE, MIN. BID=\$300 PER EACH	14.00	MO	\$ 300.00	\$ 4,200
4	109005	MOBILIZATION 7M-10M-12% ST	1.00	LS	\$ 1,316,458	\$ 1,316,458
5	110005	MAINTENANCE & PROTECTION OF TRAFFIC CONTROL INCLUDING FLAGGING	195.00	DAY	\$ 2,030.00	\$ 395,850
6	110030	UNIFORM POLICE OFFICER	360.00	HR	\$ 130.00	\$ 46,800
7	200100	CONSTRUCTION SURVEY (2 MAN CREW)	25.00	DAY	\$ 2,820.00	\$ 70,500
8	203010	DEMOLITION(STRUCTURES& SITE)	1.00	LS	\$ 115,000.00	\$ 115,000
9	202750	SAWCUT Asphalt Concrete, Full Depth	15,000.00	LF	\$ 9.00	\$ 135,000
10	204005	COMMON Excavation {QTY >500}	8,340.00	CY	\$ 110.00	\$ 917,400
11	207010	SAFETY SYSTEM IN TRENCH EXCAVATION {4-6 Feet Deep}	91,200.00	SF	\$ 2.00	\$ 182,400
12	208020	Dewatering - Pumping Water (3" Pump) to Baker Tank - Small to Mid-range Water Flow Capacity	60.00	DAY	\$ 2,660.00	\$ 159,600
13	210020	Backfilling-Engineered Fill (Elastizell Application)	3,650.00	CY	\$ 170.00	\$ 620,500
14	223100	POTHOLING AND FIELD INVESTIGATION	160.00	HR	\$ 1,260.00	\$ 201,600
15	310900	VIBRATION MONITORING (400 LF Pipe/Weekly)	26.00	WEEK	\$ 5,360.00	\$ 139,360
16	804005	CURB, CEM CONC (QTY 200-400 LF)	2,500.00	LF	\$ 61.00	\$ 152,500
17	814005	SIDEWALK, CEM CONC {QTY>500 SY}	1,150.00	SY	\$ 160.00	\$ 184,000
18	819006	DRIVEWAY, CEM CONC, 6 IN {QTY 50-100 SY}	350.00	SY	\$ 220.00	\$ 77,000
19	821006	Sign, Traffic	10.00	EA	\$ 380.00	\$ 3,800
20	833005	CONDUIT, PVC	13,760.00	LF	\$ 22.00	\$ 302,720
21	833S01	INSULATOR, CONNECTORS & ARRESTERS(L,M,E)	1.00	LS	\$ 281,637.00	\$ 281,637
22	833S02	EL BLACK TAPE	1.00	LS	\$ 4,000.00	\$ 4,000
23	835216	CONCRETE ENCASED DUCT BANK (2 EA 2" SCH 80 PVC SL, 2 EA 4" SCH 40 PVC PRIMARY)	6,950.00	LF	\$ 660.00	\$ 4,587,000
24	835310	DUCT BANK REINFORMENT OVER UTILITIES (2 EA 2" SCH 80 PVC, SL)	2,200.00	LF	\$ 350.00	\$ 770,000
25	835502	CORE DRILL/PATCH EXISTING VAULT FOR 2-3" SCH 80 PVC	3.00	EA	\$ 440.00	\$ 1,320
26	836104	575 Pre-cast EI Vault Primary Service 7'x4'-8" x4' (High)	6.00	EA	\$ 17,690.00	\$ 106,140
27	836590	CABINET, TERMINATING 26KV 3 phase cabinet (682899) - LOADBREAK JUNCTIONS	3.00	EA	\$ 4,020.00	\$ 12,060
28	833302	Handhole, ELECTRICAL SERVICE, Type 2	50.00	EA	\$ 2,660.00	\$ 133,000
29	827020	SIGN, INSTALL PROJECT IDENTIFICATION, POST MOUNTED {Size-Large-8'x10'}	2.00	EA	\$ 2,150.00	\$ 4,300
30	835S10	RE-ROUTE EXISTING DUCT BANK-CONCRETE ENCASED	500.00		\$ 2,450.00	\$ 1,225,000
31	835350	JACK AND BORE OR AIR SPADE OR DIRECTIONAL DRILLING, CONDUIT INSTALLATION INCLUDING PITS (Includes cost of launch/retrieval pits.) {QTY>700 LF}	2.00	EA	\$ 4,920.00	\$ 9,840
					\$	-
					\$	-
					\$	-
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Construction Line Item Pricing	\$	10,902,746
Allowance for Indeterminates		25.00%
Construction Bid Amount	\$	13,628,432
Sales Tax %		0.00%
Construction Contract Amount	\$	13,628,432

Last Revised: 11/4/22

Construction Contract Amount Spreadsheet

FORT LAWTON DEVELOPMENT of LOW INCOME HOUSING

Project Name: OH
Project ID: N/A
Project Phase: PLANNING/BUDGETARY
Cost Estimator(s): ALEX KARAKHANOV
Est. Reviewer(s) ANDREW STRONG
Date:

11/30/2022

Item	Bid Item	Bid Item Description	Quantity	Unit	Unit Price	Unit Price Extension
1	107005	SAFETY AND HEALTH PROGRAM	9.00	MO	\$ 2,740.00	\$ 24,660
2	107007	CONTRACTOR'S ON SITE ELECTRICAL LEAD	680.00	HR	\$ 160.00	\$ 108,800
3	109005	MOBILIZATION LARGE SIZE PROJECT-15%	1.00	LS	\$ 769,107	\$ 769,107
4	110005	MAINTENANCE & PROTECTION OF TRAFFIC CONTROL INCLUDING FLAGGING	180.00	DAY	\$ 2,030.00	\$ 365,400
5	107101	CRITICAL PATCH SCHEDULE UPDATE, MIN. BID=\$300 PER EACH	8.00	MO	\$ 300.00	\$ 2,400
6	110020	UNIFORM POLICE OFFICERUNIFORM POLICE OFFICER	240.00	HR	\$ 130.00	\$ 31,200
7	200102	CONSTRUCTION SURVEY (2 MAN CREW)	8.00	DAY	\$ 2,820.00	\$ 22,560
8	203010	DEMOLITION(STRUCTURES& SITE)	1.00	LS	\$ 85,000.00	\$ 85,000
9	202030	REMOVE ASPHALT PAVEMENT	100.00	SY	\$ 42.00	\$ 4,200
10	223100	Potholing Up to 7 FT Deep {QTY<=3 EA}	80.00	HR	\$ 1,260.00	\$ 100,800
11	202145	REMOVE CURB {QTY>100}	700.00	LF	\$ 25.00	\$ 17,500
12	202310	REMOVE Foundation, Street Light Pole {QTY >10}	10.00	EA	\$ 1,500.00	\$ 15,000
13	202395	REMOVE Light Poles	10.00	EA	\$ 500.00	\$ 5,000
14	202405	REMOVE Sign Post	5.00	EA	\$ 250.00	\$ 1,250
16	202330	REMOVE Handhole	10.00	EA	\$ 480.00	\$ 4,800
17	202290	REMOVE Electrical Vault (3'x2'x2'-8")	1.00	EA	\$ 5,340.00	\$ 5,340
18	202685	REMOVE/ SALVAGE Wiring, Street Lighting/Power	1,500.00	LF	\$ 15.00	\$ 22,500
19	202035	REMOVE CEMT. CONCR. SIDEWALK {QTY >50}	100.00	SY	\$ 42.00	\$ 4,200
20	202692	REMOVE MID VOLTAGE BUCK BOOST TRANSORMER (0.25-3KVA)	1.00	EA	\$ 2,100.00	\$ 2,100
21	202S01	PROTECT EXISTING TREE	30.00	EA	\$ 750.00	\$ 22,500
22	202S02	PROTECT EXISTING DRAIN	5.00	EA	\$ 2,500.00	\$ 12,500
23	208020	Dewatering - Pumping Water (2" Pump) to Baker Tank - Small Water Flow Capacity	60.00	DAY	\$ 2,660.00	\$ 159,600
24	310900	VIBRATION MONITORING (400 LF Pipe/Weekly)	15.00	WEEK	\$ 5,360.00	\$ 80,400
25	835S01	DEENERGIZE EXISTING DUCTBANK	1.00	LS	\$ 25,000.00	\$ 25,000
26	804005	CURB, CEM CONC (QTY >500LF)	1,200.00	LF	\$ 114.00	\$ 136,800
27	814005	SIDEWALK, CEM CONC {QTY>500 SY}	650.00	SY	\$ 190.00	\$ 123,500
28	814017	CURB RAMP -422 B{QTY >3}	4.00	EA	\$ 2,760.00	\$ 11,040
29	821030	POST, Traffic Sign {QTY >5EA}	10.00	EA	\$ 450.00	\$ 4,500
30	822004	PAVEMENT MARKING, Paint, 4 IN Stripe {QTY >200 LF}	1,500.00	LF	\$ 11.00	\$ 16,500
31	827020	SIGN, INSTALL PROJECT IDENTIFICATION, POST MOUNTED {Size-Large-8'x10'}	2.00	EA	\$ 2,150.00	\$ 4,300
32	832335	POLE, WOOD 55FT	34.00	EA	\$ 8,250.00	\$ 280,500
33	832545	FOUNDATION, STREET Light Pole {QTY >10EA}	34.00	EA	\$ 9,000.00	\$ 306,000
34	832S01	INSTALL CONDUCTOR/ADAPTER ASSEMBLY	1.00	LS	\$ 17,500.00	\$ 17,500
35	832S02	WD POLE DOUG FIR CL1	6.00	EA	\$ 7,850.00	\$ 47,100
36	832S03	INSTALL ARRESTER/CONNECTOR/TERMINAL ASSEMBLY	1.00	LS	\$ 21,000.00	\$ 21,000
37	832S04	CONTROL STREET LIGHT/LUMINAIRE	34.00	EA	\$ 1,850.00	\$ 62,900
38	832S05	INSTALL CARTIGE/CUTOUT/PLUG	1.00	LS	\$ 7,500.00	\$ 7,500
39	832S06	ELBOW/CROSSARM ASSEMBLY	1.00	LS	\$ 45,000.00	\$ 45,000
40	832S07	INSTAL INSULATOR ASSEMBLY	1.00	LS	\$ 6,500.00	\$ 6,500
41	832S08	INSTALL FUSE ASSEMBLY	1.00	LS	\$ 27,500.00	\$ 27,500
42	832S09	PRI UG WIRE ,28KV	1,800.00	LF	\$ 67.50	\$ 121,500
43	835S10	RE-ROUTE EXISTING DUCT BANK-CONCRETE ENCASED	1,000.00	LF	\$ 2,450.00	\$ 2,450,000
44	835350	JACK AND BORE OR AIR SPADE OR DIRECTIONAL DRILLING, CONDUIT INSTALLATION INCLUDING PITS (Includes cost of launch/retrieval pits.) {QTY>700 LF}	4.00	EA	\$ 4,920.00	\$ 19,680
45	832S11	PRI OH WIRE/CBL,ACSR	1.00	LS	\$ 76,500.00	\$ 76,500
46	833S12	GROUND WIRE COOPER	1.00	LS	\$ 53,000.00	\$ 53,000
47	833S14	DISTRIBUTION PRIMARY/LOAD BREAK ASSEMBLY	1.00	EA	\$ 115,700.00	\$ 115,700
48	833S15	MISSCELANEOUS BOLTS/WASHER/ANCHORS/CLAMPS	1.00	LS	\$ 3,700.00	\$ 3,700
49	833S16	INSTALL ROD ACCESSORIES	1.00	LS	\$ 7,500.00	\$ 7,500
50	833S17	INSTALL DEAN GUY WIRE ASSEMBLY	1.00	LS	\$ 7,500.00	\$ 7,500
51	833S18	MISSCELANEOUS -SWITCH TAG/CLAMPS/BRAKETS/COUPLING	1.00	LS	\$ 4,250.00	\$ 4,250
52	832S05	CONDUIT PVC SCH40, 3 IN-5 IN	170.00	LF	\$ 25.00	\$ 4,250
53	832S06	CONDUIT RIGID STEEL 3-5IN	130.00	LF	\$ 140.00	\$ 18,200
54	830S01	PIPE WATER 2-1/IN SCH 40	50.00	LF	\$ 95.00	\$ 4,750
55	819006	DRIVEWAY, CEM CONC, 6 IN {QTY 50-100 SY}	350.00	SY	\$ 300.00	\$ 105,000
						\$ -
						\$ -
						\$ -
						\$ -
Construction Line Item Pricing						\$ 6,001,487
Allowance for Indeterminates						25.00%
Construction Bid Amount						\$ 7,501,859
Sales Tax %						0.00%
Construction Contract Amount						\$ 7,501,859

Last Revised: 11/30/22

Operations and Maintenance Summary	
Storm and sewer jet & vac	
1 vac truck, operator, and 2 laborers	\$ 2,185.00
# of days for conveyance system	5 d/yr
# of days for detention/infiltration vault	5 d/yr
Cost of vac truck work	\$ 21,850.00
1 flatbed truck and 2 laborers	\$ 1,650.00
# of days for non-infiltrating bioretention planters	5 d/yr
Cost of flatbed and laborer work	\$ 8,250.00
Total cost (1-yr)	\$ 30,100.00
Street sweeping	
1 road sweeper & vac assist, operator, and laborer	\$ 3,200.00
# of days for standard road	4 d/yr
# of days for permeable surfacing road & sidewalk	5 d/yr
Total cost (1-yr)	\$ 28,800.00
Water main flushing	
1 flatbed truck and 2 laborers	\$ 1,650.00
# of days/yr	5 d/yr
Total cost (1-yr)	\$ 8,250.00
Total cost (1-yr)	\$ 67,150.00

APPENDIX C – AREA CALCULATIONS & WWHM MODELING REPORT

Vault Serial #	Date	Mark	Nature	Made	CHK'D	REV'D
###			REVISIONS			



LEGEND

- PROPOSED BUILDINGS
- PROPOSED PAVEMENTS
- ATHLETIC FIELD
- EXISTING BUILDING
- EXISTING PARKING LOT
- EXISTING ROADWAY
- LANDSCAPE BYPASS
- LANDSCAPE THAT CAN'T ROUTE TO DETENTION FACILITY

AREAS (SF)
 NEW BUILDING ROOFS: 95,684 SF
 NEW ROADS AND PARKING LOTS: 121,740 SF
 WALKWAYS: 35,007 SF
 ATHLETIC FIELD: 157,954 SF
 LANDSCAPE WITHIN DETENTION BASIN: 287,193 SF
 LANDSCAPE BYPASS: 337,882 SF

EXISTING BUILDING: 8,488 SF
 EXISTING PARKING LOT: 92,700 SF
 EXISTING ROADS: 40,785 SF

NOT INCLUDED IN STORMWATER CALCULATIONS
 LANDSCAPE THAT CAN'T ROUTE TO DETENTION:
 265,705 SF
 EXISTING TEXAS WAY: 31,215 SF

TOTAL SITE AREA: 1,474,353 SF
 TOTAL SITE AREA FOR WWHM: 1,177,433 SF

AREAS (AC)
 NEW BUILDING ROOFS: 2.1966 AC
 NEW ROADS AND PARKING LOTS: 2.7947 AC
 WALKWAYS: 0.8036 AC
 ATHLETIC FIELD: 3.6261 AC
 LANDSCAPE WITHIN DETENTION BASIN: 6.593 AC
 LANDSCAPE BYPASS: 7.7567 AC

EXISTING BUILDING: 0.1948 AC
 EXISTING PARKING LOT: 2.128 AC
 EXISTING ROADS: 0.9362 AC

NOT INCLUDED IN STORMWATER CALCULATIONS
 LANDSCAPE THAT CAN'T ROUTE TO DETENTION:
 6.0997 AC
 EXISTING TEXAS WAY: 0.7165 AC

TOTAL SITE AREA: 33.8464 AC
 TOTAL SITE AREA FOR WWHM: 27.0301 AC

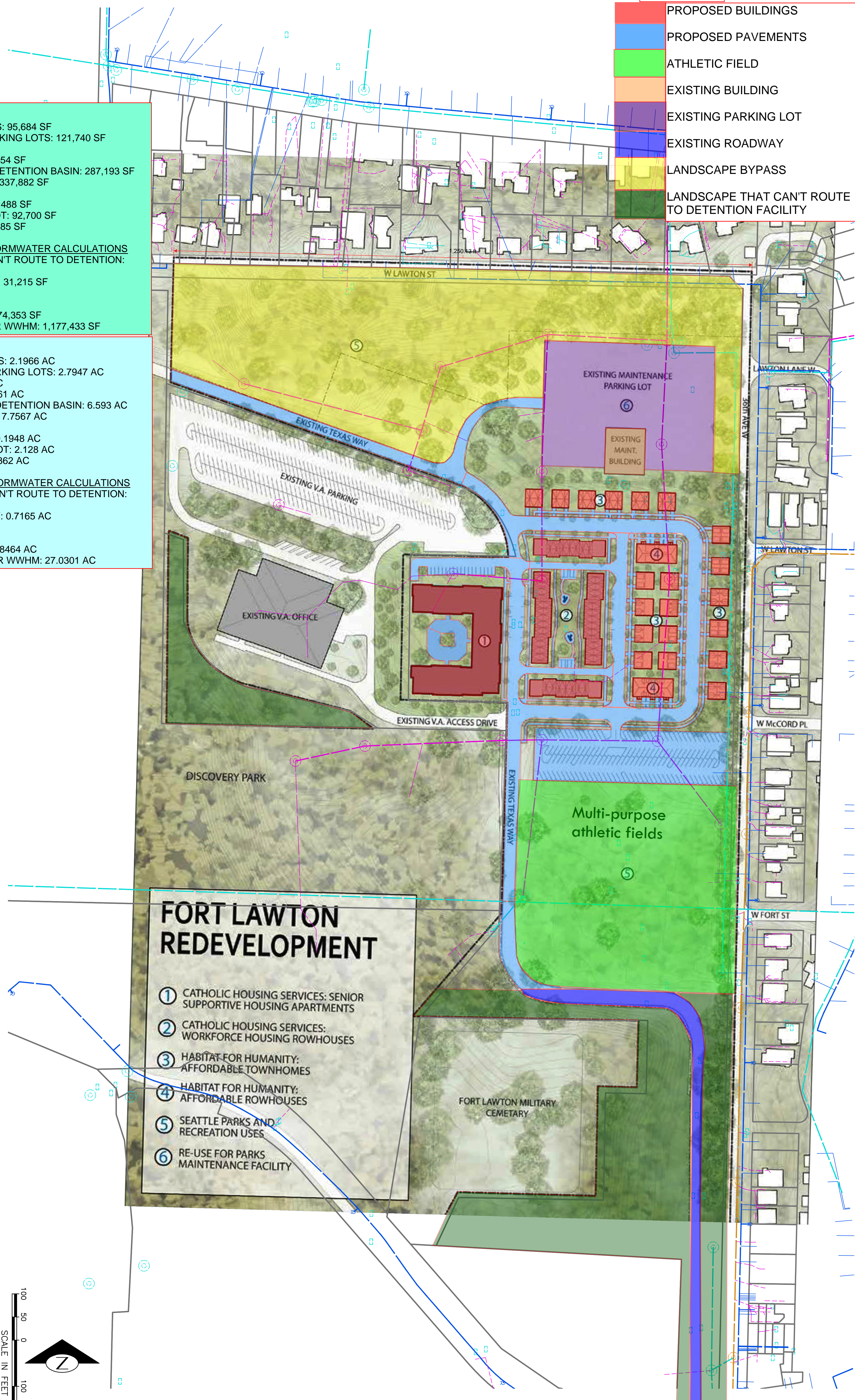
INITIALS AND DATE		INITIALS AND DATE	
DESIGNED	###	REVIEWED	###
CHECKED	###	DES.	###
DRAWN	###	SLOT	###
CHECKED	###	RECEIVED	###
	###	RENSED AS BUILT	###
	###	PROJ. WGR.	###

Seattle Public Utilities

ORDINANCE NO. ###
 P.W. NO. ###
 SCALE: ###

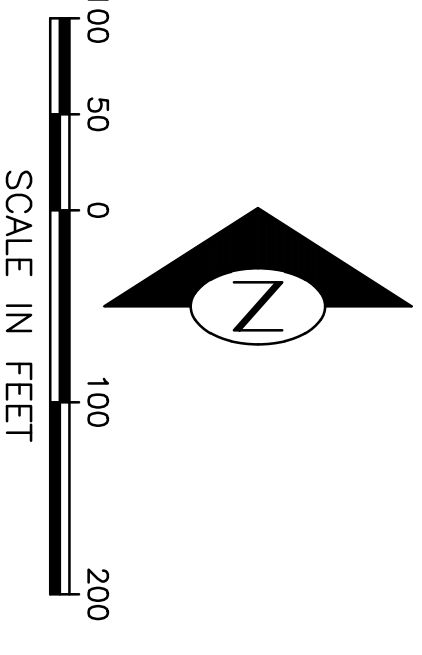
FORT LAWTON REDEVELOPMENT

JOB NO.	###
VP #	###
PC #	###
DATE	###
SHEET #	###



FORT LAWTON REDEVELOPMENT

- ① CATHOLIC HOUSING SERVICES: SENIOR SUPPORTIVE HOUSING APARTMENTS
- ② CATHOLIC HOUSING SERVICES: WORKFORCE HOUSING ROWHOUSES
- ③ HABITAT FOR HUMANITY: AFFORDABLE TOWNHOMES
- ④ HABITAT FOR HUMANITY: AFFORDABLE ROWHOUSES
- ⑤ SEATTLE PARKS AND RECREATION USES
- ⑥ RE-USE FOR PARKS MAINTENANCE FACILITY



WWHM2012
PROJECT REPORT

PRELIMINARY

**INFILTRATION VAULT W/
PERMEABLE PAVEMENT
SURFACING**

General Model Information

Project Name: Fort Lawton_Infiltration Vault
Site Name: Fort Lawton
Site Address: 4585 Texas Way
City: Seattle
Report Date: 11/28/2022
Gage: SPU 158 Year 5min
Data Start: 10/01/1901
Data End: 09/18/2059
Timestep: 5 Minute
Precip Scale: 1.000
Version Date: 2019/09/13
Version: 4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Pasture Basin

Bypass: No

GroundWater: No

Pervious Land Use acre
C, Pasture, Mod 27.0297

Pervious Total 27.0297

Impervious Land Use acre

Impervious Total 0

Basin Total 27.0297

Element Flows To:
Surface Interflow Groundwater

Mitigated Land Use

New and Old Roofs

Bypass: No

GroundWater: No

Pervious Land Use acre

Pervious Total 0

Impervious Land Use acre
ROOF TOPS FLAT 2.3914

Impervious Total 2.3914

Basin Total 2.3914

Element Flows To:

Surface	Interflow	Groundwater
Infiltration Vault	Infiltration Vault	

At grade surfaces

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	6.593
Pervious Total	6.593
Impervious Land Use	acre
ROADS MOD	0.3154
DRIVEWAYS MOD	0.9362
PARKING FLAT	2.128
Impervious Total	3.3796
Basin Total	9.9726

Element Flows To:		
Surface	Interflow	Groundwater
Infiltration Vault	Infiltration Vault	

Athletic Field & Grass

Bypass: No

GroundWater: No

Pervious Land Use acre

Pervious Total 0

Impervious Land Use acre
SIDEWALKS FLAT 3.6261

Impervious Total 3.6261

Basin Total 3.6261

Element Flows To:

Surface	Interflow	Groundwater
Permeable Field	Permeable Field	

Bypass Areas

Bypass: Yes

GroundWater: No

Pervious Land Use
C, Pasture, Mod acre
7.7567

Pervious Total 7.7567

Impervious Land Use acre

Impervious Total 0

Basin Total 7.7567

Element Flows To:
Surface

Interflow

Groundwater

Walkways & Roads

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS MOD	2.4793
SIDEWALKS MOD	0.8036
Impervious Total	3.2829
Basin Total	3.2829

Element Flows To:
Surface Interflow Groundwater
Permeable Pavement Permeable Pavement

Routing Elements
Predeveloped Routing

Mitigated Routing

Infiltration Vault

Width: 100 ft.
 Length: 60 ft.
 Depth: 8 ft.
 Infiltration On
 Infiltration rate: 2
 Infiltration safety factor: 0.5
 Total Volume Infiltrated (ac-ft.): 1366.047
 Total Volume Through Riser (ac-ft.): 1648.51
 Total Volume Through Facility (ac-ft.): 3014.557
 Percent Infiltrated: 45.32
 Total Precip Applied to Facility: 0
 Total Evap From Facility: 0
 Discharge Structure
 Riser Height: 7 ft.
 Riser Diameter: 18 in.
 Orifice 1 Diameter: 3.75 in. Elevation:0 ft.
 Orifice 2 Diameter: 8 in. Elevation:5 ft.
 Orifice 3 Diameter: 5.18 in. Elevation:6.5 ft.
 Element Flows To:
 Outlet 1 Outlet 2

Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.137	0.000	0.000	0.000
0.0889	0.137	0.012	0.113	0.138
0.1778	0.137	0.024	0.160	0.138
0.2667	0.137	0.036	0.197	0.138
0.3556	0.137	0.049	0.227	0.138
0.4444	0.137	0.061	0.254	0.138
0.5333	0.137	0.073	0.278	0.138
0.6222	0.137	0.085	0.301	0.138
0.7111	0.137	0.097	0.321	0.138
0.8000	0.137	0.110	0.341	0.138
0.8889	0.137	0.122	0.359	0.138
0.9778	0.137	0.134	0.377	0.138
1.0667	0.137	0.146	0.394	0.138
1.1556	0.137	0.159	0.410	0.138
1.2444	0.137	0.171	0.425	0.138
1.3333	0.137	0.183	0.440	0.138
1.4222	0.137	0.195	0.455	0.138
1.5111	0.137	0.208	0.469	0.138
1.6000	0.137	0.220	0.482	0.138
1.6889	0.137	0.232	0.495	0.138
1.7778	0.137	0.244	0.508	0.138
1.8667	0.137	0.257	0.521	0.138
1.9556	0.137	0.269	0.533	0.138
2.0444	0.137	0.281	0.545	0.138
2.1333	0.137	0.293	0.557	0.138
2.2222	0.137	0.306	0.568	0.138
2.3111	0.137	0.318	0.580	0.138
2.4000	0.137	0.330	0.591	0.138
2.4889	0.137	0.342	0.602	0.138

2.5778	0.137	0.355	0.612	0.138
2.6667	0.137	0.367	0.623	0.138
2.7556	0.137	0.379	0.633	0.138
2.8444	0.137	0.391	0.643	0.138
2.9333	0.137	0.404	0.653	0.138
3.0222	0.137	0.416	0.663	0.138
3.1111	0.137	0.428	0.673	0.138
3.2000	0.137	0.440	0.682	0.138
3.2889	0.137	0.453	0.692	0.138
3.3778	0.137	0.465	0.701	0.138
3.4667	0.137	0.477	0.710	0.138
3.5556	0.137	0.489	0.719	0.138
3.6444	0.137	0.502	0.728	0.138
3.7333	0.137	0.514	0.737	0.138
3.8222	0.137	0.526	0.746	0.138
3.9111	0.137	0.538	0.754	0.138
4.0000	0.137	0.551	0.763	0.138
4.0889	0.137	0.563	0.771	0.138
4.1778	0.137	0.575	0.780	0.138
4.2667	0.137	0.587	0.788	0.138
4.3556	0.137	0.599	0.796	0.138
4.4444	0.137	0.612	0.804	0.138
4.5333	0.137	0.624	0.812	0.138
4.6222	0.137	0.636	0.820	0.138
4.7111	0.137	0.648	0.828	0.138
4.8000	0.137	0.661	0.836	0.138
4.8889	0.137	0.673	0.843	0.138
4.9778	0.137	0.685	0.851	0.138
5.0667	0.137	0.697	1.307	0.138
5.1556	0.137	0.710	1.551	0.138
5.2444	0.137	0.722	1.732	0.138
5.3333	0.137	0.734	1.884	0.138
5.4222	0.137	0.746	2.017	0.138
5.5111	0.137	0.759	2.137	0.138
5.6000	0.137	0.771	2.248	0.138
5.6889	0.137	0.783	2.351	0.138
5.7778	0.137	0.795	2.449	0.138
5.8667	0.137	0.808	2.541	0.138
5.9556	0.137	0.820	2.629	0.138
6.0444	0.137	0.832	2.713	0.138
6.1333	0.137	0.844	2.794	0.138
6.2222	0.137	0.857	2.872	0.138
6.3111	0.137	0.869	2.947	0.138
6.4000	0.137	0.881	3.020	0.138
6.4889	0.137	0.893	3.091	0.138
6.5778	0.137	0.906	3.363	0.138
6.6667	0.137	0.918	3.524	0.138
6.7556	0.137	0.930	3.661	0.138
6.8444	0.137	0.942	3.784	0.138
6.9333	0.137	0.955	3.899	0.138
7.0222	0.137	0.967	4.059	0.138
7.1111	0.137	0.979	4.698	0.138
7.2000	0.137	0.991	5.613	0.138
7.2889	0.137	1.004	6.679	0.138
7.3778	0.137	1.016	7.783	0.138
7.4667	0.137	1.028	8.812	0.138
7.5556	0.137	1.040	9.670	0.138
7.6444	0.137	1.053	10.30	0.138

7.7333	0.137	1.065	10.75	0.138
7.8222	0.137	1.077	11.24	0.138
7.9111	0.137	1.089	11.66	0.138
8.0000	0.137	1.101	12.06	0.138
8.0889	0.137	1.114	12.45	0.138
8.1778	0.000	0.000	12.82	0.000

Permeable Pavement

Bottom Length: 143.00 ft.
 Bottom Width: 1000.00 ft.
 Trench bottom slope 1: 0 To 1
 Trench Left side slope 0: 0 To 1
 Trench right side slope 2: 0 To 1
 Material thickness of first layer: 0.25
 Pour Space of material for first layer: 0.25
 Material thickness of second layer: 0
 Pour Space of material for second layer: 0
 Material thickness of third layer: 0
 Pour Space of material for third layer: 0
 Infiltration On
 Infiltration rate: 2
 Infiltration safety factor: 0.5
 Total Volume Infiltrated (ac-ft.): 1348.838
 Total Volume Through Riser (ac-ft.): 0
 Total Volume Through Facility (ac-ft.): 1348.838
 Percent Infiltrated: 100
 Total Precip Applied to Facility: 0
 Total Evap From Facility: 0
 Discharge Structure
 Riser Height: 0.25 ft.
 Riser Diameter: 6 in.
 Element Flows To:
 Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	3.282	0.000	0.000	0.000
0.0139	3.282	0.011	0.000	3.310
0.0278	3.282	0.022	0.000	3.310
0.0417	3.282	0.034	0.000	3.310
0.0556	3.282	0.045	0.000	3.310
0.0694	3.282	0.057	0.000	3.310
0.0833	3.282	0.068	0.000	3.310
0.0972	3.282	0.079	0.000	3.310
0.1111	3.282	0.091	0.000	3.310
0.1250	3.282	0.102	0.000	3.310
0.1389	3.282	0.114	0.000	3.310
0.1528	3.282	0.125	0.000	3.310
0.1667	3.282	0.136	0.000	3.310
0.1806	3.282	0.148	0.000	3.310
0.1944	3.282	0.159	0.000	3.310
0.2083	3.282	0.171	0.000	3.310
0.2222	3.282	0.182	0.000	3.310
0.2361	3.282	0.193	0.000	3.310
0.2500	3.282	0.239	0.000	3.310
0.2639	3.282	0.285	0.008	3.310
0.2778	3.282	0.330	0.024	3.310
0.2917	3.282	0.376	0.045	3.310
0.3056	3.282	0.421	0.068	3.310
0.3194	3.282	0.467	0.095	3.310
0.3333	3.282	0.512	0.124	3.310
0.3472	3.282	0.558	0.154	3.310

0.3611	3.282	0.604	0.184	3.310
0.3750	3.282	0.649	0.215	3.310
0.3889	3.282	0.695	0.244	3.310
0.4028	3.282	0.740	0.272	3.310
0.4167	3.282	0.786	0.297	3.310
0.4306	3.282	0.832	0.320	3.310
0.4444	3.282	0.877	0.339	3.310
0.4583	3.282	0.923	0.355	3.310
0.4722	3.282	0.968	0.369	3.310
0.4861	3.282	1.014	0.380	3.310
0.5000	3.282	1.060	0.393	3.310
0.5139	3.282	1.105	0.404	3.310
0.5278	3.282	1.151	0.415	3.310
0.5417	3.282	1.196	0.425	3.310
0.5556	3.282	1.242	0.435	3.310
0.5694	3.282	1.288	0.445	3.310
0.5833	3.282	1.333	0.454	3.310
0.5972	3.282	1.379	0.464	3.310
0.6111	3.282	1.424	0.473	3.310
0.6250	3.282	1.470	0.482	3.310
0.6389	3.282	1.516	0.491	3.310
0.6528	3.282	1.561	0.499	3.310
0.6667	3.282	1.607	0.508	3.310
0.6806	3.282	1.652	0.516	3.310
0.6944	3.282	1.698	0.524	3.310
0.7083	3.282	1.744	0.533	3.310
0.7222	3.282	1.789	0.541	3.310
0.7361	3.282	1.835	0.549	3.310
0.7500	3.282	1.880	0.556	3.310
0.7639	3.282	1.926	0.564	3.310
0.7778	3.282	1.972	0.572	3.310
0.7917	3.282	2.017	0.579	3.310
0.8056	3.282	2.063	0.586	3.310
0.8194	3.282	2.108	0.594	3.310
0.8333	3.282	2.154	0.601	3.310
0.8472	3.282	2.200	0.608	3.310
0.8611	3.282	2.245	0.615	3.310
0.8750	3.282	2.291	0.622	3.310
0.8889	3.282	2.336	0.629	3.310
0.9028	3.282	2.382	0.636	3.310
0.9167	3.282	2.427	0.642	3.310
0.9306	3.282	2.473	0.649	3.310
0.9444	3.282	2.519	0.656	3.310
0.9583	3.282	2.564	0.662	3.310
0.9722	3.282	2.610	0.669	3.310
0.9861	3.282	2.655	0.675	3.310
1.0000	3.282	2.701	0.681	3.310
1.0139	3.282	2.747	0.688	3.310
1.0278	3.282	2.792	0.694	3.310
1.0417	3.282	2.838	0.700	3.310
1.0556	3.282	2.883	0.706	3.310
1.0694	3.282	2.929	0.712	3.310
1.0833	3.282	2.975	0.718	3.310
1.0972	3.282	3.020	0.724	3.310
1.1111	3.282	3.066	0.730	3.310
1.1250	3.282	3.111	0.736	3.310
1.1389	3.282	3.157	0.742	3.310
1.1528	3.282	3.203	0.748	3.310

1.1667	3.282	3.248	0.753	3.310
1.1806	3.282	3.294	0.759	3.310
1.1944	3.282	3.339	0.765	3.310
1.2083	3.282	3.385	0.770	3.310
1.2222	3.282	3.431	0.776	3.310
1.2361	3.282	3.476	0.781	3.310
1.2500	3.282	3.522	0.787	3.310

Permeable Field

Bottom Length: 157.95 ft.
 Bottom Width: 1000.00 ft.
 Trench bottom slope 1: 0 To 1
 Trench Left side slope 0: 0 To 1
 Trench right side slope 2: 0 To 1
 Material thickness of first layer: 0.25
 Pour Space of material for first layer: 0.25
 Material thickness of second layer: 0
 Pour Space of material for second layer: 0
 Material thickness of third layer: 0
 Pour Space of material for third layer: 0
 Infiltration On
 Infiltration rate: 2
 Infiltration safety factor: 0.5
 Total Volume Infiltrated (ac-ft.): 1461.763
 Total Volume Through Riser (ac-ft.): 0
 Total Volume Through Facility (ac-ft.): 1461.763
 Percent Infiltrated: 100
 Total Precip Applied to Facility: 0
 Total Evap From Facility: 0
 Discharge Structure
 Riser Height: 0.25 ft.
 Riser Diameter: 0.25 in.
 Element Flows To:
 Outlet 1 Outlet 2

Gravel Trench Bed Hydraulic Table

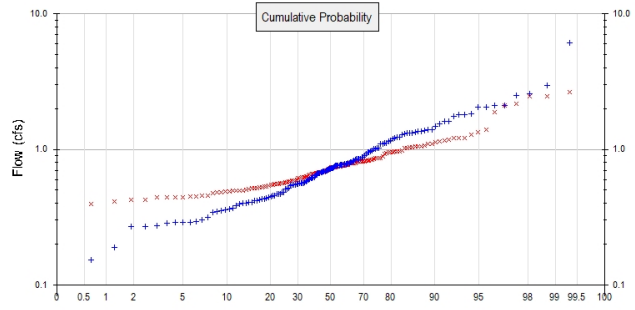
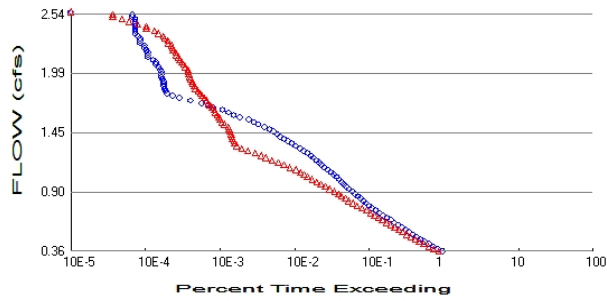
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	3.626	0.000	0.000	0.000
0.0139	3.626	0.012	0.000	3.656
0.0278	3.626	0.025	0.000	3.656
0.0417	3.626	0.037	0.000	3.656
0.0556	3.626	0.050	0.000	3.656
0.0694	3.626	0.063	0.000	3.656
0.0833	3.626	0.075	0.000	3.656
0.0972	3.626	0.088	0.000	3.656
0.1111	3.626	0.100	0.000	3.656
0.1250	3.626	0.113	0.000	3.656
0.1389	3.626	0.125	0.000	3.656
0.1528	3.626	0.138	0.000	3.656
0.1667	3.626	0.151	0.000	3.656
0.1806	3.626	0.163	0.000	3.656
0.1944	3.626	0.176	0.000	3.656
0.2083	3.626	0.188	0.000	3.656
0.2222	3.626	0.201	0.000	3.656
0.2361	3.626	0.214	0.000	3.656
0.2500	3.626	0.264	0.000	3.656
0.2639	3.626	0.314	0.000	3.656
0.2778	3.626	0.365	0.000	3.656
0.2917	3.626	0.415	0.000	3.656
0.3056	3.626	0.465	0.000	3.656
0.3194	3.626	0.516	0.000	3.656
0.3333	3.626	0.566	0.000	3.656
0.3472	3.626	0.616	0.000	3.656

0.3611	3.626	0.667	0.000	3.656
0.3750	3.626	0.717	0.000	3.656
0.3889	3.626	0.768	0.000	3.656
0.4028	3.626	0.818	0.000	3.656
0.4167	3.626	0.868	0.000	3.656
0.4306	3.626	0.919	0.000	3.656
0.4444	3.626	0.969	0.000	3.656
0.4583	3.626	1.019	0.000	3.656
0.4722	3.626	1.070	0.000	3.656
0.4861	3.626	1.120	0.000	3.656
0.5000	3.626	1.170	0.000	3.656
0.5139	3.626	1.221	0.000	3.656
0.5278	3.626	1.271	0.000	3.656
0.5417	3.626	1.322	0.000	3.656
0.5556	3.626	1.372	0.000	3.656
0.5694	3.626	1.422	0.000	3.656
0.5833	3.626	1.473	0.000	3.656
0.5972	3.626	1.523	0.000	3.656
0.6111	3.626	1.573	0.000	3.656
0.6250	3.626	1.624	0.000	3.656
0.6389	3.626	1.674	0.000	3.656
0.6528	3.626	1.724	0.000	3.656
0.6667	3.626	1.775	0.000	3.656
0.6806	3.626	1.825	0.000	3.656
0.6944	3.626	1.876	0.000	3.656
0.7083	3.626	1.926	0.000	3.656
0.7222	3.626	1.976	0.000	3.656
0.7361	3.626	2.027	0.001	3.656
0.7500	3.626	2.077	0.001	3.656
0.7639	3.626	2.127	0.001	3.656
0.7778	3.626	2.178	0.001	3.656
0.7917	3.626	2.228	0.001	3.656
0.8056	3.626	2.278	0.001	3.656
0.8194	3.626	2.329	0.001	3.656
0.8333	3.626	2.379	0.001	3.656
0.8472	3.626	2.429	0.001	3.656
0.8611	3.626	2.480	0.001	3.656
0.8750	3.626	2.530	0.001	3.656
0.8889	3.626	2.581	0.001	3.656
0.9028	3.626	2.631	0.001	3.656
0.9167	3.626	2.681	0.001	3.656
0.9306	3.626	2.732	0.001	3.656
0.9444	3.626	2.782	0.001	3.656
0.9583	3.626	2.832	0.001	3.656
0.9722	3.626	2.883	0.001	3.656
0.9861	3.626	2.933	0.001	3.656
1.0000	3.626	2.983	0.001	3.656
1.0139	3.626	3.034	0.001	3.656
1.0278	3.626	3.084	0.001	3.656
1.0417	3.626	3.135	0.001	3.656
1.0556	3.626	3.185	0.001	3.656
1.0694	3.626	3.235	0.001	3.656
1.0833	3.626	3.286	0.001	3.656
1.0972	3.626	3.336	0.001	3.656
1.1111	3.626	3.386	0.001	3.656
1.1250	3.626	3.437	0.001	3.656
1.1389	3.626	3.487	0.001	3.656
1.1528	3.626	3.537	0.001	3.656

1.1667	3.626	3.588	0.001	3.656
1.1806	3.626	3.638	0.001	3.656
1.1944	3.626	3.689	0.001	3.656
1.2083	3.626	3.739	0.001	3.656
1.2222	3.626	3.789	0.001	3.656
1.2361	3.626	3.840	0.001	3.656
1.2500	3.626	3.890	0.001	3.656

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 27.0297
 Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 14.3497
 Total Impervious Area: 12.68

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.704573
5 year	1.164144
10 year	1.530507
25 year	2.066586
50 year	2.520897
100 year	3.023881

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.698537
5 year	0.971855
10 year	1.188864
25 year	1.508054
50 year	1.781327
100 year	2.087543

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1902	0.519	0.580
1903	0.480	0.525
1904	0.626	0.793
1905	0.442	0.557
1906	0.188	0.442
1907	1.097	1.039
1908	0.749	0.749
1909	1.017	0.748
1910	0.983	0.959
1911	2.040	0.812

1912	2.949	1.392
1913	1.029	0.822
1914	0.294	0.647
1915	0.483	0.553
1916	0.691	0.614
1917	0.285	0.424
1918	0.733	0.683
1919	0.573	0.514
1920	0.847	0.747
1921	0.777	0.734
1922	0.770	0.810
1923	0.683	0.748
1924	0.426	0.567
1925	0.453	0.513
1926	0.762	0.634
1927	0.432	0.524
1928	0.550	0.612
1929	1.015	0.965
1930	0.653	0.673
1931	0.716	0.763
1932	0.592	0.677
1933	0.607	0.618
1934	1.357	1.072
1935	0.642	0.704
1936	0.559	0.562
1937	1.107	0.965
1938	0.780	0.666
1939	0.138	0.440
1940	0.626	0.739
1941	0.290	0.518
1942	0.962	0.921
1943	0.550	0.625
1944	1.617	1.204
1945	0.798	0.733
1946	0.661	0.587
1947	0.351	0.540
1948	1.377	1.209
1949	1.284	1.175
1950	0.429	0.534
1951	0.468	0.442
1952	1.757	2.480
1953	2.055	2.104
1954	0.663	0.735
1955	0.544	0.572
1956	0.301	0.360
1957	0.834	0.760
1958	1.798	1.289
1959	2.122	1.055
1960	0.370	0.546
1961	2.588	1.052
1962	0.676	0.762
1963	0.399	0.484
1964	0.404	0.655
1965	1.213	1.042
1966	0.384	0.449
1967	0.727	0.582
1968	0.760	0.791
1969	0.609	0.653

1970	0.877	0.832
1971	1.330	1.132
1972	0.873	0.881
1973	1.302	0.970
1974	0.586	0.592
1975	1.353	1.204
1976	1.322	0.788
1977	0.289	0.499
1978	1.228	1.094
1979	0.417	0.447
1980	1.013	0.660
1981	0.675	0.671
1982	0.317	0.395
1983	1.112	0.959
1984	0.696	0.774
1985	0.773	0.772
1986	0.684	0.695
1987	1.319	1.101
1988	0.764	0.809
1989	0.790	0.716
1990	0.850	0.774
1991	0.754	0.732
1992	1.834	0.846
1993	1.166	0.867
1994	1.539	1.143
1995	0.359	0.485
1996	1.390	1.046
1997	0.562	0.630
1998	0.760	0.856
1999	0.270	0.480
2000	0.561	0.658
2001	0.365	0.560
2002	1.193	0.824
2003	0.848	0.786
2004	0.727	0.742
2005	1.230	0.758
2006	0.439	0.519
2007	0.576	0.691
2008	0.719	0.674
2009	0.560	0.588
2010	0.466	0.696
2011	0.341	0.458
2012	0.827	1.020
2013	0.783	0.498
2014	0.349	0.422
2015	0.701	0.813
2016	0.291	0.442
2017	0.956	0.943
2018	1.803	1.331
2019	2.113	2.645
2020	0.558	0.676
2021	0.900	0.867
2022	0.408	0.492
2023	0.768	0.731
2024	6.069	2.156
2025	0.721	0.714
2026	1.094	0.955
2027	0.509	0.656

2028	0.400	0.475
2029	0.722	0.752
2030	1.323	1.163
2031	0.509	0.545
2032	0.271	0.412
2033	0.469	0.495
2034	0.452	0.636
2035	1.607	1.885
2036	0.817	0.809
2037	0.270	0.458
2038	0.702	0.821
2039	0.154	0.499
2040	1.393	0.688
2041	0.562	0.620
2042	2.511	2.461
2043	0.853	0.866
2044	0.957	0.839
2045	0.685	0.670
2046	0.798	0.767
2047	0.615	0.615
2048	0.796	0.814
2049	0.767	0.807
2050	0.536	0.690
2051	0.926	1.024
2052	0.456	0.535
2053	0.765	0.793
2054	1.484	0.794
2055	0.396	0.558
2056	0.420	0.500
2057	0.664	0.570
2058	0.670	0.592
2059	1.142	0.986

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	6.0688	2.6450
2	2.9487	2.4797
3	2.5883	2.4605
4	2.5113	2.1558
5	2.1217	2.1043
6	2.1126	1.8851
7	2.0549	1.3923
8	2.0397	1.3315
9	1.8340	1.2891
10	1.8027	1.2090
11	1.7978	1.2043
12	1.7567	1.2041
13	1.6166	1.1755
14	1.6069	1.1626
15	1.5391	1.1430
16	1.4843	1.1323
17	1.3926	1.1010
18	1.3898	1.0937
19	1.3775	1.0718
20	1.3574	1.0546
21	1.3531	1.0523
22	1.3295	1.0460

23	1.3229	1.0419
24	1.3215	1.0388
25	1.3187	1.0235
26	1.3023	1.0199
27	1.2840	0.9860
28	1.2301	0.9705
29	1.2283	0.9655
30	1.2132	0.9647
31	1.1928	0.9590
32	1.1656	0.9586
33	1.1419	0.9553
34	1.1118	0.9427
35	1.1067	0.9214
36	1.0972	0.8809
37	1.0939	0.8674
38	1.0287	0.8669
39	1.0166	0.8664
40	1.0149	0.8563
41	1.0132	0.8463
42	0.9827	0.8393
43	0.9617	0.8319
44	0.9572	0.8240
45	0.9562	0.8220
46	0.9258	0.8207
47	0.9002	0.8136
48	0.8773	0.8132
49	0.8727	0.8122
50	0.8529	0.8098
51	0.8501	0.8092
52	0.8475	0.8086
53	0.8474	0.8073
54	0.8342	0.7939
55	0.8267	0.7935
56	0.8174	0.7932
57	0.7982	0.7908
58	0.7976	0.7877
59	0.7963	0.7861
60	0.7901	0.7740
61	0.7834	0.7737
62	0.7802	0.7720
63	0.7766	0.7671
64	0.7726	0.7634
65	0.7698	0.7622
66	0.7678	0.7596
67	0.7674	0.7579
68	0.7651	0.7519
69	0.7636	0.7492
70	0.7616	0.7480
71	0.7601	0.7479
72	0.7598	0.7471
73	0.7541	0.7418
74	0.7487	0.7388
75	0.7329	0.7347
76	0.7267	0.7343
77	0.7266	0.7328
78	0.7222	0.7324
79	0.7213	0.7311
80	0.7195	0.7158

81	0.7155	0.7138
82	0.7023	0.7039
83	0.7011	0.6963
84	0.6956	0.6945
85	0.6914	0.6912
86	0.6854	0.6904
87	0.6837	0.6876
88	0.6831	0.6829
89	0.6761	0.6772
90	0.6752	0.6759
91	0.6699	0.6742
92	0.6644	0.6728
93	0.6634	0.6714
94	0.6613	0.6698
95	0.6525	0.6660
96	0.6417	0.6603
97	0.6257	0.6583
98	0.6255	0.6557
99	0.6147	0.6548
100	0.6090	0.6527
101	0.6073	0.6472
102	0.5924	0.6364
103	0.5855	0.6338
104	0.5763	0.6300
105	0.5726	0.6246
106	0.5624	0.6198
107	0.5622	0.6182
108	0.5605	0.6148
109	0.5599	0.6137
110	0.5591	0.6116
111	0.5580	0.5918
112	0.5501	0.5915
113	0.5501	0.5877
114	0.5436	0.5875
115	0.5361	0.5817
116	0.5194	0.5799
117	0.5092	0.5723
118	0.5087	0.5700
119	0.4826	0.5669
120	0.4797	0.5615
121	0.4690	0.5601
122	0.4680	0.5581
123	0.4664	0.5570
124	0.4559	0.5531
125	0.4531	0.5455
126	0.4516	0.5452
127	0.4421	0.5395
128	0.4393	0.5353
129	0.4321	0.5336
130	0.4286	0.5250
131	0.4262	0.5242
132	0.4202	0.5186
133	0.4175	0.5185
134	0.4082	0.5140
135	0.4045	0.5130
136	0.4003	0.5003
137	0.3994	0.4989
138	0.3962	0.4986

139	0.3839	0.4983
140	0.3699	0.4954
141	0.3651	0.4916
142	0.3592	0.4854
143	0.3512	0.4843
144	0.3489	0.4795
145	0.3414	0.4753
146	0.3165	0.4579
147	0.3006	0.4576
148	0.2935	0.4494
149	0.2906	0.4471
150	0.2899	0.4421
151	0.2890	0.4420
152	0.2847	0.4418
153	0.2714	0.4401
154	0.2698	0.4240
155	0.2697	0.4222
156	0.1881	0.4115
157	0.1537	0.3947
158	0.1377	0.3600

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3523	156845	140661	89	Pass
0.3742	135858	120438	88	Pass
0.3961	118394	103439	87	Pass
0.4180	104021	89597	86	Pass
0.4399	91525	78082	85	Pass
0.4618	80724	68428	84	Pass
0.4837	71568	59953	83	Pass
0.5056	63526	52675	82	Pass
0.5275	56580	46527	82	Pass
0.5494	50149	41126	82	Pass
0.5713	45081	36407	80	Pass
0.5932	40329	32104	79	Pass
0.6151	35992	28332	78	Pass
0.6371	32070	24992	77	Pass
0.6590	28531	22017	77	Pass
0.6809	25374	19425	76	Pass
0.7028	22599	17265	76	Pass
0.7247	20239	15316	75	Pass
0.7466	18079	13155	72	Pass
0.7685	16454	11416	69	Pass
0.7904	15000	9995	66	Pass
0.8123	13823	8770	63	Pass
0.8342	12694	7916	62	Pass
0.8561	11575	7009	60	Pass
0.8780	10635	6378	59	Pass
0.8999	9777	5670	57	Pass
0.9218	8928	4912	55	Pass
0.9437	8096	4261	52	Pass
0.9656	7556	3739	49	Pass
0.9875	7075	3259	46	Pass
1.0094	6597	2861	43	Pass
1.0313	6057	2461	40	Pass
1.0533	5525	2212	40	Pass
1.0752	5060	1982	39	Pass
1.0971	4585	1740	37	Pass
1.1190	4143	1428	34	Pass
1.1409	3805	1193	31	Pass
1.1628	3516	1007	28	Pass
1.1847	3252	827	25	Pass
1.2066	2961	683	23	Pass
1.2285	2732	587	21	Pass
1.2504	2466	489	19	Pass
1.2723	2155	389	18	Pass
1.2942	1952	324	16	Pass
1.3161	1725	279	16	Pass
1.3380	1517	258	17	Pass
1.3599	1350	253	18	Pass
1.3818	1193	242	20	Pass
1.4037	1058	238	22	Pass
1.4256	966	234	24	Pass
1.4475	866	225	25	Pass
1.4694	756	220	29	Pass
1.4914	655	213	32	Pass
1.5133	536	189	35	Pass

1.5352	466	174	37	Pass
1.5571	399	166	41	Pass
1.5790	304	161	52	Pass
1.6009	251	152	60	Pass
1.6228	214	142	66	Pass
1.6447	179	138	77	Pass
1.6666	132	129	97	Pass
1.6885	114	122	107	Pass
1.7104	94	115	122	Fail
1.7323	66	108	163	Fail
1.7542	47	101	214	Fail
1.7761	38	95	250	Fail
1.7980	32	90	281	Fail
1.8199	31	84	270	Fail
1.8418	30	78	260	Fail
1.8637	29	75	258	Fail
1.8856	29	71	244	Fail
1.9076	29	69	237	Fail
1.9295	28	68	242	Fail
1.9514	27	65	240	Fail
1.9733	27	63	233	Fail
1.9952	27	62	229	Fail
2.0171	26	62	238	Fail
2.0390	25	56	224	Fail
2.0609	23	54	234	Fail
2.0828	23	51	221	Fail
2.1047	21	48	228	Fail
2.1266	18	46	255	Fail
2.1485	18	43	238	Fail
2.1704	18	42	233	Fail
2.1923	17	39	229	Fail
2.2142	16	38	237	Fail
2.2361	16	37	231	Fail
2.2580	14	33	235	Fail
2.2799	14	33	235	Fail
2.3018	14	30	214	Fail
2.3238	13	29	223	Fail
2.3457	12	25	208	Fail
2.3676	12	22	183	Fail
2.3895	12	17	141	Fail
2.4114	12	17	141	Fail
2.4333	12	13	108	Pass
2.4552	12	10	83	Pass
2.4771	12	8	66	Pass
2.4990	11	6	54	Pass
2.5209	11	6	54	Pass

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0 acre-feet

On-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

Off-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Infiltration Vault POC	<input type="checkbox"/>	2743.25			<input type="checkbox"/>	45.32			
Permeable Pavement POC	<input type="checkbox"/>	1227.44			<input type="checkbox"/>	100.00			
Permeable Field POC	<input type="checkbox"/>	1330.20			<input type="checkbox"/>	100.00			
Total Volume Infiltrated		5300.89	0.00	0.00		71.70	0.00	0%	No Treat Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Pasture
Basin
27.03ac

Mitigated Schematic



Predeveloped UCI File

RUN

GLOBAL

```
WVHM4 model simulation
START      1901 10 01      END      2059 09 18
RUN INTERP OUTPUT LEVEL   3      0
RESUME     0 RUN         1
UNIT SYSTEM 1
```

END GLOBAL

FILES

```
<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26      Fort Lawton_Infiltration Vault.wdm
MESSU    25      PreFort Lawton_Infiltration Vault.MES
          27      PreFort Lawton_Infiltration Vault.L61
          28      PreFort Lawton_Infiltration Vault.L62
          30      POCFort Lawton_Infiltration Vault1.dat
```

END FILES

OPN SEQUENCE

```
INGRP          INDELT 00:05
  PERLND       14
  COPY         501
  DISPLY       1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      Pasture Basin          MAX          1      2      30      9
```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
1      1      1
501    1      1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
#      # OPCD ***
```

END OPCODE

PARM

```
#      #          K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #          User  t-series  Engl Metr ***
          in  out          ***
14      C, Pasture, Mod      1      1      1      1      27      0
```

END GEN-INFO

*** Section PWATER***

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST NITR PHOS TRAC ***
14      0      0      1      0      0      0      0      0      0      0      0      0
```

END ACTIVITY

PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST NITR PHOS TRAC *****
14      0      0      4      0      0      0      0      0      0      0      0      0      1      9
```

END PRINT-INFO

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
14 0 0 0 0 0 0 0 0 0 0 0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
14 0 4.5 0.06 400 0.05 0.5 0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
14 0 0 2 2 0 0 0
END PWAT-PARM3

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
14 0.15 0.4 0.3 6 0.5 0.4
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
14 0 0 0 0 2.5 1 0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***

END GEN-INFO
*** Section IWATER***

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
END ACTIVITY

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
END PRINT-INFO

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
END IWAT-PARM1

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LSUR SLSUR NSUR RETSC
END IWAT-PARM2

IWAT-PARM3
<PLS > IWATER input info: Part 3 ***
# - # ***PETMAX PETMIN
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS SURS
END IWAT-STATE1

```

END IMPLND

SCHEMATIC

<-Source->	<Name> #	<--Area-->	<-factor-->	<-Target->	MBLK	***
Pasture Basin***						
PERLND	14	27.0297		COPY 501	12	
PERLND	14	27.0297		COPY 501	13	

*****Routing*****
END SCHEMATIC

NETWORK

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
COPY	501	OUTPUT	MEAN	1 1 145.2	DISPLY 1	INPUT	TIMSER 1	

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***

END NETWORK

RCHRES

GEN-INFO	RCHRES	Name	Nexits	Unit	Systems	Printer	***
	# - #	<----->	<---->	User	T-series	Engl Metr LKFG	
				in	out		

END GEN-INFO
*** Section RCHRES***

ACTIVITY

<PLS > ***** Active Sections *****

#	-	#	HYFG	ADFG	CNFG	HTFG	SDFG	GQFG	OXFG	NUFG	PKFG	PHFG	***

END ACTIVITY

PRINT-INFO

<PLS > ***** Print-flags ***** PIVL PYR

#	-	#	HYDR	ADCA	CONS	HEAT	SED	GQL	OXRX	NUTR	PLNK	PHCB	PIVL	PYR	*****

END PRINT-INFO

HYDR-PARM1

RCHRES	Flags	for each	HYDR	Section	***	ODGTFG	for each	FUNCT	for each	***
# - #	VC A1 A2 A3	ODFVFG	for each	***	ODGTFG	for each	FUNCT	for each	***	
	FG FG FG FG	possible	exit	***	possible	exit	possible	exit	***	
	* * * *	* * * *	* * * *		* * * *	* * * *	* * * *	* * * *		

END HYDR-PARM1

HYDR-PARM2

#	-	#	FTABNO	LEN	DELTH	STCOR	KS	DB50	***

END HYDR-PARM2

HYDR-INIT

RCHRES	Initial	conditions	for each	HYDR	section	***
# - #	***	VOL	Initial	value	of COLIND	Initial
	***	ac-ft	for each	possible	exit	for each

END HYDR-INIT

END RCHRES

SPEC-ACTIONS

END SPEC-ACTIONS

FTABLES

END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
WDM	2	PREC	ENGL	1	PERLND	1 999	EXTNL	PREC
WDM	2	PREC	ENGL	1	IMPLND	1 999	EXTNL	PREC

```
WDM      1 EVAP      ENGL      1          PERLND    1 999 EXTNL  PETINP
WDM      1 EVAP      ENGL      1          IMPLND    1 999 EXTNL  PETINP
```

END EXT SOURCES

EXT TARGETS

```
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>      #      <Name> # #<-factor->strg <Name>      # <Name>      tem strg strg***
COPY      501 OUTPUT MEAN    1 1      145.2    WDM      501 FLOW      ENGL      REPL
END EXT TARGETS
```

MASS-LINK

```
<Volume>   <-Grp> <-Member-><--Mult-->   <Target>           <-Grp> <-Member->***
<Name>     #      <Name> # #<-factor->   <Name>           <Name> # #***
  MASS-LINK      12
PERLND      PWATER SURO           0.083333    COPY           INPUT  MEAN
  END MASS-LINK      12
```

```
  MASS-LINK      13
PERLND      PWATER IFWO           0.083333    COPY           INPUT  MEAN
  END MASS-LINK      13
```

END MASS-LINK

END RUN

Mitigated UCI File

RUN

GLOBAL

```
WVHM4 model simulation
START      1901 10 01      END      2059 09 18
RUN INTERP OUTPUT LEVEL   3      0
RESUME     0 RUN          1
UNIT SYSTEM 1
```

END GLOBAL

FILES

```
<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26    Fort Lawton_Infiltration Vault.wdm
MESSU    25    MitFort Lawton_Infiltration Vault.MES
          27    MitFort Lawton_Infiltration Vault.L61
          28    MitFort Lawton_Infiltration Vault.L62
          30    POCFort Lawton_Infiltration Vault1.dat
```

END FILES

OPN SEQUENCE

INGRP INDELT 00:05

```
IMPLND 4
PERLND 14
IMPLND 2
IMPLND 6
IMPLND 11
IMPLND 8
IMPLND 9
RCHRES 1
RCHRES 2
RCHRES 3
COPY 1
COPY 501
COPY 601
DISPLY 1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1 PYR DIG2 FIL2 YRND
1      Permeable Pavement      MAX      1      2      30      9
```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
1      1      1
501    1      1
601    1      1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
#      # OPCD ***
```

END OPCODE

PARM

```
#      #      K ***
```

END PARM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS Unit-systems Printer ***
# - #      User t-series Engl Metr ***
          in out ***
14      C, Pasture, Mod      1      1      1      1      27      0
```

END GEN-INFO

*** Section PWATER***

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
14      0      0      1      0      0      0      0      0      0      0      0      0
END ACTIVITY

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
14      0      0      4      0      0      0      0      0      0      0      0      0      1      9
END PRINT-INFO

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
14      0      0      0      0      0      0      0      0      0      0      0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILF LRSUR SLSUR KVARV AGWRC
14      0      4.5 0.06 400 0.05 0.5 0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
14      0      0      2      2      0      0      0
END PWAT-PARM3

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
14      0.15 0.4 0.3 6 0.5 0.4
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
14      0      0      0      0      2.5 1 0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***
4 ROOF TOPS/FLAT 1 1 1 27 0
2 ROADS/MOD 1 1 1 27 0
6 DRIVEWAYS/MOD 1 1 1 27 0
11 PARKING/FLAT 1 1 1 27 0
8 SIDEWALKS/FLAT 1 1 1 27 0
9 SIDEWALKS/MOD 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
4 0 0 1 0 0 0
2 0 0 1 0 0 0
6 0 0 1 0 0 0
11 0 0 1 0 0 0
8 0 0 1 0 0 0
9 0 0 1 0 0 0
END ACTIVITY

PRINT-INFO

```

```

<ILS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW IWAT  SLD  IWG IQAL  *****
4   0   0   4   0   0   0   1   9
2   0   0   4   0   0   0   1   9
6   0   0   4   0   0   0   1   9
11  0   0   4   0   0   0   1   9
8   0   0   4   0   0   0   1   9
9   0   0   4   0   0   0   1   9
END PRINT-INFO

```

```

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP  VRS  VNN RTLI  ***
4   0   0   0   0   0
2   0   0   0   0   0
6   0   0   0   0   0
11  0   0   0   0   0
8   0   0   0   0   0
9   0   0   0   0   0
END IWAT-PARM1

```

```

IWAT-PARM2
<PLS > IWATER input info: Part 2          ***
# - # *** LSUR   SLSUR   NSUR   RETSC
4   400   0.02   0.1   0.1
2   400   0.05   0.1   0.08
6   400   0.05   0.1   0.08
11  400   0.02   0.1   0.1
8   400   0.02   0.1   0.1
9   400   0.05   0.1   0.08
END IWAT-PARM2

```

```

IWAT-PARM3
<PLS > IWATER input info: Part 3          ***
# - # ***PETMAX  PETMIN
4   0   0
2   0   0
6   0   0
11  0   0
8   0   0
9   0   0
END IWAT-PARM3

```

```

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS  SURS
4   0   0
2   0   0
6   0   0
11  0   0
8   0   0
9   0   0
END IWAT-STATE1

```

END IMPLND

```

SCHEMATIC
<-Source->          <--Area-->          <-Target->          MBLK          ***
<Name> #           <-factor->          <Name> #          Tbl#          ***
New and Old Roofs***
IMPLND 4           2.3914          RCHRES 3          5
At grade surfaces***
PERLND 14          6.593           RCHRES 3          2
PERLND 14          6.593           RCHRES 3          3
IMPLND 2           0.3154          RCHRES 3          5
IMPLND 6           0.9362          RCHRES 3          5
IMPLND 11          2.128           RCHRES 3          5
Athletic Field & Grass***
IMPLND 8           3.6261          RCHRES 2          5
Walkways & Roads***

```



```

IMPLND 2 2.4793 RCHRES 1 5
IMPLND 9 0.8036 RCHRES 1 5
Bypass Areas***
PERLND 14 7.7567 COPY 501 12
PERLND 14 7.7567 COPY 601 12
PERLND 14 7.7567 COPY 501 13
PERLND 14 7.7567 COPY 601 13

```

*****Routing*****

```

IMPLND 4 2.3914 COPY 1 15
PERLND 14 6.593 COPY 1 12
IMPLND 2 0.3154 COPY 1 15
IMPLND 6 0.9362 COPY 1 15
IMPLND 11 2.128 COPY 1 15
PERLND 14 6.593 COPY 1 13
IMPLND 8 3.6261 COPY 1 15
IMPLND 2 2.4793 COPY 1 15
IMPLND 9 0.8036 COPY 1 15
RCHRES 3 1 COPY 501 17
RCHRES 1 1 COPY 501 17
RCHRES 2 1 COPY 501 17

```

END SCHEMATIC

NETWORK

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
COPY 501 OUTPUT MEAN 1 1 145.2 DISPLY 1 INPUT TIMSER 1

```

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
END NETWORK

```

RCHRES

GEN-INFO

RCHRES	Name	Nexits	Unit	Systems	Printer					
# - #	<----->	<---->	User	T-series	Engl Metr	LKFG				
			in	out						
1	Permeable Paveme-011	2	1	1 1	28 0	1				
2	Permeable Field	2	1	1 1	28 0	1				
3	Infiltration Vau-009	2	1	1 1	28 0	1				

END GEN-INFO

*** Section RCHRES***

ACTIVITY

```

<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
1 1 0 0 0 0 0 0 0 0 0 0
2 1 0 0 0 0 0 0 0 0 0 0
3 1 0 0 0 0 0 0 0 0 0 0

```

END ACTIVITY

PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL PYR
# - # HYDR ADCA CONS HEAT SED GQL OXRX NUTR PLNK PHCB PIVL PYR *****
1 4 0 0 0 0 0 0 0 0 0 0 1 9
2 4 0 0 0 0 0 0 0 0 0 0 1 9
3 4 0 0 0 0 0 0 0 0 0 0 1 9

```

END PRINT-INFO

HYDR-PARM1

RCHRES	Flags for each HYDR Section																		
# - #	VC A1 A2 A3	ODFVFG for each	***	ODGTFG for each	***	possible	exit	***	possible	exit	FUNCT	for each	possible	exit					
	FG FG FG FG		*	*	*	*	*	*	*	*									
1	0 1 0 0	4 5 0 0 0	*	*	*	*	*	*	*	*	2 2	2 2	2 2	2 2					
2	0 1 0 0	4 5 0 0 0	*	*	*	*	*	*	*	*	2 2	2 2	2 2	2 2					
3	0 1 0 0	4 5 0 0 0	*	*	*	*	*	*	*	*	2 2	2 2	2 2	2 2					

END HYDR-PARM1

```

HYDR-PARM2
# - # FTABNO LEN DELTH STCOR KS DB50 ***
<-----><-----><-----><-----><-----><-----><----->
1 1 0.03 0.0 0.0 0.5 0.0
2 2 0.03 0.0 0.0 0.5 0.0
3 3 0.01 0.0 0.0 0.5 0.0

```

END HYDR-PARM2

HYDR-INIT

RCHRES Initial conditions for each HYDR section ***

```

# - # *** VOL Initial value of COLIND Initial value of OUTDGT
*** ac-ft for each possible exit for each possible exit
<-----><-----><-----><-----><-----><-----><-----><----->
1 0 4.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
2 0 4.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
3 0 4.0 5.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

```

END HYDR-INIT

END RCHRES

SPEC-ACTIONS

END SPEC-ACTIONS

FTABLES

FTABLE 3

92 5

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.137741	0.000000	0.000000	0.000000		
0.088889	0.137741	0.012244	0.113775	0.138889		
0.177778	0.137741	0.024487	0.160901	0.138889		
0.266667	0.137741	0.036731	0.197063	0.138889		
0.355556	0.137741	0.048975	0.227549	0.138889		
0.444444	0.137741	0.061218	0.254408	0.138889		
0.533333	0.137741	0.073462	0.278690	0.138889		
0.622222	0.137741	0.085706	0.301019	0.138889		
0.711111	0.137741	0.097949	0.321803	0.138889		
0.800000	0.137741	0.110193	0.341324	0.138889		
0.888889	0.137741	0.122436	0.359787	0.138889		
0.977778	0.137741	0.134680	0.377347	0.138889		
1.066667	0.137741	0.146924	0.394126	0.138889		
1.155556	0.137741	0.159167	0.410220	0.138889		
1.244444	0.137741	0.171411	0.425705	0.138889		
1.333333	0.137741	0.183655	0.440647	0.138889		
1.422222	0.137741	0.195898	0.455098	0.138889		
1.511111	0.137741	0.208142	0.469104	0.138889		
1.600000	0.137741	0.220386	0.482704	0.138889		
1.688889	0.137741	0.232629	0.495932	0.138889		
1.777778	0.137741	0.244873	0.508815	0.138889		
1.866667	0.137741	0.257117	0.521380	0.138889		
1.955556	0.137741	0.269360	0.533650	0.138889		
2.044444	0.137741	0.281604	0.545643	0.138889		
2.133333	0.137741	0.293848	0.557379	0.138889		
2.222222	0.137741	0.306091	0.568873	0.138889		
2.311111	0.137741	0.318335	0.580138	0.138889		
2.400000	0.137741	0.330579	0.591190	0.138889		
2.488889	0.137741	0.342822	0.602038	0.138889		
2.577778	0.137741	0.355066	0.612695	0.138889		
2.666667	0.137741	0.367309	0.623169	0.138889		
2.755556	0.137741	0.379553	0.633470	0.138889		
2.844444	0.137741	0.391797	0.643606	0.138889		
2.933333	0.137741	0.404040	0.653585	0.138889		
3.022222	0.137741	0.416284	0.663414	0.138889		
3.111111	0.137741	0.428528	0.673099	0.138889		
3.200000	0.137741	0.440771	0.682647	0.138889		
3.288889	0.137741	0.453015	0.692063	0.138889		
3.377778	0.137741	0.465259	0.701353	0.138889		
3.466667	0.137741	0.477502	0.710522	0.138889		
3.555556	0.137741	0.489746	0.719573	0.138889		
3.644444	0.137741	0.501990	0.728512	0.138889		
3.733333	0.137741	0.514233	0.737343	0.138889		
3.822222	0.137741	0.526477	0.746069	0.138889		

3.911111	0.137741	0.538721	0.754695	0.138889
4.000000	0.137741	0.550964	0.763223	0.138889
4.088889	0.137741	0.563208	0.771656	0.138889
4.177778	0.137741	0.575451	0.779999	0.138889
4.266667	0.137741	0.587695	0.788253	0.138889
4.355556	0.137741	0.599939	0.796422	0.138889
4.444444	0.137741	0.612182	0.804507	0.138889
4.533333	0.137741	0.624426	0.812513	0.138889
4.622222	0.137741	0.636670	0.820440	0.138889
4.711111	0.137741	0.648913	0.828291	0.138889
4.800000	0.137741	0.661157	0.836069	0.138889
4.888889	0.137741	0.673401	0.843774	0.138889
4.977778	0.137741	0.685644	0.851411	0.138889
5.066667	0.137741	0.697888	1.307407	0.138889
5.155556	0.137741	0.710132	1.551467	0.138889
5.244444	0.137741	0.722375	1.732594	0.138889
5.333333	0.137741	0.734619	1.884010	0.138889
5.422222	0.137741	0.746863	2.017127	0.138889
5.511111	0.137741	0.759106	2.137503	0.138889
5.600000	0.137741	0.771350	2.248342	0.138889
5.688889	0.137741	0.783594	2.351692	0.138889
5.777778	0.137741	0.795837	2.448954	0.138889
5.866667	0.137741	0.808081	2.541140	0.138889
5.955556	0.137741	0.820324	2.629007	0.138889
6.044444	0.137741	0.832568	2.713139	0.138889
6.133333	0.137741	0.844812	2.794000	0.138889
6.222222	0.137741	0.857055	2.871961	0.138889
6.311111	0.137741	0.869299	2.947332	0.138889
6.400000	0.137741	0.881543	3.020366	0.138889
6.488889	0.137741	0.893786	3.091280	0.138889
6.577778	0.137741	0.906030	3.363328	0.138889
6.666667	0.137741	0.918274	3.524722	0.138889
6.755556	0.137741	0.930517	3.661115	0.138889
6.844444	0.137741	0.942761	3.784405	0.138889
6.933333	0.137741	0.955005	3.899014	0.138889
7.022222	0.137741	0.967248	4.059932	0.138889
7.111111	0.137741	0.979492	4.698100	0.138889
7.200000	0.137741	0.991736	5.613670	0.138889
7.288889	0.137741	1.003979	6.679281	0.138889
7.377778	0.137741	1.016223	7.783102	0.138889
7.466667	0.137741	1.028466	8.812377	0.138889
7.555556	0.137741	1.040710	9.670797	0.138889
7.644444	0.137741	1.052954	10.30775	0.138889
7.733333	0.137741	1.065197	10.75520	0.138889
7.822222	0.137741	1.077441	11.24818	0.138889
7.911111	0.137741	1.089685	11.66594	0.138889
8.000000	0.137741	1.101928	12.06597	0.138889
8.088889	0.137741	1.114172	12.45049	0.138889

END FTABLE 3

FTABLE 1

92 5

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	3.282828	0.000000	0.000000	0.000000		
0.013889	3.282828	0.011399	0.000000	0.000000		3.310185
0.027778	3.282828	0.022797	0.000000	0.000000		3.310185
0.041667	3.282828	0.034196	0.000000	0.000000		3.310185
0.055556	3.282828	0.045595	0.000000	0.000000		3.310185
0.069444	3.282828	0.056994	0.000000	0.000000		3.310185
0.083333	3.282828	0.068392	0.000000	0.000000		3.310185
0.097222	3.282828	0.079791	0.000000	0.000000		3.310185
0.111111	3.282828	0.091190	0.000000	0.000000		3.310185
0.125000	3.282828	0.102588	0.000000	0.000000		3.310185
0.138889	3.282828	0.113987	0.000000	0.000000		3.310185
0.152778	3.282828	0.125386	0.000000	0.000000		3.310185
0.166667	3.282828	0.136785	0.000000	0.000000		3.310185
0.180556	3.282828	0.148183	0.000000	0.000000		3.310185
0.194444	3.282828	0.159582	0.000000	0.000000		3.310185
0.208333	3.282828	0.170981	0.000000	0.000000		3.310185
0.222222	3.282828	0.182379	0.000000	0.000000		3.310185

0.236111	3.282828	0.193778	0.000000	3.310185
0.250000	3.282828	0.239373	0.000000	3.310185
0.263889	3.282828	0.284968	0.008681	3.310185
0.277778	3.282828	0.330563	0.024524	3.310185
0.291667	3.282828	0.376157	0.044953	3.310185
0.305556	3.282828	0.421752	0.068914	3.310185
0.319444	3.282828	0.467347	0.095623	3.310185
0.333333	3.282828	0.512942	0.124350	3.310185
0.347222	3.282828	0.558537	0.154365	3.310185
0.361111	3.282828	0.604132	0.184914	3.310185
0.375000	3.282828	0.649726	0.215235	3.310185
0.388889	3.282828	0.695321	0.244580	3.310185
0.402778	3.282828	0.740916	0.272241	3.310185
0.416667	3.282828	0.786511	0.297598	3.310185
0.430556	3.282828	0.832106	0.320157	3.310185
0.444444	3.282828	0.877701	0.339607	3.310185
0.458333	3.282828	0.923295	0.355866	3.310185
0.472222	3.282828	0.968890	0.369151	3.310185
0.486111	3.282828	1.014485	0.380031	3.310185
0.500000	3.282828	1.060080	0.393704	3.310185
0.513889	3.282828	1.105675	0.404492	3.310185
0.527778	3.282828	1.151270	0.415000	3.310185
0.541667	3.282828	1.196864	0.425249	3.310185
0.555556	3.282828	1.242459	0.435256	3.310185
0.569444	3.282828	1.288054	0.445038	3.310185
0.583333	3.282828	1.333649	0.454610	3.310185
0.597222	3.282828	1.379244	0.463984	3.310185
0.611111	3.282828	1.424839	0.473173	3.310185
0.625000	3.282828	1.470434	0.482187	3.310185
0.638889	3.282828	1.516028	0.491035	3.310185
0.652778	3.282828	1.561623	0.499726	3.310185
0.666667	3.282828	1.607218	0.508269	3.310185
0.680556	3.282828	1.652813	0.516671	3.310185
0.694444	3.282828	1.698408	0.524938	3.310185
0.708333	3.282828	1.744003	0.533077	3.310185
0.722222	3.282828	1.789597	0.541094	3.310185
0.736111	3.282828	1.835192	0.548994	3.310185
0.750000	3.282828	1.880787	0.556781	3.310185
0.763889	3.282828	1.926382	0.564461	3.310185
0.777778	3.282828	1.971977	0.572038	3.310185
0.791667	3.282828	2.017572	0.579516	3.310185
0.805556	3.282828	2.063166	0.586899	3.310185
0.819444	3.282828	2.108761	0.594190	3.310185
0.833333	3.282828	2.154356	0.601392	3.310185
0.847222	3.282828	2.199951	0.608510	3.310185
0.861111	3.282828	2.245546	0.615545	3.310185
0.875000	3.282828	2.291141	0.622500	3.310185
0.888889	3.282828	2.336735	0.629379	3.310185
0.902778	3.282828	2.382330	0.636183	3.310185
0.916667	3.282828	2.427925	0.642916	3.310185
0.930556	3.282828	2.473520	0.649578	3.310185
0.944444	3.282828	2.519115	0.656173	3.310185
0.958333	3.282828	2.564710	0.662702	3.310185
0.972222	3.282828	2.610304	0.669168	3.310185
0.986111	3.282828	2.655899	0.675571	3.310185
1.000000	3.282828	2.701494	0.681915	3.310185
1.013889	3.282828	2.747089	0.688200	3.310185
1.027778	3.282828	2.792684	0.694428	3.310185
1.041667	3.282828	2.838279	0.700601	3.310185
1.055556	3.282828	2.883873	0.706720	3.310185
1.069444	3.282828	2.929468	0.712786	3.310185
1.083333	3.282828	2.975063	0.718801	3.310185
1.097222	3.282828	3.020658	0.724767	3.310185
1.111111	3.282828	3.066253	0.730683	3.310185
1.125000	3.282828	3.111848	0.736552	3.310185
1.138889	3.282828	3.157442	0.742375	3.310185
1.152778	3.282828	3.203037	0.748152	3.310185
1.166667	3.282828	3.248632	0.753885	3.310185
1.180556	3.282828	3.294227	0.759575	3.310185
1.194444	3.282828	3.339822	0.765223	3.310185

1.208333 3.282828 3.385417 0.770829 3.310185
 1.222222 3.282828 3.431012 0.776394 3.310185
 1.236111 3.282828 3.476606 0.781920 3.310185
 1.250000 3.282828 3.522201 0.787408 3.310185
 1.263889 3.282828 3.567796 0.792857 3.310185

END FTABLE 1
 FTABLE 2
 92 5

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	3.626033	0.000000	0.000000	0.000000		
0.013889	3.626033	0.012590	0.000000	3.656250		
0.027778	3.626033	0.025181	0.000000	3.656250		
0.041667	3.626033	0.037771	0.000000	3.656250		
0.055556	3.626033	0.050362	0.000000	3.656250		
0.069444	3.626033	0.062952	0.000000	3.656250		
0.083333	3.626033	0.075542	0.000000	3.656250		
0.097222	3.626033	0.088133	0.000000	3.656250		
0.111111	3.626033	0.100723	0.000000	3.656250		
0.125000	3.626033	0.113314	0.000000	3.656250		
0.138889	3.626033	0.125904	0.000000	3.656250		
0.152778	3.626033	0.138494	0.000000	3.656250		
0.166667	3.626033	0.151085	0.000000	3.656250		
0.180556	3.626033	0.163675	0.000000	3.656250		
0.194444	3.626033	0.176265	0.000000	3.656250		
0.208333	3.626033	0.188856	0.000000	3.656250		
0.222222	3.626033	0.201446	0.000000	3.656250		
0.236111	3.626033	0.214037	0.000000	3.656250		
0.250000	3.626033	0.226627	0.000000	3.656250		
0.263889	3.626033	0.239218	0.000161	3.656250		
0.277778	3.626033	0.251808	0.000228	3.656250		
0.291667	3.626033	0.264399	0.000295	3.656250		
0.305556	3.626033	0.276989	0.000362	3.656250		
0.319444	3.626033	0.289580	0.000429	3.656250		
0.333333	3.626033	0.302170	0.000496	3.656250		
0.347222	3.626033	0.314761	0.000563	3.656250		
0.361111	3.626033	0.327351	0.000630	3.656250		
0.375000	3.626033	0.339942	0.000697	3.656250		
0.388889	3.626033	0.352532	0.000764	3.656250		
0.402778	3.626033	0.365123	0.000831	3.656250		
0.416667	3.626033	0.377713	0.000898	3.656250		
0.430556	3.626033	0.390304	0.000965	3.656250		
0.444444	3.626033	0.402894	0.001032	3.656250		
0.458333	3.626033	0.415485	0.001099	3.656250		
0.472222	3.626033	0.428075	0.001166	3.656250		
0.486111	3.626033	0.440666	0.001233	3.656250		
0.500000	3.626033	0.453256	0.001300	3.656250		
0.513889	3.626033	0.465847	0.001367	3.656250		
0.527778	3.626033	0.478437	0.001434	3.656250		
0.541667	3.626033	0.491028	0.001501	3.656250		
0.555556	3.626033	0.503618	0.001568	3.656250		
0.569444	3.626033	0.516209	0.001635	3.656250		
0.583333	3.626033	0.528799	0.001702	3.656250		
0.597222	3.626033	0.541390	0.001769	3.656250		
0.611111	3.626033	0.553980	0.001836	3.656250		
0.625000	3.626033	0.566571	0.001903	3.656250		
0.638889	3.626033	0.579161	0.001970	3.656250		
0.652778	3.626033	0.591752	0.002037	3.656250		
0.666667	3.626033	0.604342	0.002104	3.656250		
0.680556	3.626033	0.616933	0.002171	3.656250		
0.694444	3.626033	0.629523	0.002238	3.656250		
0.708333	3.626033	0.642114	0.002305	3.656250		
0.722222	3.626033	0.654704	0.002372	3.656250		
0.736111	3.626033	0.667295	0.002439	3.656250		
0.750000	3.626033	0.679885	0.002506	3.656250		
0.763889	3.626033	0.692476	0.002573	3.656250		
0.777778	3.626033	0.705066	0.002640	3.656250		
0.791667	3.626033	0.717657	0.002707	3.656250		
0.805556	3.626033	0.730247	0.002774	3.656250		
0.819444	3.626033	0.742838	0.002841	3.656250		

0.833333	3.626033	2.379584	0.001044	3.656250
0.847222	3.626033	2.429946	0.001056	3.656250
0.861111	3.626033	2.480307	0.001069	3.656250
0.875000	3.626033	2.530669	0.001081	3.656250
0.888889	3.626033	2.581030	0.001093	3.656250
0.902778	3.626033	2.631392	0.001104	3.656250
0.916667	3.626033	2.681754	0.001116	3.656250
0.930556	3.626033	2.732115	0.001128	3.656250
0.944444	3.626033	2.782477	0.001139	3.656250
0.958333	3.626033	2.832838	0.001151	3.656250
0.972222	3.626033	2.883200	0.001162	3.656250
0.986111	3.626033	2.933561	0.001173	3.656250
1.000000	3.626033	2.983923	0.001184	3.656250
1.013889	3.626033	3.034285	0.001195	3.656250
1.027778	3.626033	3.084646	0.001206	3.656250
1.041667	3.626033	3.135008	0.001216	3.656250
1.055556	3.626033	3.185369	0.001227	3.656250
1.069444	3.626033	3.235731	0.001237	3.656250
1.083333	3.626033	3.286092	0.001248	3.656250
1.097222	3.626033	3.336454	0.001258	3.656250
1.111111	3.626033	3.386816	0.001269	3.656250
1.125000	3.626033	3.437177	0.001279	3.656250
1.138889	3.626033	3.487539	0.001289	3.656250
1.152778	3.626033	3.537900	0.001299	3.656250
1.166667	3.626033	3.588262	0.001309	3.656250
1.180556	3.626033	3.638623	0.001319	3.656250
1.194444	3.626033	3.688985	0.001329	3.656250
1.208333	3.626033	3.739347	0.001338	3.656250
1.222222	3.626033	3.789708	0.001348	3.656250
1.236111	3.626033	3.840070	0.001358	3.656250
1.250000	3.626033	3.890431	0.001367	3.656250
1.263889	3.626033	3.940793	0.001376	3.656250

END FTABLE 2

END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***	
<Name>	#	<Name>	#	tem strg	<-factor-->	strg	<Name>	# #	***
WDM	2	PREC		ENGL	1		PERLND	1 999	EXTNL PREC
WDM	2	PREC		ENGL	1		IMPLND	1 999	EXTNL PREC
WDM	1	EVAP		ENGL	1		PERLND	1 999	EXTNL PETINP
WDM	1	EVAP		ENGL	1		IMPLND	1 999	EXTNL PETINP

END EXT SOURCES

EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name>	#	#<-factor-->	strg	<Name>	#	<Name>	tem strg	strg***
COPY	1	OUTPUT	MEAN	1 1	145.2	WDM	701	FLOW	ENGL	REPL
COPY	501	OUTPUT	MEAN	1 1	145.2	WDM	801	FLOW	ENGL	REPL
COPY	601	OUTPUT	MEAN	1 1	145.2	WDM	901	FLOW	ENGL	REPL
RCHRES	3	HYDR	RO	1 1	1	WDM	1000	FLOW	ENGL	REPL
RCHRES	3	HYDR	O	1 1	1	WDM	1002	FLOW	ENGL	REPL
RCHRES	3	HYDR	O	2 1	1	WDM	1003	FLOW	ENGL	REPL
RCHRES	3	HYDR	STAGE	1 1	1	WDM	1001	STAG	ENGL	REPL
RCHRES	1	HYDR	RO	1 1	1	WDM	1004	FLOW	ENGL	REPL
RCHRES	1	HYDR	O	1 1	1	WDM	1005	FLOW	ENGL	REPL
RCHRES	1	HYDR	O	2 1	1	WDM	1006	FLOW	ENGL	REPL
RCHRES	1	HYDR	STAGE	1 1	1	WDM	1007	STAG	ENGL	REPL
RCHRES	2	HYDR	RO	1 1	1	WDM	1008	FLOW	ENGL	REPL
RCHRES	2	HYDR	O	1 1	1	WDM	1009	FLOW	ENGL	REPL
RCHRES	2	HYDR	O	2 1	1	WDM	1010	FLOW	ENGL	REPL
RCHRES	2	HYDR	STAGE	1 1	1	WDM	1011	STAG	ENGL	REPL

END EXT TARGETS

MASS-LINK

<Volume>	<-Grp>	<-Member->	<--Mult-->	<Target>	<-Grp>	<-Member->	***
<Name>		<Name>	# #<-factor-->	<Name>		<Name>	# #***
MASS-LINK			2				
PERLND	PWATER	SURO	0.083333	RCHRES	INFLOW	IVOL	

```

END MASS-LINK      2

MASS-LINK          3
PERLND      PWATER IFWO      0.083333      RCHRES      INFLOW IVOL
END MASS-LINK      3

MASS-LINK          5
IMPLND      IWATER SURO      0.083333      RCHRES      INFLOW IVOL
END MASS-LINK      5

MASS-LINK          12
PERLND      PWATER SURO      0.083333      COPY      INPUT  MEAN
END MASS-LINK      12

MASS-LINK          13
PERLND      PWATER IFWO      0.083333      COPY      INPUT  MEAN
END MASS-LINK      13

MASS-LINK          15
IMPLND      IWATER SURO      0.083333      COPY      INPUT  MEAN
END MASS-LINK      15

MASS-LINK          17
RCHRES      OFLOW  OVOL      1      COPY      INPUT  MEAN
END MASS-LINK      17

END MASS-LINK

END RUN

```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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www.clearcreeksolutions.com

WWHM2012
PROJECT REPORT

PRELIMINARY

DETENTION VAULT

General Model Information

Project Name: Fort Lawton_Detention Vault_V2
Site Name: Fort Lawton
Site Address: 4585 Texas Way
City: Seattle
Report Date: 10/13/2022
Gage: SPU 158 Year 5min
Data Start: 10/01/1901
Data End: 09/18/2059
Timestep: 5 Minute
Precip Scale: 1.000
Version Date: 2019/09/13
Version: 4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Pasture Basin

Bypass: No

GroundWater: No

Pervious Land Use acre
C, Pasture, Mod 27.0297

Pervious Total 27.0297

Impervious Land Use acre

Impervious Total 0

Basin Total 27.0297

Element Flows To:
Surface Interflow Groundwater

Mitigated Land Use

New and Old Roofs

Bypass: No

GroundWater: No

Pervious Land Use acre

Pervious Total 0

Impervious Land Use acre
ROOF TOPS FLAT 2.3914

Impervious Total 2.3914

Basin Total 2.3914

Element Flows To:

Surface	Interflow	Groundwater
Detention Vault	Detention Vault	

At grade pavements

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
ROADS MOD	2.7947
DRIVEWAYS MOD	0.9362
SIDEWALKS MOD	0.8036
PARKING FLAT	2.128
Impervious Total	6.6625
Basin Total	6.6625

Element Flows To:		
Surface	Interflow	Groundwater
Detention Vault	Detention Vault	

Athletic Field & Grass

Bypass: No

GroundWater: No

Pervious Land Use acre
C, Pasture, Mod 6.593

Pervious Total 6.593

Impervious Land Use acre
SIDEWALKS FLAT 3.6261

Impervious Total 3.6261

Basin Total 10.2191

Element Flows To:

Surface	Interflow	Groundwater
Detention Vault	Detention Vault	

Bypass Areas

Bypass: Yes

GroundWater: No

Pervious Land Use
C, Pasture, Mod acre
7.7567

Pervious Total 7.7567

Impervious Land Use acre

Impervious Total 0

Basin Total 7.7567

Element Flows To:
Surface

Interflow

Groundwater

Routing Elements
Predeveloped Routing

Mitigated Routing

Detention Vault

Width: 80 ft.
Length: 100 ft.
Depth: 8 ft.
Discharge Structure
Riser Height: 7 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 3.75 in. Elevation:0 ft.
Orifice 2 Diameter: 8 in. Elevation:5 ft.
Orifice 3 Diameter: 5.18 in. Elevation:6.5 ft.
Element Flows To:
Outlet 1 Outlet 2

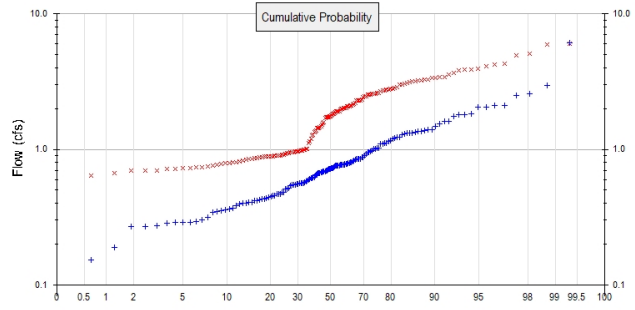
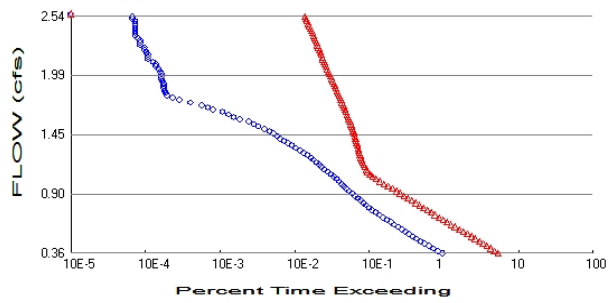
Vault Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.183	0.000	0.000	0.000
0.0889	0.183	0.016	0.113	0.000
0.1778	0.183	0.032	0.160	0.000
0.2667	0.183	0.049	0.197	0.000
0.3556	0.183	0.065	0.227	0.000
0.4444	0.183	0.081	0.254	0.000
0.5333	0.183	0.097	0.278	0.000
0.6222	0.183	0.114	0.301	0.000
0.7111	0.183	0.130	0.321	0.000
0.8000	0.183	0.146	0.341	0.000
0.8889	0.183	0.163	0.359	0.000
0.9778	0.183	0.179	0.377	0.000
1.0667	0.183	0.195	0.394	0.000
1.1556	0.183	0.212	0.410	0.000
1.2444	0.183	0.228	0.425	0.000
1.3333	0.183	0.244	0.440	0.000
1.4222	0.183	0.261	0.455	0.000
1.5111	0.183	0.277	0.469	0.000
1.6000	0.183	0.293	0.482	0.000
1.6889	0.183	0.310	0.495	0.000
1.7778	0.183	0.326	0.508	0.000
1.8667	0.183	0.342	0.521	0.000
1.9556	0.183	0.359	0.533	0.000
2.0444	0.183	0.375	0.545	0.000
2.1333	0.183	0.391	0.557	0.000
2.2222	0.183	0.408	0.568	0.000
2.3111	0.183	0.424	0.580	0.000
2.4000	0.183	0.440	0.591	0.000
2.4889	0.183	0.457	0.602	0.000
2.5778	0.183	0.473	0.612	0.000
2.6667	0.183	0.489	0.623	0.000
2.7556	0.183	0.506	0.633	0.000
2.8444	0.183	0.522	0.643	0.000
2.9333	0.183	0.538	0.653	0.000
3.0222	0.183	0.555	0.663	0.000
3.1111	0.183	0.571	0.673	0.000
3.2000	0.183	0.587	0.682	0.000
3.2889	0.183	0.604	0.692	0.000

3.3778	0.183	0.620	0.701	0.000
3.4667	0.183	0.636	0.710	0.000
3.5556	0.183	0.653	0.719	0.000
3.6444	0.183	0.669	0.728	0.000
3.7333	0.183	0.685	0.737	0.000
3.8222	0.183	0.702	0.746	0.000
3.9111	0.183	0.718	0.754	0.000
4.0000	0.183	0.734	0.763	0.000
4.0889	0.183	0.750	0.771	0.000
4.1778	0.183	0.767	0.780	0.000
4.2667	0.183	0.783	0.788	0.000
4.3556	0.183	0.799	0.796	0.000
4.4444	0.183	0.816	0.804	0.000
4.5333	0.183	0.832	0.812	0.000
4.6222	0.183	0.848	0.820	0.000
4.7111	0.183	0.865	0.828	0.000
4.8000	0.183	0.881	0.836	0.000
4.8889	0.183	0.897	0.843	0.000
4.9778	0.183	0.914	0.851	0.000
5.0667	0.183	0.930	1.307	0.000
5.1556	0.183	0.946	1.551	0.000
5.2444	0.183	0.963	1.732	0.000
5.3333	0.183	0.979	1.884	0.000
5.4222	0.183	0.995	2.017	0.000
5.5111	0.183	1.012	2.137	0.000
5.6000	0.183	1.028	2.248	0.000
5.6889	0.183	1.044	2.351	0.000
5.7778	0.183	1.061	2.449	0.000
5.8667	0.183	1.077	2.541	0.000
5.9556	0.183	1.093	2.629	0.000
6.0444	0.183	1.110	2.713	0.000
6.1333	0.183	1.126	2.794	0.000
6.2222	0.183	1.142	2.872	0.000
6.3111	0.183	1.159	2.947	0.000
6.4000	0.183	1.175	3.020	0.000
6.4889	0.183	1.191	3.091	0.000
6.5778	0.183	1.208	3.363	0.000
6.6667	0.183	1.224	3.524	0.000
6.7556	0.183	1.240	3.661	0.000
6.8444	0.183	1.257	3.784	0.000
6.9333	0.183	1.273	3.899	0.000
7.0222	0.183	1.289	4.059	0.000
7.1111	0.183	1.306	4.698	0.000
7.2000	0.183	1.322	5.613	0.000
7.2889	0.183	1.338	6.679	0.000
7.3778	0.183	1.355	7.783	0.000
7.4667	0.183	1.371	8.812	0.000
7.5556	0.183	1.387	9.670	0.000
7.6444	0.183	1.403	10.30	0.000
7.7333	0.183	1.420	10.75	0.000
7.8222	0.183	1.436	11.24	0.000
7.9111	0.183	1.452	11.66	0.000
8.0000	0.183	1.469	12.06	0.000
8.0889	0.183	1.485	12.45	0.000
8.1778	0.000	0.000	12.82	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1

Total Pervious Area: 27.0297
 Total Impervious Area: 0

Mitigated Landuse Totals for POC #1

Total Pervious Area: 14.3497
 Total Impervious Area: 12.68

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.704573
5 year	1.164144
10 year	1.530507
25 year	2.066586
50 year	2.520897
100 year	3.023881

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	1.613251
5 year	2.635213
10 year	3.424437
25 year	4.546939
50 year	5.473362
100 year	6.476891

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1902	0.519	1.432
1903	0.480	0.899
1904	0.626	2.086
1905	0.442	1.834
1906	0.188	0.728
1907	1.097	3.218
1908	0.749	1.729
1909	1.017	1.796
1910	0.983	3.013
1911	2.040	1.436

1912	2.949	3.952
1913	1.029	2.024
1914	0.294	1.152
1915	0.483	0.876
1916	0.691	1.972
1917	0.285	0.741
1918	0.733	1.721
1919	0.573	0.899
1920	0.847	1.445
1921	0.777	1.751
1922	0.770	2.474
1923	0.683	2.130
1924	0.426	0.933
1925	0.453	0.883
1926	0.762	1.203
1927	0.432	0.924
1928	0.550	0.901
1929	1.015	3.107
1930	0.653	0.980
1931	0.716	1.992
1932	0.592	1.734
1933	0.607	1.736
1934	1.357	3.248
1935	0.642	1.005
1936	0.559	0.878
1937	1.107	3.160
1938	0.780	1.266
1939	0.138	0.728
1940	0.626	1.900
1941	0.290	0.794
1942	0.962	2.574
1943	0.550	1.346
1944	1.617	4.969
1945	0.798	2.101
1946	0.661	0.917
1947	0.351	1.472
1948	1.377	3.419
1949	1.284	3.386
1950	0.429	0.888
1951	0.468	0.799
1952	1.757	6.035
1953	2.055	5.944
1954	0.663	1.291
1955	0.544	0.959
1956	0.301	0.601
1957	0.834	2.032
1958	1.798	3.797
1959	2.122	2.539
1960	0.370	0.857
1961	2.588	2.748
1962	0.676	2.033
1963	0.399	0.885
1964	0.404	0.965
1965	1.213	3.130
1966	0.384	0.831
1967	0.727	0.903
1968	0.760	2.067
1969	0.609	1.560

1970	0.877	2.592
1971	1.330	3.273
1972	0.873	2.565
1973	1.302	3.043
1974	0.586	1.466
1975	1.353	3.892
1976	1.322	2.540
1977	0.289	0.805
1978	1.228	3.194
1979	0.417	0.742
1980	1.013	0.988
1981	0.675	1.381
1982	0.317	0.738
1983	1.112	2.702
1984	0.696	1.816
1985	0.773	1.868
1986	0.684	1.113
1987	1.319	3.238
1988	0.764	2.012
1989	0.790	1.698
1990	0.850	1.910
1991	0.754	2.175
1992	1.834	2.477
1993	1.166	2.108
1994	1.539	3.015
1995	0.359	0.718
1996	1.390	2.740
1997	0.562	0.951
1998	0.760	2.669
1999	0.270	0.694
2000	0.561	0.950
2001	0.365	0.855
2002	1.193	1.524
2003	0.848	2.320
2004	0.727	2.212
2005	1.230	0.941
2006	0.439	0.782
2007	0.576	2.707
2008	0.719	1.361
2009	0.560	0.884
2010	0.466	2.296
2011	0.341	0.701
2012	0.827	3.430
2013	0.783	0.888
2014	0.349	0.669
2015	0.701	2.299
2016	0.291	0.719
2017	0.956	5.051
2018	1.803	3.582
2019	2.113	4.241
2020	0.558	0.916
2021	0.900	2.591
2022	0.408	0.765
2023	0.768	1.772
2024	6.069	2.826
2025	0.721	1.587
2026	1.094	2.894
2027	0.509	0.972

2028	0.400	0.818
2029	0.722	1.761
2030	1.323	3.641
2031	0.509	0.859
2032	0.271	0.639
2033	0.469	0.836
2034	0.452	1.991
2035	1.607	4.257
2036	0.817	1.901
2037	0.270	0.763
2038	0.702	2.804
2039	0.154	0.696
2040	1.393	1.887
2041	0.562	0.969
2042	2.511	4.115
2043	0.853	2.553
2044	0.957	2.288
2045	0.685	1.005
2046	0.798	2.082
2047	0.615	0.977
2048	0.796	2.437
2049	0.767	2.528
2050	0.536	1.596
2051	0.926	3.863
2052	0.456	1.912
2053	0.765	2.279
2054	1.484	3.378
2055	0.396	0.847
2056	0.420	0.787
2057	0.664	0.992
2058	0.670	0.984
2059	1.142	2.805

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	6.0688	6.0351
2	2.9487	5.9441
3	2.5883	5.0510
4	2.5113	4.9690
5	2.1217	4.2566
6	2.1126	4.2408
7	2.0549	4.1151
8	2.0397	3.9522
9	1.8340	3.8916
10	1.8027	3.8627
11	1.7978	3.7968
12	1.7567	3.6411
13	1.6166	3.5817
14	1.6069	3.4301
15	1.5391	3.4194
16	1.4843	3.3858
17	1.3926	3.3775
18	1.3898	3.2726
19	1.3775	3.2479
20	1.3574	3.2384
21	1.3531	3.2176
22	1.3295	3.1943

23	1.3229	3.1597
24	1.3215	3.1296
25	1.3187	3.1066
26	1.3023	3.0426
27	1.2840	3.0151
28	1.2301	3.0125
29	1.2283	2.8937
30	1.2132	2.8264
31	1.1928	2.8048
32	1.1656	2.8038
33	1.1419	2.7476
34	1.1118	2.7405
35	1.1067	2.7066
36	1.0972	2.7024
37	1.0939	2.6692
38	1.0287	2.5915
39	1.0166	2.5910
40	1.0149	2.5736
41	1.0132	2.5649
42	0.9827	2.5533
43	0.9617	2.5399
44	0.9572	2.5391
45	0.9562	2.5284
46	0.9258	2.4768
47	0.9002	2.4744
48	0.8773	2.4372
49	0.8727	2.3199
50	0.8529	2.2988
51	0.8501	2.2962
52	0.8475	2.2885
53	0.8474	2.2786
54	0.8342	2.2122
55	0.8267	2.1750
56	0.8174	2.1305
57	0.7982	2.1079
58	0.7976	2.1013
59	0.7963	2.0858
60	0.7901	2.0819
61	0.7834	2.0670
62	0.7802	2.0331
63	0.7766	2.0319
64	0.7726	2.0241
65	0.7698	2.0123
66	0.7678	1.9920
67	0.7674	1.9914
68	0.7651	1.9721
69	0.7636	1.9117
70	0.7616	1.9104
71	0.7601	1.9007
72	0.7598	1.8997
73	0.7541	1.8869
74	0.7487	1.8677
75	0.7329	1.8337
76	0.7267	1.8159
77	0.7266	1.7965
78	0.7222	1.7717
79	0.7213	1.7614
80	0.7195	1.7510

81	0.7155	1.7363
82	0.7023	1.7339
83	0.7011	1.7286
84	0.6956	1.7212
85	0.6914	1.6980
86	0.6854	1.5965
87	0.6837	1.5865
88	0.6831	1.5603
89	0.6761	1.5236
90	0.6752	1.4718
91	0.6699	1.4657
92	0.6644	1.4453
93	0.6634	1.4363
94	0.6613	1.4324
95	0.6525	1.3809
96	0.6417	1.3607
97	0.6257	1.3457
98	0.6255	1.2907
99	0.6147	1.2661
100	0.6090	1.2029
101	0.6073	1.1519
102	0.5924	1.1133
103	0.5855	1.0055
104	0.5763	1.0053
105	0.5726	0.9919
106	0.5624	0.9881
107	0.5622	0.9839
108	0.5605	0.9799
109	0.5599	0.9770
110	0.5591	0.9718
111	0.5580	0.9688
112	0.5501	0.9652
113	0.5501	0.9592
114	0.5436	0.9509
115	0.5361	0.9497
116	0.5194	0.9408
117	0.5092	0.9334
118	0.5087	0.9242
119	0.4826	0.9167
120	0.4797	0.9160
121	0.4690	0.9026
122	0.4680	0.9007
123	0.4664	0.8994
124	0.4559	0.8986
125	0.4531	0.8877
126	0.4516	0.8876
127	0.4421	0.8847
128	0.4393	0.8838
129	0.4321	0.8826
130	0.4286	0.8782
131	0.4262	0.8761
132	0.4202	0.8592
133	0.4175	0.8566
134	0.4082	0.8546
135	0.4045	0.8467
136	0.4003	0.8357
137	0.3994	0.8314
138	0.3962	0.8176

139	0.3839	0.8048
140	0.3699	0.7986
141	0.3651	0.7942
142	0.3592	0.7869
143	0.3512	0.7821
144	0.3489	0.7653
145	0.3414	0.7627
146	0.3165	0.7425
147	0.3006	0.7413
148	0.2935	0.7378
149	0.2906	0.7282
150	0.2899	0.7281
151	0.2890	0.7185
152	0.2847	0.7180
153	0.2714	0.7015
154	0.2698	0.6962
155	0.2697	0.6943
156	0.1881	0.6691
157	0.1537	0.6390
158	0.1377	0.6006

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.3523	156845	881019	561	Fail
0.3742	135858	788132	580	Fail
0.3961	118394	703220	593	Fail
0.4180	104021	625786	601	Fail
0.4399	91525	556494	608	Fail
0.4618	80724	494680	612	Fail
0.4837	71568	438516	612	Fail
0.5056	63526	388001	610	Fail
0.5275	56580	341640	603	Fail
0.5494	50149	301095	600	Fail
0.5713	45081	267197	592	Fail
0.5932	40329	235791	584	Fail
0.6151	35992	207543	576	Fail
0.6371	32070	182950	570	Fail
0.6590	28531	161963	567	Fail
0.6809	25374	142738	562	Fail
0.7028	22599	126437	559	Fail
0.7247	20239	112013	553	Fail
0.7466	18079	99551	550	Fail
0.7685	16454	88484	537	Fail
0.7904	15000	78597	523	Fail
0.8123	13823	69790	504	Fail
0.8342	12694	61748	486	Fail
0.8561	11575	54553	471	Fail
0.8780	10635	48205	453	Fail
0.8999	9777	42971	439	Fail
0.9218	8928	38484	431	Fail
0.9437	8096	33798	417	Fail
0.9656	7556	29628	392	Fail
0.9875	7075	26105	368	Fail
1.0094	6597	22998	348	Fail
1.0313	6057	20439	337	Fail
1.0533	5525	18445	333	Fail
1.0752	5060	17065	337	Fail
1.0971	4585	15934	347	Fail
1.1190	4143	15115	364	Fail
1.1409	3805	14473	380	Fail
1.1628	3516	13975	397	Fail
1.1847	3252	13546	416	Fail
1.2066	2961	13127	443	Fail
1.2285	2732	12787	468	Fail
1.2504	2466	12492	506	Fail
1.2723	2155	12203	566	Fail
1.2942	1952	11937	611	Fail
1.3161	1725	11726	679	Fail
1.3380	1517	11497	757	Fail
1.3599	1350	11276	835	Fail
1.3818	1193	11040	925	Fail
1.4037	1058	10804	1021	Fail
1.4256	966	10567	1093	Fail
1.4475	866	10312	1190	Fail
1.4694	756	10116	1338	Fail
1.4914	655	9890	1509	Fail
1.5133	536	9649	1800	Fail

1.5352	466	9402	2017	Fail
1.5571	399	9128	2287	Fail
1.5790	304	8853	2912	Fail
1.6009	251	8574	3415	Fail
1.6228	214	8322	3888	Fail
1.6447	179	8079	4513	Fail
1.6666	132	7843	5941	Fail
1.6885	114	7622	6685	Fail
1.7104	94	7391	7862	Fail
1.7323	66	7180	10878	Fail
1.7542	47	6956	14800	Fail
1.7761	38	6748	17757	Fail
1.7980	32	6524	20387	Fail
1.8199	31	6314	20367	Fail
1.8418	30	6127	20423	Fail
1.8637	29	5916	20400	Fail
1.8856	29	5738	19786	Fail
1.9076	29	5547	19127	Fail
1.9295	28	5374	19192	Fail
1.9514	27	5198	19251	Fail
1.9733	27	5027	18618	Fail
1.9952	27	4860	18000	Fail
2.0171	26	4683	18011	Fail
2.0390	25	4533	18132	Fail
2.0609	23	4375	19021	Fail
2.0828	23	4246	18460	Fail
2.1047	21	4116	19600	Fail
2.1266	18	3996	22200	Fail
2.1485	18	3880	21555	Fail
2.1704	18	3774	20966	Fail
2.1923	17	3666	21564	Fail
2.2142	16	3564	22275	Fail
2.2361	16	3456	21600	Fail
2.2580	14	3362	24014	Fail
2.2799	14	3260	23285	Fail
2.3018	14	3159	22564	Fail
2.3238	13	3062	23553	Fail
2.3457	12	2973	24775	Fail
2.3676	12	2881	24008	Fail
2.3895	12	2788	23233	Fail
2.4114	12	2694	22450	Fail
2.4333	12	2599	21658	Fail
2.4552	12	2501	20841	Fail
2.4771	12	2414	20116	Fail
2.4990	11	2336	21236	Fail
2.5209	11	2257	20518	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.

The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume: 0 acre-feet

On-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

Off-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Detention Vault POC	<input type="checkbox"/>	5301.39			<input type="checkbox"/>	0.00			
Total Volume Infiltrated		5301.39	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Pasture
Basin
27.03ac

Mitigated Schematic



Predeveloped UCI File

RUN

GLOBAL

```
WVHM4 model simulation
START      1901 10 01      END      2059 09 18
RUN INTERP OUTPUT LEVEL   3      0
RESUME     0 RUN         1
UNIT SYSTEM 1
```

END GLOBAL

FILES

```
<File> <Un#> <-----File Name----->***
<-ID->                                     ***
WDM      26      Fort Lawton_Detention Vault_V2.wdm
MESSU    25      PreFort Lawton_Detention Vault_V2.MES
          27      PreFort Lawton_Detention Vault_V2.L61
          28      PreFort Lawton_Detention Vault_V2.L62
          30      POCFort Lawton_Detention Vault_V21.dat
```

END FILES

OPN SEQUENCE

```
INGRP          INDELT 00:05
  PERLND       14
  COPY         501
  DISPLY       1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      Pasture Basin          MAX          1    2    30    9
```

END DISPLY-INFO1

END DISPLY

COPY

TIMESERIES

```
# - # NPT NMN ***
1      1    1
501    1    1
```

END TIMESERIES

END COPY

GENER

OPCODE

```
#      # OPCODE ***
```

END OPCODE

PARAM

```
#      #          K ***
```

END PARAM

END GENER

PERLND

GEN-INFO

```
<PLS ><-----Name----->NBLKS  Unit-systems  Printer ***
# - #          User  t-series  Engl Metr ***
          in  out          ***
14      C, Pasture, Mod  1    1    1    1    27    0
```

END GEN-INFO

*** Section PWATER***

ACTIVITY

```
<PLS > ***** Active Sections *****
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST NITR PHOS TRAC ***
14      0    0    1    0    0    0    0    0    0    0    0    0
```

END ACTIVITY

PRINT-INFO

```
<PLS > ***** Print-flags ***** PIVL  PYR
# - # ATMP SNOW PWAT  SED  PST  PWG  PQAL MSTL PEST NITR PHOS TRAC *****
14      0    0    4    0    0    0    0    0    0    0    0    0    1    9
```

END PRINT-INFO

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VNN VIFW VIRC VLE INFC HWT ***
14 0 0 0 0 0 0 0 0 0 0 0
END PWAT-PARM1

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LRSUR SLSUR KVARY AGWRC
14 0 4.5 0.06 400 0.05 0.5 0.996
END PWAT-PARM2

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
14 0 0 2 2 0 0 0
END PWAT-PARM3

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
14 0.15 0.4 0.3 6 0.5 0.4
END PWAT-PARM4

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
14 0 0 0 0 2.5 1 0
END PWAT-STATE1

END PERLND

IMPLND
GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engl Metr ***
in out ***

END GEN-INFO
*** Section IWATER***

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
END ACTIVITY

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****
END PRINT-INFO

IWAT-PARM1
<PLS > IWATER variable monthly parameter value flags ***
# - # CSNO RTOP VRS VNN RTLI ***
END IWAT-PARM1

IWAT-PARM2
<PLS > IWATER input info: Part 2 ***
# - # *** LRSUR SLSUR NSUR RETSC
END IWAT-PARM2

IWAT-PARM3
<PLS > IWATER input info: Part 3 ***
# - # ***PETMAX PETMIN
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # *** RETS SURS
END IWAT-STATE1

```

END IMPLND

SCHEMATIC

<-Source->	<Name>	<--Area-->	<-factor-->	<-Target->	MBLK	Tbl#	***
Pasture Basin***							
PERLND	14	27.0297		COPY	501	12	
PERLND	14	27.0297		COPY	501	13	

*****Routing*****
END SCHEMATIC

NETWORK

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
COPY	501	OUTPUT	MEAN	1 1 145.2	DISPLY	1	INPUT	TIMSER 1

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***

END NETWORK

RCHRES

GEN-INFO	RCHRES	Name	Nexits	Unit	Systems	Printer	***
	# - #	<----->	<---->	User	T-series	Engl Metr LKFG	***
				in	out		***

END GEN-INFO
*** Section RCHRES***

ACTIVITY

<PLS > ***** Active Sections *****

#	-	#	HYFG	ADFG	CNFG	HTFG	SDFG	GQFG	OXFG	NUFG	PKFG	PHFG	***

END ACTIVITY

PRINT-INFO

<PLS > ***** Print-flags ***** PIVL PYR

#	-	#	HYDR	ADCA	CONS	HEAT	SED	GQL	OXRX	NUTR	PLNK	PHCB	PIVL	PYR	*****

END PRINT-INFO

HYDR-PARM1

RCHRES	Flags	for each	HYDR	Section	***	ODGTFG	for each	FUNCT	for each
# - #	VC A1 A2 A3	ODFVFG	for each	***	ODGTFG	for each	FUNCT	for each	
	FG FG FG FG	possible	exit	***	possible	exit	possible	exit	
	* * * *	* * * *	* * * *		* * * *	* * * *	* * * *	* * * *	

END HYDR-PARM1

HYDR-PARM2

#	-	#	FTABNO	LEN	DELTH	STCOR	KS	DB50	***

END HYDR-PARM2

HYDR-INIT

RCHRES	Initial	conditions	for each	HYDR	section	***
# - #	***	VOL	Initial	value	of COLIND	Initial
	***	ac-ft	for each	possible	exit	for each

END HYDR-INIT

END RCHRES

SPEC-ACTIONS

END SPEC-ACTIONS

FTABLES

END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap	<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***
WDM	2	PREC	ENGL	1	PERLND	1 999	EXTNL	PREC
WDM	2	PREC	ENGL	1	IMPLND	1 999	EXTNL	PREC

WDM 1 EVAP ENGL 1 PERLND 1 999 EXTNL PETINP
WDM 1 EVAP ENGL 1 IMPLND 1 999 EXTNL PETINP

END EXT SOURCES

EXT TARGETS

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name> # <Name> # #<-factor->strg <Name> # <Name> tem strg strg***
COPY 501 OUTPUT MEAN 1 1 145.2 WDM 501 FLOW ENGL REPL
END EXT TARGETS

MASS-LINK

<Volume> <-Grp> <-Member-><--Mult--> <Target> <-Grp> <-Member->***
<Name> <Name> # #<-factor-> <Name> <Name> # #***
MASS-LINK 12
PERLND PWATER SURO 0.083333 COPY INPUT MEAN
END MASS-LINK 12

MASS-LINK 13
PERLND PWATER IFWO 0.083333 COPY INPUT MEAN
END MASS-LINK 13

END MASS-LINK

END RUN

Mitigated UCI File

RUN

GLOBAL

WVHM4 model simulation
START 1901 10 01 END 2059 09 18
RUN INTERP OUTPUT LEVEL 3 0
RESUME 0 RUN 1 UNIT SYSTEM 1
END GLOBAL

FILES

<File>	<Un#>	<-----File Name----->	***
<-ID->			***
WDM	26	Fort Lawton_Detention Vault_V2.wdm	
MESSU	25	MitFort Lawton_Detention Vault_V2.MES	
	27	MitFort Lawton_Detention Vault_V2.L61	
	28	MitFort Lawton_Detention Vault_V2.L62	
	30	POCFort Lawton_Detention Vault_V21.dat	

END FILES

OPN SEQUENCE

INGRP INDELT 00:05
IMPLND 4
IMPLND 2
IMPLND 6
IMPLND 9
IMPLND 11
PERLND 14
IMPLND 8
RCHRES 1
COPY 1
COPY 501
COPY 601
DISPLY 1

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

#	-	#	<-----Title----->	***TRAN	PIVL	DIG1	FIL1	PYR	DIG2	FIL2	YRND
1			Detention Vault	MAX				1	2	30	9

END DISPLY-INFO1

END DISPLY

COPY

#	-	#	NPT	NMN	***
1			1	1	
501			1	1	
601			1	1	

END TIMESERIES

END COPY

GENER

OPCODE
OPCD ***
END OPCODE

PARM
K ***
END PARM

END GENER

PERLND

GEN-INFO

<PLS >	<-----Name----->	NBLKS	Unit-systems	Printer	***		
#	-	#	User	t-series	Engl Metr	***	
			in	out		***	
14	C, Pasture, Mod	1	1	1	1	27	0

END GEN-INFO

*** Section PWATER***

ACTIVITY

<PLS > ***** Active Sections *****

```

# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC ***
14 0 0 1 0 0 0 0 0 0 0 0 0 0
END ACTIVITY

```

```

PRINT-INFO
<PLS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW PWAT SED PST PWG PQAL MSTL PEST NITR PHOS TRAC *****
14 0 0 4 0 0 0 0 0 0 0 0 0 1 9
END PRINT-INFO

```

```

PWAT-PARM1
<PLS > PWATER variable monthly parameter value flags ***
# - # CSNO RTOP UZFG VCS VUZ VMN VIFW VIRC VLE INFC HWT ***
14 0 0 0 0 0 0 0 0 0 0 0
END PWAT-PARM1

```

```

PWAT-PARM2
<PLS > PWATER input info: Part 2 ***
# - # ***FOREST LZSN INFILT LSUR SLSUR KVARY AGWRC
14 0 4.5 0.06 400 0.05 0.5 0.996
END PWAT-PARM2

```

```

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
14 0 0 2 2 0 0 0
END PWAT-PARM3

```

```

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
14 0.15 0.4 0.3 6 0.5 0.4
END PWAT-PARM4

```

```

PWAT-STATE1
<PLS > *** Initial conditions at start of simulation
ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
# - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
14 0 0 0 0 2.5 1 0
END PWAT-STATE1

```

END PERLND

IMPLND

```

GEN-INFO
<PLS ><-----Name-----> Unit-systems Printer ***
# - # User t-series Engr Metr ***
in out ***
4 ROOF TOPS/FLAT 1 1 1 27 0
2 ROADS/MOD 1 1 1 27 0
6 DRIVEWAYS/MOD 1 1 1 27 0
9 SIDEWALKS/MOD 1 1 1 27 0
11 PARKING/FLAT 1 1 1 27 0
8 SIDEWALKS/FLAT 1 1 1 27 0

```

```

END GEN-INFO
*** Section IWATER***

```

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
4 0 0 1 0 0 0
2 0 0 1 0 0 0
6 0 0 1 0 0 0
9 0 0 1 0 0 0
11 0 0 1 0 0 0
8 0 0 1 0 0 0
END ACTIVITY

```

```

PRINT-INFO
<ILS > ***** Print-flags ***** PIVL PYR
# - # ATMP SNOW IWAT SLD IWG IQAL *****

```



```

4      0      0      4      0      0      0      1      9
2      0      0      4      0      0      0      1      9
6      0      0      4      0      0      0      1      9
9      0      0      4      0      0      0      1      9
11     0      0      4      0      0      0      1      9
8      0      0      4      0      0      0      1      9

```

END PRINT-INFO

IWAT-PARM1

<PLS > IWATER variable monthly parameter value flags ***

```

# - # CSNO RTOP VRS VNN RTLI ***
4      0      0      0      0      0
2      0      0      0      0      0
6      0      0      0      0      0
9      0      0      0      0      0
11     0      0      0      0      0
8      0      0      0      0      0

```

END IWAT-PARM1

IWAT-PARM2

<PLS > IWATER input info: Part 2 ***

```

# - # *** LSUR SLSUR NSUR RETSC
4      400      0.02      0.1      0.1
2      400      0.05      0.1      0.08
6      400      0.05      0.1      0.08
9      400      0.05      0.1      0.08
11     400      0.02      0.1      0.1
8      400      0.02      0.1      0.1

```

END IWAT-PARM2

IWAT-PARM3

<PLS > IWATER input info: Part 3 ***

```

# - # ***PETMAX PETMIN
4      0      0
2      0      0
6      0      0
9      0      0
11     0      0
8      0      0

```

END IWAT-PARM3

IWAT-STATE1

<PLS > *** Initial conditions at start of simulation

```

# - # *** RETS SURS
4      0      0
2      0      0
6      0      0
9      0      0
11     0      0
8      0      0

```

END IWAT-STATE1

END IMPLND

SCHEMATIC

<-Source->	<--Area-->	<-Target->	MBLK	***
<Name> #	<-factor-->	<Name> #	Tbl#	***
New and Old Roofs***				
IMPLND 4	2.3914	RCHRES 1	5	
At grade pavements***				
IMPLND 2	2.7947	RCHRES 1	5	
IMPLND 6	0.9362	RCHRES 1	5	
IMPLND 9	0.8036	RCHRES 1	5	
IMPLND 11	2.128	RCHRES 1	5	
Athletic Field & Grass***				
PERLND 14	6.593	RCHRES 1	2	
PERLND 14	6.593	RCHRES 1	3	
IMPLND 8	3.6261	RCHRES 1	5	
Bypass Areas***				
PERLND 14	7.7567	COPY 501	12	

```

PERLND 14          7.7567      COPY    601    12
PERLND 14          7.7567      COPY    501    13
PERLND 14          7.7567      COPY    601    13

```

*****Routing*****

```

IMPLND  4          2.3914      COPY     1    15
IMPLND  2          2.7947      COPY     1    15
IMPLND  6          0.9362      COPY     1    15
IMPLND  9          0.8036      COPY     1    15
IMPLND 11          2.128       COPY     1    15
PERLND 14          6.593       COPY     1    12
IMPLND  8          3.6261      COPY     1    15
PERLND 14          6.593       COPY     1    13
RCHRES  1          1          COPY    501    16
END SCHEMATIC

```

NETWORK

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
COPY 501 OUTPUT MEAN 1 1 145.2 DISPLY 1 INPUT TIMSER 1

```

```

<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member-> ***
<Name> # <Name> # #<-factor->strg <Name> # # <Name> # # ***
END NETWORK

```

RCHRES

```

GEN-INFO
RCHRES      Name      Nexits  Unit Systems  Printer      ***
# - #<-----><----> User T-series Engl Metr LKFG      ***
              in out
1 Detention Vault      1  1  1  1  28  0  1
END GEN-INFO
*** Section RCHRES***

```

ACTIVITY

```

<PLS > ***** Active Sections *****
# - # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFQ PKFG PHFG ***
1   1   0   0   0   0   0   0   0   0   0   0
END ACTIVITY

```

PRINT-INFO

```

<PLS > ***** Print-flags ***** PIVL  PYR
# - # HYDR ADCA CONS HEAT SED  GQL  OXRX NUTR PLNK PHCB PIVL  PYR *****
1   4   0   0   0   0   0   0   0   0   0   0   1   9
END PRINT-INFO

```

HYDR-PARM1

```

RCHRES      Flags for each HYDR Section      ***
# - # VC A1 A2 A3 ODFVFG for each *** ODGTFG for each  FUNCT for each
      FG FG FG FG possible exit *** possible exit  possible exit
      * * * * * * * * * * * * * * * * * * * * * * *
1   0 1 0 0 4 0 0 0 0 0 0 0 0 0 0 0 2 2 2 2 2
END HYDR-PARM1

```

HYDR-PARM2

```

# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><----->
1   1   0.02      0.0      0.0      0.5      0.0
END HYDR-PARM2

```

HYDR-INIT

```

RCHRES      Initial conditions for each HYDR section      ***
# - # *** VOL      Initial value of COLIND      Initial value of OUTDGT
      *** ac-ft      for each possible exit      for each possible exit
<-----><-----> <-----><-----><-----><-----> *** <-----><-----><-----><-----><----->
1   0      4.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
END HYDR-INIT

```

END RCHRES

SPEC-ACTIONS
 END SPEC-ACTIONS
 FTTABLES

FTTABLE 1
 92 4

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.183655	0.000000	0.000000		
0.088889	0.183655	0.016325	0.113775		
0.177778	0.183655	0.032650	0.160901		
0.266667	0.183655	0.048975	0.197063		
0.355556	0.183655	0.065299	0.227549		
0.444444	0.183655	0.081624	0.254408		
0.533333	0.183655	0.097949	0.278690		
0.622222	0.183655	0.114274	0.301019		
0.711111	0.183655	0.130599	0.321803		
0.800000	0.183655	0.146924	0.341324		
0.888889	0.183655	0.163249	0.359787		
0.977778	0.183655	0.179574	0.377347		
1.066667	0.183655	0.195898	0.394126		
1.155556	0.183655	0.212223	0.410220		
1.244444	0.183655	0.228548	0.425705		
1.333333	0.183655	0.244873	0.440647		
1.422222	0.183655	0.261198	0.455098		
1.511111	0.183655	0.277523	0.469104		
1.600000	0.183655	0.293848	0.482704		
1.688889	0.183655	0.310172	0.495932		
1.777778	0.183655	0.326497	0.508815		
1.866667	0.183655	0.342822	0.521380		
1.955556	0.183655	0.359147	0.533650		
2.044444	0.183655	0.375472	0.545643		
2.133333	0.183655	0.391797	0.557379		
2.222222	0.183655	0.408122	0.568873		
2.311111	0.183655	0.424446	0.580138		
2.400000	0.183655	0.440771	0.591190		
2.488889	0.183655	0.457096	0.602038		
2.577778	0.183655	0.473421	0.612695		
2.666667	0.183655	0.489746	0.623169		
2.755556	0.183655	0.506071	0.633470		
2.844444	0.183655	0.522396	0.643606		
2.933333	0.183655	0.538721	0.653585		
3.022222	0.183655	0.555045	0.663414		
3.111111	0.183655	0.571370	0.673099		
3.200000	0.183655	0.587695	0.682647		
3.288889	0.183655	0.604020	0.692063		
3.377778	0.183655	0.620345	0.701353		
3.466667	0.183655	0.636670	0.710522		
3.555556	0.183655	0.652995	0.719573		
3.644444	0.183655	0.669319	0.728512		
3.733333	0.183655	0.685644	0.737343		
3.822222	0.183655	0.701969	0.746069		
3.911111	0.183655	0.718294	0.754695		
4.000000	0.183655	0.734619	0.763223		
4.088889	0.183655	0.750944	0.771656		
4.177778	0.183655	0.767269	0.779999		
4.266667	0.183655	0.783594	0.788253		
4.355556	0.183655	0.799918	0.796422		
4.444444	0.183655	0.816243	0.804507		
4.533333	0.183655	0.832568	0.812513		
4.622222	0.183655	0.848893	0.820440		
4.711111	0.183655	0.865218	0.828291		
4.800000	0.183655	0.881543	0.836069		
4.888889	0.183655	0.897868	0.843774		
4.977778	0.183655	0.914192	0.851411		
5.066667	0.183655	0.930517	1.307407		
5.155556	0.183655	0.946842	1.551467		
5.244444	0.183655	0.963167	1.732594		
5.333333	0.183655	0.979492	1.884010		
5.422222	0.183655	0.995817	2.017127		
5.511111	0.183655	1.012142	2.137503		

5.600000	0.183655	1.028466	2.248342
5.688889	0.183655	1.044791	2.351692
5.777778	0.183655	1.061116	2.448954
5.866667	0.183655	1.077441	2.541140
5.955556	0.183655	1.093766	2.629007
6.044444	0.183655	1.110091	2.713139
6.133333	0.183655	1.126416	2.794000
6.222222	0.183655	1.142741	2.871961
6.311111	0.183655	1.159065	2.947332
6.400000	0.183655	1.175390	3.020366
6.488889	0.183655	1.191715	3.091280
6.577778	0.183655	1.208040	3.363328
6.666667	0.183655	1.224365	3.524722
6.755556	0.183655	1.240690	3.661115
6.844444	0.183655	1.257015	3.784405
6.933333	0.183655	1.273339	3.899014
7.022222	0.183655	1.289664	4.059932
7.111111	0.183655	1.305989	4.698100
7.200000	0.183655	1.322314	5.613670
7.288889	0.183655	1.338639	6.679281
7.377778	0.183655	1.354964	7.783102
7.466667	0.183655	1.371289	8.812377
7.555556	0.183655	1.387614	9.670797
7.644444	0.183655	1.403938	10.30775
7.733333	0.183655	1.420263	10.75520
7.822222	0.183655	1.436588	11.24818
7.911111	0.183655	1.452913	11.66594
8.000000	0.183655	1.469238	12.06597
8.088889	0.183655	1.485563	12.45049

END FTABLE 1

END FTABLES

EXT SOURCES

<-Volume->	<Member>	SsysSgap<--Mult-->	Tran	<-Target vols>	<-Grp>	<-Member->	***	
<Name>	#	<Name>	#	tem strg<-factor->	strg	<Name>	# #	***
WDM	2	PREC	ENGL	1		PERLND	1 999	EXTNL PREC
WDM	2	PREC	ENGL	1		IMPLND	1 999	EXTNL PREC
WDM	1	EVAP	ENGL	1		PERLND	1 999	EXTNL PETINP
WDM	1	EVAP	ENGL	1		IMPLND	1 999	EXTNL PETINP

END EXT SOURCES

EXT TARGETS

<-Volume->	<-Grp>	<-Member->	<--Mult-->	Tran	<-Volume->	<Member>	Tsys	Tgap	Amd	***
<Name>	#	<Name>	#	#<-factor->	strg	<Name>	#	<Name>	tem strg	strg***
COPY	1	OUTPUT	MEAN	1 1	145.2	WDM	701	FLOW	ENGL	REPL
COPY	501	OUTPUT	MEAN	1 1	145.2	WDM	801	FLOW	ENGL	REPL
COPY	601	OUTPUT	MEAN	1 1	145.2	WDM	901	FLOW	ENGL	REPL
RCHRES	1	HYDR	RO	1 1	1	WDM	1000	FLOW	ENGL	REPL
RCHRES	1	HYDR	STAGE	1 1	1	WDM	1001	STAG	ENGL	REPL

END EXT TARGETS

MASS-LINK

<Volume>	<-Grp>	<-Member->	<--Mult-->	<Target>	<-Grp>	<-Member->	***	
<Name>	#	<Name>	#	<-factor->	<Name>	#	#	***
MASS-LINK			2					
PERLND	PWATER	SURO		0.083333	RCHRES	INFLOW	IVOL	
END MASS-LINK			2					
MASS-LINK			3					
PERLND	PWATER	IFWO		0.083333	RCHRES	INFLOW	IVOL	
END MASS-LINK			3					
MASS-LINK			5					
IMPLND	IWATER	SURO		0.083333	RCHRES	INFLOW	IVOL	
END MASS-LINK			5					
MASS-LINK			12					
PERLND	PWATER	SURO		0.083333	COPY	INPUT	MEAN	
END MASS-LINK			12					

MASS-LINK		13				
PERLND	PWATER	IFWO	0.083333	COPY	INPUT	MEAN
END MASS-LINK		13				
MASS-LINK		15				
IMPLND	IWATER	SURO	0.083333	COPY	INPUT	MEAN
END MASS-LINK		15				
MASS-LINK		16				
RCHRES	ROFLOW			COPY	INPUT	MEAN
END MASS-LINK		16				

END MASS-LINK

END RUN

Predeveloped HSPF Message File

Mitigated HSPF Message File

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