FINAL ENGINEERING DESIGN REPORT

District on the River Redevelopment
PPCD No. 21200059-32

Prepared for: Sagamore Spokane, LLC

Project No. 190210 • April 29, 2021 FINAL

Aspect CONSULTING

earth + water

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Contents

List of Tables

List of Figures

List of Appendices

Acronyms & Abbreviations

Aspect	Aspect Consulting, LLC
BETX	benzene, ethylbenzene, toluene and xylenes
CAP	cleanup action plan
CFR	Code of Federal Regulations
CMMP	Contaminated Media Management Plan
CSWGP	Construction Stormwater General Permit
CUL	Cleanup level
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
HBM	hazardous building materials
MDNS	mitigated determination of nonsignificance
MGP	manufactured gas plant
MTCA	Model Toxics Control Act
NPDES	National Pollution Discharge Elimination System
PAH	Polycyclic Aromatic Hydrocarbons
PLP	potentially liable parties
PPCD	Prospective Purchaser Consent Decree
PSP	Portable Source Permit
SCUP	Shoreline Conditional Use Permit
SEPA	Washington State Environmental Policy Act
SOW	Scope of Work
SSD	sub-slab depressurization
SSV	sub-slab vapor
SWPPP	Stormwater Pollution Prevention Plan
UST	underground storage tank
VOC	volatile organic compound
WAC	Washington Administrative Code

1 Introduction

This Final Engineering Design Report (EDR) was prepared by Aspect Consulting, LLC (Aspect) on behalf on Sagamore Spokane, LLC (Sagamore) for cleanup and redevelopment activities at the properties located at 111 North Erie Street in Spokane, Washington (Property). Sagamore entered into Prospective Purchaser Consent Decree (PPCD) No. 21200059-32 with the Washington State Department of Ecology (Ecology) on January 15, 2021. This Final EDR is a deliverable required by the PPCD and will be approved by Ecology prior to commencing the cleanup and construction activities described herein.

The cleanup activities will allow for the beneficial reuse of vacant properties contaminated by manufactured gas plant (MGP) operations. Completion of the cleanup activities will allow for redevelopment of the properties into a four-building residential apartment complex, known as the District on the River project (Project). The Project has obtained all necessary permits from the City of Spokane (City).

The Project will be conducted on the Hamilton Street Bridge Site (Site), which is subject to existing Consent Decree No. 02205445-0 (Consent Decree) between potentially liable parties (PLPs) Avista Corporation (Avista) and BNSF Railway Company (BNSF), and Ecology (Cleanup Site ID 3509). A cleanup action plan (CAP) was implemented at the Site under this Consent Decree (Ecology, 2001). The cleanup action provided in the CAP consisted of streambank bioengineering, limited soil cap, natural attenuation, groundwater monitoring, institutional controls, and stormwater management (Landau, 2006; Existing Cleanup Action). The Consent Decree, CAP Site boundary, and the Property to be purchased and redeveloped by Sagamore are shown on Figure 1.

The PPCD requires that Sagamore implement a CAP Amendment (CAP-A), and Scope of Work (SOW), which are Exhibits to the PPCD. Implementation of the CAP-A will enhance the existing cleanup action by converting the existing cover to a more extensive, protective, and resilient hardscape cap; additionally, the CAP-A implementation will enhance stormwater management and vapor mitigation and monitoring.

The permitting and engineering design of all components of the Project required by the CAP-A are presented in this EDR, and include:

- **Building Foundation Design and Floor Slabs** – The building foundation designs minimize the disturbance of subsurface contamination and reduce the potential for mobilization. The design consists of rafted structural (mat) foundations for Buildings 1A and 1B adjacent to the river, and deep foundations (piles) for Buildings 2A and 2B set back from the river.
- **Soil Handling** – Removal of geotechnically unsuitable soil is necessary for redevelopment. Soils will be segregated according to three categories and reused on Site and on the Property (if geotechnically suitable) or disposed off-Site at a permitted landfill.

- **Vapor Mitigation** – Any residual volatile contaminants in soil gas will be mitigated via an active sub-slab depressurization (SSD) system beneath the building foundations of buildings that have first-floor occupancy. The SSD system will protect the indoor air from both volatile contaminants and naturally occurring radon. Additionally, sub-slab vapor points installed and monitored postconstruction in buildings that have first floor occupancy (Buildings 1A, 1B, and 2B).

- **Soil Cap Enhancements** – The completed Project creates an improved and resilient surface and effective cap of contaminated soils that is less susceptible to erosion and uncontrollable disturbances. The completed Project also increases impervious area and decreases infiltration within the extent of soil contamination[1] at the Site.

- **Stormwater Management** – Both during and postconstruction, stormwater management will prevent stormwater contact with contaminated soils. The postconstruction stormwater management design captures stormwater on impervious surfaces and conveys it away from the subsurface contamination before infiltrating via dry wells and an infiltration basin.

- **Operations and Maintenance (O&M) Plan Addendum Outline** – An O&M Plan is outlined in Section 9. The O&M Plan will include the passive venting system, the sub-slab vapor monitoring points, impervious surfaces, and stormwater facilities.

- **Compliance Monitoring Plan Addendum Outline** – Groundwater compliance monitoring is the continued responsibility of the PLPs. A soil vapor monitoring plan will consist of sub-slab vapor monitoring in Buildings 1A, 1B, and 2B and comprises the addendum to the existing Site Compliance Monitoring Plan (Landau, 2003).

[1] Soil contamination extents are from the Remedial Investigation (Landau, 2001) and shows the extent of carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in soil.

2 Permitting and Substantive Requirements

In accordance with Model Toxics Control Act (MTCA), the cleanup action, being conducted under the PPCD, is exempt from the procedural requirements of Chapters 70.94, 70.95, 70.105, 77.55, and 90.58 of the Revised Code of Washington (RCW), and of any laws requiring or authorizing local government permits or approvals. The Project must still comply with the substantive requirements of such permits or approvals (Washington Administrative Code [WAC] 173-340-520). This cleanup action is a component of the Project, which has received the required land use permits and is soon to be permitted for construction by the City. This section presents permitting and substantive requirements relevant to the CAP-A activities.

2.1 City of Spokane

This property has a decades-long history of cleanup and planning for redevelopment. The planning and permitting of residential buildings started with a request of a shoreline exemption in 2001. Therefore, this Project is permitted with the City in two phases.

- The first permitting phase included two on-slab buildings immediately adjacent to the Spokane River, (now known as Buildings 1A and 1B). On August 17, 2001, the City of Spokane Hearing Examiner approved a Substantial Development/ Shoreline Conditional Use Permit (SCUP) with a Binding Site Plan for Buildings 1A and 1B. On May 28, 2002, Ecology approved the Shoreline Permit issued by the City. Subsequent to the Ecology approval, modifications to this Shoreline Permit allowed for the residential development Project.

- The commercial building permits for Buildings 1A and 1B were issued by the City of Spokane on March 11, 2021, as Permit No. B2006572BLDC and B2006573BLDC, respectively. Building permits are included in Appendix A.

- The second phase of the Project currently under review by the City includes Buildings 2A and 2B, which face Martin Luther King Jr. Way (Figure 1). On September 11, 2020, the City Hearing Examiner approved a Shoreline Conditional Use Permit (SCUP) application:

  "The Hearing Examiner concludes that the proposed use is allowed under the provisions of the land use codes and shoreline regulations, provided a SCUP is obtained and other development regulations are satisfied."

  This SCUP (Z20-079SCUP, issued September 11, 2020) was approved by Ecology in accordance with WAC 173-32-200 and is included in Appendix A. The commercial building permits for Buildings 2A and 2B have been approved as Permit No. B2009605 and B2009606, respectively on January 27, 2021.

2.2 National Pollution Discharge Elimination System

Construction stormwater will be managed under National Pollution Discharge Elimination System (NPDES) administered by the Ecology Water Quality Program. Ecology issued a Construction Stormwater General Permit (CSWGP) and accompanying

Administrative Order (Appendix B) for the Project due to the presence of contaminated soils and groundwater at the Site. The CSWGP Number WAR309537 for this redevelopment was issued on December 3, 2020. Administrative Order No. 19443, issued on December 3, 2020, establishes Indicator Levels for the Project based on known Site contaminants shown in Table 1 of the Administrative Order (Appendix B) for compliance with water quality standards for Surface Water of the State of Washington. Any and all pretreatment, monitoring, and reporting will be conducted by the Contractor in accordance with the CSWGP WAR309537 and Administrative Order No. 19443.

Construction activities will comply with the CSWGP during the temporary condition of Project earthworks. Once the Site is stabilized, the CSWGP will be terminated. As part of the CSWGP, a Stormwater Pollution Prevention Plan (SWPPP) is also approved by Ecology Water Quality Program for the Project. The SWPPP is provided in Appendix C.

2.3 Washington Dangerous Waste Regulations

Implementation of the CAP-A will comply with Washington State Dangerous Waste Regulations (WAC 173-303). Although dangerous waste soil is not anticipated to be encountered at the construction excavation depths, soil contaminated with PAHs, benzene, and lead will be profiled during construction to confirm compliance with dangerous waste designation criteria. Soil samples will be collected by Aspect for waste profiling and according to the sampling outlined in the Contaminated Media Management Plan in Appendix D.

2.4 Federal Hazardous Waste Regulations

This soil removal action has been designed and permitted in compliance with the Code of Federal Regulations (CFR) Title 40 – Protection of the Environment (i.e., Resource Conservation and Recovery Act). Wastes associated with historical manufactured gas plants, as exist within the Site (although as stated in Section 2.3, are not anticipated to be encountered at construction depths), are exempt from hazardous waste regulations per the CFR 40-261.4. Soil transportation and disposal as a result of the limited soil removal will also comply with federal transportation and hazardous waste regulations.

2.5 Washington State Environmental Policy Act

The City is the lead State Environmental Policy Act (SEPA) agency, and Ecology has been the supporting agency. The SEPA checklist was coordinated with Ecology and submitted to the City on March 30, 2020. The City issued a mitigated determination of nonsignificance (MDNS) on August 6, 2020 (Appendix E). A condition of MDNS was:

"Under the Model Toxic Control Act (RCW Chapter 70.105D) the Applicant and Washington State Department of Ecology (WSDOE) are addressing and mitigating the pre-existing environmental contamination through a Prospective Purchaser Consent Decree."

This condition is satisfied with the PPCD and the implementation of the CAP-A.

2.6 Archaeological and Historical Preservation Act

In the SCUP (Appendix A), the City of Spokane Hearing Examiner stated in a September 11, 2020, decision to Sagamore: "If any artifacts or human remains are found upon excavation, The Spokane Tribe of Indians and the City of Spokane shall be immediately notified, and the work in the immediate area cease. Pursuant to RCW 27.53.060 it is unlawful to destroy any historic or prehistoric archaeological resources. RCW 27.44 and RCW 27.53.060 require that a person obtain a permit from the Washington State Department of Archaeology & Historic Preservation (WSDAHP) before excavating, removing, or altering Native American human remains or archaeological resources in Washington."

In accordance with the SCUP, if potential archaeological materials are observed in the excavation, work will be stopped, and Sagamore will mobilize a professional archaeologist to the excavation location to observe and assess the materials encountered and determine the appropriate path forward in accordance with applicable laws and regulations.

2.7 Spokane Regional Clean Air Agency

Air contamination by chemicals and particulates will meet the requirements of the Spokane Regional Clean Air Agency (SRCAA) for Portable Sources, as discussed below.

During Project earthworks, the Contractor will conduct dust and odor control procedures to limit dust generation and meet applicable air quality standards. Dust management is the responsibility of the Contractor during earthwork, and if required, Best Management Practices (BMPs) will be implemented to mitigate any dust generation (see Erosion Control Notes, Note 7, Sheet C-001 in Appendix F). Guidelines laid out in SRCAA Regulations Article IV Section 6.06 will be followed by the Contractor.

Limited soil excavation is exempt from the Portable Source Permit (PSP) for Soil Remediation Operations because: (1) no on-Site treatment of soil is being performed as part of the Project, (2) the volume of excavated soil is to be limited (estimated at 1,500 cubic yards), and (3) the volatile organic compounds (VOCs) fraction of contamination has been documented to be minimal. Therefore, it can be concluded that the amount of the volatile fraction of contamination to be released into the atmosphere as a result of soil excavation is de minimis of the amounts listed in SCRAA Regulations Article IV Section 4.04(A)(5)(a-d) on the order of single criteria pollutants exceeding 0.5 tons/year and combined air contaminants exceeding 1 ton/year. Thus, the remediation operation for this Project is exempt from a PSP under Article V, Section 5.08(D)(1)(b).

Equipment emissions will be subject to Article V, Section 5.08 SRCAA regulations for portable sources. Construction equipment would fall under Article 5.08(A)(6), as a nonroad vehicle and would be required to apply for a PSP and obtain an approved permission to operate if:

1) The nonroad engine is rated at 500 or more British horsepower.
2) The nonroad engine operates at the Site for 30 or more calendar days in any 12-month period. Nonroad engines anticipated to operate for more than 30 days in

any 12-month period, but less than one year, are subject to the requirements of Article V, Section 5.08

The Contractor would be responsible for applying for the PSP and obtaining the Permission to Operate if these conditions apply.

3 Roles and Responsibilities

Aspect is the remediation engineer of record (Engineer) for the Project and responsible for ensuring the cleanup actions are completed in accordance with the CAP-A and this EDR. Aspect is also the geotechnical engineer of record (Geotechnical Engineer) and is responsible for geotechnical inspections. The civil engineer of record is DCI Engineers, and they are responsible for the Project civil bidding plan set included as Appendix F. Sagamore's construction representative, and manager is OAC Services, Inc (OAC), who is responsible for contracting and overseeing the General Contractor. The General Contractor selected for the project is Swinerton Inc.; Swinerton Inc. and all of their subcontractors are referred to herein as the Contractor. The Contractor is responsible for adhering to requirements outlined in this EDR and the Contaminated Media Management Plan (CMMP) provided in Appendix D. The Contractor Health and Safety Plan and Spill Prevention, Control and Countermeasure Plan (SPCC) are in Appendix J and K, respectively.

4 Building Foundations and Floor Slabs

The existing cleanup remedy as outlined in the Consent Decree relies on soil containment, stormwater management, and monitoring, along with an environmental covenant to prevent the disturbance and potential mobilization of the subsurface contamination. The CAP-A as outlined in the PPCD enhances the selected cleanup remedy.

This section addresses the CAP-A SOW requirements to:

1) Include description of where Project construction will disturb soils on the Site, and
2) Include description and design of the foundation and pile system and what measures are needed to minimize potential downward migration of contamination into groundwater and the Spokane River.

The building foundation designs minimize the disturbance of subsurface contamination. The completed foundations and floors of each building represent a more robust, permanent barrier to contaminated soil beneath the existing cap.

The shallow foundations, pile caps associated with deep foundations, and the two new construction monitoring well locations are shown on Figure 2. The foundation designs are described in this section.

4.1 Shallow Foundations – Buildings 1A and 1B

Buildings 1A and 1B will be supported on rafted structural slab (mat) foundations; both of which require limited excavation. Building 1A is assumed to require excavation of approximately 3 feet below ground surface (bgs) over the western end of building footprint to remove geotechnically unsuitable fill. Building 1B is assumed to require excavation of approximately 5.5 feet over the eastern end of building footprint to remove geotechnically unsuitable fill. These approximated areas of excavation are shown on Figure 3.

The excavation is required due to the risk of settlement with compressible soils and has been reduced to the extent practicable. The Geotechnical Engineer will determine the final extent of excavation during construction. The final Geotechnical Engineering Report – River Bend Development (Geotech Report) can be referenced in Appendix G. The soil removal and handling requirements associated with the excavations is described in Section 5. After excavation is completed the rafted slab and overlying floor slabs of buildings 1A and 1B will be constructed. These slabs represent a continuous hard-cap over the entire footprints of these buildings.

4.2 Deep Foundations – Buildings 2A and 2B

Buildings 2A and 2B require deep foundations and grouted helical piles have been selected for the Project. These deep foundations will support the building and the concrete slab that will form the enhanced cap within these building footprints. The deep foundations will penetrate the subsurface contamination, and the grouted helical piles have been selected to minimize subsurface vibration and contaminant disturbance during

installation. This type of pile also minimizes the volume of spoil production and is further described in the following paragraphs.

Grouted helical piles are composed of galvanized steel pile shaft sections (5 to 7 feet long), with a lead section that includes a helical bearing plate. Supplementary bearing plates can be added to shaft sections to provide additional axial capacity from side friction. The pile is spun into the ground, while a continuous flow of grout is pushed through grout ports in the pile shaft. These piles have high axial and lateral load capacities due to the interaction of the grout with the soils.

Installation of grouted helical piles results in little to no vibration, and little to no production of potentially contaminated soil spoils. Selecting a low vibration pile type minimizes disturbance to the subsurface and thus minimizes the disruption and potential mobilization of contamination in groundwater. Potential drag down of contamination is also minimized with this pile type due to the grout surrounding the pile and filling voids during install; positive pressure pushes contamination away from the auger, rather than creating additional void space for any unbound contamination to follow preferentially. Grouted helical pile installation can be difficult in coarse (cobble and boulder) stratigraphy; predrilling with an auger may be necessary where boulders or other obstructions are encountered. In this case, the auger would be backed out, also producing little to no potentially contaminated spoils.

Based on the subsurface conditions at the Site, it is anticipated that grouted helical piles will be installed to an embedment depth of 40 feet bgs and will have an allowable axial load capacity of 100 kips (one kip equals 1,000 pounds of force). It is estimated that approximately 540 and 216 grouted helical piles will be necessary to support the preliminary anticipated design loads for Buildings 2A and 2B, respectively.

Prior to the installation of the piles, the historical MGP concrete slab foundations that are buried beneath the Site may have to be either uncovered and cored through or removed for subsurface access. There are seven historical slab foundations present, as confirmed by the Supplemental Soil and Soil Gas Investigation Summary (Aspect, 2020) and shown on Figure 2. These slabs vary in depth from 2 feet bgs to 5 feet bgs; their thickness is unknown. Any concrete rubble would need to be broken up, hauled off Site, and disposed of in accordance with state and local requirements by the Contractor. All excavated material for pile emplacement will be handled per the CMMP (Appendix D), and Section 5.3 below.

4.2.1 Construction Groundwater Monitoring Plan

The PPCD requires groundwater monitoring during and following construction of the deep foundations. This construction groundwater monitoring requires the installation of two new monitoring wells and conduct of eight groundwater monitoring events. The monitoring wells were installed and sampled in April 2021 prior to beginning of Project earthworks. The locations of the two new monitoring wells are shown on Figure 2. Construction monitoring wells are constructed of 2” PVC casing and screened approximately 20 to 30 feet below ground surface. Monitoring wells were installed in accordance with Washington State requirements for resource protection wells (WAC 173-160) including Ecology’s well permitting and reporting requirements.

Seven quarterly groundwater monitoring events will be conducted over two years after the construction of deep foundations. Groundwater monitoring events will be coordinated with the semiannual Site groundwater compliance monitoring conducted by the PLPs to the extent possible.

Groundwater monitoring methods are consistent with the Site groundwater compliance monitoring plan (Landau, 2003). Each sample will be analyzed for Site indicator hazardous substances: PAHs, total and dissolved arsenic, total mercury, and WAD cyanide. The PPCD also requires the analysis of total petroleum hydrocarbons. Laboratory analysis of groundwater samples will be conducted by a Washington State-accredited laboratory.

The completion of the building foundations and the construction groundwater monitoring plan will be reported in the PPCD-required monthly progress reports and in the Construction Completion Report.

5 Soil Handling

Contaminated soils will be handled during CAP-A implementation. Soil is anticipated to be generated from (1) Buildings 1A and 1B partial excavation, and (2) Buildings 2A and 2B deep foundations spoils (limited volume). All soil handling methods, including field screening, segregation, stockpiling, sampling, and disposal requirements, can be found in the Contaminated Media Management Plan (CMMP; Appendix D).

This section addresses the CAP-A scope of work (SOW) requirements include a description of where Project construction will disturb soils on the Site.

5.1 Soil to Be Removed

The estimated excavation extents are shown on Figure 3 and consist of:

- Building 1A partial excavation for mat foundation down to an estimated 3 feet bgs (Elevation 1878.5) along the western building end.
- Building 1B partial excavation and backfill for mat foundation down to 5.5 feet bgs (Elevation 1882) along eastern building portion.

The final extents of these excavations will be approved by the Geotechnical Engineer.

Installation of the deep foundation piles may require the excavation of remaining concrete slabs below the ground surface. The Contractor will determine the need for this excavation, which would require the removal of shallow overlying soils to access and remove the concrete foundations.

Utility connections, and other Project-required limited excavations will be completed as necessary and any soils generated will be handled in accordance with the CMMP.

5.2 Mobilization and Site Preparation

Erosion and sediment controls will be established and utilities will be cut and capped as shown in the Project civil bidding plan set in Appendix F. Additionally, all existing compliance monitoring wells, and the two new construction groundwater monitoring wells, will be protected in place using physical barriers (i.e., concrete jersey barriers) to prevent risk of damage during Project construction. Should any monitoring wells need to be decommissioned due to unforeseen circumstances during construction, both decommissioning and eventual replacement would be completed by a licensed driller and coordinated with Ecology and the PLPs.

There are no documented underground storage tanks (USTs) on the Property. However, any USTs encountered during the excavation will be removed prior to excavation in accordance with Ecology's UST regulations (WAC 173-360-200 and WAC 173-360-385). The protocol for UST removal is described in detail in the CMMP in Appendix D.

5.3 Soil Categories and Segregation

The Engineer is responsible for overseeing soil segregation activities during construction. The estimated extents of each soil category are shown on Figure 3 and will be used as a starting point for soil segregation (Appendix D). Aspect will field-screen soils during the excavation and direct the Contractor's segregation. Analytical testing is required to verify the soil category, and Aspect will collect analytical samples and direct the Contractor for soil reuse and disposition based on the analytical results. The details of soil segregation requirements, field screening, and stockpile sampling are presented in Section 5.1 of the CMMP.

The soils to be removed (both excavated and potential pile installation spoils) will be categorized according to three categories summarized below. These details of soil categories and segregation are included in the CMMP.

1) **Clean Crushed Rock** (estimated 510 tons). Clean crushed rock will be removed from the top two feet of the existing soil cover. Clean crushed rock will be verified through physical observation as containing no field indications of contamination. The crushed rock will be segregated from other soil categories. The crushed rock may be reused, if approved by the Geotechnical Engineer, without the need for chemical analytical testing. The estimated quantity of clean crushed rock is based on the as-built from the existing cleanup action (Landau, 2006). The areas of potential reuse are shown on Figure 3.

2) **Contaminated Fill** (approximately 850 tons). Contaminated fill is anticipated based on the extents of contaminated soils overlying the building excavation areas (Figure 3). The soils overlying the former MGP concrete slabs (if removed), will be handled as Contaminated Fill. These potentially contaminated soils will be segregated from other soil categories, and will be sampled for waste characterization by the Engineer to confirm contaminated fill categorization.

   All contaminated fill excavated for construction confirmed to have concentrations of indicator hazardous substances (IHSs) that exceed Site cleanup levels (Ecology, 2001) and is not eligible for reuse will be removed from the Site for permitted disposal (See Section 5.4). Contaminated soils may be temporarily stockpiled on Property and on Site, and then will be transported for disposal at a permitted Subtitle D Facility such as Waste Management's Graham Road Landfill in Medical Lake, Washington. Waste profiling and facility acceptance will be determined during construction and as outlined in the CMMP (Appendix D). All contaminated material will be handled and disposed of in accordance with state (Section 2.3) and federal (Section 2.4) Hazardous Waste regulations. Contaminated Fill does not include anthropogenic debris, which is classified as Contaminated Debris and described below.

3) **Potentially Noncontaminated Fill** (approximately 700 cubic yards; 1,190 tons). Noncontaminated is defined as soil with analytical results showing that concentrations of IHSs are below their respective Site cleanup levels (Ecology, 2001) and no observed physical evidence of contamination (sheen, odor, or staining) exists. Once analytical testing confirms categorization, Noncontaminated Fill may be reused on Site if approved by Ecology and

Geotechnical Engineer. Alternatively, noncontaminated fill can be disposed of at an off-Site location approved by the Engineer.

4) **Contaminated Debris.** During excavation to remove soil, debris may be encountered. Contaminated Debris includes any non-wood debris whose largest dimension exceeds 1 foot, wood debris whose largest dimension exceeds 6 feet, or a total debris content that exceeds 10 percent by volume of the total waste stream (or based on disposal facility specific acceptance requirements). Any debris that does not meet these criteria will be segregated and managed as contaminated debris as directed by the Engineer. Any metallic debris or MGP infrastructure that is encountered will be handled as Contaminated Debris. Debris will be disposed of offsite and is not eligible for reuse.

5.4 Excavation Backfill

The Building 1A and 1B building excavations will be backfilled to subgrade for building foundation construction with structural fill as specified in the Geotechnical Report (Appendix G). Building subgrade will include the vapor mitigation as discussed in Section 6.

The Clean Crushed Rock soil category may be used as backfill in the existing western stormwater infiltration basin, and the Building 2B footprint as subgrade material (Figure 3) without analytical testing.

Potentially noncontaminated and/or Contaminated Fill may be temporarily stockpiled and reused on Site if deemed geotechnically suitable as determined by the Geotechnical Engineer and approved by Ecology. The anticipated amount of on-Site reuse for this category is minimal as a majority of this fill is oversized (greater than 12 inches in diameter) or anticipated to not be geotechnically suitable (high fines content; see Appendix G, Section 5.10.3 Structural Fill for specifications). Inert anthropogenic material (i.e., bricks) may also be reused as non-structural fill with Ecology approval; however, other Comminated Debris (i.e., large or treated wood, or MGP infrastructure) will not be reused as backfill.

Any utility trenches excavated into contaminated soils are to be lined with high density polyethylene liner and backfilled with Noncontaminated Fill approved by Geotechnical Engineer or clean imported structural fill.

Imported clean structural fill from a certified source may be used without any prior sampling. This includes fill from a clean virgin source. All imported fill will be certified by the Contractor as clean, and be approved by Ecology before import.

6 Vapor Mitigation

The CAP-A requires mitigation to reduce the potential for chemical vapor intrusion into buildings with first floor residential spaces (1A, 1B, and 2B). The environmental basis for requiring mitigation was the detection of benzene and naphthalene in soil gas at concentrations less than 2 times the screening levels, from 2 of 4 locations. The volatile components of the MGP contaminated soil has degraded over the decades since MGP operations were discontinued, and these soil vapor concentrations are anticipated to be diffuse and decreasing in concentration.

Post construction sub-slab soil-vapor maintenance and compliance monitoring will be implemented per the CAP-A. This monitoring will be conducted as outlined in Ecology's soil vapor intrusion guidance document (Ecology, 2018). The Operations and Maintenance (O&M) outline and the Compliance Monitoring outline can be found in Sections 8 and 9.

6.1 Active SSD System

An active SSD system will be constructed to enhance air exchanges in the foundation subgrade beneath buildings 1A, 1B and 2B, preventing potential accumulation of soil vapor under building slabs. The active SSD system will be powered via electric, in-line fans located on the roof. There will be two to four fan-equipped vertical risers per building and effluent points will be a minimum of 10 feet from windows, doors, and heating, ventilation, and air conditioning (HVAC) intake points.

The sub-slab vent piping will be constructed of Schedule 40 PVC and be perforated to allow for vacuum-induced transmission of soil vapors. The perforated piping will be connected to a header pipe that runs vertically through the building and vents to atmosphere on the roofs. Sub-slab perforated pipes will be located no more than 50 feet apart and no more than 25 feet from building perimeters. The vent piping plans, piping layout, and technical specifications are in Figure 4.

6.2 Sub-Slab Vapor Points

Sub-slab vapor (SSV) monitoring points will be installed through the building slabs of Buildings 1A, 1B, and 2B in approximate locations shown on Figure 4. Two SSV locations will be installed in Buildings 1A and 1B, and one location in Building 2A based on overlap with the extent of contaminated soil. These SSV monitoring points will be installed after the vent piping system and first-floor construction, and in low-traffic areas of the building for sampling during occupancy, as shown on Figure 4 and Appendix H. Permanent installations of Cox-Colvin Vapor Pins® or similar will be completed by Aspect or a licensed driller subcontractor. Vapor Pin® information can be found in Appendix I. These SSV monitoring points will be sampled according to the Compliance Monitoring Plan outlined in Section 10.

7 Soil Cap Enhancements

This Section addresses the CAP-A SOW requirements include a description and design of new soil capping structures.

The completed Project creates an improved and resilient surface and effective cap of contaminated soils that is much less susceptible to erosion and uncontrollable disturbances (e.g., extreme weather events, burrowing animals, etc.) than the existing soil cover. The cover enhancements (building foundations, concrete slabs, paved trails, drive areas, and hardscapes) increase long-term reliability and protectiveness as required by WAC 173-340-740(6)(f) for cleanup actions that rely on containment of hazardous substances.

The completed Project also increases impervious area and decreases infiltration within the extent of contaminated soil at the Site. The impervious surfaces consist of building foundations, parking, paved trails, and hard landscaping.

The extent of contaminated soil on the Property is approximately 2.5 acres, with 0.9 of those acres being shadowed underneath the Hamilton Street Bridge. The land portion of the Site that is also the Property is approximately 4.8 acres. The 0.59 acres shadowed beneath the Hamilton Street Bridge is 12 percent of the Site acreage and considered impervious for the sake of comparison. The Project includes a total of 1.76 acres of building roof and 1.28 acres of other impervious surfaces (paving and hardscaping). This comparison indicates 70 percent of surfaces will be impervious upon Project completion – a much higher percentage than currently exists at the Site. These surface areas and the comparison are shown on Figure 5.

The building slabs are the largest enhancement of the existing soil cap and will contribute to reducing infiltration into contaminated soils. The building slabs will consist of:

Buildings 1A and 1B. It is anticipated that Buildings 1A (0.36 acres) and 1B (0.36 acres) will have a concrete mat foundation underlain by a 2- to 4-inch-thick mud slab comprising the enhanced cap.

Buildings 2A and 2B. The deep foundations of Buildings 2A (0.76 acres) and 2B (0.28 acres) will be connected at grade with a concrete mat foundation and floor slab, comprising the enhanced cap.

The pervious areas shown on Figure 5 will be landscaped at grades higher than current grades, increasing the thickness of existing cover. The pervious areas are beneficial for this Site when taken in the context of the redevelopment because of the atmospheric interaction with the subsurface contributing to natural attenuation.

8 Stormwater Management

The enhanced soil cover reduces infiltration in the permanent stormwater condition, and the management of stormwater will route stormwater away from the contaminated soils. This section discusses both short-term (construction) and long-term (permanent) stormwater management.

8.1 Construction Stormwater Management

Stormwater management will be conducted during Project activities in compliance with the Construction Stormwater General Permit (CSWGP), and accompanying Administrative Order (Appendix B). Any required discharges associated with the management of construction stormwater will be conducted in accordance with the Administrative Order. Construction stormwater management is outlined in the SWPPP (Appendix C). Per the SWPPP, construction activities include: Site preparations, surficial fill grading, utility trenching, installation of building foundation piles, building construction, and paving.

The current conditions of the Property are such that stormwater flows overland to the infiltration basins in the north and southwest sides of the Property based on the grading completed during the 2001 CAP (Landau, 2006). There is minimal flow onto the Property from adjacent properties. Once construction grading commences, all stormwater will be directed to the northern basin, which will be utilized as an infiltration basin. The northern infiltration basin will receive no contaminated stormwater runoff. All Site runoff that reaches the basin will come from rooftops, noncontaminated or capped areas; no runoff from exposed contaminated areas will reach the basin. The southwestern stormwater basin will be backfilled to allow for redevelopment.

Construction stormwater management includes preventing precipitation from encountering exposed contaminated materials. Exposed contaminated materials during construction will be in the form of (1) Potentially contaminated/contaminated stockpiles (from excavations), and (2) open excavations or trenches in contaminated material. Stockpile management is outlined in the CMMP Sections 5.1 and 5.3, and water management in relation to excavations is outlined in the CMMP Section 6 (Appendix D). Stormwater will be managed to prevent contact with contaminated soils, neither within an open contamination nor when stockpiled. The Contractor shall use BMPs to ensure stormwater does not come in contact with contaminated soils.

As construction progresses, catch basins, conveyance pipes and drywells will be installed; however, the northern basin will not be replaced by these features until final Site stabilization is complete. Drywells shall be protected from sedimentation via catch basin inserts. Catch basins will be protected by covering them with steel plates and burying them until they are raised and completed at final grade. Silt fence will be installed along the north side of the property to protect from sediment runoff into the Spokane River. Straw wattles will be placed at the existing curb inlets along Martin Luther King Jr Way to protect existing drywells and catch basins from silt-laden runoff.

8.2 Postconstruction Stormwater Management

Stormwater collected from Buildings 1A, 2A, and the Ben Burr Trail will be routed to a modified northern infiltration basin on the northeast side of the Property that is located off Site (as shown on Figure 6). Stormwater will be conveyed to this northern infiltration basin via three laterals: one serving the paved trail, one serving downspouts from both Buildings 1A and 2A, and one serving the at-grade parking west of building 2A. This existing northern basin was investigated by Aspect in April 2020 (Aspect, 2020), and the floor of the stormwater basin was determined to be clean via analytical samples at the elevation the drywells would infiltrate into.

Stormwater collected from Buildings 1B and 2B will be routed to three proposed new drywells located off Site, on the western side of the Property (as shown on Figure 6). Stormwater will be conveyed through one lateral, which serves downspouts from Buildings 1B, 2B, and the pedestrian space between them. The drywells will be installed outside of the extents of contaminated soils.

Stormwater on paved driveways, parking lots, and hard landscaping not captured by the stormwater conveyance system will also be directed away from the limits of contamination via grading and overland flow. A small amount of stormwater generated from north of the Ben Burr Trail will continue to overland flow into the Spokane River, as it does currently.

Snowmelt runoff will be collected in the same way as precipitation derived stormwater. The Project requires a small amount of snow storage capacity. Snow stockpiles will be located outside of the limits of contaminated soil. Any additional snow storage capacity requiring stockpiling within the contamination limits will be stockpiled on impervious surfaces and runoff routed through stormwater conveyance system.

9 Operations and Maintenance Plan Addendum Outline

The Operations and Maintenance Plan Addendum (O&M Plan) is a reference document that outlines the management, inspection, repair, and reporting requirements associated with the long-term operation and maintenance (O&M) of CAP-A implementation at the Site. Specific objectives of the O&M Plan are to:

- Identify the Organizations responsible for managing and maintaining the remedial infrastructure. Sagamore is responsible for the O&M of the elements outlined in the CAP-A; the PLPs are responsible for the continued O&M requirements of the CAP.
- Identify general tasks, frequency, and responsibilities for O&M and to ensure ongoing performance to maintain the intended design function.
- Specify the required type and frequency of reports associated with O&M.
- Identify emergency procedures related to the O&M of the impervious cover, stormwater facilities, monitoring wells, and vapor points.

The O&M Plan will be prepared as required by the CAP-A, as outlined in the SOW, and is outlined in further detail below.

9.1 Site History and O&M Objectives

Understanding the history of the Site is critical to implementing the required O&M activities and will be summarized for that purpose.

9.2 Remedial Infrastructure

Once completed, the cleanup components described in this EDR will be summarized in the O&M Plan as-built. This summary will include locations, as-built records, and all other information necessary to implement the O&M Plan. The remedial infrastructure to be included in the O&M Plan will include

- Vent Piping System
- SSV monitoring points
- Monitoring Wells
- Impervious Surfaces
- Stormwater Facilities

9.3 Operation and Maintenance Procedures

The O&M procedures will include a section on Project Coordinators by Company. O&M procedures for the remedial infrastructure will include:

- Annual inspections of impervious surfaces, and stormwater facilities.

- Process for conversion and operation of the vent piping system with applied vacuum; the need for this active operation, and the triggers, will be outlined in the Compliance Monitoring Plan.
- If necessary, coordinating and implementing repairs or corrective actions.

The specifics of this procedure will vary by the remedial infrastructure, and the O&M Plan will outline details of inspection and possible repairs for each of the above listed facilities.

9.4 Reporting and Record Keeping

The O&M Plan will include the inspection forms to be used and will be completed during each event. O&M activities, including the compliance monitoring, will be reported to Ecology in an annual report. In accordance with the PPCD, all records must be maintained for a minimum of 10 years after the completion of Site Cleanup, Confirmation Monitoring, and termination of the PPCD. A copy of all records will be maintained by Sagamore or their consultant designated responsible in the O&M Plan.

10 Compliance Monitoring Plan Addendum Outline

Compliance monitoring is required for all cleanup actions, as described in WAC 173-340-410, and periodic reviews under WAC 173-340-420 to ensure the long-term integrity of the cleanup action. The CAP requires the PLPs to conduct groundwater compliance monitoring at the Site (Landau, 2003).

The CAP-A requires a Compliance Monitoring Plan Addendum. This Addendum will not include any changes to the existing PLP responsibility for conducting groundwater compliance monitoring.

10.1 Soil Vapor Monitoring Plan Outline

The Compliance Monitoring Plan Addendum will incorporate the CAP-A requirements for a soil vapor monitoring plan. The soil vapor monitoring plan includes but is not limited to: scope, sampling and analysis plan (SAP), quality assurance project plan (QAPP), and reporting.

Per the WAC 173-340-140, long-term monitoring is required for containment remedies. Long-term monitoring is anticipated at the Site for the foreseeable future (more than 30 years). Ecology will review the PPCD compliance monitoring status with the Site's 5-year review schedule and approve any changes to the soil vapor monitoring plan.

11 Reporting and Schedule

A Construction Completion Report will be prepared and submitted to Ecology for approval after completion of all construction elements in this EDR. The Construction Completion Report will comply with the requirements of WAC-173-340-400(6)(b) and satisfy all requirement outlined in the CAP-A SOW.

The activities outlined in this EDR are anticipated to proceed according to the following construction[2] schedule:

- **May 1, 2021** – Contractor mobilization, implement SWPPP, and initiate construction stormwater management.
- **May/June 2021** – Conduct Buildings 1A and 1B shallow foundation excavations, and associated management of contaminated media.
- **June/July 2021** – Conduct Buildings 2A and 2B deep foundations and associated management of contaminated media.
- **July 2021** – Construct sub-slab vapor mitigation system and begin building construction.
- **By end of 2022** – Project construction completion.

The construction groundwater monitoring will to be conducted quarterly and is estimated to be completed at the time of construction completion, or by the end of 2022. The following schedule for the other PPCD-required scope and deliverables is estimated based on this estimated construction schedule.

- **By February 1, 2023** – Record environmental covenant on Property.
- **By April 1, 2023** – Submit Draft Construction Completion Report, Draft O&M Plan Addendum, and Draft Compliance Monitoring Plan Addendum to Ecology for review and approval.

Additionally, the Section XII of the PPCD establishes requirements for written monthly progress reports be submitted to Ecology. The monthly progress reporting will be initiated on March 1, 2021 and will provide any necessary updates to this estimated schedule.

[2] The Contractor mobilization date is estimated, and Ecology will be notified of any changes to the estimated date. The Contractor's final construction schedule will also be submitted to Ecology prior to construction start.

References

Aspect Consulting LLC (Aspect), 2020, Supplemental Soil and Soil Gas Investigation Summary, District on the River Redevelopment, Spokane, Washington, June 22, 2020.

Landau Associates, Inc. (Landau), 2001, Second Supplemental and Remedial Investigation, Hamilton Street Bridge Site, Spokane, Washington, February 9, 2001.

Landau Associates, Inc. (Landau), 2003, Compliance Monitoring Plan, Hamilton Street Bridge Site, Spokane, Washington, May 28, 2003.

Landau Associates, Inc. (Landau), 2006, Cleanup Action Completion Report: Hamilton Street Bridge Site, Spokane, Washington, February 2, 2006.

Washington State Department of Ecology (Ecology), 2001, Final Cleanup Action Plan, Hamilton Street Bridge Site, Spokane, Washington, August 10, 2001.

Washington State Department of Ecology (Ecology), 2018, Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Publication No. 90-09-047, Revised April 2018.

Limitations

Work for this project was performed for the Sagamore Spokane, LLC (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

TABLE

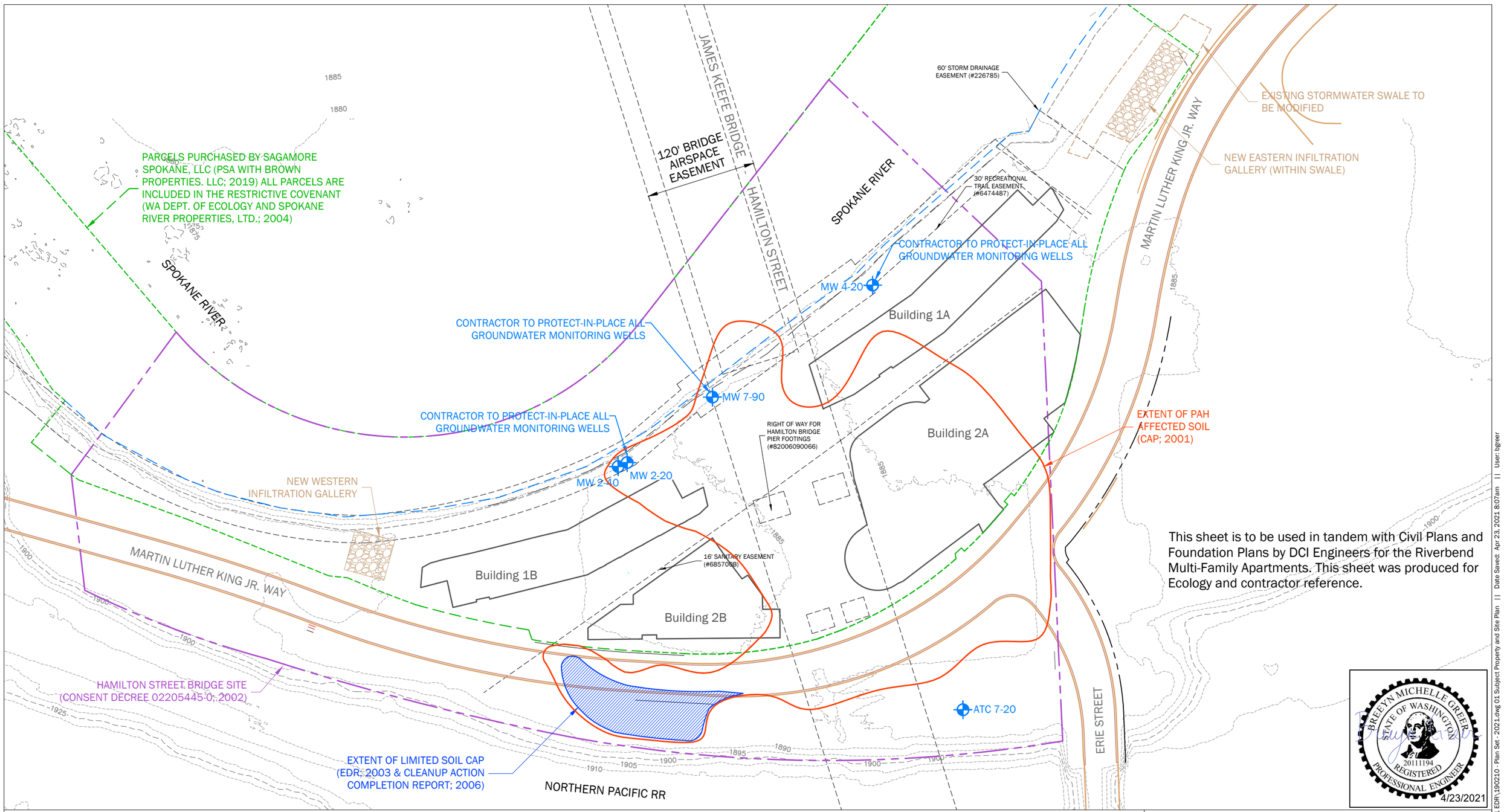
Table 1. Removal Quantity Estimates

Project No. 190210, Sagamore Spokane, LLC, Spokane, Washington

	Extent	Clean Crushed Rock	Potentially Non-Contaminated Fill	Contaminated Fill
		Material placed on surface during 2005 cleanup action, as-built survey showing extents and grades included as Figure 4 for reference only.	Fill soils that are outside the limits of contamination and eligible for reuse if determined to be geotechincally suitable, and verfied clean with analytical sampling.	Fill soils and other materials that are within the limits of contamination and will require off-Site disposal at Subtitled D Facility. Waste characterization to be verified by Aspect during construction.
Building 1A - Mat Foundation Subexcavation	*3 feet over-excavation for ~10% of the building footprint area*	100 CY (170 tons)	200 CY (340 tons)	0 CY
Building 1B - Mat Foundation Subexcavation	*5.5 feet over-excavation in eastern 1/3 of the building footprint area*	200 CY (340 tons)	500 CY (850 tons)	500 CY (850 tons)
Building 2A & 2B - Deep Foundation Spoils	**Small quantities of spoils anticipated with selected grouted helical piles. Any spoils generated will be handled as contaminated fill. For bidding purposes, Contractor should assume 100 CY (170 tons) quantity for pricing.**			
Building 2B - Potential Removal of Concrete Slabs	**If concrete slabs need to be removed for deep foundations, overlying soil and concrete debris will be handled as contaminated fill. However, crushed rock that exists at the ground surface could be considered clean and reused. See Figure 2 for concrete slab extents.**			

Notes:
CY = cubic yards
Assumes 1.7 tons/BCY
Volume calculations using Civil3D to measure volumes from surveyed ground surface to bottom of remedial excavation.

FIGURES



This sheet is to be used in tandem with Civil Plans and Foundation Plans by DCI Engineers for the Riverbend Multi-Family Apartments. This sheet was produced for Ecology and contractor reference.

BREEYN MICHELLE GREER
STATE OF WASHINGTON
20111194
REGISTERED
PROFESSIONAL ENGINEER
4/23/2021

Legend

- Subject Property
- Proposed Buildings
- Hamilton Street Bridge Site
- Extent of PAH Affected Soil (CAP, 2001)
- Extent of Limited Soil Cap (EDR, 2003)
- Groundwater Compliance Monitoring Wells
- Ordinary High Water Mark
- Historical Features
- 1920 Existing Elevation Contours in Feet
- Existing Stormwater Features

CAP - Cleanup Action Plan
PAH - Polycyclic Aromatic Hydrocarbons
EDR - Engineering Design Report

0 100 200 Feet

Source: Surveyed base map provided by Druyea & Associates, dated November 2, 2019.

Elevation contour data from DEM file generated by ArcGIS™ software, March, 2018.

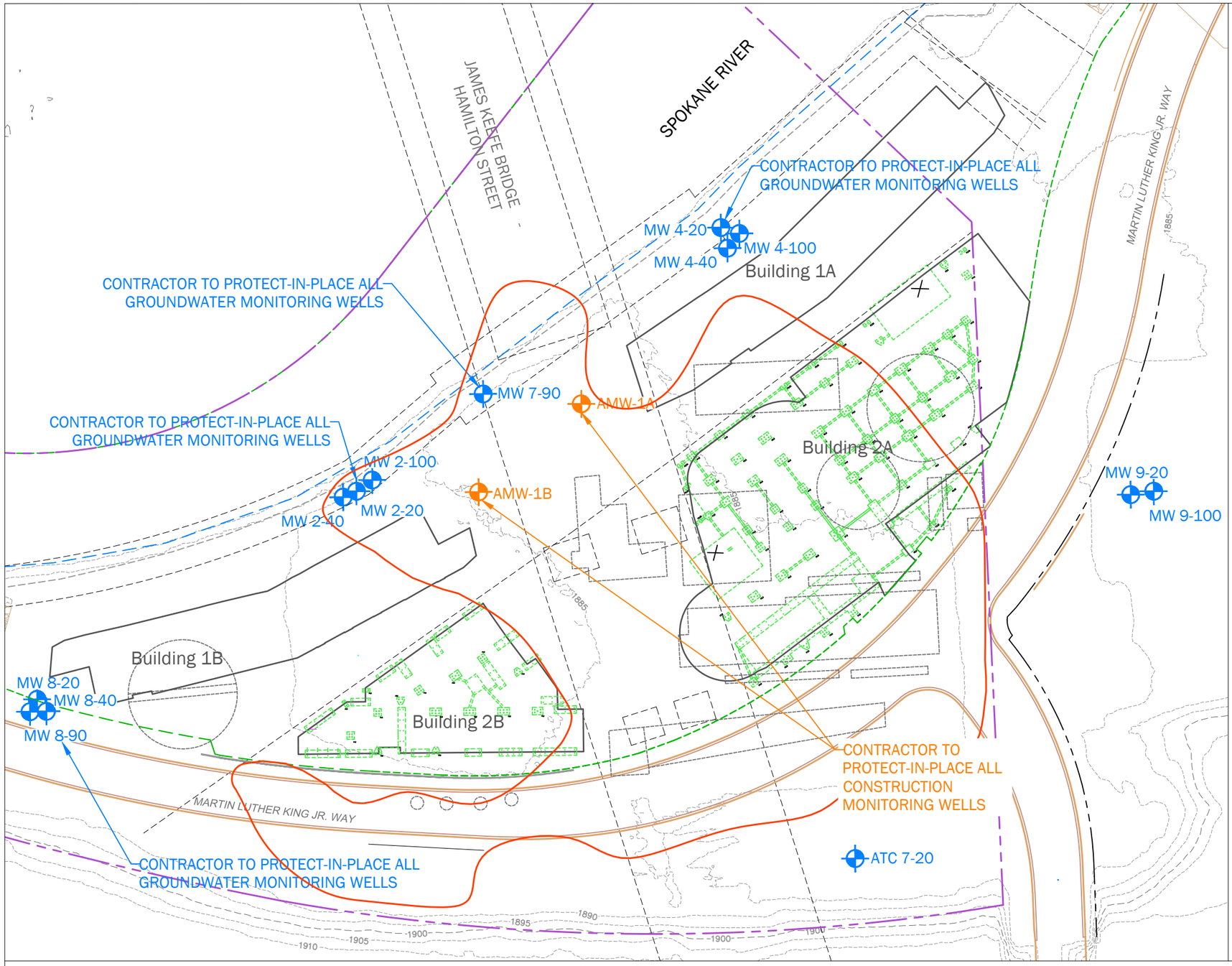
The Hamilton Street Bridge Site, Extent of PAH Affected Soil and Extent of Limited Soil CAP are approximated and have not been surveyed.

Subject Property and Site Plan

Engineering Design Report
Hamilton Street Bridge Site
Spokane, Washington

Aspect Consulting	April-26-2021	BY: BMG/CMV	FIGURE NO. 1
	PROJECT NO. 190210	REVISED BY: BMG	

CAD Path: Q:\Riverbend Redevelopment\2020-11 EDR\190210 - Plan Set - 2021.dwg 01 Subject Property and Site Plan || Date Saved: Apr 23, 2021 8:07am || User: bgreer



Notes:

Building 2A Pile Cap Information

PILE CAP SCHEDULE

TYPE	NUMBER OF PILES	SIZE WIDTH	SIZE LENGTH	SIZE DEPTH	REFERENCE DETAIL	ASD PILE LOAD
P2.0A	2	2'-6"	5'-6"	2'-6"	1/S-302	40k - C
P2.0B	2	2'-6"	5'-6"	2'-6"	1/S-302	60k - C
P2.0C	2	2'-6"	5'-6"	2'-6"	1/S-302	100k - C
P3.0	3	5'-2"	5'-6"	3'-0"	2/S-302	100k - C
P4.0	4	5'-6"	5'-6"	2'-6"	3/S-302	100k - C
P5.0	5	5'-6"	7'-9"	3'-0"	6/S-302	100k - C
P6.0	6	5'-6"	8'-6"	3'-3"	7/S-302	100k - C
P7.0	7	7'-9"	8'-6"	3'-0"	8/S-302	100k - C

NOTE:
1. PILE LOADS SHOWN IN SCHEDULE ARE ASD LOADING.
2. PILE LOCATIONS SHOWN ON PLAN ARE FOR VISUAL REFERENCE ONLY. PILE DESIGNER IS RESPONSIBLE FOR FINAL LOCATIONS.
3. REFERENCE GEOTECH REPORT FOR PILE TYPE AND DRIVEN LENGTH.

Building 2B Pile Cap Information

PILE CAP SCHEDULE

TYPE	NUMBER OF PILES	SIZE WIDTH	SIZE LENGTH	SIZE DEPTH	REFERENCE DETAIL	ASD PILE LOAD
P2.0	2	5'-6"	2'-6"	2'-11"	1/S-302	100k-C
P3.0	3	5'-2"	5'-6"	3'-0"	2/S-302	100k-C
P4.0	4	5'-6"	5'-6"	2'-8"	3/S-302	100k-C
P5.0	5	5'-6"	7'-9"	3'-0"	6/S-302	100k-C
P6.0	6	8'-6"	5'-6"	3'-8"	7/S-302	100k-C

NOTE:
1. PILE LOADS SHOWN IN SCHEDULE ARE ASD LOADING.
2. PILE LOCATIONS SHOWN ON PLAN ARE FOR VISUAL REFERENCE ONLY. PILE DESIGNER IS RESPONSIBLE FOR FINAL LOCATIONS.
3. REFERENCE GEOTECH REPORT FOR PILE TYPE AND DRIVEN LENGTH.

The deep foundation information on this plan is for reference only; the Foundation Plans in S-101 for Buildings 2A and 2B provided by DCI Engineers supersede and are FOR CONSTRUCTION. This sheet was produced for Ecology and ONLY THE PROTECTION OF MONITORING WELLS IS FOR CONSTRUCTION.

BREEYN MICHELLE GREER
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Legend

- Subject Property
- Proposed Buildings
- Hamilton Street Bridge Site
- Extent of PAH Affected Soil (CAP, 2001)
- 1920 Existing Elevation Contours in Feet
- Proposed Pile Cap
- Proposed Grouted Helical Pile
- Groundwater Monitoring Well
- Construction Monitoring Well
- PAH = Polycyclic Aromatic Hydrocarbon

0 80 100 Feet

Source: Surveyed base map provided by Druyea & Associates, dated November 2, 2019.

Elevation contour data from DEM file generated by ArcGIS™ software, March, 2018.

Foundation Plans with pile layout provided by DCI Engineers, dated April 16, 2021.

The Hamilton Street Bridge Site, Extent of PAH Affected Soil and Extent of Limited Soil CAP are approximated and have not been surveyed.

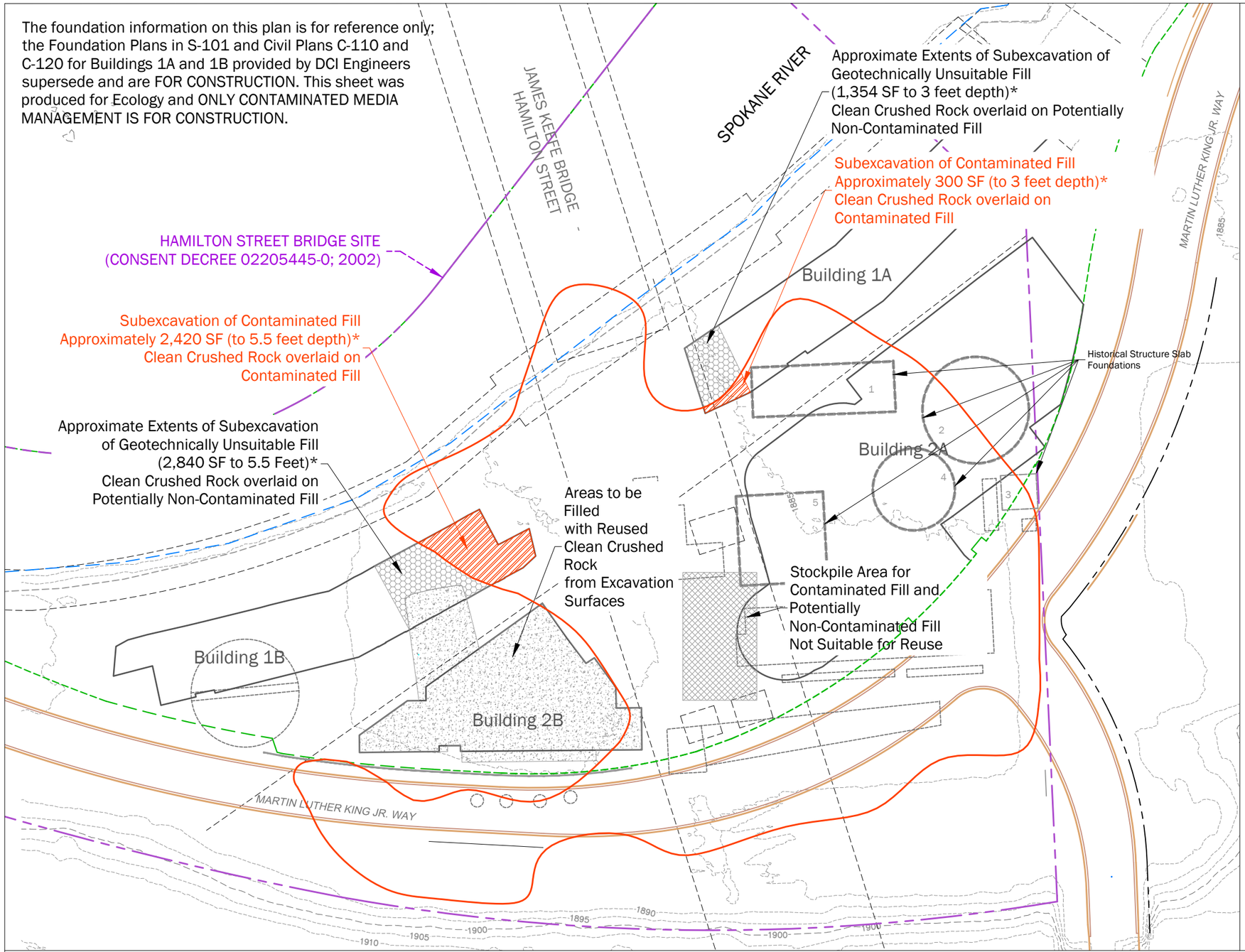
DEEP FOUNDATIONS OVERLAY

Engineering Design Report
Hamilton Street Bridge Site
Spokane, Washington

Aspect CONSULTING	April-26-2021	BY: BMG	FIGURE NO. 2
	PROJECT NO. 180003	REVISED BY: BMG	

CAD Path: Q:\Riverbend Redevelopment\2020-11 EDR\190210 - Plan Set - 2021.dwg 02 Deep Foundations Overlay || Date Saved: Apr 23, 2021 8:07am || User: bgreer

The foundation information on this plan is for reference only; the Foundation Plans in S-101 and Civil Plans C-110 and C-120 for Buildings 1A and 1B provided by DCI Engineers supersede and are FOR CONSTRUCTION. This sheet was produced for Ecology and ONLY CONTAMINATED MEDIA MANAGEMENT IS FOR CONSTRUCTION.



GENERAL NOTES

* Final subexcavation limits will be determined during construction by the Geotechnical Engineer.

MINIMUM HANDLING AND DISPOSAL REQUIREMENTS FOR CONTAMINATED MEDIA

1. All Contractor requirements for screening, handling, and disposal of contaminated soil is presented in the project Contaminated Media Management Plan (Appendix D of EDR).
2. Excavated soil will be segregated by the Geotechnical Engineer via field screening methods. Soil segregation categories are 1) Potentially Non-Contaminated Fill, 2) Contaminated fill, 3) Clean Crushed Rock, and 4) Contaminated Debris. Categories 1 and 2 will be verified during construction by the Geotechnical Engineer via analytical testing. Oversized material (>12 inches diameter) will be segregated and handled as Contaminated Debris.
3. Temporary stockpiling of all category 1 and 2 soils will be necessary pending analytical results. Stockpile locations are also shown in the Civil Plan C-110; deviations in stockpile locations will be approved by the Engineer. All stockpiles will be underlain and covered by plastic sheeting and managed in accordance with the requirements of the Stormwater Pollution Prevention Plan (SWPPP).
4. The Remediation Engineer will direct the disposal requirements for any Contaminated Fill or Debris requiring off-Site disposal. Trucks hauling contaminated material must be covered during transport.

POTENTIAL REUSE OF NON-CONTAMINATED MEDIA

1. Clean Crushed Rock (1.25-inch minus rock meeting WSDOT Standard Specs.) is the existing Site covering. This material may be segregated and reused if it does not come in contact with contaminated media.
2. Analytically confirmed Non-Contaminated material may also be reused onsite if geotechnically suitable as determined by the Geotechnical Engineer and Ecology. It is anticipated that the amount of reusable Non-Contaminated material is minimal as most of it is anticipated to be oversized or geotechnically unsuitable.
3. Locations for Clean Crushed Rock reuse are shown on the plan.

HISTORICAL SLAB FOUNDATION INFORMATION

1. 3,940 SF, top of slab 6 feet deep.
2. 4,925 SF, top of slab 3 feet deep.
3. 680 SF, top of slab 5 feet deep.
4. 2,920 SF, top of slab 4 feet deep.
5. 4,310 sf, top of slab 4 feet deep.

Each historical slab area has about 1 foot of clean crushed rock overlaid on Contaminated or Potentially Non-Contaminated Material.

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Legend

- Subject Property
- Proposed Buildings
- Hamilton Street Bridge Site
- Extent of PAH Affected Soil (CAP, 2001)
- 1920 Existing Elevation Contours in Feet
- Contaminated Fill Removal
- Potentially Non-Contaminated Fill Removal
- Areas for Reuse of Clean Crushed Rock as Backfill
- Stockpile Area

CAP - Cleanup Action Plan
PAH - Polycyclic Aromatic Hydrocarbons
EDR - Engineering Design Report

0 80 100 Feet

Source: Surveyed base map provided by Druyea & Associates, dated November 2, 2019.

Elevation contour data from DEM file generated by ArcGIS™ software, March, 2018.

The Hamilton Street Bridge Site, Extent of PAH Affected Soil and Extent of Limited Soil CAP are approximated and have not been surveyed.

Contaminated Media Management

Engineering Design Report
Hamilton Street Bridge Site
Spokane, Washington

Aspect Consulting	April-26-2021	BY: BMG	FIGURE NO. 3
	PROJECT NO. 180003	REVISED BY: SCC / SJA	

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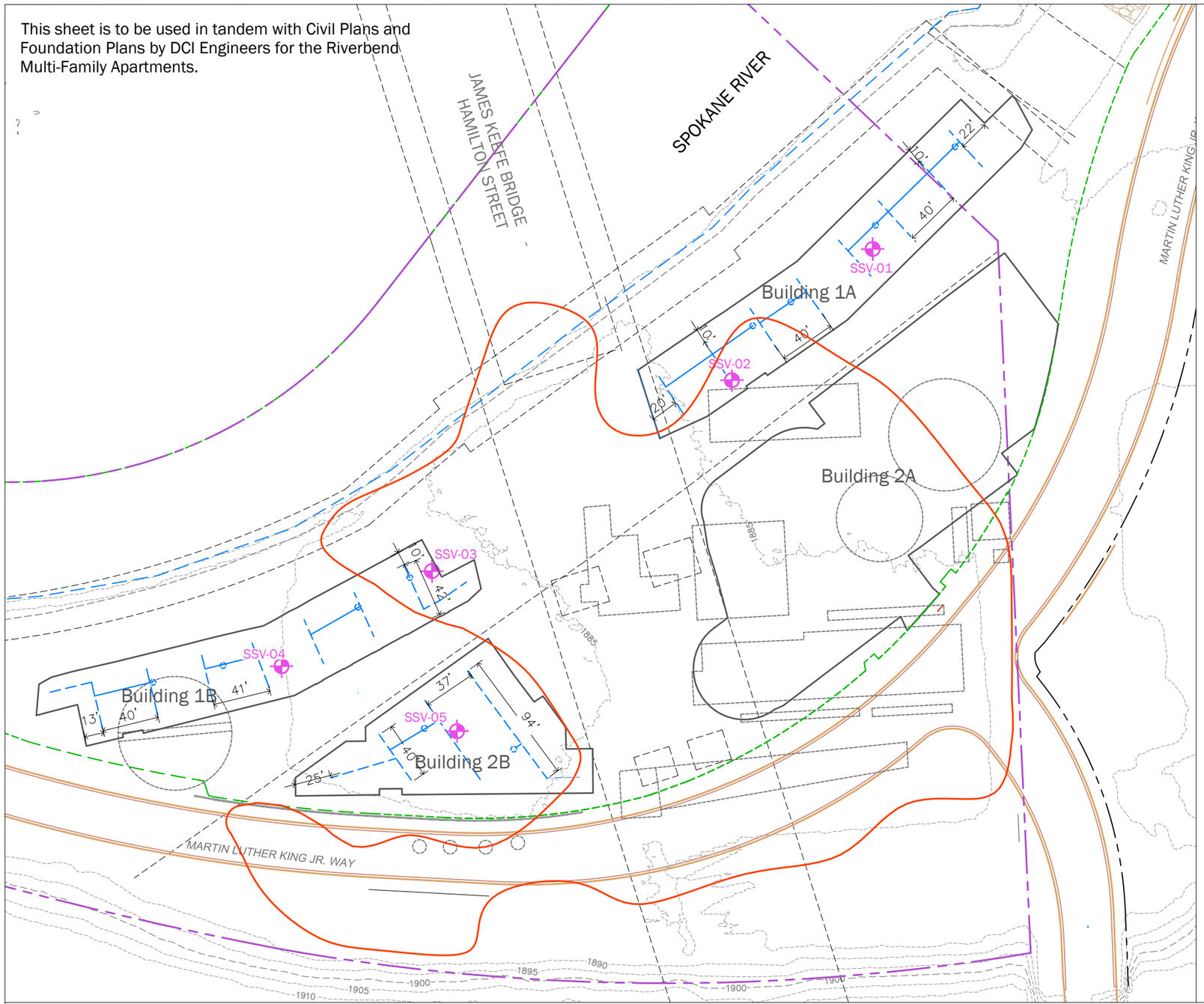
This sheet is to be used in tandem with Civil Plans and Foundation Plans by DCI Engineers for the Riverbend Multi-Family Apartments.



Vapor Mitigation Technical Specifications

These technical specifications are for mitigation of chemical vapor intrusion only and are not intended to address foundation waterproofing/moisture barrier or geotechnical requirements.

Any modifications to these specifications must be approved by the Remediation Engineer. The Contractor is not responsible for installation of the proposed sub-slab vapor monitoring points.

Sub-slab ventilation pipe specifications:

- Ventilation pipe shall be 4-inch schedule 80 PVC. All joints shall be glued.
- Ventilation pipes shall be spaced no more 50 feet apart. Ventilation pipes will be no less than 10 feet and no more than 25 feet from the building perimeter.
- A minimum of 4 inches of capillary break material shall surround the pipes on all sides. The capillary break material must have D_{50} > 0.5 inches and be washed with limited fines content (<5%).
- Ventilation pipe perforations shall be either 1) four maximum ½-inch diameter holes drilled symmetrically around the pipe every 6-inches along the length of the perforated pipe, or 2) 0.020-inch slotted pipe.
- Ventilation pipe ends shall be capped.
- Non-perforated sections of horizontal ventilation pipe shall be sloped towards the perforated section at a minimum of 2%.
- Ventilation pipes passing underneath footings shall be perforated at the low point to prevent blockage due to moisture accumulation. This applies to any low point in the pipe network.

Sub-slab header, and vertical ventilation piping:

- Sub-slab ventilation pipes will be connected to non-perforated, sub-slab header pipes using a tee, sweeping 90 degree, or consecutive 45 degree connections.
- Header pipes will be turned up at 90-degree connection to vertical ventilation pipes. Vertical ventilation pipes will be provided for radon mitigation requirements; this amounts to four (4) vertical ventilation pipes for Buildings 1A and 1B, and two (2) vertical ventilation pipe for building 2B.
- Vertical ventilation pipes must be terminated a minimum of two feet above the highest point on the roof within a 10-foot radius of the vent pipe and a minimum of 10 feet away from windows or HVAC equipment intakes.
- The top end of the ventilation pipe must be turned down to prevent rainwater from entering the pipe. Open ends shall be covered with galvanized wire mesh.
- Exterior vent pipes shall be constructed of cast iron, ductile iron, UV-stabilized HDPE, or similar material, to protect against ultraviolet sunlight.

Vertical ventilation piping at roof:

- Each vertical ventilation piping will be connected to a radon mitigation fan on the roof.
- Power should be provided on the roof at each location for fan connection.
- In instances where radon mitigation plans may conflict, contact Remediation Engineer.

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Legend

- Subject Property
- Proposed Buildings
- Hamilton Street Bridge Site
- Extent of PAH Affected Soil (CAP, 2001)
- 1920 — Existing Elevation Contours in Feet
- Proposed Sub-Slab Vapor Monitoring Points
- Proposed Sub-Slab Ventilation Piping
- Proposed Sub-Slab Header
- Proposed Vertical Ventilation Riser Pipe

0 80 100 Feet

Source: Surveyed base map provided by Druyea & Associates, dated November 2, 2019.

Elevation contour data from DEM file generated by ArcGIS™ software, March, 2018.

The Hamilton Street Bridge Site, Extent of PAH Affected Soil and Extent of Limited Soil CAP are approximated and have not been surveyed.

Vapor Mitigation and Monitoring

Engineering Design Report
Hamilton Street Bridge Site
Spokane, Washington

Aspect Consulting	April-26-2021	BY: BMG	FIGURE NO. 4
	PROJECT NO. 180003	REVISED BY: BMG	

CAD Path: Q:\Riverbend Redevelopment\2020-11 EDR\190210 - Plan Set - 2021.dwg 04 Vapor Mitigation and Monitoring || Date Saved: Apr 23, 2021 8:08am || User: bgreer

Surface Type*	Description	Acres
* Surfacing tabulated in this table are based on the Property and Site overlapping extents		
	Hamilton Street Bridge Rainshadow	0.59
Impervious		
	Building Roofs	1.76
	Sidewalks and Drivelanes	1.28
	Landscaping within Hamilton Street Bridge Rainshadow	0.36
	Total Impervious	3.40
Pervious	Landscaping	1.40
Total		4.80

This sheet is to be used in tandem with Civil Plans and Foundation Plans by DCI Engineers for the Riverbend Multi-Family Apartments. This sheet was produced for Ecology and is NOT FOR CONSTRUCTION.

Legend

- Subject Property
- Proposed Buildings
- Hamilton Street Bridge Site
- Extent of PAH Affected Soil (CAP, 2001)
- 1920 Existing Elevation Contours in Feet
- Hamilton Street Bridge Rain Shadow

Proposed Redevelopment Site Conditions

- Pervious Area
- Pervious Area Beneath Hamilton Street Bridge (Acts as Impervious)
- Proposed Impervious Building
- Proposed Other Impervious (Asphalt/Concrete)

0 100 200 Feet

Source: Surveyed base map provided by Druyea & Associates, dated November 2, 2019.

Elevation contour data from DEM file generated by ArcGIS™ software, March, 2018.

The Hamilton Street Bridge Site, Extent of PAH Affected Soil and Extent of Limited Soil CAP are approximated and have not been surveyed.

Project Surfaces

Engineering Design Report
Hamilton Street Bridge Site
Spokane, Washington

Aspect Consulting	April-2021	BY: BMG	Figure 5
	PROJECT NO. 190210	REVISED BY: SCC	

CAD Path: Q:\Riverbend Redevelopment\2020-11 EDR\190210 - Plan Set - 2021.dwg 05 Project Surfaces || Date Saved: Jan 29, 2021 12:35pm || User: bgreer

LEGEND

- Catchment A
- Catchment B
- Catchment C
- Catchment D
- Direction of Flow
- Extent of PAH Affected Soil (CAP, 2001)
- Bridge Outline
- Building Roof
- Hardscape (Asphalt or Concrete)
- Landscaping

Stormwater Plan C-140 was provided by DCI Engineers for the Riverbend Multi-Family Apartments.This sheet was produced by Ecology and is NOT FOR CONSTRUCTION

The Hamilton Street Bridge Site, Extent of PAH Affected Soil and Extent of Limited Soil CAP are approximated and have not been surveyed.

Existing Stormwater Swale to be modified Bottom Elev. = 1881.00

Eastern Infiltration Gallery within Existing Swale (Catchments A, B, C; Buildings 1A and 2A)

Western Infiltration Gallery (Catchment D; Buildings 1B and 2B)

CATCHMENT A

CATCHMENT B

CATCHMENT C

CATCHMENT D

BUILDING 1A

BUILDING 2A

BUILDING 1B

BUILDING 2B

120' BRIDGE AIRSPACE EASEMENT

JAMES KEEFE BRIDGE

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

HAMILTON STREET OVERHEAD BRIDGE

ON-SITE TBM

E. MARTIN LUTHER KING JR. WAY

ERIE AVENUE

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

110 LF 15" PERFORATED PIPE S= 0.00%

15 LF 15" PERFORATED PIPE S= 0.00%

75'± LF 15" SD LINE S= 0.50%

45'± LF 12" SD LINE S= 0.50%

160'± LF 12" SD LINE S= 0.50%

180'± LF 8" SD LINE S= 0.50%

135'± LF 8" SD LINE S= 0.50%

190'± LF 8" SD LINE S= 0.50%

95'± LF 8" SD LINE S= 0.50%

163'± LF 8" SD LINE S= 0.50%

60'± LF 8" SD LINE S= 0.50%

100'± LF 12" SD LINE S= 0.50%

44 LF 12" PERFORATED PIPE S= 0.00%

FOR PERMIT

THESE DRAWINGS ARE SUFFICIENTLY COMPLETE FOR SUBMISSION TO THE JURISDICTION HAVING AUTHORITY FOR PERMIT. THE CONTRACTOR SHALL NOT USE THESE DRAWINGS FOR CONSTRUCTION UNTIL THE CONTRACTOR RECEIVES WRITTEN APPROVAL FOR USE IN CONSTRUCTION BY THE JURISDICTION HAVING AUTHORITY AND DCI ENGINEERS.

CONTRACTOR NOTE

ALL EXISTING UTILITIES SHOWN ON PLANS ARE TO BE VERIFIED HORIZONTALLY AND VERTICALLY PRIOR TO ANY CONSTRUCTION. ALL EXISTING FEATURES INCLUDING BURIED UTILITIES ARE SHOWN AS INDICATED ON RECORD MAPS AND SURVEYS FURNISHED BY OTHERS. WE ASSUME NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS AND SURVEYS. CONTACT THE UTILITY OWNER/AGENCY FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO CONSTRUCTION.

GRAPHIC SCALE

(IN FEET)
1 inch = 30 ft.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

ALSC ARCHITECTS
203 North Washington, Suite 9400
Spokane, WA 99201
509.838.8568
6500 Mineral Drive, Suite 101
Coure d' Alene, Idaho 83815
208.676.8292
alscarchitects.com

MATTHEW R. GRIFFIN
STATE OF WASHINGTON
41809
REGISTERED PROFESSIONAL ENGINEER
6/5/2020

DCI ENGINEERS
707 W. 2ND AVENUE
SPOKANE, WASHINGTON 99201
PHONE: (509) 455-4448 ● FAX: (509) 455-7492
WEBSITE: www.dci-engineers.com
CIVIL / STRUCTURAL

Aspect CONSULTING

NOT FOR CONSTRUCTION

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

PERMIT SET

REV	DATE	DESCRIPTION

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	6/5/20

STORM WATER PLAN

C-140

FIGURE 6

APPENDIX A

City of Spokane Shoreline Conditional Use Permit

Commercial Building New

Record/Permit Number: B2006572BLDC
Inspector: Jacob Koslowsky 509-625-6148

Development Services Center
808 W Spokane Falls Blvd
Spokane, WA 99201
Phone: (509) 625-6300
my.spokanecity.org

Job Title: River Bend Development Phase 1 - Building 1A

Expires: 3/11/2022

Site Information:

Address: 1185 E MARTIN LUTHER KING JR WAY

Parcel #: 35174.0613

Permit Status: Issued
Status Date: 03/11/2021
Parent Permit: B19M0126PDEV

Bldg Reviewer: Dean Giles
Permit Manager: Tami P 625-6157

Applicant

DCI Engineers
707 W 2nd Ave
SPOKANE WA 99201

Owner

SAGAMORE, SPOKANE LLC
9616 E A.W. TILLINGHAST RD
SCOTTSDALE AZ 85262

Description of Work: **River Bend Development Phase 1 - Building 1A**

Four floor, wood framed apartment building with associated site remediation in compliance with the Dept. of Ecology

Contractor(s)

Construct Contr	SWINERTON BUILDERS	Lic: SWINEB*992DR	(415) 984-1248

Inspector: Jacob Koslowsky Phone: 509-625-6148 (Call between 7:30 am and 8:30 am for Inspection.)

Fees:	Qty:	Amount:
Administrative Fee	1	$918.05
Permit Fee	1	$26,047.00
Plan Review	1	$16,930.55
Processing Fee	1	$25.00
SO Multi Family (3-10 level)--221	1	$30,601.59
State Building Code Residential Fee	57	$118.50
		$74,640.69

Payments:		Ref#	Amount:
02/08/2021	Check	177	$57,710.14
05/28/2020	Check	7331	$16,930.55
			$74,640.69

Estimated Balance Due : **Amount:** $0.00

Occupancy Group	Construction Type	Unit Amount	Unit	Unit Cost	Total Value
R-2 Residential, multi family	06 IIIB	62092	SQFT	$129.23	$8,024,149.16
					$8,024,149.16

CONDITIONS OF APPROVAL

Contact SRCAA at (509) 477-4727 and/or visit www.spokanecleanair.org before renovation or demolition activity begins to ensure compliance with applicable asbestos regulations. An Asbestos Survey may be required.

* TRANSPORTATION REVIEW The parking calculations given on sheet C-120 only give the proposed number of parking stalls but not the required number for the uses - ADA requirements have been met for the proposed number of stalls.* CURRENT PLANNING REVIEW 1. Adhere to all conditions of approval issued by the Hearing Examiner for Planning File #Z2001-17-SL/BSP.
2. Adhere to all design standards required by the Design Review board.* WATER REVIEW 1. Need to field locate/pothole existing tap to establish angle and select final position for meter vault with Water Dept: vault to be 3 ft on property and aligned perpendicular to water main (no bends between main and vault) if possible, and need to avoid vault being located on top of or within 10' of existing large trunk sewer lines (69", 36", etc.).
2. Per Engineer's Notes 1 thru 6 on C-150, water services shall meet current backflow standards per WAC 246-290-490 and follow City of Spokane Water Department Rules and Regulations for Water Service Installations.
3. Please be aware that City of Spokane has a new hydrant use permit program that requires an RPBA and flow meter assembly for all fire hydrant water usage if needed for construction phase of the project (e.g. dust control, etc.). This hydrant program requires a new permit fee, consumption billing, and deposit for the RPBA & meter assembly. Please call 311 or City Water Dept. at 509-625-7800 for more info.* WATER REVIEW 1. On Sheet C-150 Keynotes 1, 6, & 10, be aware that no joints in water lines allowed within 5' of foundation; coordinate location for end of service stub and PIV during mandatory Preconstruction Meeting with Water Dept (required min. two weeks before construction start).
1a. Note that CB locations are in conflict with water line and need to be moved (1) at meter vault and (2) near stub for future 3rd building along MLK Way.
2. Need to provide City (prior to C of O) with copy/PDF of recorded parcel purchase/aggregation or recorded easement for water line (min. 10 ft wide each side) encroaching on parcel (119 N ERIE ST, registered to Brown Properties). Per C.O.S. Water Service Rules, other utilities need to be 5' min. from water lines.
3. For meter signal bollard, need to provide and attach a 16" long treated 2x6 to face of bollard just below its top (board length parallel to ground, facing nearest street) to mount the meter transmitters.
4. On Sheet C-001 disregard Water Note 16 – per Water Service Rule 9, 5.5' water service depth shall be maintained into building.
5. Must provide passing testing reports for all backflow assemblies (e.g. irrigation and fire systems) to the City of Spokane Water Department. Send all reports to watercrossconnection@spokanecity.org before site survey/inspection, and also before certificate of occupancy can be issued.
6. Coordinate a site survey/inspection with the City Water Department (after backflow devices have been tested) no less than 48 hours prior to requesting certificate of occupancy. Cross Connection Line to schedule a water use survey/inspection is 509-625-7969.
7. Please be aware that City of Spokane has a new hydrant use permit program that requires an RPBA and flow meter assembly for all fire hydrant water usage if needed for construction phase of the project (e.g. dust control, etc.). This hydrant program requires a new permit fee, consumption billing, and deposit for the RPBA & meter assembly. Please call 311 or City Water Dept. at 509-625-7800 for more info.* ARCHITECTURAL 1. Provide NREC review and inspection agreement. If any corrections are needed, revised plans must be submitted for approval.* URBAN FORESTRY REVIEW Ensure that all trees along Martin Luther King Blvd are in the public right of way and not on private property so this project meets the street tree requirements.
Have licensed certified arborist submit tree permit as stated on plans.* OSSW REVIEW

- A Certificate of Occupancy is required to legally occupy a building.
- Call 625-6106, or email cocoordinator@spokanecity.org a minimum of 10 working days prior to the conclusion of the project to initiate the Certificate of Occupancy process.
- It is the applicant's responsibility to ensure all conditions are met.
- Plan Review, Inspection, and CO statuses and comments are available at www.spokanepermits.org.

MUST BE POSTED ON JOB SITE

If work has not commenced within 180 days, the permit will be deemed abandoned and become void.
This permit will also expire after 365 days unless an extension is requested through the assigned inspector.

The City of Spokane will continue to process, permit, and inspect projects. We are here to support any and all development and construction that is allowed under current conditions.
The City of Spokane is not in a position to interpret the Governor's Construction Guidance Memorandum of 25 MARCH 2020- that is the responsibility of the project owner/builder.
The project owner/builder must determine, and be responsible for, compliance with the Governor's directives related to COVID-19.
The City's inspection processes for permitting and inspections will be in accordance with all such directives. Meaning; certain processes will be altered, amended, deferred, or unavailable depending on the specific situation. All such decisions will be made on a case-by-case basis.
The City of Spokane's goal is to remain as open and supportive as possible to our building community during this crisis.
Due to an emergency ordinance, all permits set to expire in 2020 will expire on 12/31/2020

Commercial Building New

Record/Permit Number: B2006573BLDC
Inspector: Jacob Koslowsky 509-625-6148

Development Services Center
808 W Spokane Falls Blvd
Spokane, WA 99201
Phone: (509) 625-6300
my.spokanecity.org

Job Title: River Bend Development Phase 1 - Building 1B

Expires: 3/11/2022

Site Information:

Address: 915 E MARTIN LUTHER KING JR WAY

Parcel #: 35174.0612

Permit Status: Issued
Status Date: 03/11/2021
Parent Permit: B2006572BLDC

Bldg Reviewer: Dean Giles
Permit Manager: Tami P 625-6157

Applicant

DCI Engineers
707 W 2nd Ave
SPOKANE WA 99201

Owner

SAGAMORE, SPOKANE LLC
9616 E A.W. TILLINGHAST RD
SCOTTSDALE AZ 85262

Description of Work: **River Bend Development Phase 1 - Building 1B**

Four floor, wood framed apartment building with associated site remediation in compliance with the Dept. of Ecology

Contractor(s)

Construct Contr	SWINERTON BUILDERS	Lic: SWINEB*992DR	(415) 984-1248

Inspector: Jacob Koslowsky Phone: 509-625-6148 (Call between 7:30 am and 8:30 am for Inspection.)

Fees:	Qty:	Amount:
Administrative Fee	1	$92.46
DT Multi Family (3-10 level)--221	1	$3,082.00
Permit Fee	1	$26,287.00
Plan Review	1	$17,086.55
Processing Fee	1	$25.00
State Building Code Residential Fee	67	$138.50
		$46,711.51

Payments:		Ref#	Amount:
02/08/2021	Check	176	$29,599.96
05/28/2020	Check	7331	$17,111.55
			$46,711.51

Estimated Balance Due : **Amount:** $0.00

Occupancy Group	Construction Type	Unit Amount	Unit	Unit Cost	Total Value
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Have licensed certified arborist submit tree permit as stated on plans.* OSSW REVIEW 1. Provide a copy of the PPCD with Ecology.

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- It is the applicant's responsibility to ensure all conditions are met.
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Due to an emergency ordinance, all permits set to expire in 2020 will expire on 12/31/2020

CITY OF SPOKANE HEARING EXAMINER

Re: Application for Shoreline Conditional Use Permit by Sagamore Spokane, LLC, to construct approximately 134 residential units in two buildings with inside and outside parking on property zoned HI and GC-150	)))))	FINDINGS, CONCLUSIONS, AND DECISION FILE NO. Z20-079SCUP

SUMMARY OF PROPOSAL AND DECISION

Proposal: The applicant, Sagamore Spokane, LLC ("Sagamore"), has applied for a Shoreline Conditional Use Permit (SCUP). Sagamore is proposing to construct approximately 134 residential units in two buildings with inside and outside parking. It is within the 200-foot shoreline designation and, therefore, requires a Type III SCUP before the Hearing Examiner. This project is the second phase of the River Bend Development that will total approximately 300 units in four buildings.

Decision: Approved, with conditions.

FINDINGS OF FACT
BACKGROUND INFORMATION

Applicant/ Property Owner:	Sagamore Spokane, LLC One East Camelback Road Suite 140 Phoenix, AZ 85016
Agent:	Stanley Schwartz Witherspoon Kelly 422 W. Riverside Avenue Suite 1100 Spokane, WA 99201

Property Location: The project site is bounded by the Spokane River to the north and Martin Luther King, Jr. Way to the south. The project site is located to the north and across from the intersection of Martin Luther King, Jr. Way and N. Erie Street. The site addresses include 111, 115, 119, 225, and 229 E. Erie Street. The site includes Tax Parcel Nos. 35174.0601 through 35174.0608, and is located in the City of Spokane, Washington.

Legal Description: The full legal description of the property is set forth in Exhibit 2.

Zoning: The property is zoned Heavy Industrial (HI) and General Commercial-150' Height Limit (GC-150).

Comprehensive Plan (CP) Map Designation: The project falls within the Heavy Industrial (HI) and General Commercial (GC) CP land use designations.

Shoreline Designations: Limited Urban Environment Designation; 200-foot Shoreline Jurisdiction Buffer; Campus/U District Shoreline District.

Environmental Overlays: Habitat and Species, Riparian Habitat Area 2.

Site Description: The project site is approximately 13.16 acres and is essentially flat, having a grade of less than 2%. The project site is currently vacant and has been for decades. Major cleanup efforts continue due to previous industrial uses on the site and the contamination left behind. Given this history, the soils at the site is largely imported fill. The Hamilton Street Bridge bisects the site, with bridge piers located in the center of the property.

Project Description: Sagamore is proposing to construct approximately 134 multi-family dwelling units in two buildings on the southern portion of the site. There will be parking on the ground, and the first and second floors of one of the buildings. This project will be the second phase of an overall 300-unit development in four total buildings. In 2001, a SCUP and Binding Site Plan (BSP) was approved for the first phase of the development, which includes two slab-on-grade buildings immediately adjacent to the Spokane River. Building permits are currently being processed for that phase and are slated for construction within the year.

Surrounding Zoning: The property to the north, on the other side of the Spokane River, is zoned Centers and Corridors 1 (CC1). The property to the immediate west is zoned GC. The property to the south is zoned HI, Light Industrial (LI), or GC. The property to the east is zoned HI.

Adjacent Land Use: To the north of the site, on the other side of the Spokane River, is the McKinstry Building and another large office building. Easterly of the site are Second Harvest Food Bank and the Union Gospel Mission. West and south of the site are various commercial and industrial uses.

PROCEDURAL INFORMATION

Authorizing Ordinances: Spokane Municipal Code (SMC) 17E.060 – Shoreline Regulations; and SMC 17G.060.170 – Decision Criteria.

Community Meeting: March 19, 2020

Notice of Application/Public Hearing: Mailed and Posted: July 1, 2020

Public Hearing Date: August 20, 2020

Site Visit: September 11, 2020

State Environmental Policy Act (SEPA): A Mitigated Determination of Nonsignificance (MDNS) was issued on August 5, 2020, with an appeal period ending on August 19, 2020. No appeal was filed.

Testimony:

Dave Compton, Assistant Planner
City of Spokane, Planning & Development
808 W. Spokane Falls Boulevard
Spokane WA 99201

Stanley Schwartz
Witherspoon & Kelley
422 W. Riverside Avenue
Suite 1100
Spokane WA 99201

David Cook
Aspect Consulting
710 2nd Avenue
Suite 550
Seattle WA 98104

Rustin Hall
ALSC Architects
203 N. Washington
Suite 400
Spokane WA 99201

Phil Altmeyer
Union Gospel Mission
1224 E. Trent Avenue
Spokane WA 99202

Matt Gibb
DCI Engineers
707 W. 2nd Avenue
Spokane WA 99201

Robert Hayes
4215 East Calle Redonda
Phoenix AZ 85018

Present but did not testify:

Gale Stanley
ALSC Architects
203 N. Washington
Suite 400
Spokane WA 99201

Eric Brown
Brown Properties LLC
PO Box 30668
Spokane WA 99223

Exhibits:

1. Planning Services Staff Report
2. General Application, including:
   - A Shoreline Permit Application
   - B SCUP SMC Criteria
   - C Shoreline/Critical Areas Checklist
   - D Notification Map and Addresses
   - E Revised Phase 2 Site Plan
3. SEPA Checklist
4. MDNS
5. Request for Comments, including
   - A City of Spokane Engineering Comments
   - B City of Spokane Waste Water Comments
6. Public Comments
7. Noticing Documents
8. Parking Reduction Letters
9. Boundary Line Adjustment (BLA) Certificate of Approval
10. Design Review Board Staff Report

11. Community Meeting Documents
12. Pre-Development Final Comments
13. Staff Presentation
14. Applicant's Letter dated 08/18/20
15. Applicant's Presentation
16. Applicant's Additional Slide re: piling

FINDINGS AND CONCLUSIONS

To be approved, the proposed SCUP application must comply with the criteria set forth in SMC 17G.060.170 and SMC 17E.060, the shoreline regulations. The Hearing Examiner has reviewed the proposed SCUP and the evidence of record with regard to the application and makes the following findings and conclusions:

1. *The proposal is allowed under the provisions of the land use codes. See SMC 17G.060.170(C)(1).*

To be allowed, a proposed use must be permitted in the shoreline jurisdiction and comply with the zoning of the property. *See* SMC 17E.060.690(C).

The subject site is zoned HI and GC. Residential use categories are identified in SMC 17C.190.110. In that section, the term "residential household uses" includes multi-family dwellings such as apartments and condominiums, among other residential uses. *See* SMC 17C.190.110(C).

Multi-family uses are allowed outright on the GC portions of the site. *See* SMC Table 17C.120-1. The remainder of the site, which is zoned HI, also allows the proposed use, given that the project is located within one-quarter (1/4) mile of the Spokane River. *See* SMC Table 17C.130-1; *see also* SMC 17C.130.110(2)(a). Thus, the zoning code authorizes multi-family uses on the entire site.

The site is designated by the Shoreline Master Program (SMP) as being within the Limited Urban Environment (LUE) as well as the Campus/U District Shoreline District. *See* Exhibit 1. The Campus/U District Shoreline District contemplates a mixture of passive recreation and residential, academic, and other uses. *See* SMC 17E.060.830(A)(1). A multi-family project certainly fits within the mixture of uses in the vicinity. The project is designed to have campus-like amenities, which fit well with the adjacent University District. In addition, in LUE designated areas, multi-family residential uses (4 or more dwelling units) are allowed through a conditional use permit. *See* SMC Table 17E.060-4.

The shoreline regulations contemplate that multi-family development may take place in the shorelines. *See* SMC 17E.060.570(A). However, new multi-family residential development must provide public access to the shoreline, consistent with the requirements of SMC 17E.060.290. *See* SMC 17E.060.570(E). In addition, parking facilities, which are accessory to that use, are subject to certain restrictions. *See* SMC 17E.060.590(E) & (F).

The project has been designed to provide public access to the shoreline through parking facilities, pedestrian friendly layout and trail connections, open areas for public use, and the campus-like atmosphere that takes advantage of the site's proximity to the

Spokane River. Onsite parking will be required to adhere to the applicable code requirements, as reflected in the conditions of approval.

The Hearing Examiner concludes that the proposed use is allowed under the provisions of the land use codes and shoreline regulations, provided an SCUP is obtained and the other development regulations are satisfied. Therefore, this criterion for approval is fulfilled.

2. *The proposal is consistent with the Comprehensive Plan designation and goals, objectives and policies for the property. See SMC 17G.060.170(C)(2).*

The western-most portion of the site is designated as GC under the CP. *See* Exhibit 13 (Surrounding Land Use). GC supports a wide range of commercial uses. *See* CP, Chapter 3, Land Use, p. 3-39. This designation also allows higher-density residential use. *See id*.

The remaining property, which makes up the majority of the site, is designated as HI. *See* CP, Chapter 3, Land Use, p. 3-39. HI is intended to accommodate heavier industrial uses at locations where there is no interaction with residential uses. *See id*. However, higher density residential use is allowed in the HI zones, as previously discussed, when situated near the Spokane River. The CP reinforces that idea, stating that "river-oriented residential use" is allowed in industrial areas "along the Spokane River where residents can take advantage of the river amenity." *See* CP, Chapter 3, Land Use, p. 3-12.

As the Applicant notes, the project site is adjacent to the University District and is close to downtown, the "regional center" of Spokane. *See* Exhibit 2A (Attachment to CUP Application). This multi-family project will provide additional housing for a broad range of individuals, including students, individuals who work in the University District and in the downtown area, medical professionals, and others. *Testimony of R. Hayes*. In addition to housing, the project provides "pedestrian pathways, visual access to the river, large open-space areas, off-street parking, as well as facilities by transit and bicycle use." *See* Exhibit 2A (Attachment to CUP Application).

The project's design is consistent with Goal LU 1, concerning citywide land use. The project features a range of opportunities for living, working, recreation, education, and cultural activities, in furtherance of that goal. *See* CP, Chapter 3, LU 1, p. 3-6. The project also reinforces downtown's role as the urban center of the city, as contemplated by LU 1. *See id*. By developing higher density housing in this location, the project supports the efficient functioning of transit, in furtherance of Policy TR 3.4. *See* CP, Chapter 4, TR 3.4, p. 21. The design of the project promotes walking and pedestrian circulation, as contemplated by Policies TR 2.6 and 2.7. *See* Exhibit 1; *see also* CP, Chapter 4, TR 2.6, and 2.7, p. 15. In addition, the project has features that improve the appearance of development, encourage social interaction, and enhance the urban and natural environment. This aspect of the project fulfills Policy LU 2.1, relating to public realm features. See CP, Chapter 3, LU 2.1, p. 3-16.

The project also satisfies the intent and policies of the SMP, as is discussed below. *See* Paragraph 6. The Hearing Examiner also agrees with the analysis of Staff concerning this criterion. *See* Exhibit 1.

The Hearing Examiner concludes that this criterion for the approval of the SCUP is satisfied.

3. *The proposal meets the concurrency requirements of SMC Chapter 17D.010. See SMC 17G.060.170(C)(3).*

The application was circulated on May 4, 2020, among all City departments and outside agencies with jurisdiction. *See* Exhibit 1, p. 5; *see also* Exhibit 5. There were no departments or agencies that reported that concurrency could not be achieved. *See id.* The lack of comment from the various departments and outside agencies suggests that there are no unmet concurrency requirements. The Hearing Examiner concludes that this criterion is satisfied.

4. *If approval of a site plan is required, the property is suitable for the proposed use and site plan considering the physical characteristics of the property, including but not limited to size, shape, location, topography, soils, slope, drainage characteristics, the existence of ground or surface water and the existence of natural, historic or cultural features. See SMC 17G.060.170(C)(4).*

The site plan for the Phase II is included in the record as Exhibit 2E. The site plan generally shows the location, size, and shape of the property. The plan also includes information about the physical characteristics of the site and other details about the proposed project.

The Applicant and its consultants expertly designed the project to account for the conditions of the site. This is not a small accomplishment. The site is bisected by the Hamilton Street Bridge, which certainly poses limitation on how the property can be developed and used. The site is also encumbered by industrial contamination, which is the subject of ongoing cleanup efforts. As the Applicant explained:

> *The property is the subject of a Consent Decree (Spokane County Superior Court No. 02-205445) and is subject to institutional controls to remediate hazardous substances under the supervision of the WDOE. Applicant has been working with WSDOE to obtain a Prospective Purchaser Consent Decree (PPCD) under the Model Toxics Control Act, RCW 70.105D to include submitting environmental information and planned remediation to WDOE*.

See Exhibit 3 (Environmental Checklist ¶ A(8)); *see also Testimony of D. Cook*. Despite the challenges, the Applicant has presented a project that places buildings to take advantage of the unique benefit of being by the Spokane River, creates an attractive campus along the river for both public and private enjoyment, while also avoiding or minimizing the risk of disturbing the contaminants underground. *See Testimony of R. Hayes, D. Cook, R. Hall, and M. Gibb*.

The property is a suitable location for multi-family housing, despite the existing contamination. Cleanup efforts at the site have been ongoing for many years. The "responsible parties" and the Washington State Department of Ecology (WSDOE) entered into a Consent Decree, which established the cleanup strategy. *Testimony of D. Cook*. That strategy primarily involved identifying the extent of the contamination, placing a layer of soil over the contaminated area and contouring it to direct rainwater away from the

contamination, and ongoing monitoring of the ground water. *See id*. The Applicant is working with the WSDOE to draft a Prospective Purchaser Consent Decree (PPCD) consistent with the Model Toxics Control Act (MTCA). *See id*.; *see also* Exhibit 14. The Applicant anticipates that the PPCD will be signed shortly. *Testimony of D. Cook.* Through the PPCD, the Applicant will complete additional remediation, including "enhancing the existing cap and rock surfacing and creating impervious caps over significant portions of the Property to prevent stormwater infiltration and direct contact with impacted soils." *See* Exhibit 14; *see also Testimony of D. Cook*. The WSDOE will be in charge of the additional remediation measures, per the PPCD. *Testimony of D. Cook*. In addition, the original Consent Decree will remain in place. *See id*.

The project has been designed to minimize the environmental risks. Whenever possible, the proposed buildings avoid the area that is contaminated. *Testimony of R. Hall and D. Cook*. In instances when the project encroaches into the contaminated area, such as to excavate for a foundation, the soil will either be put back to its original location, as appropriate, or will be removed and disposed of in an environmentally safe manner. *Testimony of D. Cook*. The excavation for the foundations of the buildings will be above the ground water level. *Testimony of D. Cook and M. Gibb*. The only penetration below the ground water level will be by the pilings to support Building IIB. *Testimony of D. Cook*. However, those pilings will be inserted using a technique that will ensure that the contaminants are not provided a route for migration. *See id*.; *see also* Exhibit 16. The contaminant itself is also very viscous, meaning it does not readily flow and, when not disturbed, will tend to stay in its current location. *Testimony of D. Cook*. While undertaking a development project on a contaminated site may not be the ideal, in this case the appropriate precautions are being taken, after thorough consideration of the conditions. In addition, the remediation work will be taking place under the direction of the WSDOE.

Drainage from the site will be handled in a manner that does not contribute to or exacerbate the underground contamination. The impervious surfaces of the project will assist in controlling the movement and infiltration of storm water into the ground. *See* Exhibit 2A (Attachment to CUP Application); *see also Testimony of D. Cook*. Storm water will be collected and stored in ponds. *See* Exhibit 2A (Attachment to CUP Application). In this manner, the storm water will be treated by bioinfiltration before being disposed of into the ground. *See* Exhibit 3 (Environmental Checklist ¶ A(14)(b)(2)). The bioinfiltration facility will be located outside the area of soil contamination. *See id*.; *see also Testimony of D. Cook*. No impacts to the ground water or the river are anticipated from this drainage. *See id*.

The site is essentially flat, so the slope or topography is not a significant challenge for development. The size and shape of the property are likewise not significant obstacles to development. The project has been designed to fit well with the slightly irregular shape of the property and the presence of the bridge, and there is plenty of area to accommodate the project as designed. Thus, there is nothing about the size, shape, location, or topography of the property that makes is unsuitable for this development. City departments and other agencies reviewing the project apparently agreed. None of those entities suggested that the site was unsuitable for the proposed development. *See* Exhibit 1, p. 6.

The site does not have any known historic or cultural features. *See* Exhibit 2A (Attachment to CUP Application); *see also* Exhibit 3 (Environmental Checklist ¶ B(13)(b)). There are no buildings or objects that are listed on or proposed to be listed on the national,

state, or local registers. *See* Exhibit 3 (Environmental Checklist ¶ B(13)(a)). If anything, the historic use of the site as a gas and tar facility suggests that no such resources are present. *See* Exhibit 2A (Attachment to CUP Application). No evidence was introduced at the hearing to demonstrate that there were historic or cultural features that needed protection. In addition, no comments were received from the Spokane Tribe of Indians or the Department of Archaeological and Historic Preservation. Irrespective of that, the usual protocols under State law apply to this project, as is reflected in the conditions of approval.

Based upon the foregoing, the Hearing Examiner concludes that this criterion for project approval is satisfied.

5. *The proposal will not have a significant adverse impact on the environment or the surrounding properties, and if necessary conditions can be placed on the proposal to avoid significant effects or interference with the use of neighboring properties or the surrounding area, considering the design and intensity of the proposed use. See SMC 17G.060.170(C)(5).*

As the Applicant has explained, the property was previously the location of intense industrial activity, which resulted in a significant contamination of the site. *See* Exhibit 2A (Attachment to CUP Application). However, in 2002, the "responsible parties" entered into a Consent Decree with the State of Washington pursuant to MTCA. *See id*. This Consent Decree established a remediation plan to address the contamination on the site.

As discussed above, the Applicant has been working with WSDOE on both a new and amended Consent Decree. *See id*. Through these arrangements, the proposed development will incorporate environmental remediation measures that are acceptable to WSDOE. *See id*. The MDNS issued by the City sets forth a condition that memorializes that intent. *See* Exhibit 4. Specifically, the MDNS states:

> *Under the Model Toxics Control Act (RCW 70.105D) the Applicant and WSDOE are addressing and mitigating the pre-existing environmental contamination through a Prospector Purchaser Consent Decree.*

See Exhibit 4. The MDNS was not appealed and, thus, the conclusion reached by the City, as the lead agency, is not subject to challenge. In addition, the Hearing Examiner finds that there is no evidence in this record that undermines the City's judgment that the project, as conditioned, will not have a significant impact on the environment. *See also* Paragraph 4 above.

The record also does not contain evidence that the proposal creates any significant impacts on neighboring or surrounding properties. No neighboring property owners criticized the design of the project or contended that there would be unaddressed impacts, with the possible exception of a concern about traffic. Furthermore, the site is bisected by the Hamilton Street Bridge and contains substantial industrial contamination. This project will put an otherwise problematic piece of real estate to a use that will benefit future residents and the public. The project will create new opportunities to congregate, recreate, and enjoy the Spokane River, and will be an amenity that complements the adjacent University District. The site has already been the subject of substantial governmental scrutiny due to the existing contamination. New or modified consent decrees will ensure that the environmental concerns are being addressed going forward.

As just alluded to, there was one concern raised about the project, and that concerned traffic and parking. *Testimony of P. Altmeyer*. Mr. Altmeyer pointed out that Martin Luther King Way was only two lanes, which may not be sufficient to handle the traffic from this project. *See id*. He also worried that the parking may be insufficient, in particular given the parking variance. *See id*. The Hearing Examiner is sympathetic to these concerns. However, on this record, the Hearing Examiner does not believe he is in the position to impose additional traffic mitigation.

There are no comments from the City Traffic Department suggesting that additional traffic mitigation measures are needed, and no other traffic engineers testified on the matter. Thus, there is no expert testimony at this stage that would support the need for traffic mitigation. The Hearing Examiner has no specific information, for example, regarding the capacity of Martin Luther King Way and how that capacity is affected by the anticipated traffic from the project. The MDNS contains no traffic mitigation measures, and that determination was not appealed. The Applicant also pointed out that traffic impacts may still be addressed at the building permit stage, but that is a matter for discussion or negotiation with the City of Spokane at a later date. With respect to the parking, the parking variance was granted after due consideration of the issue following submission of the relevant information by the Applicant and consideration of a range of factors by the Planning Department. *See* Exhibit 8. That administrative decision was also unchallenged. At this stage, then, the Hearing Examiner is inclined to approve the project and allow the subject of traffic mitigation to be handled, as needed or appropriate, in subsequent discussions between the Applicant and the City.

The Hearing Examiner concludes that this project is not likely to have significant, negative impacts on the environment. To the extent impacts will occur, those impacts will be sufficiently mitigated. As a result, this criterion for approval is satisfied.

6. *The proposed use is consistent with the policies of RCW 90.58.020 and the shoreline master program. See SMC 17G.060.170(D)(a)(i).*

The site is designated as LUE in the CP. The LUE environment is "intended for development that creates a unique waterfront environment, enhances aesthetic appeal, provides public access, and allows compatible uses." *See* CP, Chapter 14, Shorelines, p. 14-18. The proposal plainly satisfies this intent. One need only review the site plan and project renderings to see how the proposal will create a unique amenity along the shoreline. *See e.g.* Exhibit 15. Public access will be enhanced by the trail and access improvements as well as the open spaces that are incorporated into the design. The project is an allowed use under both the shoreline regulations and the zoning, which will blend well with the University District. *See* Paragraph 1 above. The proposal is also consistent with the policies directed specifically at the use of the shoreline environment, as discussed below.

The Applicant has been coordinating the planning of this project with City Planning as well as WSDOE, in particular given the underground pollution resulting from the site's historic use for industrial purposes. In particular, the Applicant is working with the WSDOE on a PPCD to address additional measures for site remediation as the site is re-developed. In this fashion, the project fulfills Policy SMP 1.1, which calls for coordinated planning with state and local agencies. See CP, Chapter 14, Shorelines, p. 14-23.

The project will ensure that there is no net loss of ecological functions, consistent with Policy SMP 1.3. *See* CP, Chapter 14, Shorelines, p. 14-23. The project will incorporate additional remediation measures as well as impervious surfaces over the contaminant plume. *See* Exhibit 2A. Storm water will be collected and treated in ponds located outside the contaminated area. *See* Exhibit 3 (Environmental Checklist ¶ A(14)(b)(2)). These features will provide additional protections for the shoreline environment by reducing the likelihood that hazardous substances will migrate. *See* Exhibit 2A; *see also* Exhibit 3 (Environmental Checklist ¶ A(14)(b)(2)).

The project furthers several other policies contained in the SMP. Those policies are sufficiently discussed in the Staff Report and the Applicant's comments on the project. *See* Exhibit 1; *see also* Exhibit 2A. Rather than merely repeat that analysis, the Hearing Examiner incorporates those comments by reference.

The proposal is also consistent with the broader goals and objectives expressed in Revised Code of Washington (RCW) 90.58.020. One of the overarching goals of the Shoreline Management Act (SMA) is to promote public access the shorelines. *See* CP, Chapter 14, Shorelines, p. 14-8. As discussed above, the project will provide enhanced and additional opportunities for the public to use and enjoy the Spokane River. Furthermore, state policy encourages all reasonable and appropriate uses of the shorelines. *See* CP, Chapter 14, Shorelines, p. 14-8. State policy also prefers uses that are "consistent with the control of pollution and prevention of damage to the natural environment…" *See* CP, Chapter 14, Shorelines, p. 14-9. This project puts a former industrial site, which has significant contamination, to productive, beneficial use. The project will also incorporate remediation measures, under WSDOE supervision, that ensure that the pre-existing contamination does not migrate further to impact ground water or the river.

The Hearing Examiner concludes that the proposal fulfills the intent of the SMA as well as the SMP. Therefore, this criterion for approval is satisfied.

7. *The proposed use will not unreasonably interfere with the normal public use of public shorelines. See SMC 17G.060.170(D)(a)(ii).*

The site is currently vacant, although there is an existing asphalt trail providing pedestrian access along the shoreline. Through development of this project, the existing public trail will be enhanced to provide increased access and viewing opportunities for the public. *See* Exhibit 1. The project design includes not only enhancement of the trail, but also landscaping, greenspace, and other open areas providing places for viewing and enjoying the Spokane River environment. *See* Exhibit 2A. There is no evidence in this record that the proposed structures will unreasonably interfere with normal public use of the shorelines. Therefore, the Hearing Examiner concludes that this criterion is satisfied.

8. *The cumulative impact of several additional conditional use permits on the shoreline in the area will not preclude achieving the goals of the shoreline master program. See SMC 17G.060.170(D)(a)(iii).*

There is no evidence, on this record, of multiple SCUPs affecting the shoreline in this vicinity. Therefore, there is no basis upon which to perform a cumulative impact analysis. The most recent SCUP concerned the adjacent property to the east. The City of Spokane installed a Combined Sewer Overflow (CSO) tank at that property in 2019. CSO

tanks are designed to reduce or prevent sewage from being discharged into the river and, thus, generally have a net positive effect on the shoreline environment. In addition, the development potential of that publicly owned property is limited. *See* Exhibit 1. The property to the west may be developed in the future. However, there is no current application to consider or analyze.

The Hearing Examiner concludes this SCUP will not contribute to cumulative impacts on the shoreline. Therefore, this criterion for approval is met.

9. *The proposed use of the site and design of the project is compatible with other authorized uses within the area and with the uses planned for the area under the comprehensive plan and the shoreline master program. See SMC 17G.060.170(D)(a)(iv).*

The Hearing Examiner has already concluded that this multi-family project is consistent with the shoreline designation, the shoreline regulations, and the SMP. *See* Paragraphs 1, 2, and 6. It is also consistent with the zoning and CP. *See* Paragraphs 1 and 2. The Hearing Examine further concluded that the surrounding properties will not experience significant impacts from this project. *See* Paragraph 5. The previous discussion of these issues clearly supports the conclusion that the proposal is compatible with surrounding properties and potential uses.

That being said, the surrounding area is undergoing substantial re-development at present with both public and private commercial projects. *See* Exhibit 1. The Staff concluded, and the Hearing Examiner agrees, that this residential development complements this growth and is consistent and desirable as outlined in the CP and SMP. *See id*. Moreover, by enhancing public access to the shoreline and incorporating open space amenities, the project is improving the connections between the site and the nearby University District and downtown. The Hearing Examiner concludes that this criterion is met.

10. *The proposed use will cause no significant adverse effects to the shoreline environment in which it is to be located, and the public interest in enjoying the physical and visual access suffers no substantial detrimental effect. See SMC 17G.060.170(D)(a)(v).*

This site, in combination with Phase I of this development, is still subject to an existing Consent Decree with the WSDOE, Avista, and Burlington Northern Railroad. *See* Exhibit 1. Significant mitigation, rehabilitation, and restoration has occurred and will continue under MTCA. *See id*. This was made a condition of the SEPA MDNS issued on August 5, 2020. *See* Exhibit 4. In addition, a landscape plan will be required during the building review process to meet current development code standards and is intended to incorporate the recommendations found in the Design Review Committee staff report. *See* Exhibit 1. Finally, as previously discussed, this proposal will not have a negative impact on the ability to enjoy the Spokane River, and will in fact enhance the public's ability to access and view the River. The Hearing Examiner concludes that this criterion is satisfied.

DECISION

Based on the findings and conclusions above, it is the decision of the Hearing Examiner to approve the SCUP, subject to the following conditions:

1. The site shall be developed in substantial compliance with the plans submitted with the application, as well as comments received on the project from City Departments and outside agencies with jurisdiction.

2. If any artifacts or human remains are found upon excavation, The Spokane Tribe of Indians and the City of Spokane shall be immediately notified, and the work in the immediate area cease. Pursuant to RCW 27.53.060 it is unlawful to destroy any historic or prehistoric archaeological resources. RCW 27.44 and RCW 27.53.060 require that a person obtain a permit from the Washington State Department of Archaeology & Historic Preservation (WSDAHP) before excavating, removing, or altering Native American human remains or archaeological resources in Washington.

3. The Applicant shall adhere to the conditions of the Parking Variance request granted by the Planning Director on August 7, 2020.

4. The Applicant shall adhere to all mitigation measures of the MDNS issued August 5, 2020.

5. The Applicant shall take into consideration recommendations of the Design Review Chair made on April 22, 2020.

6. This approval does not waive the Applicant's obligation to comply with all other requirements of the SMC, as well as requirements of City Departments and outside agencies with jurisdiction over land development.

7. The Applicant shall adhere to any additional performance and development standards documented in comments or required by City of Spokane, Spokane County, Washington State, and any Federal agency.

8. Prior to the issuance of any building or occupancy permits, the Applicant shall submit evidence to this file that the property owner has signed and caused the following statement to be recorded with the Spokane County Auditor’s Office.

COVENANT

> Development of this property is subject to certain conditions on file with the City of Spokane Planning Department and the Office of the City of Spokane Hearing Examiner. The property may not be developed except in accordance with these conditions. A copy of these conditions is attached to this Covenant.

This statement shall be identified as a Covenant. The owner’s signature shall be notarized.

9. SMC 17G.060.240 regulates the expiration of this approval, and Table 17G.060-3 sets forth the time frame for the expiration of all approvals.

10. This approval is subject to the above-stated conditions. By accepting this approval the Applicant acknowledges that these conditions are reasonable and agrees to comply with them. The filing of the above-required covenant constitutes the Applicant's written agreement to comply with all conditions of approval. The property may not be developed except in accordance with these conditions and failure to comply with them may result in the revocation of this approval.

SIGNED this 11th day of September 2020.

Brian T. McGinn
City of Spokane Hearing Examiner

NOTICE OF RIGHT TO APPEAL

Appeals of decisions by the Hearing Examiner are governed by SMC 17G.060.210 and 17G.050.

On September 14, 2020 a copy of this decision will be sent by first class mail to the Applicant, the Property Owner, and the Agent and by email or first class mail to other parties of record.

Decisions of the Hearing Examiner regarding SCUPs are reviewed by WSDOE. After review, they may be appealed to the Washington State Shoreline Hearings Board. All appeals must be filed with the Shoreline Hearings Board within twenty-one (21) calendar days of the date of the Ecology decision.

In addition to paying any Court costs to appeal the decision, the ordinance requires payment of a transcript fee to the City of Spokane to cover the costs of preparing a verbatim transcript and otherwise preparing a full record for the Court.

Pursuant to RCW 36.70B.130, affected property owners may request a change in valuation for property tax purposes notwithstanding any program of revaluation.

APPENDIX B

Construction Stormwater Permit and Administrative Order

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

December 3, 2020

Robert Hayes
Sagamore Spokane LLC
1 E Camelback Rd Ste 200
Phoenix, AZ 85012-1684

RE: Coverage under the Construction Stormwater General Permit (CSWGP)

Permit number:	**WAR309537**
Site Name:	**Riverbend Multi-Family Apartments**
Location:	**intersection of Erie Street and Martin Luther King Jr Way**
	Spokane County: Spokane
Disturbed Acres:	**8.83**

Dear Robert Hayes:

The Washington State Department of Ecology (Ecology) received your Notice of Intent for coverage under Ecology's Construction Stormwater General Permit (CSWGP). This is your permit coverage letter. Your permit coverage is effective December 3, 2020. **Please retain this permit coverage letter as the official record of permit coverage for your site.**

Ecology has approved use of electronic formats as long as they are easily produced on your construction site. A mobile friendly copy of the CSWGP permit, permit forms, and information related to your permit can be viewed and downloaded at www.ecology.wa.gov/eCoverage-packet. Please contact your Permit Administrator, listed below, if you would like to receive a hard copy of the CSWGP.

Please take time to read the entire permit and contact Ecology if you have any questions.

Additional Monitoring
Please refer to the enclosed Administrative Order number 19443 for additional monitoring requirements.

Electronic Discharge Monitoring Reports (WQWebDMR)
This permit requires that Permittees submit monthly discharge monitoring reports (DMRs) for the full duration of permit coverage (from issuance date to termination). DMRs must be submitted electronically using Ecology's secure online system, WQWebDMR. To sign up for WQWebDMR go to www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html. If you have questions, contact the portal staff at (360) 407-7097 (Olympia area), or (800) 633-6193/option 3, or email WQWebPortal@ecy.wa.gov.

Appeal Process
You have a right to appeal coverage under the general permit to the Pollution Control Hearing Board (PCHB). Appeals must be filed within 30 days of the date of receipt of this letter. Any appeal is limited to the general permit's applicability or non-applicability to a specific discharger. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2). For more information regarding your right to appeal, go to https://fortress.wa.gov/ecy/publications/SummaryPages/1710007.html to view

Ecology's Focus Sheet: *Appeal of General Permit Coverage*.

Ecology Field Inspector Assistance
If you have questions regarding stormwater management at your construction site, please contact Shannon Adams of Ecology's Eastern Regional Office in Spokane at shannon.adams@ecy.wa.gov or (509) 329-3610.

Questions or Additional Information
Ecology is committed to providing assistance. Please review our web page at www.ecology.wa.gov/constructionstormwaterpermit. If you have questions about the Construction Stormwater General Permit, please contact your Permit Administrator, Miya Spratt at miya.spratt@ecy.wa.gov, or (360) 407-6442.

Sincerely,

Jeff Killelea, Acting Section Manager
Program Development Services Section
Water Quality Program

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

IN THE MATTER OF AN ADMINISTRATIVE ORDER AGAINST Sagamore Spokane LLC Robert Hayes	)))))	ADMINISTRATIVE ORDER DOCKET #19443

To: Robert Hayes
Sagamore Spokane LLC
1 E Camelback Rd Ste 200
Phoenix, AZ85012-1684

Order Docket #	19443
Site Location	Erie Street and Martin Luther King Jr. Way, Spokane,

The Washington State Department of Ecology (Ecology) has issued this Administrative Order (Order) requiring the Sagamore Spokane LLC to comply with:

- Chapter 90.48 Revised Code of Washington (RCW) – State of Washington Water Pollution Control Act.
- Chapter 173-201A Washington Administrative Code (WAC) – Water Quality Standards for Surface Waters of the State of Washington.
- Construction Stormwater General Permit WAR309537: National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated with Construction Activity.

This is an Administrative Order in accordance with General Condition G13 (Additional Monitoring) as set forth in the Construction Stormwater General Permit. RCW 90.48.120(2) RCW authorizes Ecology to issue Administrative Orders to accomplish the purposes of Chapter 90.48 RCW.

ORDER TO COMPLY

Sagamore Spokane LLC is subject to coverage under NPDES Construction Stormwater General Permit WAR309537 for construction activities associated with the construction site known as Riverbend Multi-Family Apartments (Consent Decree MTCA Number 1T707 and Agreed Order Number DE 00TCPER-75). Sagamore Spokane LLC reported that the site contains contaminated soil which has the potential to discharge in stormwater and dewatering water due to the proposed construction activity. The Construction Stormwater General Permit does not have water quality sampling or benchmarks for acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, pyrene, benzo(a)anthracene, benzo(b)fluoranthene (3,4-benzofluoranthene), benzo(k)fluoranthene (11,12-benzofluoranthene), benzo(a)pyrene, chrysene, dibenzo(a-h)anthracene (1,2,5,6-dibenzanthracene), indeno(1,2,3-cd)pyrene, arsenic (total), lead (total), mercury (total), selenium (total), oil-range hydrocarbons (NWTPH-Dx), and PCBs; however, the permit requires compliance with the Water Quality Standards for Surface Water of the State of Washington (Water Quality Standards).

The Order establishes indicator levels for the Riverbend Multi-Family Apartments. Indicator levels express a pollutant concentration used as a threshold, below which a pollutant is considered unlikely to cause a water quality violation, and above which it may. Indicator levels in this Administrative Order were derived from the Freshwater Toxic Substances Criteria (WAC 173-201A-240), and practical quantitation level.

For these reasons and in accordance with RCW 90.48.120(2) it is ordered that the Sagamore Spokane LLC take the following actions. These actions are required at the location known as Riverbend Multi-Family Apartments, located at Erie Street and Martin Luther King Jr. Way, Spokane, WA. In the event of a permit transfer to another Permittee, compliance with this Administrative Order and the actions listed below are required.

Sagamore Spokane LLC must take the following actions to remain in compliance with NPDES Permit WAR309537:

Follow Sagamore Spokane LLC current Riverbend Multi-Family Apartments Stormwater Pollution Prevention Plan (SWPPP 19042-0014_SWPPP_2020-08-25 8/25/2020) and Erosion Control Sheets (ECS Revised C-110 Erosion Control Plan 8/25/2020):

- On site stormwater runoff during construction shall initially flow overland to a bio-infiltration swale at the north end of the property. The swale shall not receive any contaminated stormwater runoff. All site runoff that reaches the swale shall come from capped (impermeable) areas.

- No stormwater shall be allowed to infiltrate into contaminated soil. Stormwater that has comingled with contaminated soil shall be captured, contained, and disposed of offsite at a controlled facility.

- Drywells and catch basins shall not be constructed within contaminated soils. Drywells and catch basins shall be protected from sedimentation and stormwater by installing inlet protection, covering with steel plates, and burying until they are prepared for final pavement grade.

- Silt fence shall be installed along the north side of the property to prevent sediment runoff into the Spokane River. Work near the Spokane River shall involve placing clean fill material on the existing clean fill to increase the subgrade to the final grade for the buildings. If excavation exceeds the two feet of clean fill and contaminated soil is exposed, plastic sheeting shall be used to line the back of the silt fence.

- Construction activities requiring excavation for building foundations and utilities below current grades shall implement Best Management Practices (BMPs) to prevent stormwater from flowing into the excavation to prevent comingling of construction stormwater and contaminated soil.

- BMPs shall include:
    - Performing excavations during dry weather periods only.
    - Covering open utility trenches at the end of every workday.
    - Line larger excavations with an impermeable liner at the end of every workday.
    - The Updated C-110 Erosion Control Plan (8/25/2020) identifies location where contaminated spoils shall be stockpiled on an impermeable liner and covered with an impermeable liner. These stockpiles are located under the Hamilton Street Bridge if possible to minimize chance of precipitation reaching stockpile.
    - Work shall stop immediately and the excavation shall be covered during storm events.
    - Concrete shall be placed as soon as possible in footing excavations to minimize open excavation time.
    - Soil from pile augers shall be collected and placed in designated contaminated soil stockpile locations, with appropriate BMP protection.
    - Captured stormwater on any impermeable liners in excavations shall be captured and then discharged to a location within the site where on-site clean soil cap is undisturbed.
    - Impermeable liners shall be monitored to ensure they remain intact and no discharges occur.
    - Berms constructed for the containment areas shall retain stormwater or prevent stormwater from entering.
    - Stockpiles shall not generate turbid water or fugitive dust.
    - Stockpiled contaminated material shall be disposed of offsite at an approved landfill facility.

- The proposed parking lot excavation shall not penetrate the two feet of clean soil cap.

- The northern building slabs (Buildings 1A and 1B) are slab-on-grade. Limited excavation is required to remove geotechnically unsuitable soils that are potentially contaminated. The soil shall be stockpiled in the locations identified on the updated C-110 Erosion Control Plan (8/25/2020). The finished floor will be approximately two feet above existing grade. Clean fill material will be placed on existing soil to bring to final grade.

- Piles shall be augered for foundation support for the southern buildings (Buildings 2A and 2B). Ecology's Toxic Cleanup Program shall approve the pile type. Spoils generated from the augered piles shall be placed on an impermeable liner and covered with an impermeable liner, as soon as possible. The spoils shall be stockpiled in the location identified on the updated C-110 Erosion Control Plan (8/25/2020).

- Utility trenching activities shall create spoils that shall temporarily be stored on site in the designated contaminated stockpile storage location identified on the updated C-110 Erosion Control Plan (8/25/2020). Utility excavation shall not exceed ten feet deep and dewatering is not anticipated in the trenches. The observed groundwater depths are below ten feet deep. Clean material shall be used for backfilling trenches.

- Stormwater run on from adjacent areas shall be intercepted and conveyed to areas of undisturbed clean soil. Stormwater run on shall not comingle with contaminated soil.

- Any vehicle that comes into contact with contaminated soil shall be washed on an impermeable liner, captured, contained, and disposed of offsite at a controlled facility in accordance with all applicable Federal, State, and local regulations.

- The Certified Erosion and Sediment Control Lead (CESCL) shall keep a record of any stormwater that is trucked off site for disposal. Documentation shall be obtained from the disposal facility, and kept with the CESCLs record.

In the event the planned stormwater methods are not effective, Sagamore Spokane LLC shall take the following actions to remain in compliance with NPDES Permit WAR309537:

- If trucking comingled stormwater off site proves to be inadequate, stormwater or dewatering water must be captured, contained, treated, and sampled for contaminants prior to discharging into areas where clean soil has not been disturbed or discharge off site. If Sagamore Spokane LLC intends to treat and sample stormwater prior to discharging, Sagamore Spokane LLC shall provide a treatment train (illustration of treatment) and narrative (including a description of components, volume, discharge location, etc.) to be approved by Ecology prior to discharging.

- If a chemical treatment system is proposed, obtain authorization from Ecology's Doug Howie (doho461@ecy.wa.gov or 360.407.6444) prior to submitting for approval.

- The treatment system shall have enough capacity to hold the treated dewatering water or stormwater until it has been sampled to determine if any of the indicator levels listed in Table 1 have been exceeded. No dewatering water or stormwater may be discharged before it has been sampled for the parameters listed in Table 1. If any of the indicator levels listed in Table 1 are exceeded, Sagamore Spokane LLC shall stop the discharge of treated dewatering water, until it has been treated again and resampled to determine that all parameters are equal to or below the indicator levels in Table 1.

- If any of the indicator levels are exceeded after being resampled, Sagamore Spokane LLC may discharge into the City of Spokane's Municipal Sanitary Sewer under a separate agreement with the City of Spokane. Sagamore Spokane LLC shall obtain authorization from the proper sewer authority and notify Ecology of the change. Sagamore Spokane LLC shall provide a signed authorization document to Ecology if discharging into the sewer, and modify the SWPPP with the changes.

- If the treatment system (not yet approved by Ecology) is determined to be effective, Sagamore Spokane LLC may revert to a flow-through treatment system after a minimum of two batch sampling and testing events and upon written approval from Ecology. The flow-through treatment system design shall be submitted to Ecology for review prior to use and approval.

- If a flow-through treatment system is adopted, all dewatering water or contaminated stormwater shall be grab-sampled weekly while discharging and tested for the parameters listed in Table 1.

- When using a flow-through treatment system, if any of the indicator levels listed in Table 1 are exceeded, Sagamore Spokane LLC shall stop the discharge of treated dewatering water or stormwater to the designated area with clean undisturbed soil. Discharge shall not occur until it has been resampled to determine that all parameters are equal to or below the indicator levels in Table 1. If any of the indicator levels are exceeded after being resampled, Sagamore Spokane LLC shall modify the existing flow through treatment system to increase its effectiveness, install an Ecology approved treatment system, or truck the contaminated stormwater or groundwater to an off-site disposal facility for appropriate disposal.

- Sampling for acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, pyrene, benzo(a)anthracene, benzo(b)fluoranthene (3,4-benzofluoranthene), benzo(k)fluoranthene (11, 12-benzofluoranthene), benzo(a)pyrene, chrysene, dibenzo(a-h)anthracene (1,2,5,6-dibenzanthracene), indeno(1,2,3-cd)pyrene, arsenic (total), lead (total), mercury (total), selenium (total), oil-range hydrocarbons (NWTPH-Dx), and PCBs shall be reported on the required Discharge Monitoring Report (DMR) according to Permit conditions (S5.B Discharge Monitoring Reports).

- All sampling data shall be reported monthly on DMRs electronically using Ecology's secure online system WQWebDMR, in accordance to permit condition S5.B. If the measured concentration is below the detection level then Sagamore Spokane LLC shall report single analytical values below detection as "less than the detection level (DL)" by entering "<" followed by the numeric value of the detection level (e.g. "<0.1"). All other values above DL must be reported as the numeric value.

- If sampling is conducted more frequently than required by this Order, the results of this monitoring shall be included in the calculation and reporting of the data that is submitted in the DMRs.

- Any discharge to waters of the state above the indicator levels for acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, pyrene, benzo(a)anthracene, benzo(b)fluoranthene (3,4-benzofluoranthene), benzo(k)fluoranthene (11,12-benzofluoranthene), benzo(a)pyrene, chrysene, dibenzo(a-h)anthracene (1,2,5,6-dibenzanthracene), indeno(1,2,3-cd)pyrene, arsenic (total), lead (total), mercury (total), selenium (total), oil-range hydrocarbons (NWTPH-Dx), and PCBs shall be immediately reported to the Department of Ecology.

- All captured sediment from the treatment of the dewatering water or contaminated stormwater shall be transported to an approved disposal facility based on the level of contamination.

- All monitoring data must be prepared by a laboratory registered or accredited under the provisions of Accreditation of Environmental Laboratories, Chapter 137-50 WAC. Final lab reports shall be shown in **same units as Table 1**. Provide copies of all final lab reports and chain of custody to Ecology's Eastern Regional Construction Stormwater Inspector.

Additional Conditions:

- Noncompliance with permit requirements or the provisions of this Order shall be immediately reported to the Eastern Regional Office of the Department of Ecology in accordance with Permit Condition S5.F, Noncompliance Notification.

- If a modification of the Order is desired, a written request shall be submitted to Ecology and if approved, Ecology shall issue an amendment to this Order.

Ecology retains the right to make modifications to this Order through supplemental Order, or amendment to this Order, it if appears necessary to further protect the public interest.
This Order does not exempt Sagamore Spokane LLC from any Construction Stormwater General Permit requirement. This Order automatically terminates when NPDES Construction Stormwater General Permit WAR309537 is terminated.

Table 1.

Sagamore Spokane LLC must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table for monitoring unless the method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136. If the Sagamore Spokane LLC uses an alternative method, not specified in the order and as allowed above, it must report the test method, DL, and QL on the discharge monitoring report.

Pollutant & CAS No. (if available)	Sampling Frequency	Sample Type	Indicator Level, µg/L unless otherwise noted	Required Analytical Protocol	Detection Level, µg/L	Quantitation Level, µg/L
POLYCYCLIC AROMATIC HYDROCARBONS (PAH)						
Acenaphthene (83-32-9)	Batch	Grab	5.7 [a]	625.1	1.9	5.7
Anthracene (120-12-7)	Batch	Grab	5.7 [a]	625.1	1.9	5.7
Fluoranthene (206-44-0)	Batch	Grab	6.6 [a]	625.1	2.2	6.6
Fluorene (86-73-7)	Batch	Grab	5.7 [a]	625.1	1.9	5.7
Naphthalene (91-20-3)	Batch	Grab	4.8 [a]	625.1	1.6	4.8
Pyrene (129-00-0)	Batch	Grab	5.7 [a]	625.1	1.9	5.7
CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS (cPAH)						
Benzo(a)anthracene (56-55-3)	Batch	Grab	23.4 [a]	625.1	7.8	23.4
Benzo(b)fluoranthene (3,4-benzofluoranthene) (205-99-2)	Batch	Grab	14.4 [a]	610/625.1	4.8	14.4
Benzo(k)fluoranthene (11,12-benzofluoranthene) (207-08-9)	Batch	Grab	7.5 [a]	610/625.1	2.5	7.5
Benzo(a)pyrene (50-32-8)	Batch	Grab	7.5 [a]	610/625.1	2.5	7.5
Chrysene (218-01-9)	Batch	Grab	7.5 [a]	610/625.1	2.5	7.5
Dibenzo(a-h)anthracene (1,2,5,6-dibenzanthracene) (53-70-3)	Batch	Grab	7.5 [a]	625.1	2.5	7.5

Indeno(1,2,3-cd)Pyrene (193-39-5)	Batch	Grab	11.1[a]	610/625.1	3.7	11.1
METALS						
Arsenic, Total (7440-38-2)	Batch	Grab	360.0 [b]	200.8	0.1	0.5
Lead, Total (7439-92-1)	Batch	Grab	30.0 [c]	200.8	0.1	0.5
Mercury, Total (7439-97-6)	Batch	Grab	2.1 [b]	1631E	0.0002	0.0005
Selenium, Total (7782-49-2)	Batch	Grab	20.0 [b]	200.8	1.0	1.0
PETROLEUM HYDROCARBONS						
Oil-Range Hydrocarbons (NWTPH-Dx) [e]	Batch	Grab	250 [a]	NWTPH-Dx	250	250
POLYCHLORINATED BIPHENYLS (PCBs)						
PCBs [g]	Batch	Grab	2.0 [d]	608.3	0.07	0.20

Construction Stormwater General Permit Benchmarks				
Parameter			**Benchmark**	**Analytical Method**
Turbidity	Batch	Grab	25 NTU	SM2130 [f]
pH	Batch	Grab	6.5 - 8.5 SU	SM4500-H^+ B

a	No surface water standard, value is laboratory quantitation level.
b	Acute – Freshwater Toxic Substances Criteria (WAC 173-201A-240). At or below the indicator level using analytical protocol for total or dissolved metal values meets the water quality standard.
c	Acute – Freshwater Toxic Substances Criteria (WAC 173-201A-240) based on hardness of 50.0 mg/L for hardness depended metals. The indicator level for hardness dependent metals is expressed as a dissolved metal value. At or below the indicator level using analytical protocol for total or dissolved metal values meets the water quality standard.
d	Acute – Freshwater Toxic Substances Criteria (WAC 173-201A-240).
e	NWTPH-Dx = Northwest Total Petroleum Hydrocarbons – Semi-volatile (“diesel”) for diesel range organics and heavy oils (includes jet fuels, kerosene, diesel-oils, hydraulic fluids, mineral oils, lubricating oils, and fuel oils).
f	Or equivalent.
g	Report the sum of the Aroclors.

FAILURE TO COMPLY WITH THIS ORDER

Failure to comply with this Order may result in the issuance of civil penalties or other actions, whether administrative or judicial, to enforce the terms of this Order.

YOUR RIGHT TO APPEAL

You have a right to appeal this Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do both of the following within 30 days of the date of receipt of this Order:

- File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order on Ecology in paper form – by mail or in person (see addresses below). Email is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Your appeal alone will not stay the effectiveness of this Order. Stay requests must be submitted in accordance with RCW 43.21B.320.

ADDRESS AND LOCATION INFORMATION

Street Addresses	**Mailing Addresses**
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel Road SW Suite 301 Tumwater, WA 98501	**Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

CONTACT INFORMATION

Please direct all questions about this Order to:

Shannon E. Adams
Department of Ecology
Eastern Regional Office
4601 N Monroe St
Spokane, WA 99205-1295

Phone: (509) 329-3610
Email: Shannon.adams@ecy.wa.gov

MORE INFORMATION

- **Pollution Control Hearings Board Website**
  www.eho.wa.gov/Boards_PCHB.aspx
- **Chapter 43.21B RCW – Environmental Hearings Office – Pollution Control Hearings Board**
  http://apps.leg.wa.gov/RCW/default.aspz?cite=43.21B
- **Chapter 371-08 WAC – Practice and Procedure**
  http://apps.leg.wa.gov/WAC/default.aspx?cite=371-08
- **Chapter 34.05 RCW – Administrative Procedure Act**
  http://apps.leg.wa.gov/RCW/default.aspx?cite=34.05
- **Laws:** www.ecy.wa.gov/laws-rules/ecyrcw.html
- **Rules:** www.ecy.wa.gov/laws-rules/ecywac.html

SIGNATURE

Adriane P. Borgias

Adriane P. Borgias
Water Quality Section Manger
Eastern Regional Office

12/3/2020
Date

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N. Monroe Street • Spokane, Washington 99205-1295 • (509) 329-3400

December 8, 2020

Robert Hayes
Sagamore Spokane LLC
1 E Camelback Road, Suite 200
Phoenix, AZ 85012-1684

Order Docket No.	19443
Site Location	Erie Street and Martin Luther King Jr. Way, Spokane

RE: Administrative Order

Dear Robert Hayes:

The Department of Ecology has issued this Administrative Order requiring Sagamore Spokane LLC to comply with:

- Chapter 90.48 Revised Code of Washington (RCW) – State of Washington Water Pollution Control Act.
- Chapter 173-201A Washington Administrative Code (WAC) – Water Quality Standards for Surface Waters of the State of Washington.
- National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit WAR309537.

Please contact Shannon Adams at (509) 329-3610 or spet461@ecy.wa.gov if you have questions.

Sincerely,

Adriane P. Borgias

Adriane P. Borgias
Water Quality Section Manager
Eastern Regional Office

CERTIFIED MAIL: 7019 0140 0000 6497 0510

APB:SEA:red
Enclosure: Administrative Order Docket No. 19443

APPENDIX C

Stormwater Pollution Prevention Plan

Construction Stormwater General Permit (CSWGP)

Stormwater Pollution Prevention Plan (SWPPP)

for

Riverbend Multi-Family Apartments

Prepared for:

Department of Ecology

Eastern Regional Office – Spokane

Permittee / Owner	Developer	Operator / Contractor
Sagamore Spokane LLC	Sagamore Spokane LLC	TBD

M.L.K. Jr. Way & Erie St.
Spokane, WA 99202

Certified Erosion and Sediment Control Lead (CESCL)

Name	Organization	Contact Phone Number
TBD	TBD	TBD

SWPPP Prepared By

Name	Organization	Contact Phone Number
Matt Gibb, P.E.	DCI Engineers 707 W 2nd Ave. Spokane, WA 99201	509-227-5721

SWPPP Preparation Date

August 25, 2020

Project Construction Dates

Activity / Phase	Start Date	End Date
Construction	11 / 15 / 2020	11 / 15 / 2022

Table of Contents **Page**

List of Tables

List of Appendices

List of Acronyms and Abbreviations

Acronym / Abbreviation	Explanation
303(d)	Section of the Clean Water Act pertaining to Impaired Waterbodies
BFO	Bellingham Field Office of the Department of Ecology
BMP(s)	Best Management Practice(s)
CESCL	Certified Erosion and Sediment Control Lead
CO_2	Carbon Dioxide
CRO	Central Regional Office of the Department of Ecology
CSWGP	Construction Stormwater General Permit
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ERO	Eastern Regional Office of the Department of Ecology
ERTS	Environmental Report Tracking System
ESC	Erosion and Sediment Control
GULD	General Use Level Designation
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
NWRO	Northwest Regional Office of the Department of Ecology
pH	Power of Hydrogen
RCW	Revised Code of Washington
SPCC	Spill Prevention, Control, and Countermeasure
su	Standard Units
SWMMEW	Stormwater Management Manual for Eastern Washington
SWMMWW	Stormwater Management Manual for Western Washington
SWPPP	Stormwater Pollution Prevention Plan
TESC	Temporary Erosion and Sediment Control
SWRO	Southwest Regional Office of the Department of Ecology
TMDL	Total Maximum Daily Load
VFO	Vancouver Field Office of the Department of Ecology
WAC	Washington Administrative Code
WSDOT	Washington Department of Transportation
WWHM	Western Washington Hydrology Model

Project Information (1.0)

Project/Site Name: **Riverbend Multi-Family Apartments**
Street/Location: **M.L.K. Jr. Way & Erie St.**
City: **Spokane** State: **WA** Zip code: **99202**
Subdivision: **N/A**
Receiving waterbody: **Spokane River**

Existing Conditions (1.1)

Total acreage (including support activities such as off-site equipment staging yards, material storage areas, borrow areas).

Total acreage: **13.16 acres**

Disturbed acreage: **8.83 acres**

Existing structures: **None**

Landscape topography: **Low-lying vegetation with surface slopes at approximately 2%**

Drainage patterns: **Onsite surface runoff flows from the southwest to northeast**

Existing Vegetation: **Indigenous grass and shrubs, gravel throughout**

Critical Areas (wetlands, streams, high erosion risk, steep or difficult to stabilize slopes): **None**

Existing Soils:

Fill soils underlying the Site are related to previous site grading and development, previous environmental capping, and relocation of basalt rock that was removed from the nearby railroad alignment during its development. The type and thickness of fill material is highly variable throughout the Site, and we assume it to be non-engineered, meaning that its composition is not documented. Some of the fill may be contaminated from the former gas works onsite. The exception to this assumption is the soil cap which created the existing surface, which was placed and compacted. The engineered soil cap was placed as part of a cleanup action at the Site overseen by Ecology. Aspect identified five categories of fill: Soil Cap, brick fill, basalt fill, cinder fill, and undifferentiated fill (mixed debris).

Geologic mapping of the area indicates that the Site is underlain by glacial flood-channel deposits of the Pleistocene age (Qfcg). Qfcg unit that underlies the Site generally consists

of boulders, cobbles, gravel, and sand, with some sand and silt beds, and may be on the order of several hundred feet thick. The western portion of the site has fill and flood deposits overlaying basalt boulders and bedrock.

List of known impairments for 303(d) listed or Total Maximum Daily Load (TMDL) for the receiving waterbody:

TMDLs: Dissolved Oxygen and Dissolved Metals (Lead and Zinc).

- **Dissolved Oxygen**
  - **Ammonia (NH3-N)**
    - **0.83 mg/L – March-May, October**
    - **0.21 mg/L – June-September**
  - **Total Phosphorus (TP)**
    - **Develop SWPPP and maintain BMP's during construction**
  - **Carbonaceous Biochemical Oxygen Demand (CBOD)**
    - **4.2 mg/L**

- **Dissolved Metals:**

	River Hardness$_1$ at River Mile Locations (m/L as $CaCO_3$)			Dissolved Lead (m/L as CaCO3)		Dissolved Zinc (m/L as CaCO3)	
Time Period	River Mile 85.3	River Mile 66.0	River Mile$_2$ 75.5	Chronic$_3$	Acute$_3$	Chronic$_4$	Acute$_4$
Winter (December-February)	27.0	37.0	32.1	**0.72**	**18.37**	**39.88**	**43.67**
Spring (March-May)	26.0	36.0	31.1	**0.69**	**17.73**	**38.82**	**42.52**
Summer (June-August)	59.5	72.0	65.8	**1.59**	**40.86**	**73.35**	**80.33**
Fall September-November)	37.0	58.0	47.7	**1.11**	**28.58**	**55.78**	**61.08**
Annual (January-December)	32.5	48.5	40.6	**0.93**	**23.92**	**48.72**	**53.35**

Additional documentation regarding known impairments for 303(d) listed or TMDLs for the Spokane River can be found in Appendix F.

Table 1 includes a list of suspected and/or known contaminants associated with the construction activity.

Table 1 – Summary of Site Pollutant Constituents

Constituent (Pollutant)	Location[1]	Depth (feet below ground surface)	Concentration, Soil (mg/kg)
Total Petroleum Hydrocarbons - Multiple	See Figure 13	2 - 80	10 – 663,000
Carcinogenic Polycyclic Aromatic Hydrocarbons - Total	See Figure 13	2 – 80	.078 – 10,986
Non-Carcinogenic Polycyclic Aromatic Hydrocarbons - Multiple	See Figure 13	2 – 80	.01 – 31,000
Semi Volatile Organic Compounds - Carbazole	See Figure 13	2 – 80	.12 – 2,270
Metals – As, Ba, Pb, Hg, Se	See Figure 13	2 – 80	.01 - 670
Cyanide	See Figure 13	2 - 80	.24 - 172

[1] Figure 13 from Landau, 2001, Hamilton Street Bridge Supplemental & Remedial Investigation, located in Attachment G.

Proposed Construction Activities (1.2)

Description of site development (example: subdivision):
The proposed development includes the construction of two four-story and one seven-story multi-family apartments with asphalt concrete parking and landscaping.

Description of construction activities (example: site preparation, demolition, excavation):
Construction activities will include site preparations, fill grading, utility trenching, installation of building foundation piles, building construction and paving.

There is minimal flow onto the site from adjacent properties. The storm water flows generally flows across the site from the southeast to the northwest overland. A small amount of onsite runoff naturally flows downhill towards the Spokane River on the north side of the Ben Burr Trail.

Onsite stormwater runoff during construction will initially flow overland to the existing bio-infiltration swale at the north end of the property, which will be utilized as a settling pond and will allow for infiltration of runoff. The swale will receive no contaminated

stormwater runoff. All site runoff that reaches the swale will come from capped areas, not from exposed contamination areas.

As construction progresses, some runoff will be directed to new catch basins and drywells. No drywells will be constructed within contaminated soils. Drywells will be protected from sedimentation through the use of catch basin inserts. Catch basins will be protected by covering them with steel plates and burying them until such time that they are raised to final pavement grade. Silt fencing will be installed along the north side of the property to protect from sediment runoff into the Spokane River. Straw wattles will be placed at existing curb inlets along MLK Jr. Way to protect existing drywells and catch basins from sediment runoff.

Post-developed onsite stormwater runoff will be generated from the new roofs and paved surfaces. All pollutant-generating impervious surfaces (PGIS) will be directed to the existing bio-infiltration swale with drywells at the northeast end of the property. All non-pollutant-generating surfaces (NPGIS) will be discharges directly to drywells at the northeast and west ends of the site.

Description of final stabilization (example: extent of revegetation, paving, landscaping):
Buildings, pavement and revegetation will accomplish the final stabilization of the site.

Contaminated Site Information:
Proposed activities regarding contaminated soils or groundwater (example: on-site treatment system, authorized sanitary sewer discharge):

The property on which the proposed River Bend development is located is known as the Hamilton Street Bridge Site ("Site" with Ecology Cleanup Site ID #3509). Soil and groundwater at the Site are contaminated from historical industrial activities. A cleanup action was completed in 2005 that included a 2' deep clean soil cap that prevents stormwater contact with contaminated soils. The proposed construction activities will be conducted in accordance with the Contaminated Media Management Plan (CMMP), required by the Prospective Purchaser Consent Decree (PPCD) with Ecology's Toxics Cleanup Program. The CMMP will define all requirements for handling and disposing of contaminated soil and water at the Site. The CMMP will include the following minimum requirements as it relates to stormwater during construction:

1. **All contaminated soils generated during construction with be handled in accordance with local, state, and federal regulations. Contaminated soils that are stockpiled on-Site will be covered to prevent contamination stormwater. Clean soils that are excavated and stockpiled on-Site will also be covered to prevent contamination of any stormwater.**

2. **Construction requires excavation for building foundations and utilities. All excavations will be below current grades and BMPs will be used to prevent stormwater from flowing into the excavation.**
3. **For areas where excavations will expose contaminated soils, the contractor shall take multiple precautions to ensure that rainwater does not comingle with the contamination, and contamination is not spread to other areas of the site. These precautions include but are not limited to:**

    a. **Perform excavations during dry weather periods only.**
    b. **Cover open utility trenches at the end of every workday.**
    c. **Line larger excavations with an impermeable liner at the end of every workday.**
    d. **Place contaminated spoils in designated stockpile areas on top of an impermeable liner, and cover with an impermeable liner. Place stockpile under bridge if possible to minimize chance of rainfall reaching stockpile.**
    e. **If rainfall begins while excavation is in progress, stop work immediately and cover or line the open excavation.**
    f. **Place permanent concrete as soon as possible in footing excavations to minimize exposure time of contamination.**
    g. **Collect spoils from augered pile construction, place in designated stockpile locations.**
    h. **Before removing impermeable liners from excavations, check for collected rainwater. If rainwater exists, remove and discharge to a location onsite where the clean soil cap is undisturbed.**
    i. **Transport stockpiled contaminated material offsite to an approved dump site.**

Proposed activities that will affect the contaminated soil and groundwater are few. The proposed parking lot excavation will not penetrate the 2' clean soil cap.

The northern building slabs (Buildings 1A and 2A) are slab-on-grade and excavation into contaminated material will not occur. The finish floor of the northern buildings will be set approximately 2' above existing grade. Clean fill will be imported onsite to accomplish this.

The southern buildings (Buildings 1B and 2B) will have pin piles installed for foundation support. The deep foundation (pile) type will be approved by the Ecology Toxics Cleanup Program. Pile type has been selected to minimize potential of mobilization of subsurface contamination. All contaminated spoils generated during pile install will be segregated and placed in covered stockpiles to prevent stormwater contamination. The river bank will be monitored during pile construction to ensure that sediment is not pushed into the river.

Utility trenching activities will also create spoils which will be temporarily stored onsite in plastic covered stockpiles and then re-used as backfill in the utility trenches. The

trenches will be a maximum of 10’ deep, higher than observed groundwater depths. At no point will the exposed contaminated soil in the trenches be subject to overland flow. See Appendix G for more information on the Site.

Construction Stormwater Best Management Practices (BMPs) (2.0)

The SWPPP is a living document reflecting current conditions and changes throughout the life of the project. These changes may be informal (i.e. hand-written notes and deletions). Update the SWPPP when the CESCL has noted a deficiency in BMPs or deviation from original design.

The 13 Elements (2.1)

Element 1: Preserve Vegetation / Mark Clearing Limits (2.1.1)

To protect adjacent properties, existing connecting trail paths and to reduce the area of soil exposed to construction, the limits of construction will be clearly marked before land-disturbing activities begin. Trees that are to be preserved, as well as all sensitive areas and their buffers, shall be clearly delineated, both in the field and on the plans. In general, natural vegetation and native topsoil shall be retained in an undisturbed state to the maximum extent possible. High-visibility fencing will aid in creating a visible barrier as a reminder to be careful in sensitive areas.

List and describe BMPs: **C101E: Preserving Natural Vegetation**
C102E: Buffer Zone

Installation Schedules: **Prior to site disturbance activities**

Inspection and Maintenance plan: **Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately, and visibility restored. If tree roots have been exposed or injured, "prune" cleanly with an appropriate pruning saw or loppers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (e.g., fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.**

Responsible Staff: **CESCL (TBD)**

Element 2: Establish Construction Access (2.1.2)

Dust generation will be minimized through the use of a stabilized construction entrance located along the entrance of the parking lot. There will only be one construction entrance to the site. Quarry spalls will be used for the construction entrance instead of recycled concrete to eliminate the need to treat the stormwater generated near the construction entrance. Construction access or activities occurring on unpaved areas shall be minimized, yet where necessary, access points shall be stabilized to minimize the tracking of sediment onto public roads. Street sweeping and street cleaning will be necessary if the effectiveness of the stabilized construction entrance is reduced or if a quarry spall is displaced from the pad.

List and describe BMPs: **C105E: Stabilized Construction Access**

Installation Schedules: **Prior to construction activities**

Inspection and Maintenance plan: **Quarry spalls shall be added if the pad is no longer in accordance with the specifications. If the entrance is not preventing sediment from being tracked onto pavement then cleaning of quarry spalls, street sweeping and/or installation of a wheel wash may be necessary. Any sediment tracked onto pavement shall be removed by shoveling or street sweeping. Street sweeping may be performed by hand or with a high-efficiency sweeper. Any displaced quarry spalls that end up in the roadway shall be removed immediately. No trucks will be allowed to track contaminated soil from stockpiles.**

Responsible Staff: **CESCL (TBD)**

Element 3: Control Flow Rates (2.1.3)

There is an existing bio-infiltration swale on the northeast portion of the lot that will be utilized as a temporary settling pond during construction. Water from the site surfaces being prepared will be routed to the temporary detention pond. Water will be conveyed to the temporary pond overland. Once the site is completed, the pond will be stripped of the top layer of soil and be converted to a permanent infiltration pond.

Will you construct stormwater retention and/or detention facilities?
Yes No

Will you use permanent infiltration ponds or other low impact development (example: rain gardens, bio-retention, porous pavement) to control flow during construction?
Yes No

List and describe BMPs: **C241E: Sediment Pond (Temporary)**

Installation Schedules: **Prior to construction activities.**

Inspection and Maintenance plan: **Remove sediment from the pond if it reaches 1-foot in depth. Repair any damage to the pond embankments or slopes. The swale will receive no contaminated stormwater runoff. All site runoff that reaches the swale will come from capped areas, not from exposed contamination areas.**

Responsible Staff: **CESCL (TBD)**

Element 4: Install Sediment Controls (2.1.4)

Sediment discharges will be minimized through the use of silt fencing, straw wattles, and inlet protection. Silt fencing will be placed on the river side of the existing path and inlet protection will be constructed as one of the first steps of grading. BMP's being used to filter sediment prior to being discharged to an infiltration system or leaving the construction site are inlet and outlet protection. The construction team will replace any ineffective sediment control measures if they are ineffective and turbid water is observed discharging from the site.

List and describe BMPs: **C220E: Inlet Protection**
C233E: Silt Fence
C235E: Wattles

Installation Schedules: I**nlet protection and silt fence, shall be installed prior to construction activities and as new drywells and catch basins are installed. Wattles are to be utilized along existing street gutters throughout construction as needed. No drywells will be constructed within contaminated soils. Drywells will be protected from sedimentation through the use of catch basin inserts. Catch basins will be protected by covering them with steel plates and burying them until such time that they are raised to final pavement grade.**

Inspection and Maintenance plan: **Inspect all forms of inlet protection frequently, especially after storm events. Clean and replace clogged catch basin filters. Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.**

Repair any damage immediately. If concentrated flows are evident uphill of the fence, they must be intercepted and conveyed to a sediment-trapping BMP. Check the uphill side of the silt fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence and remove the trapped sediment. Remove sediments deposits when the deposit reaches approximately one-third the height of the silt fence or install a second silt fence. Replace geotextile fabric that has deteriorated due to ultraviolet breakdown.

Wattles may require maintenance to ensure they remain in place, especially after significant rainfall. Inspect the street gutters after significant storms and repair any areas where wattles are not intercepting runoff.

Responsible Staff: **CESCL (TBD)**

Element 5: Stabilize Soils (2.1.5)

The majority of the project site will need to be cleared in preparation for the proposed construction. The site is currently stabilized with vegetation and gravel. Clear plastic covering will be used to protect aggregate/soil stockpiles and temporary excavation slopes during wet weather. Plastic covering will also be used to cover contaminated stockpiles at all times; contaminated stockpiles will not be left exposed and will be appropriately covered by the end of each work day. Dust control will be utilized as needed during the dry summer months to mitigate airborne erosion of exposed soils. Soil compaction will be minimized by limiting the area which construction equipment will be used. Final stabilization of the site will include building coverage, paving, and required landscaping. Landscaping will include the import of topsoil as specified in the construction drawings and hydroseeding of these areas. Reference the table below for the duration which soil stockpiles are allowed to be left exposed.

East of the Cascade Mountains Crest, except the Central Basin

Season	Dates	Number of Days Soils Can be Left Exposed
During the Dry Season	July 1 – September 30	10 days
During the Wet Season	October 1 – June 30	5 days

Soils must be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

Anticipated project dates: Start date: **July 1st, 2020** End date: **July 1st, 2022**

Will you construct during the wet season?
Yes No

List and describe BMPs: **C123E: Plastic Covering**
C140E: Dust Control

Installation Schedules: **Throughout construction as needed**

Inspection and Maintenance plan: **Potentially contaminated soils and materials will be stored on plastic and also covered with plastic. Clean soils will be covered with plastic. Torn sheets must be replaced, and open seams repaired. Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation. Completely remove plastic when no longer needed.**

Respray area with water as necessary to keep dust to a minimum.

Responsible Staff: **CESCL (TBD)**

Element 6: Protect Slopes (2.1.6)

No work will take place in the existing riverbank.

Will steep slopes be present at the site during construction?
Yes **No**

List and describe BMPs: **N/A**

Installation Schedules: **N/A**

Inspection and Maintenance plan: **N/A**

Responsible Staff: **N/A**

Element 7: Protect Drain Inlets (2.1.7)

There are four general locations where storm drain inlets will require protection: the new and existing catch basins on the impervious surfaces onsite, the new drywells in the site swales, the existing swale along the southwest side of the site along MLK Jr. Way and the curb inlets along the southeast side of the site along MLK Jr. Way and Erie Street. Before construction begins, a stabilized construction access will need to be installed to minimize the sediment tracked into the street. Construction access or activities occurring on unpaved areas shall be minimized, yet where necessary, access points shall be stabilized to minimize the tracking of sediment onto public roads and into catch basins. Wheel washing, street sweeping, and street cleaning shall be employed to prevent sediment from entering state waters.

List and describe BMPs: **C105E: Stabilized Construction Access**
C220E: Inlet Protection

Installation Schedules: **Stabilized construction access and existing inlet protection to be installed prior to construction activities. Additional inlet protection to be installed as new inlets are installed.**

Inspection and Maintenance plan: **All construction access points shall be inspected regularly. Any sediment tracked onto pavement shall be removed by shoveling or street sweeping. Street sweeping may be performed by hand or with a high-efficiency sweeper. Any displaced debris that end up in the roadway shall be removed immediately.**

Do not track any contaminated soil offsite. Equipment and vehicles that have come in contact with contaminated soil and materials must be washed, preferably pressure washed. Rinse water with potentially contaminated materials must be containerized and disposed of off-site at a controlled facility in accordance with all applicable Federal, State, and local regulations.

Inspect all forms of inlet protection frequently, especially after storm events. Clean and replace clogged inlet protection filters. For rock and gravel filters, pull, away the rocks from the inlet and clean or replace. An alternative approach is to use the clogged rock as fill and put fresh rock around the inlet. Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

Responsible Staff: **CESCL (TBD)**

Element 8: Stabilize Channels and Outlets (2.1.8)

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows. Downstream erosion will be prevented through the use of rip rap outlet protection and utilizing the new protected drywell field for stormwater events.

Provide stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes, and downstream reaches, will be installed at the outlets of all conveyance systems.

List and describe BMPs: **C209E: Outlet Protection**

Installation Schedules: **Prior to parking lot construction. Rock outlet protection will remain in swale as part of permanent measures. No construction stormwater that has comingled with contaminated soil will enter the swale.**

Inspection and Maintenance plan: **Inspect and repair as needed. Add rock as needed to maintain the intended function. Clean energy dissipater if sediment builds up.**

Responsible Staff: **CESCL (TBD)**

Element 9: Control Pollutants (2.1.9)

The following pollutants are anticipated to be present on-site:

Table 2 – Pollutants

Pollutant (and source, if applicable)
Concrete (sitewide)
Diesel fuel (sitewide) from heavy equipment
Hydraulic fluid (sitewide) from heavy equipment
Contaminants of Concern listed in Table 1 are contained in soil and groundwater above MTCA cleanup levels. Additional information is located in Appendix G.
Construction Debris

The contractor shall employ good housekeeping practices for the duration of the project. All storm water runoff shall be prevented from flowing off the project site during construction and shall be retained in the temporary settling pond onsite.

The intent of the proposed BMP's is for all sediment-laden runoff to be routed to the temporary settling pond for infiltration. However, if storm water accumulates in the temporary settling pond, such that the contractor will need to remove the retained storm water from the site and thereby increase the available storm water storage capacity, the contractor must have the storm water tested and analyzed for contaminant concentrations prior to any possible allowed discharge.

If storm water tests result in contamination levels that do not exceed the limit levels for a discharge to the Spokane River, the contractor shall notify the civil engineer, who will then notify the Washington State Department of Ecology, to obtain approval for said discharge. Discharges allowed to the Spokane River from the site shall be pumped for the temporary storage ponds on the site (where appropriate water samples were retrieved from for testing) and pumped directly to the Spokane River. See Appendix F for Spokane River Discharge Limit Levels.

If storm water tests result in contamination levels that do exceed the limit levels for a discharge into the Spokane River, but do not exceed the local limit levels allowed for discharge into the City of Spokane's Wastewater System, the contractor must then notify the civil engineer of test results and proposed possible discharge to the City of Spokane's Wastewater System. All protocols and requirements for discharge must be followed.

List and describe BMPs: **C151E: Concrete Handling**
C152E: Sawcutting and Surfacing Pollution Prevention

Installation Schedules: **Duration of construction**

Inspection and Maintenance plan: **Check concrete related containers for holes in the liner daily during concrete pours and repair the same day.**

Continually monitor operations to determine whether slurry, cuttings or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and/or vacuum trucks.

Responsible Staff: **CESCL (TBD)**

Will maintenance, fueling, and/or repair of heavy equipment and vehicles occur on-site?
Yes No

The contractor shall employ good housekeeping practices for the duration of the project. Spill control kits should be available at the site for any fueling and refueling of construction equipment. The contractor shall abide by all manufacturer's recommendations and applicable federal, state (C153E: Material Delivery, Storage, and Containment), and local requirements for the storage and use of construction products that have the potential for generating pollutants in runoff.

All materials will be stored in secured locations, off the ground, under cover, and protected from the elements after the hours of construction.

The material storage area will be kept clean, organized and equipped with a spill kit in case of emergency. Hazardous material storage on-site will be minimized, and handling will be as infrequent as possible. The contractor will be responsible for creation and implementation of a Spill Prevention, Control, and Countermeasure Plan (SPCC).

Re-fueling of heavy equipment shall be conducted at a pre-determined location with immediate access to the above-mentioned spill kit. It is also expected that the service which re-fuels the equipment will use containment equipment to be placed under fueling device during fueling activities.

List and describe BMPs: **C153E: Material Delivery, Storage, and Containment**

Installation Schedules: **Duration of construction**

Inspection and Maintenance plan: **Daily inspection of chemical storage areas shall be conducted by the contractor. A weekly inspection by the CESCL shall also be conducted. Any spills or containment deficiencies shall be corrected immediately per the SPCC. Specific locations with secondary containment measures in place shall be designated for all re-fueling activities. Secondary containment facilities shall be maintained free of accumulated rainwater and spills. Re-stock spill kit as necessary. Fuels and liquid hazardous materials used in the construction activities must be stored within a tight secondary containment area that is able to contain precipitation (if outdoors) in accordance with standard industry spill prevention, control, and countermeasures (SPCC) procedures..**

Responsible Staff: **CESCL (TBD)**

Will wheel wash or tire bath system BMPs be used during construction?

Yes, for contaminated soil. No

List and describe BMPs: **N/A**

Installation Schedules: **N/A**

Inspection and Maintenance plan: **N/A**

Responsible Staff: **N/A**

Will pH-modifying sources be present on-site?
Yes No

Table 3 – pH-Modifying Sources

	None
X	Bulk cement
	Cement kiln dust
	Fly ash
	Other cementitious materials
X	New concrete washing or curing waters
	Waste streams generated from concrete grinding and sawing
	Exposed aggregate processes
	Dewatering concrete vaults
	Concrete pumping and mixer washout waters
	Recycled concrete
	Other (i.e. calcium lignosulfate) [please describe]

Concrete washout areas will be implemented where concrete truck drums are to be washed on-site. Washout area must be located at least 50 feet from sensitive areas such as storm drains and open ditches.

List and describe BMPs: **C154E: Concrete Washout Area**
C153E: Material Delivery, Storage and Containment

Installation Schedules: **Prior to the commencement of concrete work**

Inspection and Maintenance plan:

Inspect and verify that concrete washout areas are in place prior to the commencement of concrete work. Once concrete wastes are washed into the designated washout area and allowed to harden, the concrete should be broken up, removed, and disposed of per applicable solid waste regulations. Dispose of hardened concrete on a regular basis. During periods of concrete work, inspect the concrete washout areas daily to verify continued performance of the following.

Maintain the concrete washout areas to provide adequate holding capacity with a minimum freeboard of 12 inches. Concrete washout areas must be cleaned, or new concrete washout areas must be constructed and ready for use once the concrete washout area is 75% full. If the concrete washout area is nearing capacity, vacuum and dispose of the waste material in an approved manner. When you remove materials from a self-installed concrete washout area, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Re-line the structure with new plastic after each cleaning.

When concrete washout areas are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of. Materials used to construct concrete washout areas shall be removed from the site of the work and disposed of or recycled. Holes, depressions or other ground disturbance caused by the removal of the concrete washout areas shall be backfilled, repaired, and stabilized to prevent erosion.

Responsible Staff: **CESCL (TBD)**

Concrete trucks must not be washed out onto the ground, or into storm drains, open ditches, streets, or streams. Excess concrete must not be dumped on-site, except in designated concrete washout areas with appropriate BMPs installed.

Element 10: Control Dewatering (2.1.10)

It is unlikely that dewatering will take place during this construction project. Slab-on-grade foundations (Buildings 1A and 1B) will be placed on imported fill. Utility trench depth will not reach observed groundwater depths.

Open trenches and excavations will be covered or protected with impermeable liners during wet weather. Any clean rainwater that collects on top of the liners will be removed and discharged to a location onsite where the clean soil cap is undisturbed.

The deep foundation (pile) type will be approved by the Ecology Toxics Cleanup Program. Pile type has been selected to minimize potential of mobilization of subsurface contamination via transport of groundwater to the surface.

Table 4 – Dewatering BMPs

	Infiltration of clean water only. No potentially contaminated stormwater or rinsewater will be infiltrated anywhere on-Site. Potentially contaminated stormwater and rinsewater must be containerized within the Property and disposed of off-site at a controlled facility in accordance with all applicable Federal, State, and local regulations. Clean stormwater can be infiltrated at locations within the property as specified in the Cleanup Action Plan addendum.

List and describe BMPs: **N/A**

Installation Schedules: **N/A**

Inspection and Maintenance plan: **N/A**

Responsible Staff: **N/A**

Element 11: Maintain BMPs (2.1.11)

All temporary and permanent Erosion and Sediment Control (ESC) BMPs shall be maintained and repaired as needed to ensure continued performance of their intended function.

Maintenance and repair shall be conducted in accordance with each particular BMP specification (see *Volume II of the SWMMWW or Chapter 7 of the SWMMEW*).

Visual monitoring of all BMPs installed at the site will be conducted at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site. If the site becomes inactive and is temporarily stabilized, the inspection frequency may be reduced to once every calendar month.

All temporary ESC BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed.

Trapped sediment shall be stabilized on-site or removed. Disturbed soil resulting from removal of either BMPs or vegetation shall be permanently stabilized.

Additionally, protection must be provided for all BMPs installed for the permanent control of stormwater from sediment and compaction. BMPs that are to remain in place following completion of construction shall be examined and restored to full operating condition. If sediment enters these BMPs during construction, the sediment shall be removed and the facility shall be returned to conditions specified in the construction documents.

Element 12: Manage the Project (2.1.12)

The project will be managed based on the following principles:

- Projects will be phased to the maximum extent practicable and seasonal work limitations will be taken into account.
- Inspection and monitoring:
    - Inspection, maintenance and repair of all BMPs will occur as needed to ensure performance of their intended function.
    - Site inspections and monitoring will be conducted in accordance with Special Condition S4 of the CSWGP. Sampling locations are indicated on the Site Map. Sampling station(s) are located in accordance with applicable requirements of the CSWGP.
- Maintain an updated SWPPP.
    - The SWPPP will be updated, maintained, and implemented in accordance with Special Conditions S3, S4, and S9 of the CSWGP.

As site work progresses the SWPPP will be modified routinely to reflect changing site conditions. The SWPPP will be reviewed monthly to ensure the content is current.

Table 5 – Management

X	Design the project to fit the existing topography, soils, and drainage patterns
X	Emphasize erosion control rather than sediment control
X	Minimize the extent and duration of the area exposed
X	Keep runoff velocities low
X	Retain sediment on-site
X	Thoroughly monitor site and maintain all ESC measures
X	Schedule major earthwork during the dry season
	Other (please describe)

Table 6 – BMP Implementation Schedule

Phase of Construction Project	Stormwater BMPs	Date	Wet/Dry Season

Phase of Construction Project	Stormwater BMPs	Date	Wet/Dry Season

Element 13: Protect Low Impact Development (LID) BMPs (2.1.13)

The infiltration capabilities of the bioinfiltration swale will be protected against compaction by construction equipment and foot traffic. Completed lawn and landscaped areas shall be protected from compaction as well. LID facilities will be protected from sedimentation and harmful cement laden stormwater through the use of BMP C105E, C123E, C151E, C152E, C154E, C209E, C220E, C233E, and C235E.

The swale will receive no contaminated stormwater runoff. All site runoff that reaches the swale will come from capped areas, not from exposed contamination areas.

Pollution Prevention Team (3.0)

Table 7 – Team Information

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)	TBD	TBD
Resident Engineer	Matt Gibb, P.E. DCI Engineers	(509) 227-5721
Emergency Ecology Contact	Shannon Adams	(509) 570-8783
Emergency Permittee/ Owner Contact	Robert Hayes	(602) 549-4021
Non-Emergency Owner Contact	Robert Hayes	(602) 549-4021
Monitoring Personnel	TBD	TBD
Ecology Regional Office	Eastern Regional Office	(509) 329-3400

Monitoring and Sampling Requirements (4.0)

Monitoring includes visual inspection, sampling for water quality parameters of concern, and documentation of the inspection and sampling findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Stormwater sampling data

A blank form is filed under Appendix D.

The site log book must be maintained on-site within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

Numeric effluent limits may be required for certain discharges to 303(d) listed waterbodies. See CSWGP Special Condition S8 and Section 5 of this template.

Complete the following paragraph for sites that discharge to impaired waterbodies for fine sediment, turbidity, phosphorus, or pH:

The receiving waterbody, **Spokane River**, is impaired for: **Phosphorus. The** TMDL for Phosphorus is to develop a SWPPP and maintain BMP's during construction. All stormwater and dewatering discharges from the site are subject to an **effluent limit of 8.5 su for pH and/or 25 NTU for turbidity.**

Site Inspection (4.1)

Site inspections will be conducted at least once every calendar week and within 24 hours following any discharge from the site. For sites that are temporarily stabilized and inactive, the required frequency is reduced to once per calendar month.

The discharge point(s) are indicated on the Site Map (see Appendix A) and in accordance with the applicable requirements of the CSWGP.

Stormwater Quality Sampling (4.2)

Turbidity Sampling (4.2.1)

The intent of the proposed BMP's is for all sediment-laden runoff to be routed to the temporary settling pond for infiltration. However, if storm water accumulates in the temporary settling pond, such that the contractor will need to remove the retained storm water from the site and thereby increase the available storm water storage capacity, the contractor must have the storm water tested and analyzed for turbidity prior to any possible allowed discharge.

Requirements include calibrated turbidity meter or transparency tube to sample site discharges for compliance with the CSWGP. Sampling will be conducted at all discharge points at least once per calendar week.

Method for sampling turbidity:

Table 8 – Turbidity Sampling Method

	Turbidity Meter/Turbidimeter (required for disturbances 5 acres or greater in size)
	Transparency Tube (option for disturbances less than 1 acre and up to 5 acres in size)

The benchmark for turbidity value is 25 nephelometric turbidity units (NTU) and a transparency less than 33 centimeters.

If the discharge's turbidity is 26 to 249 NTU **or** the transparency is less than 33 cm but equal to or greater than 6 cm, the following steps will be conducted:

1. Review the SWPPP for compliance with Special Condition S9. Make appropriate revisions within 7 days of the date the discharge exceeded the benchmark.
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period.
3. Document BMP implementation and maintenance in the site log book.

If the turbidity exceeds 250 NTU **or** the transparency is 6 cm or less at any time, the following steps will be conducted:

1. Telephone or submit an electronic report to the applicable Ecology Region's Environmental Report Tracking System (ERTS) within 24 hours. https://www.ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue
    - Central Region (Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima): (509) 575-2490
    - Eastern Region (Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman): (509) 329-3400
    - Northwest Region (King, Kitsap, Island, San Juan, Skagit, Snohomish, Whatcom): (425) 649-7000
    - Southwest Region (Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum,): (360) 407-6300
2. Immediately begin the process to fully implement and maintain appropriate source control and/or treatment BMPs as soon as possible. Address the problems within 10 days of the date the discharge exceeded the benchmark. If installation of necessary

treatment BMPs is not feasible within 10 days, Ecology may approve additional time when the Permittee requests an extension within the initial 10-day response period

3. Document BMP implementation and maintenance in the site log book.
4. Continue to sample discharges daily until one of the following is true:
    - Turbidity is 25 NTU (or lower).
    - Transparency is 33 cm (or greater).
    - Compliance with the water quality limit for turbidity is achieved.
        - 1 - 5 NTU over background turbidity, if background is less than 50 NTU
        - 1% - 10% over background turbidity, if background is 50 NTU or greater
    - The discharge stops or is eliminated.

pH Sampling (4.2.2)

pH monitoring is required for “Significant concrete work” (i.e. greater than 1000 cubic yards poured concrete or recycled concrete over the life of the project).The use of engineered soils (soil amendments including but not limited to Portland cement-treated base [CTB], cement kiln dust [CKD] or fly ash) also requires pH monitoring.

For significant concrete work, pH sampling will start the first day concrete is poured and continue until it is cured, typically three (3) weeks after the last pour.

For engineered soils and recycled concrete, pH sampling begins when engineered soils or recycled concrete are first exposed to precipitation and continues until the area is fully stabilized.

If the measured pH is 8.5 or greater, the following measures will be taken:

1. Prevent high pH water from entering storm sewer systems or surface water.
2. Adjust or neutralize the high pH water to the range of 6.5 to 8.5 su using appropriate technology such as carbon dioxide (CO_2) sparging (liquid or dry ice).
3. Written approval will be obtained from Ecology prior to the use of chemical treatment other than CO_2 sparging or dry ice.

Method for sampling pH:

Table 8 – pH Sampling Method

	pH test kit

Discharges to 303(d) or Total Maximum Daily Load (TMDL) Waterbodies (5.0)

303(d) Listed Waterbodies (5.1)

Is the receiving water 303(d) (Category 5) listed for turbidity, fine sediment, phosphorus, or pH?

Yes No

List the impairment(s):

The receiving waterbody, **Spokane River**, is impaired for: **Phosphorus**. The TMDL for Phosphorus is to develop a SWPPP and maintain BMP's during construction. All stormwater and dewatering discharges from the site are subject to an **effluent limit of 8.5 su for pH and/or 25 NTU for turbidity.**

List and describe BMPs: **C154E: Concrete Washout Area**

To prevent/reduce the discharge of pollutants effecting the pH of stormwater from concrete waste, all cleaning of tools and equipment that come in contact with concrete will be performed at a previously constructed on-site designated washout area per the SWMMEW (2019).

TMDL Waterbodies (5.2)

Waste Load Allocation for CSWGP discharges:

TMDLs: Dissolved Oxygen and Dissolved Metals (Lead and Zinc).

- **Dissolved Oxygen**
    - **Ammonia (NH3-N)**
        - **0.83 mg/L – March-May, October**
        - **0.21 mg/L – June-September**
    - **Total Phosphorus (TP)**
        - **Develop a SWPPP and maintain BMP's during construction**
    - **Carbonaceous Biochemical Oxygen Demand (CBOD)**
        - **4.2 mg/L**

- **Dissolved Metals:**

	River Hardness[1] at River Mile Locations (m/L as $CaCO_3$)			Dissolved Lead (m/L as CaCO3)		Dissolved Zinc (m/L as CaCO3)	
Time Period	River Mile 85.3	River Mile 66.0	River Mile[2] 75.5	Chronic[3]	Acute[3]	Chronic[4]	Acute[4]
Winter (December-February)	27.0	37.0	32.1	**0.72**	**18.37**	**39.88**	**43.67**
Spring (March-May)	26.0	36.0	31.1	**0.69**	**17.73**	**38.82**	**42.52**
Summer (June-August)	59.5	72.0	65.8	**1.59**	**40.86**	**73.35**	**80.33**
Fall September-November)	37.0	58.0	47.7	**1.11**	**28.58**	**55.78**	**61.08**
Annual (January-December)	32.5	48.5	40.6	**0.93**	**23.92**	**48.72**	**53.35**

Additional documentation regarding known impairments for 303(d) listed or TMDLs for the Spokane River can be found in Appendix F.

List and describe BMPs: **C241E: Sediment Pond (Temporary)**

Installation Schedules: **Prior to construction activities.**

Inspection and Maintenance plan: **Remove sediment from the pond when it reaches 1-foot in depth. Repair any damage to the pond embankments or slopes.**

Responsible Staff: **CESCL (TBD)**

Discharges to TMDL receiving waterbodies will meet in-stream water quality criteria at the point of discharge.

The Construction Stormwater General Permit Proposed New Discharge to an Impaired Water Body form is included in Appendix F.

Reporting and Record Keeping (6.0)

Record Keeping (6.1)

Site Log Book (6.1.1)

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements
- Site inspections
- Sample logs

Records Retention (6.1.2)

Records will be retained during the life of the project and for a minimum of three (3) years following the termination of permit coverage in accordance with Special Condition S5.C of the CSWGP.

Permit documentation to be retained on-site:

- CSWGP
- Permit Coverage Letter
- SWPPP
- Site Log Book

Permit documentation will be provided within 14 days of receipt of a written request from Ecology. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with Special Condition S5.G.2.b of the CSWGP.

Updating the SWPPP (6.1.3)

The SWPPP will be modified if:

- Found ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site.
- There is a change in design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the State.

The SWPPP will be modified within seven (7) days if inspection(s) or investigation(s) determine additional or modified BMPs are necessary for compliance. An updated timeline for BMP implementation will be prepared.

Reporting (6.2)

Discharge Monitoring Reports (6.2.1)

Cumulative soil disturbance is one (1) acre or larger; therefore, Discharge Monitoring Reports (DMRs) will be submitted to Ecology monthly. If there was no discharge during a given monitoring period the DMR will be submitted as required, reporting "No Discharge". The DMR due date is fifteen (15) days following the end of each calendar month.

DMRs will be reported online through Ecology's WQWebDMR System.

To sign up for WQWebDMR go to:
https://www.ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance/WQWebPortal-guidance

Notification of Noncompliance (6.2.2)

If any of the terms and conditions of the permit is not met, and the resulting noncompliance may cause a threat to human health or the environment, the following actions will be taken:

1. Ecology will be notified within 24-hours of the failure to comply by calling the applicable Regional office ERTS phone number (Regional office numbers listed below).
2. Immediate action will be taken to prevent the discharge/pollution or otherwise stop or correct the noncompliance. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.
3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Anytime turbidity sampling indicates turbidity is 250 NTUs or greater, or water transparency is 6 cm or less, the Ecology Regional office will be notified by phone within 24 hours of analysis as required by Special Condition S5.A of the CSWGP.

- Central Region at (509) 575-2490 for Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, or Yakima County
- Eastern Region at (509) 329-3400 for Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, or Whitman County
- Northwest Region at (425) 649-7000 for Island, King, Kitsap, San Juan, Skagit, Snohomish, or Whatcom County

- Southwest Region at (360) 407-6300 for Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, or Wahkiakum

Include the following information:

1. Your name and / Phone number
2. Permit number
3. City / County of project
4. Sample results
5. Date / Time of call
6. Date / Time of sample
7. Project name

In accordance with Special Condition S4.D.5.b of the CSWGP, the Ecology Regional office will be notified if chemical treatment other than CO_2 sparging is planned for adjustment of high pH water.

Appendix/Glossary

A. Site Map
B. BMP Detail
C. Correspondence
D. Site Inspection Form
E. Construction Stormwater General Permit (CSWGP)
F. 303(d) List Waterbodies / TMDL Waterbodies Information
G. Contaminated Site Information

Agreed Order DE 00TCPER-754

Sanitary Discharge Permit – N/A

Soil Management Plan – To be included with final submittal
Soil and Groundwater Reports – Semiannual Monitoring Report, September 17, 2019 Sampling Event (Landau, December 10, 2019)
Maps and Figures Depicting Contamination – Figure 13 (Landau, 2001)

H. Engineering Calculations

Appendix A: Site Map

Deleted from SWPPP Appendix. The Temporary Erosion and Sediment Control Plan for the Project is included in Appendix F of the Engineering Design Report.

Appendix B: BMP Details

7.3 Standards and Specifications for Best Management Practices

7.3.1 Introduction

Best Management Practices (BMPs) are defined as schedules of activities, prohibitions of practices, maintenance procedures, and structural and/or managerial practices, that when used singly or in combination, prevent or reduce the release of pollutants to waters of Washington State. This section contains standards and specifications for temporary BMPs to be used as applicable during the construction phase of a project. Often using BMPs in combination is the best method to meet Construction Stormwater Pollution Prevention Plan (SWPPP) requirements.

None of the BMPs will work successfully during the construction project without inspection and maintenance. Regular inspections to identify problems with the operation of each BMP, and the timely repair of any problems, are essential to the continued operation of the BMPs.

- 7.3.2 Source Control BMPs contains the standards and specifications for source control BMPs.
- 7.3.3 Runoff Conveyance and Treatment BMPs contains the standards and specifications for runoff conveyance and treatment BMPs.

The standards for each individual BMP are divided into four sections:

- Purpose
- Conditions of Use
- Design and Installation Specifications
- Maintenance Standards

Note: "Conditions of Use" always refers to site conditions. As site conditions change, BMPs must be changed to remain in compliance.

For more information: Information on streambank stabilization is available in the *Integrated Streambank Protection Guidelines* (WDFW, 2002).

7.3.2 Source Control BMPs

BMP C101E: Preserving Natural Vegetation

Purpose

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50% of all rain that falls during a storm. Up to 20% to 30% of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

Natural vegetation should be preserved on steep slopes, near perennial and intermittent receiving waters or swales, and on building sites in wooded areas.

- As required by the local jurisdiction.
- Phase construction to preserve natural vegetation on the project site for as long as possible during the construction period.

Design and Installation Specifications

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are the following:

- Whether the plant is worth saving. Consider the location, species, size, age, vigor, and the work involved. Local jurisdictions may also have ordinances to save natural vegetation and trees.
- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

Plants need protection from three kinds of injuries:

- Construction equipment: This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.
- Grade changes: Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. The tile system should be laid out on the original grade leading from a drywell around the tree trunk. The system should then be covered with small rocks to allow air to circulate over the root area.
- Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2 to 3 inches can cause serious injury. To protect the roots, it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.
- Excavations: Protect trees and other plants when excavating for drain fields and power, water, and sewer lines. Where possible, the trenches should be routed around trees and large

shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, the following guidelines should be followed:

- Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24 hours.
- Backfill the trench as soon as possible.
- Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered are the following:

- In general, most trees native to eastern Washington do not readily adjust to major changes in environment and special care should be taken to protect these trees.
- The danger of windthrow increases where dense stands of coniferous trees have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.
- Thinning operations in pure or mixed stands of grand fir, Pacific silver fir, noble fir, Sitka spruce, western redcedar, western hemlock, Pacific dogwood, and red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots, and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

Maintenance Standards

- Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.
- If tree roots have been exposed or injured, “prune” cleanly with an appropriate pruning saw or loppers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (e.g., fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102E: Buffer Zones

Purpose

Creation of an undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and stormwater runoff velocities.

Conditions of Use

- Natural buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Contractors can use vegetative buffer zones to protect natural swales, and they can incorporate them into the natural landscaping of an area.
- Do not use critical-areas buffer zones as sediment treatment areas. These areas shall remain completely undisturbed. The jurisdiction may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. Steel construction fencing is the most effective method to protect sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage by burying and smothering vegetation.
- Vegetative buffer zones for streams, lakes or other receiving waters shall be established by the jurisdiction or other state or federal permits or approvals.

Maintenance Standards

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately.

BMP C103E: High-Visibility Fence

Purpose

High-visibility fencing is intended to:

- Restrict clearing to approved limits;
- Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed;
- Limit construction traffic to designated construction entrances, exits, or internal roads; and
- Protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits, plastic, fabric, or metal fence may be used under certain conditions:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared
- As necessary to control vehicle access to and on the site

Design and Installation Specifications

- High-visibility plastic fence shall be composed of a high-density polyethylene (HDPE) material and shall be ≥ 4 feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every 6 inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high-visibility orange. The fence tensile strength shall be 360 pounds per foot (lb/ft) using the ASTM D4595 testing method.
- If appropriate, install fabric silt fence in accordance with BMP C233E (Silt Fence) to act as high-visibility fence. Silt fence shall be ≥ 3 feet high and must be highly visible to meet the requirements of this BMP.
- Metal fences shall be designed and installed according to the manufacturer's specifications.
- Metal fences shall be ≥ 3 feet high and must be highly visible.
- Fences shall not be wired or stapled to trees.

Maintenance Standards

If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C105E: Stabilized Construction Access

Stabilized construction entrances are established to reduce the amount of sediment transported onto paved roads by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for construction sites.

- Construction entrances shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.
- For residential subdivision construction sites, provide stabilized construction entrances for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size and configuration.
- On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized entrances not shown in the initial Construction Stormwater Pollution Prevention Plan (SWPPP). It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation

- See Figure 7.3: Stabilized Construction Entrance for details.

  Note: The 100-foot minimum length of the entrance shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100 feet).

- Construct stabilized construction entrances with a 12-inch thick pad of 4- to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction entrance stabilization because these products increase pH levels in stormwater, and concrete discharge to surface waters of the state is prohibited.

- A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards listed in Table 7.1: Stabilized Construction Entrance Geotextile Standards.

Figure 7.3: Stabilized Construction Entrance

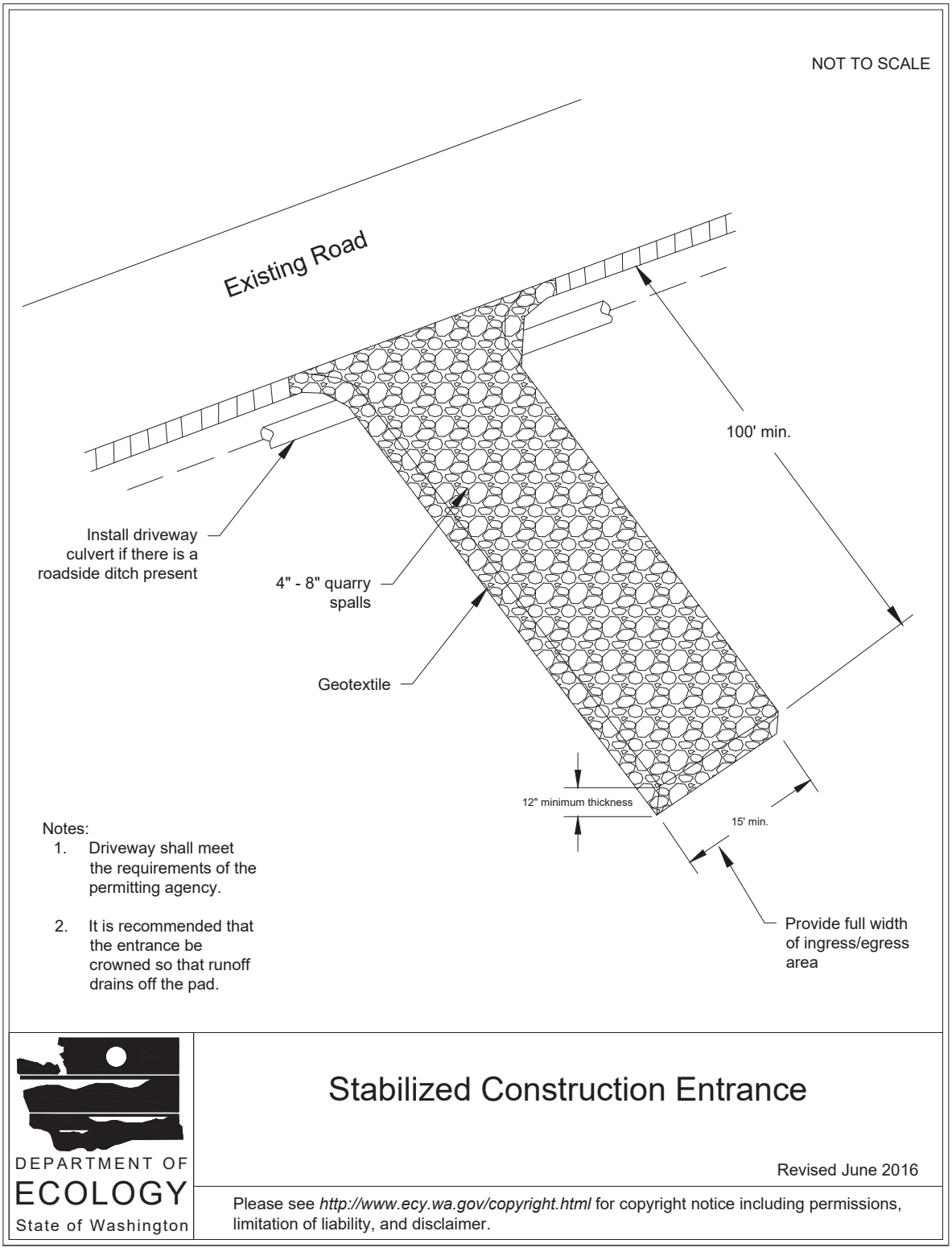


Table 7.1: Stabilized Construction Entrance Geotextile Standards

Geotextile Property	Required Value
Grab Tensile Strength (ASTM D4751)	200 pounds per square inch (psi) minimum
Grab Tensile Elongation (ASTM D4632)	30% maximum
Mullen Burst Strength (ASTM D3786-80a)	400 psi minimum
Apparent Opening Size (ASTM D4751)	No. 20 to No. 45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will be paved; this can be used as a stabilized entrance. Also consider the installation of excess concrete as a stabilized entrance. During large concrete pours, excess concrete is often available for this purpose.
- Fencing (see BMP C103E: High-Visibility Fence) shall be installed as necessary to restrict traffic to the construction entrance.
- Whenever possible, the entrance shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction entrances should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction entrance must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.
- Alternative material specification:
    - The Washington State Department of Transportation (WSDOT) has raised safety concerns about the quarry spall rock specified in the second bullet in the Design and Installation subsection. WSDOT has noticed that rocks measuring 4 to 8 inches can become trapped between dually truck tires and subsequently released off-site at highway speeds. WSDOT has chosen to use a modified specification for the rock while continuously verifying that the stabilized construction entrance remains effective. To remain effective, the BMP must prevent sediment from migrating off-site. To date, there has been no performance testing to verify operation of this new specification. Local jurisdictions may use the alternative specification, but must perform increased off-site inspections
    - Stabilized construction entrances may use material that meets the requirements of the latest version of WSDOT's *Standard Specifications for Road, Bridge, and Municipal Construction* for ballast unless the alternative grading and quality requirements listed in Table 7.2: Stabilized Construction Entrance Alternative Material Requirements are used.

Table 7.2: Stabilized Construction Entrance Alternative Material Requirements

Sieve Size	Percentage Passing
2.5 inches	99 to 100
2 inch	65 to 100
3/4 inch	40 to 80
No. 4	5 maximum
No. 100	0 to 2
% Fracture	75 minimum
Notes: All percentages are by weight. The sand equivalent value and dust ratio requirements do not apply. The fracture requirement shall be at least one fractured face and will apply the combined aggregate retained on the No. 4 sieve in accordance with FOP for AASHTO T 335.	

Maintenance Standards

Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- If the entrance is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions of the entrance, or the installation of BMP C106E: Wheel Wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on-site. The pavement shall not be cleaned by washing down the street, except when sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the washwater shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high-efficiency sweeper. Do not use a non-high-efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction entrance(s) BMP C103E: High-Visibility Fence shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

Approved as Functionally Equivalent

The Washington State Department of Ecology (Ecology) has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept these products or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C106E: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by washing dirt from the wheels of motor vehicles prior to the motor vehicles leaving the construction site.

Conditions of Use

- Use a wheel wash when BMP C105E: Stabilized Construction Access is not preventing sediment from being tracked off-site.
- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.
- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10- by 10-foot sump can be very effective.
- Wheel wash wastewater is process water and must be discharged to a separate on-site treatment system that prevents discharge to a receiving water or to the sanitary sewer with local sewer district approval.
- Wheel washes may use closed-loop recirculation systems to conserve water use.
- Wheel wash wastewater shall not include wastewater from concrete washout areas.
- When practical, the wheel wash should be placed in sequence with BMP C105E: Stabilized Construction Access. Locate the wheel wash such that vehicles exiting the wheel wash will enter directly onto the stabilized construction entrance/exit. To achieve this, the entrance/exit may need to be extended beyond the standard installation to meet the exit of the wheel wash.

Design and Installation Specifications

- Suggested details are shown in Figure 7.4: Wheel Wash. The local permitting authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.
- Use a low-clearance truck to test the wheel wash before paving. Either a belly dump or

lowboy will work well to test clearance.

- Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.
- Midpoint spray nozzles are needed only in extremely muddy conditions.
- Wheel wash systems should be designed with a small grade change, 6 to 12 inches for a 10-foot-wide pond, to allow sediment to flow to the low side of the pond to help prevent resuspension of sediment. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow easy cleaning and refilling. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel washwater at a rate of 0.25 to 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the washwater.

Maintenance Standards

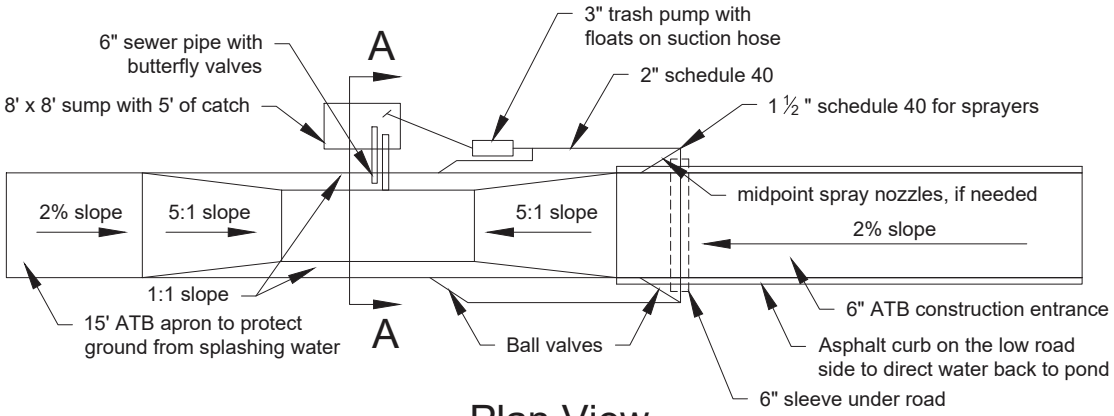
- The wheel wash should start out each day with fresh water.
- The washwater for the wheel wash should be changed a minimum of once per day. On large earthwork jobs where more than 10 to 20 trucks per hour are expected, the wheel washwater will need to be changed more often.

Approved as Functionally Equivalent

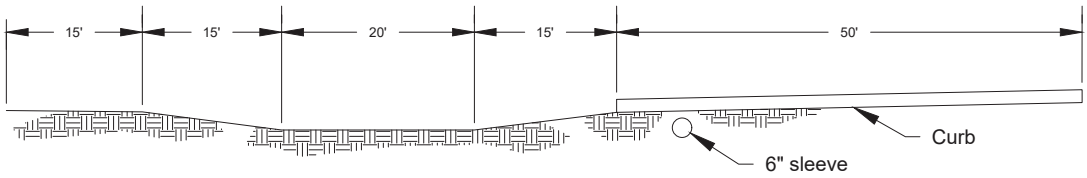
The Washington State Department of Ecology (Ecology) has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept these products or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

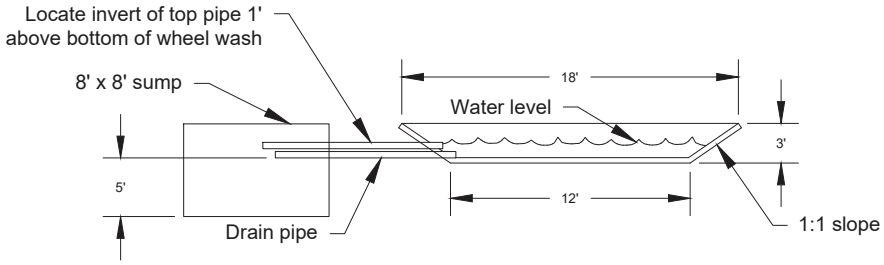
Figure 7.4: Wheel Wash



Plan View



Elevation View



Section A-A

Notes:
1. Build 8' x 8' sump to accomodate cleaning by trackhoe.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Wheel Wash

Revised June 2016

BMP C107E: Construction Road/Parking Area Stabilization

Purpose

Stabilizing roads, parking areas, and other on-site vehicle transportation routes immediately after grading reduces erosion caused by construction traffic or stormwater runoff.

Conditions of Use

- Roads and parking areas shall be stabilized wherever they are constructed, whether permanent or temporary, for use by construction traffic.
- BMP C103E: High-Visibility Fence shall be installed, if necessary, to limit the access of vehicles to only those roads and parking areas that are stabilized.

Design and Installation Specifications

- On areas that will receive asphalt as part of the project, install the first lift as soon as possible.
- A 6-inch depth of 2- to 4-inch crushed rock, gravel base, or crushed surfacing base course shall be applied immediately after grading or utility installation. A 4-inch course of asphalt treated base (ATB) may also be used, or the road/parking area may be paved. It may also be possible to use cement or calcium chloride for soil stabilization. If cement or cement kiln dust is used for road base stabilization, pH monitoring and implementation of BMP C252E: Treating and Disposing of High pH Water is necessary to evaluate and minimize the effects on stormwater. If the area will not be used for permanent roads, parking areas, or structures, a 6-inch depth of hog fuel may also be used, but this is likely to require more maintenance. Whenever possible, construction roads and parking areas shall be placed on a firm, compacted subgrade.
- Temporary road gradients shall be < 15%. Roadways shall be carefully graded to drain. Drainage ditches shall be provided on each side of the roadway in the case of a crowned section, or on one side in the case of a superelevated section. Drainage ditches shall be directed to a sediment control BMP.
- Rather than relying on ditches, it may also be possible to grade the road so that runoff sheet-flows into a heavily vegetated area with a well-developed topsoil. Landscaped areas are not adequate. If this area has ≥ 50 feet of vegetation, then it is generally preferable to use the vegetation to treat runoff, rather than a sediment pond or trap. The 50 feet shall not include wetlands. If runoff is allowed to sheet flow through adjacent vegetated areas, it is vital to design the roadways and parking areas so that no concentrated runoff is created.
- Storm drain inlets shall be protected to prevent sediment-laden water from entering the drainage system (see BMP C220E: Inlet Protection).

Maintenance Standards

- Inspect stabilized areas regularly, especially after large storm events.
- Crushed rock, gravel base, etc., shall be added as required to maintain a stable driving surface and to stabilize any areas that have eroded.

- Following construction, these areas shall be restored to preconstruction condition or better to prevent future erosion.
- Perform street cleaning at the end of each day or more often if necessary.

BMP C120E: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

- Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for > 30 days. See Element #5: Stabilize Soils for specific timelines for stabilizing exposed soils.
- The optimum permanent seeding window for eastern Washington is October 1 through November 15.
- The acceptable permanent seeding window for eastern Washington is September 1 through April 30.
- Seeding permanent species is not recommended for eastern Washington from May 1 through August 31, unless irrigation is conducted.
- Review all disturbed areas in late August to early September and complete all seeing by the end of April. Otherwise, vegetation will not establish itself well enough to provide more than average protection.
- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121E: Mulching for specifications.
- Seed and mulch all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions or geotextiles) which will prevent erosion. See BMP F6.61: Amending Construction Site Soils.

Design and Installation Specifications

General

- Install channels intended for vegetation before starting major earthwork and hydroseed with a bonded fiber matrix (BFM). For vegetated channels that will have high flows, install erosion control blankets over hydroseed. Before allowing water to flow in vegetated channels, establish a 50% vegetation cover of all seeded areas after 3 months of active growth following germination during the growing season. If vegetated channels cannot be established by seed before water flow, install sod or prevegetated mats in the channel bottom over hydromulch

and blankets.

- Confirm the installation of all required stormwater control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre (lb/acre) of mulch with 3% tackifier.
- Mulch is always required for seeding. Apply mulch on top of the seed or simultaneously by hydroseeding. See BMP C121E: Mulching for specifications.
- Areas that will have seeding only and not landscaping may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Reinstall native topsoil on the disturbed soil surface before application. See BMP F6.61: Amending Construction Site Soils in Chapter 6 - Flow Control BMP Design.
- When installing seed via hydroseeding operations, only about one-third of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. One way to overcome this is to increase seed quantities by up to 50%.
- Vegetation establishment can be enhanced by one of the following two approaches:
    - Approach 1: Enhance vegetation establishment by dividing the hydromulch operation into two phases:
        - Phase 1 – Install all seed and fertilizer with 25% to 30% mulch and tackifier onto the soil in the first lift.
        - Phase 2 – Install the remaining mulch and tackifier over the first lift.
    - Approach 2: Vegetation can also be enhanced by:
        - Installing the mulch, seed, fertilizer, and tackifier in one lift;
        - Spreading or blowing straw over the top of the hydromulch at a rate of about 800 to 1,000 lb/acre; or
        - Holding straw in place with a standard tackifier.
    - Both of these approaches (Approach 1 and Approach 2) will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:
        - Irrigation,
        - Reapplication of mulch, and
        - Repair of failed slope surfaces.

      Either of these approaches can use standard hydromulch (1,500 lb/acre minimum) and BFM/mechanically bonded fiber matrix (MBFM) (3,000 lb/acre minimum).
- Seed may be installed by hand if it is:

- Temporary and covered by straw, mulch, or topsoil; or
- Permanent in small areas (usually < 1 acre) and covered with mulch, topsoil, or erosion blankets.

- The seed mixes listed in Table 7.3: Temporary Seeding through Table 7.12: Permanent Seed Mixes: Stabilization of Ski Slopes and Subalpine Areas include recommended mixes for both temporary and permanent seeding. Alternative seed mixes approved by the local jurisdiction may be used.
- Because it is difficult to generalize soil and climate conditions in eastern Washington, the project proponent is directed to check with the local suppliers or the local conservation district for appropriate seed mixes and application rates for their site based on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic.
- In addition to meeting erosion control functions and not hindering maintenance operations, selection of long-lived, successional growth native vegetation that can compete against or exclude weeds and grow with minimal maintenance after plant establishment is preferred. Provide diversity to the greatest extent possible and plan for a succession of flowering times to improve pollinator habitat.

Table 7.3: Temporary Seeding shows seeding rates for four different seed mixes (A, B, C, and D) for the temporary stabilization of disturbed areas until permanent vegetation or other long-term erosion control measures can be established. These annual plants will generally not survive more than one growing season.

Table 7.3: Temporary Seeding

Common Name	Seeding Rate for Four Seed Mixes (lb/acre)			
	A	B	C	D
Winter or spring wheat (I)	80			
Spring barley (I)		80		
Regreen (I)[a] or triticale (I)			50	
Annual ryegrass (I)				15

[a]Sterile wheat x wheatgrass hybrid

I = introduced, nonnative plant species

Table 7.4: Permanent Seed Mixes: Upland Areas with Less than 12 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for upland areas that receive less than 12 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.4: Permanent Seed Mixes: Upland Areas with Less than 12 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Crested or Siberian wheatgrass* (droughty, coarse soils) (I)	7		
Bluebunch wheatgrass (N)		7	
Indian ricegrass (sandy soil)(N)	2		
Thickspike wheatgrass (N)			8
Sheep fescue (I)		1	1
Big bluegrass (N) or needle and thread grass (N)	1	1	
TOTAL	10	9	9
Seeds/sq ft/mixture	63	56	64

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.5: Permanent Seed Mixes: Upland Areas That Receive 12 to 15 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for upland areas that receive 12 to 15 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.5: Permanent Seed Mixes: Upland Areas That Receive 12 to 15 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Bluebunch or beardless wheatgrass (N)		8	
Pubescent wheatgrass (I)			7
Indian ricegrass (sandy or sandy loam soils) (N)	2		
Thickspike wheatgrass (N)	7		2
Sheep fescue (I)		1	2
Basin wildrye (N)		1	
TOTAL	9	10	11
Seeds/sf/mixture	53	63	49

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.6: Permanent Seed Mixes: Upland Areas With 15 to 18 Inches Precipitation shows two different erosion control seed mixes (A and B) for upland areas that receive 15 to 18 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.6: Permanent Seed Mixes: Upland Areas With 15 to 18 Inches Precipitation

Common Name	Seeding Rate for Two Seed Mixes (lb/acre)[a]	
	A	B
Bluebunch wheatgrass (N) or beardless wheatgrass (N)	8	
Pubescent wheatgrass (I) or intermediate wheatgrass (I) or thickspike wheatgrass (N)		8
Hard fescue (I) or sheep fescue (I)	2	2
Big bluegrass (N)	1	1
Native legume (N)	2	2
TOTAL	9	10
Seeds/sf/mixture	70	72

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.7: Permanent Seed Mixes: Upland Areas With 18 to 24 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for upland areas that receive 18 to 24 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.7: Permanent Seed Mixes: Upland Areas With 18 to 24 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Slender wheatgrass (N) or sodar streambank wheatgrass	7		
Blue wildrye (N)		8	
Mountain brome (N)	1		8
Hard fescue (I)	2	2	2
White clover (I) or red clover (I)			2

Table 7.7: Permanent Seed Mixes: Upland Areas With 18 to 24 Inches Precipitation (continued)

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Native lupine (N) or northern sweetvetch (N)		2	
Native clover spp. (N) or milkvetch spp. (N)	2		
TOTAL	12	12	12
Seeds/sf/mixture	64	62	76

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.8: Permanent Seed Mixes: Upland Areas With More Than 24 Inches Precipitation shows two different erosion control seed mixes (A and B) for upland areas that receive > 24 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.8: Permanent Seed Mixes: Upland Areas With More Than 24 Inches Precipitation

Common Name	Seeding Rate for Two Seed Mixes (lb/acre)[a]	
	A	B
Hard fescue (I)		2
Blue wildrye (N)	6	
Red fescue (I)	1	
Mountain brome (N)	2	4
Slender wheatgrass (N)		4
White clover (I)	2	
Native legume (N)		2
TOTAL	11	12

Table 7.8: Permanent Seed Mixes: Upland Areas With More Than 24 Inches Precipitation (continued)

Common Name	Seeding Rate for Two Seed Mixes (lb/acre)[a]	
	A	B
Seeds/sf/mixture	72	61

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.9: Permanent Seed Mixes: Grassed Waterways With Fewer Than 15 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for stabilizing grassed waterways in areas that receive fewer than 15 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.9: Permanent Seed Mixes: Grassed Waterways With Fewer Than 15 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Pubescent wheatgrass (I)		10	
Streambank wheatgrass (N)			7
Thickspike wheatgrass (N)	7		
Sheep fescue (I)		2	2
Big bluegrass (N)	2		
TOTAL	9	12	9
Seeds/sf/mixture	66	48	56

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.10: Permanent Seed Mixes: Grassed Waterways With 15 to 18 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for stabilizing grassed waterways in areas that receive 15 to 18 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.10: Permanent Seed Mixes: Grassed Waterways With 15 to 18 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Tall wheatgrass (I)	10		
Pubescent wheatgrass (I), streambank wheatgrass (N), or intermediate wheatgrass (I)		10	
Hard fescue (I) or sheep fescue (I)	2	2	2
Thickspike wheatgrass (N)			8
TOTAL	12	12	10
Seeds/sf/mixture	46	48	57

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.11: Permanent Seed Mixes: Grassed Waterways With More Than 18 Inches Precipitation shows three different erosion control seed mixes (A, B, and C) for stabilizing grassed waterways in areas that receive more than 18 inches effective precipitation. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.11: Permanent Seed Mixes: Grassed Waterways With More Than 18 Inches Precipitation

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]		
	A	B	C
Intermediate wheatgrass (I)	10		
Mountain brome (N) or meadow brome		10	
Annual ryegrass (I) or perennial ryegrass (I)	4		
Hard fescue (I)		2	
Tall wheatgrass (I)			10
TOTAL	14	12	10
Seeds/sf/mixture	40	46	38

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

sf = square feet

Table 7.12: Permanent Seed Mixes: Stabilization of Ski Slopes and Subalpine Areas shows two different erosion control seed mixes (A and B) for stabilizing ski slopes and subalpine areas in eastern Washington. For each, drilled seeding rates are given (in lb/acre); double seed rates if broadcast or hydroseeded. Consideration should be given to the traffic hazard for wildlife when selecting food species for roadside stabilization.

Table 7.12: Permanent Seed Mixes: Stabilization of Ski Slopes and Subalpine Areas

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]	
	A	B
Blue wildrye (N) or Idaho fescue (N)	10	
Pubescent wheatgrass (I) or red fescue (I)		8
Hard fescue (I)		5
Sheep fescue (I)	2	2
White clover (I) or bentgrasses (I)		2
Lupine (N)	2	

Table 7.12: Permanent Seed Mixes: Stabilization of Ski Slopes and Subalpine Areas (continued)

Common Name	Seeding Rate for Three Seed Mixes (lb/acre)[a]	
	A	B
TOTAL	14	17

[a]Expressed as pure live seed

I = introduced, nonnative plant species

N = native plant species

Roughening and Rototilling

- The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Back-blading or smoothing of slopes > 4H:1V is not allowed if they are to be seeded.
- Restoration-based landscape practices require deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical, initially rip the subgrade to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall receive soil amendments to achieve organic matter and permeability performance defined in amended soil/landscape systems. For systems that are deeper than 8 inches, complete the rototilling process in multiple lifts, or prepare the soil amendments to achieve the specified depth.

Fertilizers

- Conducting soil tests to determine the exact type and quantity of fertilizer needed is recommended. This will prevent the overapplication of fertilizer.
- Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form. A natural system typically releases 20% to 10% of its nutrients annually. Chemical fertilizers have been formulated to simulate what organic matter does naturally.
- Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow release coating.

There are numerous products available to take the place of chemical fertilizers, including several with seaweed extracts that are beneficial to soil microbes and organisms. If 100% cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.

Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix

- On steep slopes, use BFM or MBFM products. Apply BFM/MBFM products at a minimum rate of 3,000 lb per acre of mulch with approximately 10% tackifier. Achieve a minimum of 95% soil coverage during application. Numerous products are available commercially. Install products per manufacturer's instructions. Most products require 24 to 36 hours to cure before a rainfall and cannot be installed on wet or saturated soils. Generally, products come in 40- to 50-pound bags and include all necessary ingredients except for seed and fertilizer.
- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include the following:
    - BFM and MBFMs do not require surface preparation.
    - Helicopters can assist in installing BFM and MBFMs in remote areas.
    - On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
    - Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.
- In most cases, the shear strength of blankets is not a factor when used on slopes, only when used in channels.
    - Areas to be permanently landscaped shall provide a healthy topsoil or amend the existing soil to reduce the need for fertilizers, improve overall topsoil quality, provide for better plant health and vitality, improve hydrologic characteristics, and reduce the need for irrigation.
    - Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.

Maintenance Standards

- Reseed any seeded areas that fail to establish ≥ 50% cover (100% cover for areas that receive sheet or concentrated flows) of all seeded areas after 3 months of active growth following germination during the growing season. If reseeding is ineffective, use an alternative method, such as sodding, mulching, or nets/blankets. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.
- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. If the erosion problem is drainage related, the problem shall be fixed and the eroded area reseeded and protected by mulch.
- Seeded areas shall be supplied with adequate moisture, but not watered to the extent that causes runoff.

Approved as Equivalent

The Washington State Department of Ecology (Ecology) has approved products as able to meet the requirements of BMP C120E: Temporary and Permanent Seeding. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent or may require additional testing prior to

consideration for local use. The products are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C121E: Mulching

Purpose

The purpose of mulching soils is to provide immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture; holding fertilizer, seed, and topsoil in place; and moderating soil temperatures. There are a variety of mulches are available for use. Only the most common types are discussed in this section.

Conditions of Use

- As a temporary cover measure, mulch should be used:
    - For < 30 days on disturbed areas that require cover;
    - At all times for seeded areas, especially during the wet season and during the hot summer months; and
    - During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.
- Mulch may be applied at any time of the year and must be refreshed periodically.
- For seeded areas, mulch may consist of 100% of the following:
    - Cottonseed meal
    - Fibers made of wood, recycled cellulose, hemp, or kenaf
    - Compost
    - A blend of these three materials
- Tackifier shall be plant-based, such as guar or *Alpha plantago*, or chemical-based such as polyacrylamide (PAM) or polymers. Any mulch or tackifier product used shall be installed per manufacturer's instructions. Generally, mulches come in 40- to 50-pound bags. Seed and fertilizer are added at time of application.

Design and Installation Specifications

For mulch materials, application rates, and specifications see Table 7.13: Mulch Standards and Guidelines. Always use a minimum mulch thickness of 2 inches; increase the thickness until the ground is 95% covered (i.e., not visible under the mulch layer).

Note: Thicknesses may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Table 7.13: Mulch Standards and Guidelines

Mulch Material: Straw	
Quality Standards	Air-dried; free from undesirable seed and coarse material.
Application Rates	2- to 3 inches thick; five bales per 1,000 sf or 2 to 3 tons per acre
Remarks	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas, straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier because even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species, and it has no significant long-term benefits. Straw should be used only if mulches with long-term benefits are unavailable locally. It should also not be used within the ordinary high-water elevation of receiving waters (due to flotation).
Mulch Material: Hydromulch	
Quality Standards	No growth inhibiting factors.
Application Rates	Approximately 25 to 30 lb per 1,000 sf or 1,000 to 1,300 lb per acre.
Remarks	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers > 0.75 to 1 inch can clog hydromulch equipment. Fibers should be kept to < 0.75 inch.
Mulch Material: Compost	
Quality Standards	No visible water or dust during handling. Must be produced per Chapter 173-350 WAC, Solid Waste Handling Standards, but may have up to 35% biosolids.
Application Rates	2 inches thick at a minimum; approximately 100 tons per acre (approx. 750 lb per cubic yard).
Remarks	More effective control can be obtained by increasing thickness to 3 inches. Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Compost used for mulch has a coarser size gradation than compost used for BMP C125E: Topsoiling/Composting or BMP F6.61: Amending Construction Site Soils. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use near wetlands or near phosphorus-impaired water bodies.
Mulch Material: Chipped Site Vegetation	
Quality Standards	Average size shall be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.
Application Rates	2 inches thick at a minimum.
Remarks	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates

Table 7.13: Mulch Standards and Guidelines (continued)

	the problems associated with burning. Generally, it should not be used on slopes above approximately 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of receiving waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.
Mulch Material: Wood-Based Mulch or Wood Straw	
Quality Standards	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.
Application Rates	2 inches thick; approximately 100 tons per acre (approximately 750 lb per cubic yard).
Remarks	This material is often called "hog or hogged fuel." It is usable as a material for BMP C105E: Stabilized Construction Access and as a mulch. The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulch. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).
Mulch Material: Wood Strand Mulch	
Quality Standards	A blend of loose, long, thin wood pieces derived from native conifers or deciduous trees with high length-to-width ratio.
Application Rates	2 inches thick at a minimum.
Remarks	Cost-effective protection when applied with adequate thickness. A minimum of 95% of the wood strand shall have lengths between 2 and 10 inches, with a width and thickness between 1/16 and 0.5 inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. See the latest version of the Washington State Department of Transportation *Standard Specifications for Road, Bridge, and Municipal Construction*.

Where the option of "compost" is selected, it should be a coarse compost that meets the size gradations listed in Table 7.14: Size Gradations of Compost as Mulch Material when tested in accordance with Test Method 02.02-B in *Test Methods for the Examination of Composting and Compost* (Thompson, 2001).

Table 7.14: Size Gradations of Compost as Mulch Material

Sieve Size	Percentage Passing
3 inch	100
1 inch	90 to 100
3/4 inch	70 to 100
1/4 inch	40 to 100

Mulch used within the ordinary high-water mark of receiving waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult the Hydraulic Project Approval (HPA) for mulch mixes if applicable.

Maintenance Standards

- The thickness of the mulch cover must be maintained.
- Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

BMP C122E: Nets and Blankets

Purpose

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage systems during high flows.

Nets (commonly called matting) are strands of material woven into an open but high-tensile strength net (for example, coconut fiber matting and turf reinforcement mats [TRM]). Blankets are strands of material that are not tightly woven but instead form a layer of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

Conditions of Use

Erosion control nets and blankets should be used for the following purposes:

- To aid permanent vegetated stabilization of slopes 2H:1V or greater and with more than 10 feet of vertical relief.
- For drainage ditches and swales (highly recommended). The application of appropriate netting or blanket to drainage ditches and swales can protect bare soil from channelized runoff while vegetation is established. Nets and blankets also can capture a great deal of sediment due to their open, porous structure. Synthetic nets and blankets can be used to permanently stabilize channels and may provide a cost-effective, environmentally preferable alternative to riprap. 100% synthetic blankets manufactured for use in ditches may be easily reused as temporary ditch liners.

Disadvantages of nets and blankets include the following:

- Surface preparation is required.
- On slopes steeper than 2.5H:1V, net and blanket installers may need to be roped and harnessed for safety.
- They cost at least $4,000 to $6,000 per acre installed.

Advantages of nets and blankets include the following:

- They can be installed without mobilizing special equipment.
- They can be installed by anyone with minimal training.
- They can be installed in stages or phases as the project progresses.
- Seed and fertilizer can be hand-placed by the installers as they progress down the slope.
- They can be installed in any weather.
- Numerous types of nets and blankets can be designed with various parameters in mind: fiber blend, mesh strength, longevity, biodegradability, cost, and availability.

An alternative to nets and blankets is BMP C202E (Riprap Channel Lining).

Design and Installation Specifications

- See Figure 7.5: Channel Installation and Figure 7.6: Slope Installation for typical orientation and installation of nets and blankets used in channels and as slope protection. Note: these are typical only; all nets and blankets must be installed per manufacturer's installation instructions.
- Installation is critical to the effectiveness of these products. If good ground contact is not achieved, runoff can concentrate under the product, resulting in significant erosion.
- Nets and blankets are installed on slopes according to the following procedure:
    1. Complete final grade and track walk up and down the slope. Soils should be raked and uniform prior to installing nets or blankets. To be effective, nets and blankets must have good adhesion to the soil.
    2. Install hydromulch with seed and fertilizer.
    3. Dig a small trench, approximately 12 inches wide by 6 inches deep along the top of the slope.
    4. Install the leading edge of the net/blanket into the small trench and staple approximately every 18 inches. Note: Staples are metal, U-shaped, and a minimum of 6 inches long. Longer staples are used in sandy soils. Biodegradable stakes are also available.
    5. Roll the net/blanket slowly down the slope as you walk backward. Note: The net/blanket rests against the installer's legs. Staples are installed as the net/blanket is unrolled. It is critical that the proper staple pattern is used for the net/blanket being installed. The net/blanket is not to be allowed to roll down the slope on its own as this stretches the net/blanket, making it impossible to maintain soil contact. In addition, no one is allowed to walk on the net/blanket after it is in place.
    6. If the net/blanket is not long enough to cover the entire slope length, allow the trailing edge of the upper net/blanket to overlap the leading edge of the lower net/blanket and staple it. On steeper slopes, this overlap should be installed in a small trench, stapled, and covered with soil.

With the variety of products available, it is impossible to cover all the details of appropriate use and installation. Therefore, it is critical that the designer review the manufacturer's information and that a site visit take place in order to ensure that the specified product is appropriate. Information is also available in the latest version of the Washington State Department of Transportation *Standard Specifications for Road, Bridge, and Municipal Construction*.

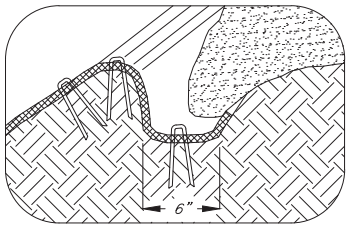
- Jute matting must be used in conjunction with mulch (BMP C121E: Mulching). Excelsior, woven straw blankets, and coir (coconut fiber) blankets may be installed without mulch. There are many other types of erosion control nets and blankets on the market that may be appropriate in certain circumstances.
- In general, most nets (e.g., jute matting) require mulch in order to prevent erosion because they have a fairly open structure. Blankets typically do not require mulch because they usually provide complete protection of the surface.
- Extremely steep, unstable, wet, or rocky slopes are often appropriate candidates for use of synthetic blankets, as are riverbanks, beaches, and other high-energy environments. If synthetic blankets are used, the soil should be hydromulched first.
- For use in sensitive areas, 100% biodegradable blankets are available. These organic blankets are usually held together with a paper or fiber mesh and stitching, which may last up to a year.
- Most netting used with blankets is photodegradable, meaning it breaks down under sunlight (not ultraviolet [UV] stabilized). However, this process can take months or years even under bright sun. Once vegetation is established, sunlight does not reach the mesh. It is not uncommon to find nondegraded netting still in place several years after installation. This can be a problem if maintenance requires the use of mowers or ditch cleaning equipment. In addition, birds and small animals can become trapped in the netting.

Maintenance Standards

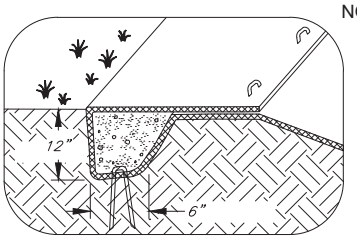
- Maintain good contact with the ground. Erosion must not occur beneath the net or blanket.
- Repair and staple any areas of the net or blanket that are damaged or not in close contact with the ground.
- Fix and protect eroded areas if erosion occurs due to poorly controlled drainage.

Figure 7.5: Channel Installation

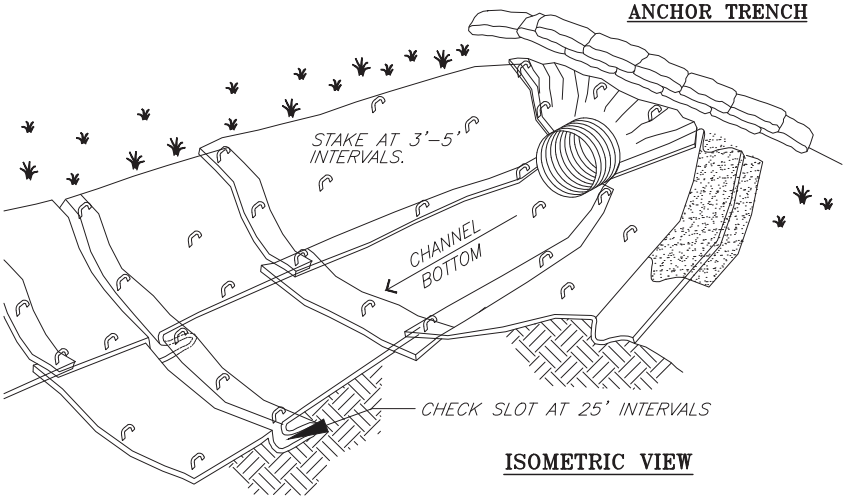
NOT TO SCALE



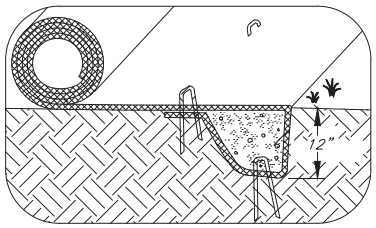
LONGITUDINAL ANCHOR TRENCH



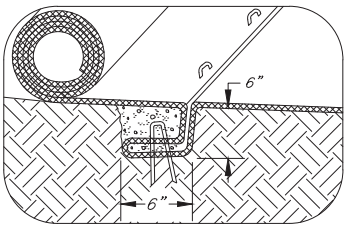
TERMINAL SLOPE AND CHANNEL ANCHOR TRENCH



ISOMETRIC VIEW



INITIAL CHANNEL ANCHOR TRENCH



INTERMITTENT CHECK SLOT

Notes:

1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.

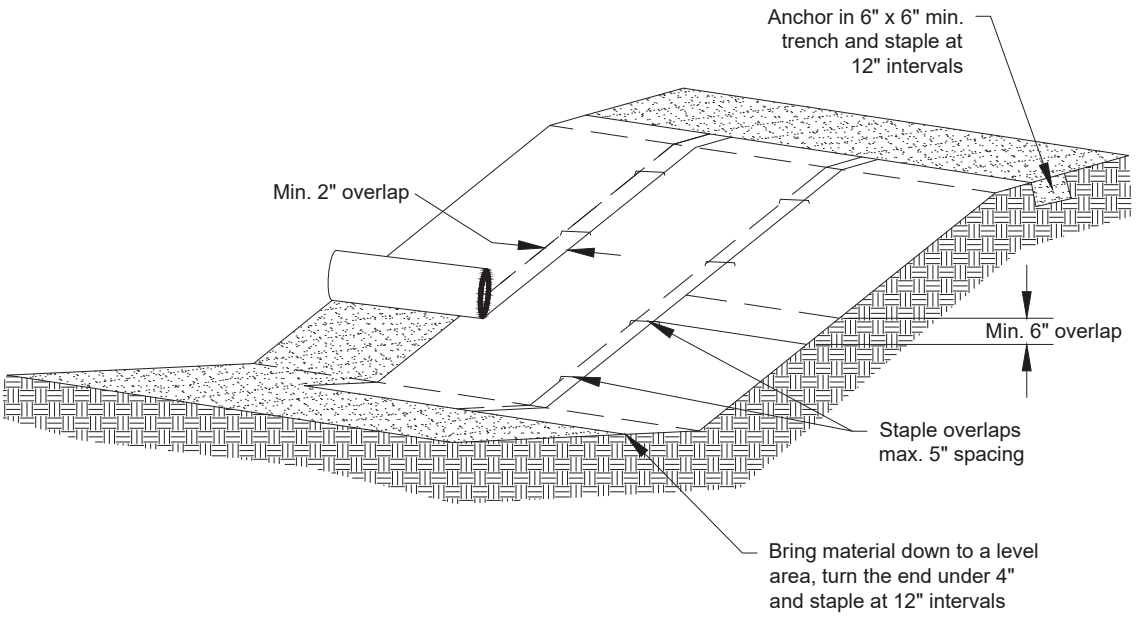
Source: Clackamas County Erosion Prevention Planning and Design Manual (2009)

DEPARTMENT OF ECOLOGY
State of Washington

Channel Installation

Revised June 2016

Figure 7.6: Slope Installation



Notes:

1. Slope surface shall be smooth before placement for proper soil contact.
2. Stapling pattern as per manufacturer's recommendations.
3. Do not stretch blankets/mattings tight - allow the rolls to mold to any irregularities.
4. For slopes less than 3H:1V, rolls may be placed in horizontal strips.
5. If there is a berm at the top of the slope, anchor upslope of the berm.
6. Lime, fertilize, and seed before installation. Planting of shrubs, trees, etc. should occur after installation.

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Slope Installation

Revised June 2016

BMP C123E: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

Plastic covering may be used on disturbed areas that require cover measures for < 30 days, with the following exceptions:

- Plastic is particularly useful for protecting cut-and-fill slopes and stockpiles. However, the relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for applications > 6 months.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill plastic covering that comes in a rolled form.
- Although the plastic material is inexpensive to purchase, the cost of installation, maintenance, removal, and disposal add to the total costs of this BMP.
- Whenever plastic is used to protect slopes, install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to convey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include the following:
    - Temporary ditch liner
    - Pond liner in temporary sediment pond
    - Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored
    - Emergency slope protection during heavy rains
    - Temporary drainpipe (“elephant trunk”) used to direct water

Design and Installation Specifications

- Plastic slope cover must be installed according to the following procedure:
    1. Run plastic up and down the slope, not across the slope.
    2. Plastic may be installed perpendicular to slope if the slope length < 10 feet.

3. Provide a minimum overlap of 8 inches at the seams.
4. On long or wide slopes, or slopes subject to wind, tape all seams.
5. Place plastic into a small (12-inch-wide by 6-inch-deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
6. Place sand-filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high-velocity runoff from contacting bare soil, which causes extreme erosion.
8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.

- Plastic sheeting shall have a minimum thickness of 0.06 millimeters.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

Approved as Functionally Equivalent

The Washington State Department of Ecology (Ecology) has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept these products or may require additional testing prior to consideration for local use. The products that Ecology has approved as functionally equivalent are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C124E: Sodding

Purpose

The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage paths where concentrated overland flow will occur.

Conditions of Use

Sodding may be used in the following areas:

- Disturbed areas that require short-term or long-term cover.
- Disturbed areas that require immediate vegetative cover.
- All waterways that require vegetative lining. Waterways may also be seeded rather than sodded and protected with a net or blanket.

Design and Installation Specifications

Sod shall be free of weeds, have a uniform thickness (approximately 1 inch), and have a dense root mat for mechanical strength.

The following steps are recommended for sod installation:

1. Shape and smooth the surface to final grade in accordance with the approved grading plan. Consider any areas (such as swales) that need to be overexcavated below design elevation to allow room for placing soil amendment and sod.
2. Amend 4 inches (minimum) of compost into the top 8 inches of the soil if the organic content of the soil is less than 10% or the permeability is less than 0.6 inches per hour. See the Washington State Department of Ecology's Compost web page for further information:

   https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Organic-materials/Managing-organics-compost
3. Fertilize according to the sod supplier's recommendations.
4. Work lime and fertilizer 1 to 2 inches into the soil, and smooth the surface.
5. Lay strips of sod beginning at the lowest area to be sodded and perpendicular to the direction of water flow. Wedge strips securely into place. Square the ends of each strip to provide for a close, tight fit. Stagger joints ≥ 12 inches. Staple on slopes steeper than 3H:1V. Staple the upstream edge of each sod strip.
6. Roll the sodded area and irrigate.
7. When sodding is carried out in alternating strips or other patterns, seed the areas between the sod immediately after sodding.

Maintenance Standards

If the grass is unhealthy, the cause shall be determined and appropriate action taken to reestablish a healthy ground cover. If it is impossible to establish a healthy ground cover due to frequent saturation, instability, or some other cause, the sod shall be removed, and the area shall be seeded with an appropriate mix and protected with a net or blanket (BMP C122E: Nets and Blankets).

BMP C125E: Topsoiling/Composting

Purpose

Topsoiling and composting provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling is an integral component of providing permanent cover in areas with an unsuitable soil surface for plant growth. Use this BMP in

conjunction with other BMPs such as BMP C120E: Temporary and Permanent Seeding, BMP C121E: Mulching, or BMP C124E: Sodding.

Note: BMP C125E: Topsoiling/Composting is functionally the same as BMP F6.61: Amending Construction Site Soils.

Native soils and disturbed soils that have been organically amended not only retain much more stormwater but also serve as effective biofiltration for urban pollutants and, by supporting more vigorous plant growth, reduce the amount of water, fertilizer, and pesticides needed to support installed landscapes. Topsoil includes no subsoils, consisting of only material from the top several inches including organic debris.

Conditions of Use

- Permanent landscaped areas shall contain healthy topsoil that reduces the need for fertilizers, improves overall topsoil quality, provides for better vegetative health and vitality, improves hydrologic characteristics, and reduces the need for irrigation.
- Leave native soils and the duff layer undisturbed to the maximum extent practicable. Stripping of existing, properly functioning soil system and vegetation for the purpose of topsoiling during construction is not acceptable. Preserve existing soil systems in undisturbed and uncompacted conditions if functioning properly.
- Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.
- Restore, to the maximum extent practical, native soils disturbed during clearing and grading to a condition equal to or better than the original site condition's moisture-holding capacity. Use on-site native topsoil, incorporate amendments into on-site soil, or import blended topsoil to meet this requirement.
- Topsoiling is a required procedure when establishing vegetation on shallow soils and soils of critically low pH (high acid) levels.
- Beware of where the topsoil comes from and what vegetation was on-site before disturbance. Invasive plant seeds may be included and could cause problems for establishing native plants, landscaped areas, or grasses.
- Topsoil from the site will contain mycorrhizal bacteria that are necessary for healthy root growth and nutrient transfer. These native mycorrhizae are acclimated to the site and will provide optimum conditions for establishing grasses. Use commercially available mycorrhizae products when using off-site topsoil.

Design and Installation Specifications

If topsoiling is to be performed, the following guidelines should be considered:

- Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium. Topsoil shall have the following:
    - A minimum depth of 8 inches.
    - A target organic content of 6% to 8% dry weight for all nonturf planting areas and 3% to

5% organic matter content for turf areas. Imported topsoil mixes should contain 35% to 40% compost by volume for nonturf planting areas and 20% to 25% compost by volume for turf areas.

    - A pH between 6.0 and 8.0 or as specified for particular plant choices.
    - If blended topsoil is imported, fines should be limited to 25% passing through a No. 200 sieve.

- Mulch planting beds with 2 inches of organic material.
- Accomplish the required organic content, depth, and pH by returning native topsoil to the site, importing topsoil of sufficient organic content, and/or incorporating organic amendments. When incorporating amendments to meet the organic content requirement, use compost that meets the compost specification for bioretention (see Chapter 5 - Runoff Treatment BMP Design), with the exception that the compost may have up to 35% biosolids or manure. The compost material should be mature and derived from organic waste materials including plant debris, biosolids, or wood wastes that meet the functional requirements and intent of the organic soil amendment specification.
- Organic amendments should be incorporated to a minimum depth of 8 inches except where tree roots or other natural features limit the depth of incorporation. Subsoils at a depth > 12 inches should be scarified ≥ 2 inches to avoid stratified layers, where feasible. The decision to either layer topsoil over a subgrade or incorporate topsoil into the underlying layer may vary depending on the planting specified.
- The final composition and construction of the soil system will result in a natural selection or favoring of certain plant species over time. For example, incorporation of topsoil may favor grasses, while layering with mildly acidic, high-carbon amendments may favor more woody vegetation.
- Allow sufficient time in scheduling for topsoil spreading prior to seeding, sodding, or planting.
- Take care when applying topsoil to subsoils with contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil layers and causes the topsoil to slough. If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method to prevent a lack of bonding is to actually work the topsoil into the layer below for a depth ≥ 6 inches.
- Field exploration of the site shall be made to determine if there is surface soil of sufficient quantity and quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, or clay loam). Avoid areas of natural ground water recharge.
- Stripping shall be confined to the immediate construction area. A 4- to 6-inch stripping depth is common, but depth may vary depending on the particular soil. All surface runoff control structures shall be in place prior to stripping.
- Ripping or restructuring the subgrade may also provide additional benefits in terms of the overall infiltration and interflow dynamics of the soil system.
- Do not place topsoil while in a frozen or muddy condition, when the subgrade is excessively

wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding.

- In any areas requiring grading, remove and stockpile the duff layer and topsoil on-site in a designated, controlled area, not adjacent to public resources and critical areas. Reapply stockpiled topsoil to other portions of the site where feasible.
- Locate the topsoil stockpile so that it meets specifications and does not interfere with work on the site. It may be possible to locate more than one pile in proximity to areas where topsoil will be used.
- Stockpiling of topsoil shall occur in the following manner:
    - Side slopes of the stockpile shall not > 2H:1V.
    - Between October 1 and June 30:
        - Install an interceptor dike with gravel outlet and silt fence to surround all topsoil stockpiles.
        - Within 7 days, complete erosion control seeding or cover stockpiles with clear plastic or other mulching materials.
    - Between July 1 and September 30:
        - Install an interceptor dike with gravel outlet and silt fence to surround all topsoil stockpiles if the stockpile will remain in place for a longer period of time than active construction grading.
        - Within 30 days, complete erosion control seeding or cover stockpiles with clear plastic or other mulching materials.
- Previously established grades on the areas to be topsoiled shall be maintained according to the approved plan.
- When native topsoil is to be stockpiled and reused, the following should apply to ensure that the mycorrhizal bacteria, earthworms, and other beneficial organisms will not be destroyed:
    1. Reinstall topsoil within 4 to 6 weeks.
    2. Do not allow the topsoil to become saturated with water.
    3. Do not use plastic covering.

Maintenance Standards

- Inspect stockpiles regularly, especially after large storm events. Stabilize any areas that have eroded.
- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant and mulch soil after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.

- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

BMP C126E: Polyacrylamide for Soil Erosion Protection

Purpose

Polyacrylamide (PAM) is used on construction sites to prevent soil erosion. Applying PAM to bare soil in advance of a rain event significantly reduces erosion and controls sediment in two ways. First, PAM increases the soil's available pore volume, thus increasing infiltration and reducing the quantity of stormwater runoff. Second, it increases flocculation of suspended particles and aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Conditions of Use

PAM shall not be directly applied to water or allowed to enter a water body.

In areas that drain to a sediment pond, PAM can be applied to bare soil under the following conditions:

- During rough grading operations.
- In staging areas.
- In balanced cut-and-fill earthwork.
- On haul roads prior to placement of crushed rock surfacing.
- On compacted soil road base.
- At stockpiles.
- After final grade and before paving or final seeding and planting.
- At pit sites.
- At sites having a winter shutdown. In the case of winter shutdown or where soil will remain unworked for several months, PAM should be used together with mulch.

Design and Installation Specifications

- Do not use PAM on a slope that flows directly into a stream or wetland. The stormwater runoff shall pass through a sediment control BMP prior to discharging to receiving waters.
- Do not add PAM to water discharging from the site.
- When the total contributing area is ≥ 5 acres, PAM-treated areas shall drain to a sediment pond.
- Areas < 5 acres shall drain to sediment control BMPs, such as a minimum of three check dams per acre. The total number of check dams used shall be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam shall be spaced evenly in the drainage channel through which stormwater flows are

discharged off-site.

- Maximize the use of silt fence to limit the discharges of sediment from the site.
- All areas not being actively worked shall be covered and protected from rainfall. PAM shall not be the only cover BMP used.
- PAM can be applied to wet soil, but dry soil is preferred due to less sediment loss.
- PAM will work when applied to saturated soil, but is not as effective as applications to dry or damp soil.

Preferred Application Method

PAM may be applied in dissolved form with water, or it may be applied in dry, granular or powdered form. The preferred application method is the dissolved form.

PAM is to be applied at a maximum rate of 2/3 pound PAM per 1,000 gallons water (80 milligrams per liter [mg/L]) per 1 acre of bare soil. See Table 7.15: Polyacrylamide and Water Application Rates to determine the PAM and water application rate for a disturbed soil area. Higher concentrations of PAM do not provide any additional effectiveness.

Table 7.15: Polyacrylamide and Water Application Rates

Disturbed Area (acres)	Polyacrylamide (pounds)	Water (gallons)
0.50	0.33	500
1.00	0.66	1,000
1.50	1.00	1,500
2.00	1.32	2,000
2.50	1.65	2,500
3.00	2.00	3,000
3.50	2.33	3,500
4.00	2.65	4,000
4.50	3.00	4,500
5.00	3.33	5,000

Implement the following steps to apply PAM using the preferred method:

1. Premeasure the area where PAM is to be applied and calculate the amount of product and water necessary to provide coverage at the specified application rate (0.5 pounds PAM/1,000 gallons/acre).
2. PAM has infinite solubility in water, but dissolves very slowly. Dissolve premeasured dry granular PAM with a known quantity of clean water in a bucket several hours or overnight.

Mechanical mixing will help dissolve the PAM. Always add PAM to water—not water to PAM.

3. Prefill the water truck about one-eighth full with water. The water does not have to be potable, but it must have relatively low turbidity—≤ 20 nephelometric turbidity units (NTUs).
4. Add the PAM/water mixture to the truck.
5. Completely fill the water truck to the specified volume.
6. Spray the PAM/water mixture onto dry soil, until the soil surface is uniformly and completely wetted.

Alternative Application Method

PAM may also be applied as a powder at the rate of 5 pounds per acre. This must be applied on a day that is dry. For areas < 5 to 10 acres, a handheld "organ grinder" fertilizer spreader set to the smallest setting will work. Tractor-mounted spreaders will work for larger areas.

The following shall be used for application of PAM:

- Powdered PAM shall be used in conjunction with other BMPs and not in place of other BMPs.
- Keep the granular PAM supply out of the sun. Granular PAM loses its effectiveness in 3 months after exposure to sunlight and air.
- Proper application and reapplication plans are necessary to ensure total effectiveness of PAM usage.

Safety and Toxicity

- PAM, combined with water, is very slippery and can be a safety hazard. Care must be taken to prevent spills of PAM powder onto paved surfaces. During an application of PAM, prevent overspray from reaching pavement to prevent slippery pavement. If PAM powder gets on skin or clothing, wipe it off with a rough towel rather than washing with water. Washing with water will make cleanup messier and take longer.
- Some PAMs are more toxic and carcinogenic than others. Only the most environmentally safe PAM products should be used.
- The specific PAM copolymer formulation must be anionic. Cationic PAM shall not be used in any application because of known aquatic toxicity problems. Use only the highest drinking water grade PAM, certified for compliance with NSF International (NSF)/American National Standards Institute (ANSI) Standard 60 for drinking water treatment, for soil applications. Recent media attention and high interest in PAM has resulted in some entrepreneurial exploitation of the term "polymer." All PAMs are polymers, but not all polymers are PAMs, and not all PAM products comply with ANSI/NSF Standard 60. PAM use shall be reviewed and approved by the local jurisdiction.
- PAM designated for these uses should be "water soluble" or "linear" or "non-cross-linked." Cross-linked or water-absorbent PAMs, polymerized in highly acidic (pH < 2) conditions, are used to maintain soil moisture content.

- The PAM anionic charge density may vary from 2% to 30%; a value of 18% is typical. Studies conducted by the U.S. Department of Agriculture (USDA), Agricultural Research Service demonstrated that soil stabilization was optimized by using very high molecular weight (12 to 15 milligrams (mg)/mole), highly anionic (> 20% hydrolysis) PAM.
- PAM tackifiers are available and being used in place of guar and alpha plantago. Typically, PAM tackifiers should be used at a rate of no more than 0.5 to 1 pound per 1,000 gallons of water in a hydromulch machine. Some tackifier product instructions say to use at a rate of 3 to 5 pounds per acre, which can be too much. In addition, pump problems can occur at higher rates due to increased viscosity.

Maintenance Standards

- PAM may be reapplied on actively worked areas after a 48-hour period.
- Reapplication is not required unless PAM-treated soil is disturbed or unless turbidity levels show the need for an additional application. If PAM-treated soil is left undisturbed, a reapplication may be necessary after 2 months. More PAM applications may be required for steep slopes, silty and clayey soils (USDA Classification Type “C” and “D” soils), long grades, and high precipitation areas. When PAM is applied first to bare soil and then covered with straw, a reapplication may not be necessary for several months.
- Loss of sediment and PAM may be a basis for penalties per RCW 90.48.080.

BMP C130E: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

For more information: Use this BMP in conjunction with other BMPs such as BMP C120E: Temporary and Permanent Seeding, BMP C121E: Mulching, or BMP C124E: Sodding.

Conditions for Use

- All slopes > 3H:1V and > 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends on the type of slope. Roughening methods include stair-step

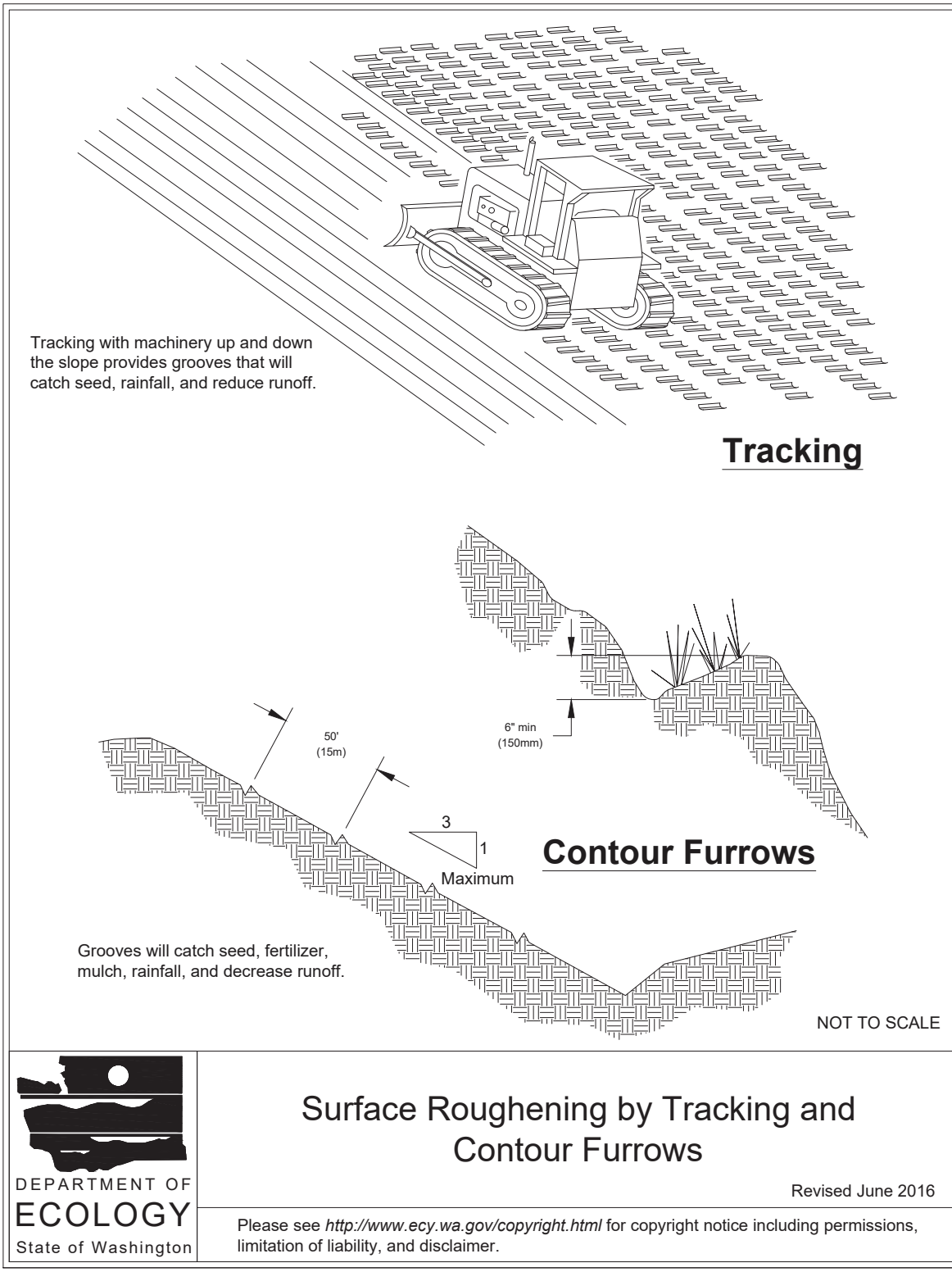
grading, grooving, contour furrows, and tracking. See Figure 7.7: Surface Roughening by Tracking and Contour Furrows for tracking and contour furrows. Factors to be considered in choosing a roughening method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3:1) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes > 3H:1V but < 2H:1V should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are surface roughened should be seeded as quickly as possible.
- Regular inspections should be made of the area. If rills appear, they should be re-roughened and reseeded immediately.

Figure 7.7: Surface Roughening by Tracking and Contour Furrows



BMP C131E: Gradient Terraces

Purpose

Gradient terraces reduce erosion damage by intercepting surface runoff and conveying it to a stable outlet at a nonerosive velocity.

Conditions for Use

Gradient terraces are normally limited to bare land having a water erosion problem. They should not be constructed on deep sands or on soils that are too stony, steep, or shallow to permit practical and economical installation and maintenance. Gradient terraces may only be used where suitable outlets are or will be made available. See Figure 7.8: Gradient Terraces for gradient terraces.

Design and Installation Specifications

- The maximum spacing of gradient terraces should be determined by the following method:

  ### Equation 7.1: Gradient Terrace Spacing

  $$VI = (0.8 * s) + y$$

  where:

  VI = vertical interval (feet)

  s = land rise per 100 feet (feet)

  y = a soil and cover variable with values from 1.0 to 4.0

  Values of "y" are influenced by soil erodibility and cover practices. The lower values are applicable to erosive soils where little to no residue is left on the surface. The higher value is applicable only to erosion-resistant soils where a large amount of residue (1.5 tons of straw per acre equivalent) is on the surface.

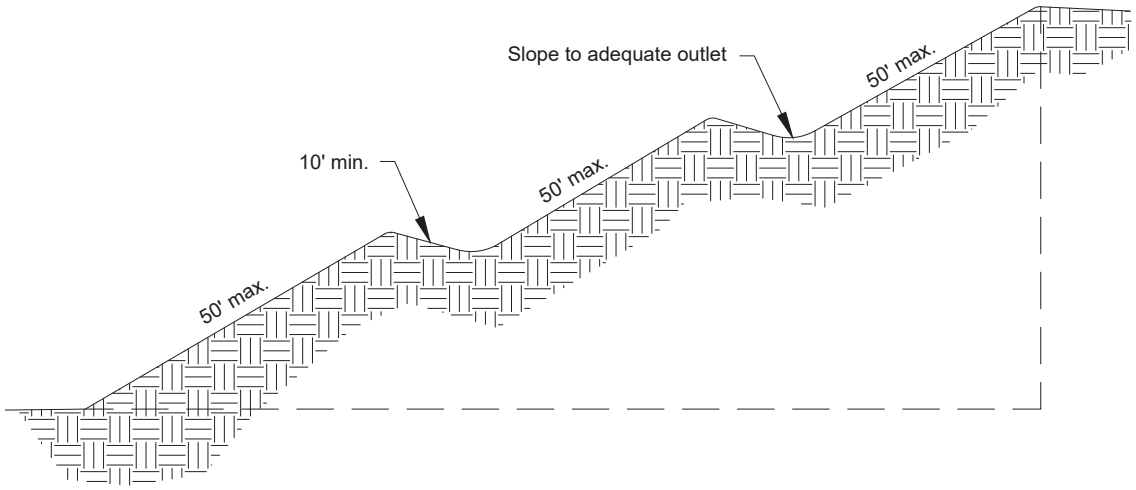
- The minimum constructed cross section should meet the design dimensions.
- The top of the constructed ridge should not be lower at any point than the design elevation plus the specified overfill for settlement. The opening at the outlet end of the terrace should have a cross section equal to that specified for the terrace channel.
- Channel grades may be either uniform or variable with a maximum grade of 0.6 feet per 100 feet length (0.6%). For short distances, terrace grades may be increased to improve alignment. The channel velocity should not exceed that which is nonerosive for the soil type.
- All gradient terraces should have adequate outlets. Such an outlet may be a grassed waterway, vegetated area, or tile outlet. In all cases the outlet must convey runoff from the terrace or terrace system to a point where the outflow will not cause damage. Vegetative cover and energy dissipaters should be used in the outlet channel.
- The design elevation of the water surface of the terrace should not be lower than the design elevation of the water surface in the outlet at their junction, when both are operating at design flow.

- Vertical spacing determined by the above methods may be increased as much as 0.5 feet or 10%, whichever is greater, to provide better alignment or location, to avoid obstacles, to adjust for equipment size, or to reach a satisfactory outlet. The contributing area above the top should not exceed the area that would be drained by a terrace with normal spacing.
- The terrace should have enough capacity to handle the peak runoff expected from a 2-year, 24-hour design storm without overtopping.
- The terrace cross section should be proportioned to fit the land slope.
- The ridge height should include a reasonable settlement factor.
- The ridge should have a minimum top width of 3 feet at the design height.
- The minimum cross-sectional area of the terrace channel should be 8 square feet (sf) for land slopes of 5% or less, 7 sf for slopes from 5% to 8%, and 6 sf for slopes steeper than 8%. The terrace can be constructed wide enough to be maintained using a small vehicle.

Maintenance Standards

Maintenance should be performed as needed. Terraces should be inspected regularly, at least once per year and after large storm events.

Figure 7.8: Gradient Terraces



NOT TO SCALE

DEPARTMENT OF
ECOLOGY
State of Washington

Gradient Terraces

Revised June 2016

BMP C140E: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, into drainage systems, and into receiving waters. Wind erosion is a significant cause of soil movement from construction sites in eastern Washington. Although wind erosion can contribute to water quality impacts, dust control is regulated in some areas of eastern Washington primarily through local air quality authorities. Where such an entity exists, contact the local air quality authority for appropriate and required BMPs for dust control to implement at your project site.

Conditions for Use

Use dust control in areas (including roadways) subject to surface and air movement of dust where on-site or off-site impacts on roadways, drainage systems, or receiving waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition, if stable. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until the surface is wet. Repeat as needed. To prevent carryout of mud onto the street, see BMP C105E: Stabilized Construction Access and BMP C106E: Wheel Wash.
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Used oil is prohibited from use as a dust suppressant. Local jurisdictions may approve other dust palliatives such as calcium chloride or polyacrylamide (PAM).
- PAM (BMP C126E: Polyacrylamide for Soil Erosion Protection) added to water at a rate of 0.5 pounds per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to the increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may reduce the quantity of water needed for dust control, especially in eastern Washington. PAM should not be directly applied to water or allowed to enter a water body.
- Contact your local air pollution control authority for guidance and training on other dust control measures. Compliance with the local air pollution control authority constitutes compliance with this BMP. See the following website for more information:

https://ecology.wa.gov/About-us/Our-role-in-the-community/Partnerships-committees/Clean-air-agencies

- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.

Techniques that can be used for unpaved roads and lots include the following:

- Reduce speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
- Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
- Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles < 0.075 millimeters to 10% to 20%.
- Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
- Encourage the use of alternate, paved routes, if available.
- Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
- Limit dust-generating work on windy days.
- Pave unpaved permanent roads and other trafficked areas.

Maintenance Standards

Respray area as necessary to keep dust to a minimum.

BMP C150E: Materials on Hand

Purpose

Quantities of erosion prevention and sediment control materials can be kept on the project site at all times to be used for emergency situations such as unexpected heavy rains. Having these materials on-site reduces the time needed to replace existing or implement new BMPs when inspections indicate that existing BMPs are not meeting the Construction Stormwater Pollution Prevention Plan (SWPPP) requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

Conditions for Use

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible pipe, sandbags, geotextile fabric and steel “T” posts.

- Materials should be stockpiled and readily available before any site clearing, grubbing, or earthwork begins. A large contractor or developer could keep a stockpile of materials that are available to be used on several projects.
- If storage space at the project site is at a premium, the contractor could maintain the materials at their office or yard. The office or yard must be less than an hour from the project site.

Design and Installation Specifications

Depending on the project type, size, complexity, and length, the materials and quantities will vary. A good minimum list of items that will cover numerous situations includes the following:

- Clear plastic, 6 mil
- Drainpipe, 6- or 8-inch-diameter
- Sandbags, filled
- Straw bales for mulching
- Quarry spalls
- Washed gravel
- Geotextile fabric
- Catch basin inserts
- Steel "T" posts
- Silt fence material
- Straw wattles

Maintenance Standards

- All materials with the exception of the quarry spalls, steel "T" posts, and gravel should be kept covered and out of both sun and rain.
- Restock materials as needed.

BMP C151E: Concrete Handling

Purpose

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the State.

Conditions of Use

Any time concrete is used, utilize these management practices. Concrete construction project components include, but are not limited to:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Disposal options for concrete, in order of preference are:

1. Off-site disposal
2. Concrete wash-out areas (see BMP C154E: Concrete Washout Area)
3. De minimus washout to formed areas awaiting concrete

Design and Installation Specifications

- Wash concrete truck drums at an approved off-site location or in designated concrete washout areas only. Do not wash out concrete trucks onto the ground (including formed areas awaiting concrete), or into storm drains, open ditches, streets, or streams. Refer to BMP C154E: Concrete Washout Area for information on concrete washout areas.
    - Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas as allowed in BMP C154E: Concrete Washout Area.
- Wash small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheelbarrows) into designated concrete washout areas or into formed areas awaiting concrete pour.
- At no time shall concrete be washed off into the footprint of an area where an infiltration feature will be installed.
- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow washwater from areas, such as concrete aggregate driveways, to drain directly (without detention or treatment) to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no designated concrete washout areas (or formed areas, allowed as described above) are available. Dispose of contained concrete and concrete washwater (process water) properly.

- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMP C252E: Treating and Disposing of High pH Water for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit (CSWGP) for pH monitoring requirements if the project involves one of the following activities:
    - Significant concrete work (as defined in the CSWGP).
    - The use of soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
    - Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

Maintenance Standards

Check containers for holes in the liner daily during concrete pours and repair the same day.

BMP C152E: Sawcutting and Surfacing Pollution Prevention

Purpose

Sawcutting and surfacing operations generate slurry and process water that contain fine particles and have a high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the state is prohibited. Use this BMP to minimize and prevent process water and slurry created by sawcutting or surfacing from entering waters of the state.

Conditions for Use

Anytime sawcutting or surfacing operations take place, these management practices should be used. Sawcutting and surfacing operations include, but are not limited to, the following:

- Sawing
- Coring
- Grinding
- Roughening
- Hydrodemolition
- Bridge and road surfacing

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings should not remain on permanent concrete or asphalt pavement overnight.

- Slurry and cuttings should not drain to any natural or constructed drainage system. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate ground water or surface water quality standards.
- Do not allow process water generated during hydrodemolition, surface roughening or similar operations to drain to any natural or constructed drainage system. Dispose of process water in a manner that does not violate ground water or surface water quality standards.
- Handle and dispose of cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pickup sweeper at an appropriate disposal site.

Maintenance Standards

Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and/or vacuum trucks.

BMP C153E: Material Delivery, Storage, and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the drainage system or receiving waters from material delivery and storage. Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.

Conditions of Use

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g., polyacrylamide)
- Fertilizers, pesticides, and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents, and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

The following steps should be taken to minimize risk:

- Temporary storage area should be located away from vehicle traffic, near the construction entrance(s), and away from receiving waters or storm drains.
- Safety Data Sheets should be supplied for all stored materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (October 1 through June 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as earthen dike, horse trough, or even a children's wading pool for nonreactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.

Material Storage Areas and Secondary Containment Practices

- Liquids, petroleum products, and substances listed in 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.
- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be nonhazardous.
- Sufficient separation should be provided between stored containers to allow spill cleanup and emergency response access.
- During the wet weather season (October 1 through June 30), each secondary containment facility shall be covered during nonworking days.
- At all times, each secondary containment facility shall be covered prior to and during rain events.
- Keep material storage areas clean, organized, and equipped with an ample supply of

appropriate spill cleanup material (spill kit).

- The spill kit should include, at a minimum, the following items:
    - One water-resistant nylon bag
    - Three oil-absorbent socks (3 inches by 4 feet)
    - Two oil-absorbent socks (3 inches by 10 feet)
    - Twelve oil-absorbent pads (17 by 19 inches)
    - One pair of splash-resistant goggles
    - Three pairs of nitrile gloves
    - Ten disposable bags with ties
    - Instructions

BMP C154E: Concrete Washout Area

Purpose

Prevent or reduce the discharge of pollutants from concrete waste to stormwater by conducting washout off-site, or performing on-site washout in a designated area.

Conditions of Use

Concrete washout areas are implemented on construction projects where:

- Concrete is used as a construction material
- It is not possible to dispose of all concrete wastewater and washout off-site (ready mix plant, etc.).
- Concrete truck drums are washed on-site.

  Note that auxiliary concrete truck components (e.g. chutes and hoses) and small concrete handling equipment (e.g. hand tools, screeds, shovels, rakes, floats, trowels, and wheelbarrows) may be washed into formed areas awaiting concrete pour.

At no time shall concrete be washed off into the footprint of an area where an infiltration feature will be installed.

Design and Installation Specifications

Implementation

- Perform washout of concrete truck drums at an approved off-site location or in designated concrete washout areas only.
- Do not wash out concrete onto non-formed areas, or into storm drains, open ditches, streets,

or streams.

- Wash equipment difficult to move, such as concrete paving machines, in areas that do not directly drain to natural or constructed stormwater conveyance or potential infiltration areas.
- Do not allow excess concrete to be dumped on-site, except in designated concrete washout areas as allowed above.
- Concrete washout areas may be prefabricated concrete washout containers, or self-installed structures (above-grade or below-grade).
- Prefabricated containers are most resistant to damage and protect against spills and leaks. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste.
- If self-installed concrete washout areas are used, below-grade structures are preferred over above-grade structures because they are less prone to spills and leaks.
- Self-installed above-grade structures should only be used if excavation is not practical.
- Concrete washout areas shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

Education

- Discuss the concrete management techniques described in this BMP with the ready-mix concrete supplier before any deliveries are made.
- Educate employees and subcontractors on the concrete waste management techniques described in this BMP.
- Arrange for the contractor's superintendent or Certified Erosion and Sediment Control Lead (CESCL) to oversee and enforce concrete waste management procedures.
- A sign should be installed adjacent to each concrete washout area to inform concrete equipment operators to utilize the proper facilities.

Contracts

Incorporate requirements for concrete waste management into concrete supplier and subcontractor agreements.

Location and Placement

- Locate concrete washout areas at least 50 feet from sensitive areas such as storm drains, open ditches, water bodies, or wetlands.
- Allow convenient access to the concrete washout area for concrete trucks, preferably near the area where the concrete is being poured.
- If trucks need to leave a paved area to access the concrete washout area, prevent track-out with a pad of rock or quarry spalls (see BMP C105E: Stabilized Construction Access). These

areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills.

- The number of concrete washout areas you install should depend on the expected demand for storage capacity.
- On large sites with extensive concrete work, concrete washout areas should be placed in multiple locations for ease of use by concrete truck drivers.

Concrete Truck Washout Procedures

- Washout of concrete truck drums shall be performed in designated concrete washout areas only.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated concrete washout areas or properly disposed of off-site.

Concrete Washout Area Installation

- Concrete washout areas should be constructed as shown in the figures below, with a recommended minimum length and minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
- Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
- Lath and flagging should be commercial type.
- Liner seams shall be installed in accordance with manufacturers' recommendations.
- Soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Maintenance Standards

Inspection and Maintenance

- Inspect and verify that concrete washout areas are in place prior to the commencement of concrete work.
- Once concrete wastes are washed into the designated washout area and allowed to harden, the concrete should be broken up, removed, and disposed of per applicable solid waste regulations. Dispose of hardened concrete on a regular basis.
- During periods of concrete work, inspect the concrete washout areas daily to verify continued performance.
    - Check overall condition and performance.
    - Check remaining capacity (% full).
    - If using self-installed concrete washout areas, verify plastic liners are intact and

sidewalls are not damaged.

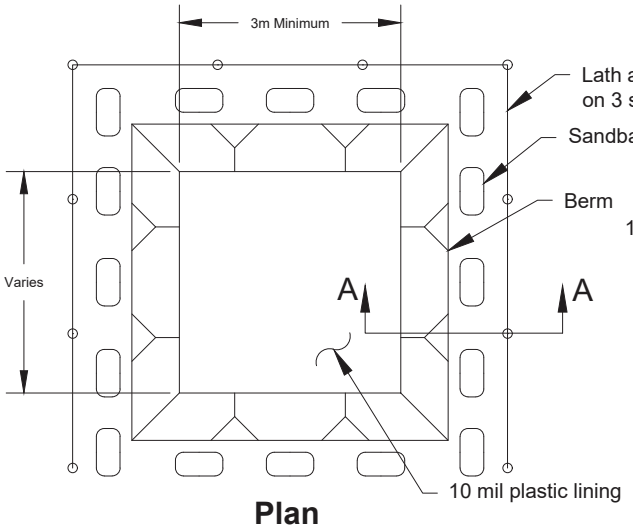
- If using prefabricated containers, check for leaks.

- Maintain the concrete washout areas to provide adequate holding capacity with a minimum freeboard of 12 inches.
- Concrete washout areas must be cleaned, or new concrete washout areas must be constructed and ready for use once the concrete washout area is 75% full.
- If the concrete washout area is nearing capacity, vacuum and dispose of the waste material in an approved manner.
    - Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.
    - Do not discharge to the sanitary sewer without local approval.
    - Place a secure, non-collapsing, non-water collecting cover over the concrete washout area prior to predicted wet weather to prevent accumulation and overflow of precipitation.
    - Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete may be reused on-site or hauled away for disposal or recycling.
- When you remove materials from a self-installed concrete washout area, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Re-line the structure with new plastic after each cleaning.

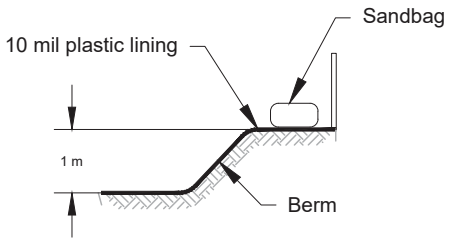
Removal of Concrete Washout Areas

- When concrete washout areas are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of.
- Materials used to construct concrete washout areas shall be removed from the site of the work and disposed of or recycled.
- Holes, depressions or other ground disturbance caused by the removal of the concrete washout areas shall be backfilled, repaired, and stabilized to prevent erosion.

Figure 7.9: Concrete Washout Area with Wood Planks



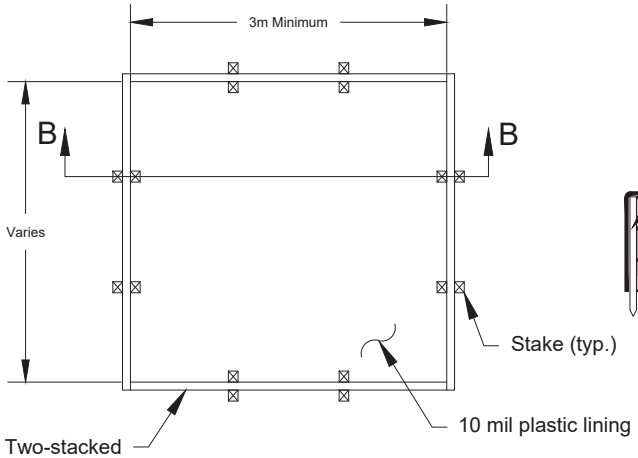
Plan



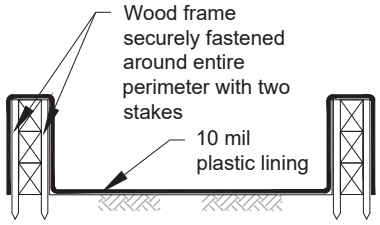
Section A-A

Type "Below Grade"

Notes:
1. Actual layout determined in the field.
2. A concrete washout sign shall be installed within 10 m of the temporary concrete washout facility.



Plan



Section B-B

Type "Above Grade" with Wood Planks

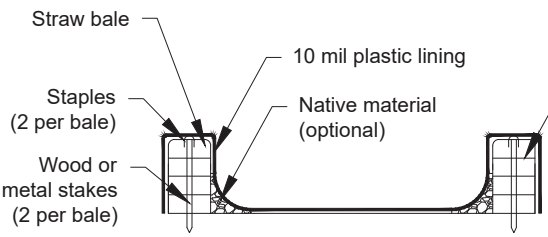
NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

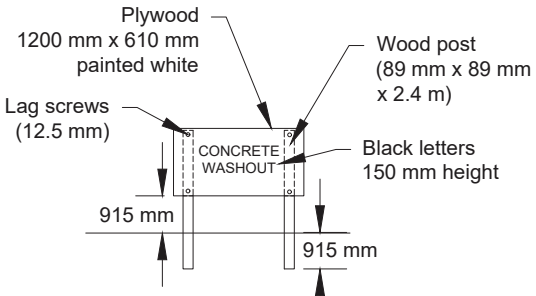
Concrete Washout Area with Wood Planks

Revised June 2016

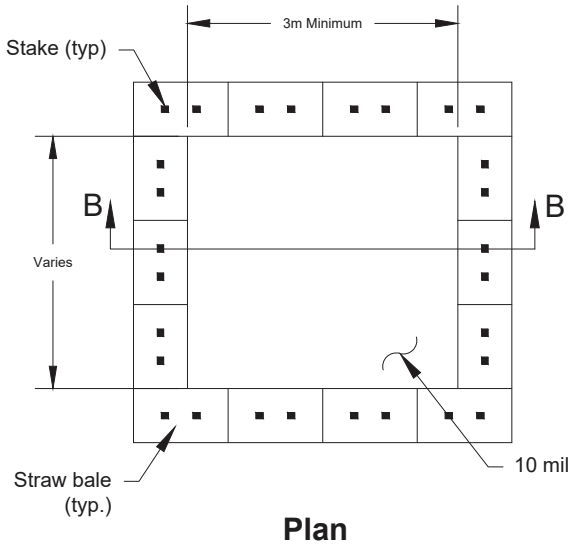
Figure 7.10: Concrete Washout Area with Straw Bales



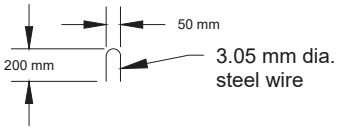
Section B-B



Concrete Washout Sign Detail (or equivalent)



Plan



Staple Detail

Notes:

1. Actual layout determined in the field.
2. The concrete washout sign shall be installed within 10 m of the temporary concrete washout facility.

Type "Above Grade" with Straw Bales

NOT TO SCALE

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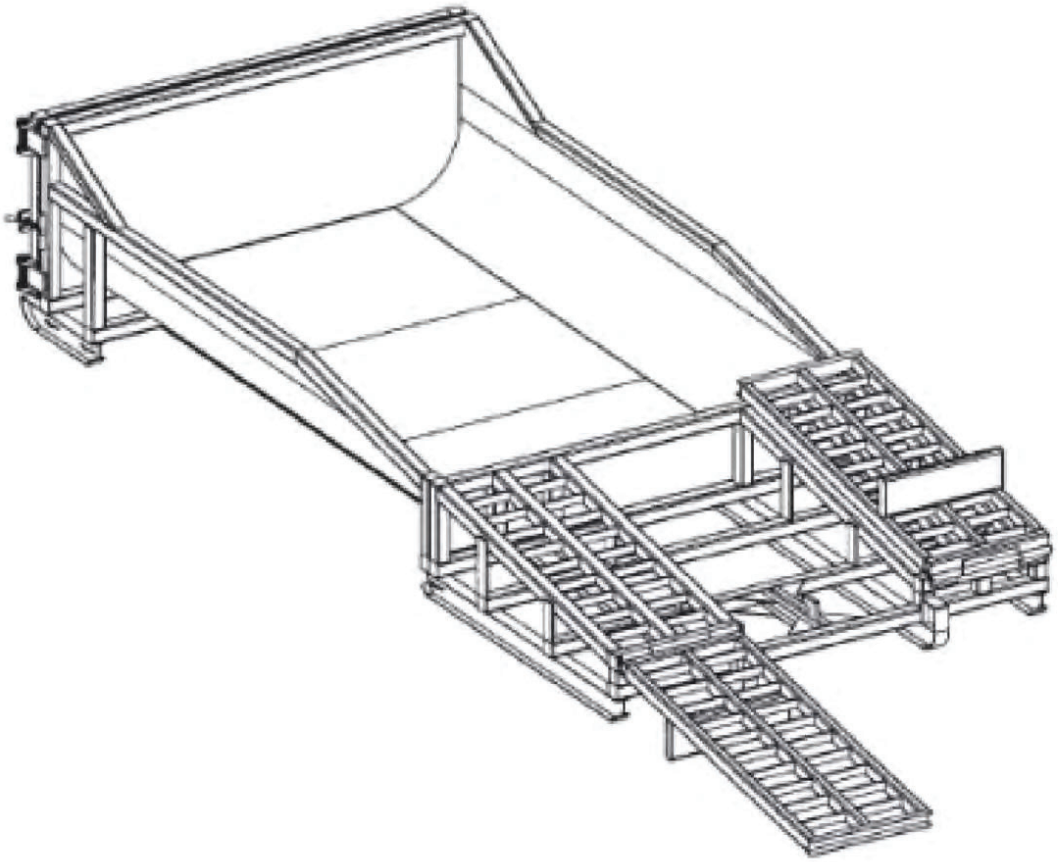
State of Washington

Concrete Washout Area with Straw Bales

Revised June 2016

Figure 7.11: Prefabricated Concrete Washout Container with Ramp



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Prefabricated Concrete Washout Container with Ramp

Revised June 2016

BMP C160E: Certified Erosion and Sediment Control Lead

Purpose

The project proponent designates at least one person as the responsible representative in charge of erosion and sediment control (ESC) and water quality protection. The designated employee or contact shall be the Certified Erosion and Sediment Control Lead (CESCL) who is responsible for ensuring compliance with all local, state, and federal ESC and water quality requirements.

Conditions of Use

A CESCL should be made available on projects ≥ 1 acre that discharge stormwater to surface waters of the state. Sites < 1 acre do not require a CESCL certification for conducting inspections; sampling is not required on sites that disturb < 1 acre. The CESCL shall meet one of the following requirements:

- Have a current certificate proving attendance in an ESC training course that meets the minimum ESC training and certification requirements established by Ecology. The minimum requirements for CESCL course training, as well as a list of ESC training and certification providers, are available on the Washington State Department of Ecology's Certified Erosion & Sediment Control Lead web page at the following address:

  https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Certified-erosion-sediment-control

- Be a Certified Professional in Erosion and Sediment Control (CPESC). For additional information, see the Envirocert CPESC website at the following address:

  http://www.envirocertintl.org/cpesc/

Specifications

- CESCL certification shall remain valid for 3 years.
- The CESCL shall have authority to act on behalf of the contractor or developer and shall be available, on call, 24 hours per day throughout the period of construction.
- The Construction Stormwater Pollution Prevention Plan (SWPPP) shall include the name, telephone number, fax number, and address of the designated CESCL. See Chapter 3 - Preparation of Stormwater Site Plans and 7.2 Planning.
- A CESCL may provide inspection and compliance services for multiple construction projects in the same geographic region.
- Duties and responsibilities of the CESCL shall include, but are not limited to, the following:
  - Maintaining a permit file on-site at all times, which includes the SWPPP and any associated permits and plans
  - Directing BMP installation, inspection, maintenance, modification, and removal
  - Updating all project drawings and the Construction SWPPP with changes made

- Completing any sampling requirements including reporting results using electronic Discharge Monitoring Reports (WebDMR)
- Facilitating, participating in, and taking corrective actions resulting from inspections performed by outside agencies or the owner
- Keeping daily logs, and inspection reports. Inspection reports should include the following:
    - Inspection date/time
    - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection
    - Visual monitoring results, including a description of discharged stormwater and a notation of the presence of suspended sediment, turbid water, discoloration, and oil sheen, as applicable
    - Any water quality monitoring performed during inspection
    - General comments and notes, including a brief description of any BMP repairs, maintenance, or installations made as a result of the inspection
    - A summary or list of all BMPs implemented, including observations of all ESC structures or practices and the following:
        1. Locations of BMPs inspected
        2. Locations of BMPs that need maintenance
        3. Locations of BMPs that failed to operate as designed or intended
        4. Locations where additional or different BMPs are required

BMP C162E: Scheduling

Purpose

Sequencing a construction project can reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Conditions for Use

The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sediment control (ESC) BMPs planned for the project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of ground cover leaves a site vulnerable to erosion. Construction

sequencing that limits land clearing, provides timely installation of ESC BMPs, and restores protective cover quickly can significantly reduce the erosion potential of a site.

Design Considerations

- Minimize construction during rainy periods.
- Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding in order to revegetate cut-and-fill slopes as the work progresses.

7.3.3 Runoff Conveyance and Treatment BMPs

BMP C200E: Interceptor Dike and Swale

Purpose

Provide a dike of compacted soil or a swale at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Use the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Conditions for Use

Use an interceptor dike or swale where runoff from an exposed site or disturbed slope must be conveyed to an erosion control BMP that can safely convey the stormwater.

- Locate upslope of a construction site to prevent runoff from entering the disturbed area.
- When placed horizontally across a disturbed slope, it reduces the amount and velocity of runoff flowing down the slope.
- Locate downslope to collect runoff from a disturbed area and direct it to a sediment-trapping BMP (e.g., BMP C240E: Sediment Trap, or BMP C241E: Sediment Pond (Temporary).

Design Considerations

- Dike and/or swale and channel must be stabilized with temporary or permanent vegetation or other channel protection during construction.
- Steep grades require channel protection and check dams.
- Review construction for areas where overtopping may occur.
- Can be used at the top of new fill before vegetation is established.
- May be used as a permanent diversion channel to carry the runoff.
- Contributing area for an individual dike or swale should be ≤ 1 acre.
- Design the dike and/or swale capacity as follows:

- Temporary interceptor dikes: Sized to handle the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short-duration storm.
- Permanent interceptor dikes: The peak volumetric flow rate is calculated using a 10-minute time step for a 25-year, 24-hour frequency storm for the developed condition.

Interceptor Dikes

Interceptor dikes shall meet the following criteria:

- Top Width: 2 feet minimum.
- Height: 1.5 feet minimum on berm.
- Side Slope: 2H:1V or flatter.
- Grade: Depends on topography; however, dike system minimum is 0.5%, and maximum is 1%.
- Compaction: Minimum of 90% ASTM D698 standard Proctor.
- Stabilization: Depends on velocity and reach. Inspect regularly to ensure stability.
- Ground Slopes < 5%: Seed and mulch should be applied within 5 days of dike construction (see BMP C121E: Mulching).
- Ground Slopes from 5% to 40%: Depends on runoff velocities and dike materials. Slope should be stabilized immediately using either sod or riprap, or other measures to avoid erosion.
- The upslope side of the dike shall provide positive drainage to the dike outlet. No erosion shall occur at the outlet. Provide energy dissipation measures as necessary. Sediment-laden runoff must be released through a sediment-trapping BMP.
- Minimize construction traffic over temporary dikes. Use temporary cross culverts for channel crossing.
- See Table 7.16: Horizontal Spacing of Interceptor Dikes Along Ground Slope for recommended horizontal spacing between dikes.

Table 7.16: Horizontal Spacing of Interceptor Dikes Along Ground Slope

Average Slope	Slope Percentage	Flow Path Length (feet)
20H:1V or less	3 to 5	300
(10 to 20)H:1V	5 to 10	200
(4 to 10)H:1V	10 to 25	100t
(2 to 4)H:1V	25 to 50	50

Interceptor Swales

Interceptor swales shall meet the following criteria:

- Bottom Width: 2 feet minimum; the bottom shall be level
- Depth: 1 foot minimum
- Side Slope: ≤ 2H:1V
- Grade: Maximum 5%, with positive drainage to a suitable outlet (such as BMP C241E: Sediment Pond (Temporary))
- Stabilization: Seed per BMP C120E: Temporary and Permanent Seeding or BMP C202E: Riprap Channel Lining, 12 inches thick of riprap pressed into the bank and extending ≥ 8 inches vertical from the bottom

Maintenance Standards

- Inspect diversion dikes and interceptor swales once a week and after every rainfall. Immediately remove sediment from the flow area.
- Damage caused by construction traffic or other activity must be repaired before the end of each working day.
- Check outlets and make timely repairs as needed to avoid gully formation. When the area below the temporary diversion dike is permanently stabilized, remove the dike and fill and stabilize the channel to blend with the natural surface.

BMP C201E: Grass-Lined Channels

Purpose

To provide a channel with a vegetative lining for conveyance of runoff. The purpose of the vegetative lining is to prevent transport of sediment and erosion.

Conditions of Use

This practice applies to construction sites where concentrated runoff needs to be contained to prevent erosion or flooding.

- Use this BMP when a vegetative lining can provide sufficient stability for the channel cross section and at lower velocities of water (normally dependent on grade). This means that the channel slopes are generally < 5% and space is available for a relatively large cross section.
- Typical uses include roadside ditches, channels at property boundaries, outlets for diversions, and other channels and drainage ditches in low areas.
- Channels that will be vegetated should be installed before major earthwork and hydroseeded with a bonded fiber matrix (BFM). The vegetation should be well established (i.e., 50% cover of all seeded areas after 3 months of active growth following germination during the growing season) before water is allowed to flow in the ditch. With channels that will have high flows,

erosion control blankets should be installed over the hydroseed. If vegetation cannot be established from seed before water is allowed in the ditch, sod should be installed in the bottom of the ditch in lieu of hydromulch and blankets.

Design and Installation Specifications

See Figure 7.12: Typical Grass-Lined Channels.

- Locate channels where they can conform to the topography and other features such as roads. Use natural drainage systems to the greatest extent possible.
- Avoid sharp changes in alignment or bends and changes in grade.
- Do not reshape the landscape to fit the drainage channel.
- The maximum design velocity shall be based on soil conditions, type of vegetation, and method of revegetation, but at no time shall velocity > 5 feet per second (ft/sec). The channel shall not be overtopped by the peak volumetric flow rate calculated using the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short-duration storm.
- Where the grass-lined channel will also function as a permanent stormwater conveyance, consult the conveyance requirements of the local jurisdiction.
- An established grass or vegetated lining is required before the channel can be used to convey stormwater, unless stabilized with nets or blankets (see BMP C122E: Nets and Blankets).
- If design velocity of a channel to be vegetated by seeding > 2 ft/sec, a temporary channel liner is required. Geotextile or special mulch protection such as fiberglass roving or straw and netting provides stability until the vegetation is fully established. See Figure 7.13: Temporary Channel Liners.
- Check dams shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is > 4%. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- If vegetation is established by sodding, the permissible velocity for established vegetation may be used and no temporary liner is needed.
- Do not subject the grass-lined channel to sedimentation from disturbed areas. Use sediment-trapping BMPs upstream of the channel.
- V-shaped grass channels generally apply where the quantity of water is small, such as in short reaches along roadsides. The V-shaped cross section is least desirable because it is difficult to stabilize the bottom where velocities may be high.
- Trapezoidal grass channels are used where runoff volumes are large and slope is low so that velocities are nonerosive to vegetated linings.

  Note: It is difficult to construct small parabolic channels.
- Subsurface drainage or riprap channel bottoms may be necessary on sites that are subject to prolonged wet conditions due to long-duration flows or a high water table.

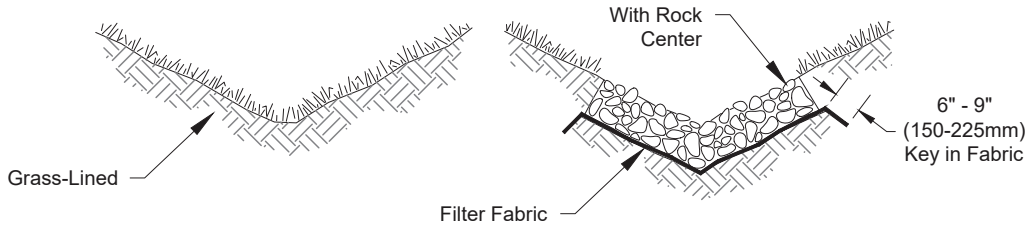
- Provide outlet protection at culvert ends and at channel intersections.
- Temporary grass channels, at a minimum, should carry peak runoff for the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short-duration storm. Where flood hazard exists, increase the capacity according to the potential damage.
- Grassed channel side slopes generally are constructed ≤ 3:1 to aid in the establishment of vegetation and for maintenance.
- Construct channels a minimum of 0.2 feet larger around the periphery to allow for soil bulking during seedbed preparations and sod buildup.

Maintenance Standards

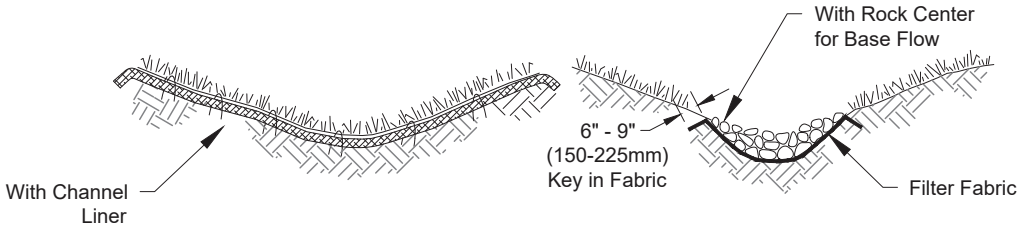
- During the establishment period, check grass-lined channels after every rainfall.
- After grass is established, periodically check the channel; check it after every heavy rainfall event. Immediately make repairs.
- Check the channel outlet and all road crossings for bank stability and evidence of piping or scour holes.
- Remove all significant sediment accumulations to maintain the designed carrying capacity. Keep the grass in a healthy, vigorous condition at all times, since it is the primary erosion protection for the channel.

Figure 7.12: Typical Grass-Lined Channels

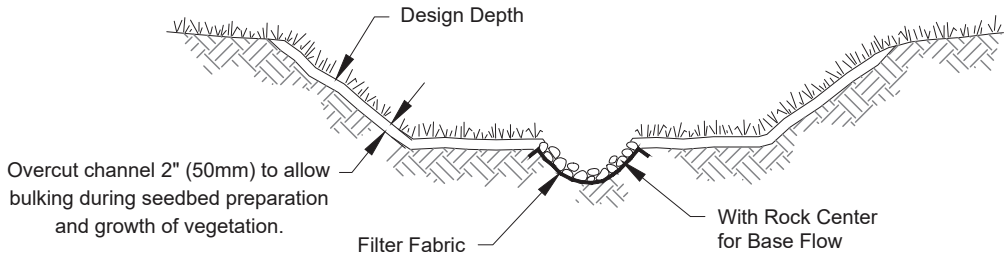
Typical V-Shaped Channel Cross-Section



Typical Parabolic Channel Cross-Section



Typical Trapezoidal Channel Cross-Section



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Typical Grass-Lined Channels

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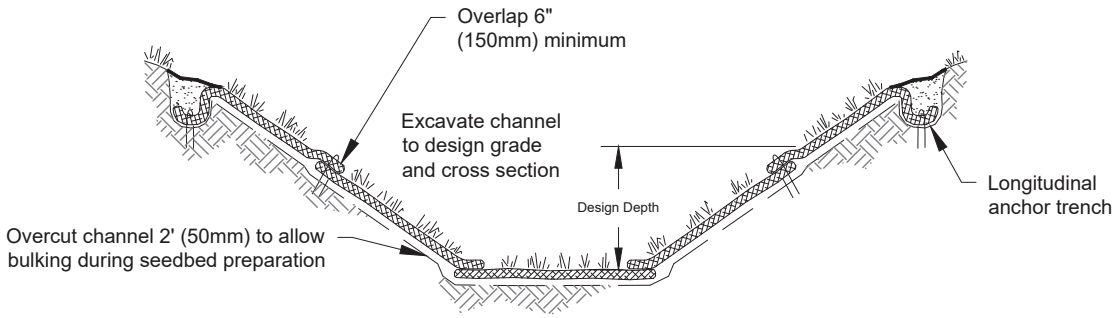
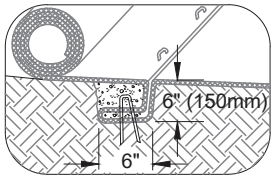
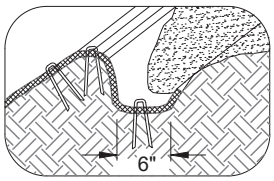
Figure 7.13: Temporary Channel Liners



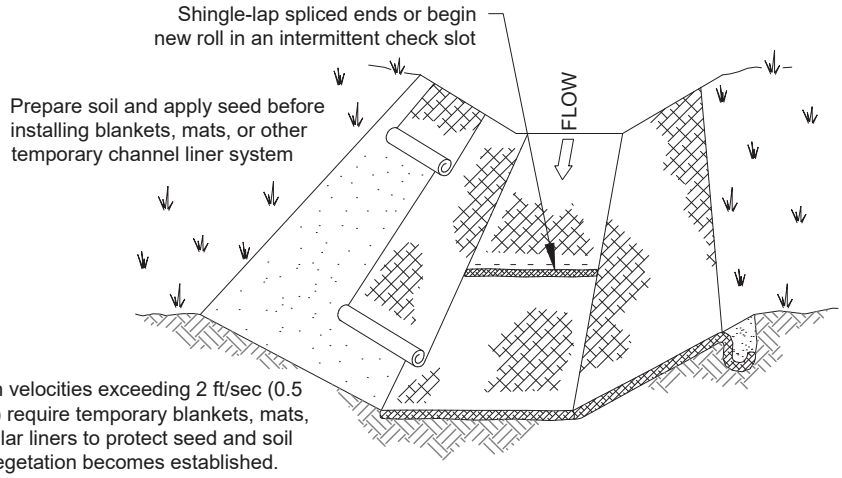


Intermittent Check Slot

Typical installation with
erosion control blankets
or turf reinforcement mats



Longitudinal Anchor Trench



Notes:

1. Design velocities exceeding 2 ft/sec (0.5 m/sec) require temporary blankets, mats, or similar liners to protect seed and soil until vegetation becomes established.
2. Grass-lined channels with design velocities exceeding 6 ft/sec (2 m/sec) should include turf reinforcement mats.

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Temporary Channel Liners

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BMP C202E: Riprap Channel Lining

Purpose

To protect erodible channels by providing a channel liner using riprap.

Conditions of Use

- Use this BMP when natural soils or vegetated stabilized soils in a channel are not adequate to prevent channel erosion.
- Use this BMP when a permanent ditch or pipe system is to be installed and a temporary measure is needed.
- An alternative to riprap channel lining is BMP C122E: Nets and Blankets.
- The Federal Highway Administration recommends not using geotextile liners whenever the slope exceeds 10% or the shear stress exceeds 8 pounds per square foot.
- Since riprap is typically used where erosion potential is high, construction must be sequenced so that the riprap is put in place with the minimum possible delay.
- Disturb areas awaiting riprap only when final preparation and placement of the riprap can follow immediately behind the initial disturbance. Where riprap is used for outlet protection, the riprap should be placed before or in conjunction with the construction of the pipe or channel so that it is in place when the pipe or channel begins to operate.
- The designer, after determining the riprap size that will be stable under the flow conditions, shall consider that size to be a minimum size and then, based on riprap gradations actually available in the area, select the size or sizes that equal or exceed the minimum size. The possibility of drainage structure damage by others shall be considered in selecting a riprap size, especially if there is nearby water or a gully in which to toss the rocks.
- Rock for riprap shall consist of field stone or quarry rock that is approximately rectangular. The rock shall be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering and it shall be suitable in all respects for the purpose intended. See the latest version of the Washington State Department of Transportation *Standard Specifications for Road, Bridge, and Municipal Construction*.
- A lining of engineering geotextile shall be placed between the riprap and the underlying soil surface to prevent soil movement into or through the riprap. The geotextile should be keyed in at the top of the bank.
- Geotextile shall not be used on slopes > 1.5:1 as slippage may occur. It should be used in conjunction with a layer of coarse aggregate (granular filter blanket) when the riprap to be placed is 12 inches and larger.

Maintenance Standards

Replace riprap as needed.

BMP C203E: Water Bars

Purpose

A water bar is a small ditch or ridge of material that is constructed diagonally across a road or right-of-way to divert stormwater runoff from the road surface, wheel tracks, or a shallow road ditch. See Figure 7.14: Water Bars.

Conditions of Use

Clearing right-of-way and construction of access for power lines, pipelines, and other similar installations often require long narrow rights-of-way over sloping terrain. Disturbance and compaction promotes gully formation in these cleared strips by increasing the volume and velocity of runoff. Gully formation may be especially severe in tire tracks and ruts. To prevent gullying, runoff can often be diverted across the width of the right-of-way to undisturbed areas by using small predesigned diversions.

Give special consideration to each individual outlet area, as well as to the cumulative effect of added diversions. Use gravel to stabilize the diversion where significant vehicle traffic is anticipated.

Design and Installation Specifications

- Height: 8 inches minimum, measured from the channel bottom to the ridgetop.
- Side slope of channel: 2H:1V maximum; 3H:1V or flatter when vehicles will cross.
- Top width of ridge: 6 inches minimum.
- Locate water bars to use natural drainage systems and to discharge into well-vegetated stable areas.
- See Table 7.17: Water Bar Spacing Guidelines for spacing guidelines for water bars.

Table 7.17: Water Bar Spacing Guidelines

Slope Along Road (%)	Spacing (feet)
< 5	125
5 to 10	100
10 to 20	75
20 to 35	50
> 35	Use rock-lined ditch

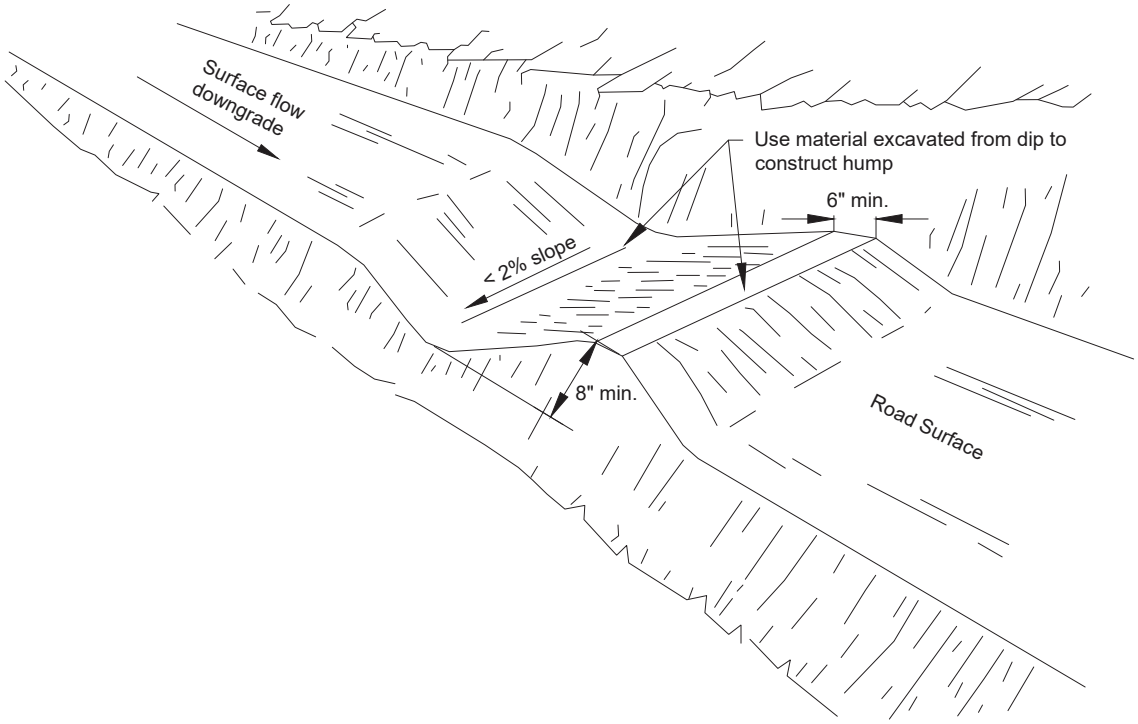
- Grade of water bar and angle: Select an angle that results in a ditch slope < 2%.
- Install the water bar as soon as the clearing and grading is completed. When utilities are being installed, reconstruct the water bar as construction is completed on each section.
- Compact the water bar ridge.

- Stabilize, seed, and mulch the portions that are not subjected to traffic. Place gravel in the areas crossed by vehicles.
- Note that BMP C208E: Triangular Silt Dike (TSD) can be used to create the ridge for the water bar.

Maintenance Standards

- Periodically inspect water bars for wear and after every heavy rainfall for wear and erosion damage.
- Immediately remove sediment from the flow area and repair the dike.
- Check outlet areas and make timely repairs as needed.
- When permanent road drainage is established and the area above the temporary water bar is permanently stabilized, remove the dike and fill the channel to blend with the natural ground, and appropriately stabilize the disturbed area.

Figure 7.14: Water Bars



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Water Bars

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BMP C204E: Pipe Slope Drains

Purpose

The purpose of pipe slope drains is to prevent gullies, channel erosion, and saturation of slide-prone soils by using a pipe to convey stormwater away from or over bare soil.

Conditions of Use

Pipe slope drains should be used when a temporary or permanent stormwater conveyance is needed to move water down a steep slope to avoid erosion.

Pipe slope drains should be used at bridge ends to collect runoff and convey it to the base of the fill slopes along the bridge approaches. Another use on road projects is to collect runoff from pavement in a pipe slope drain and convey it away from side slopes.

Temporary installations of pipe slope drains can be useful because there is generally a time lag between having the first lift of asphalt installed and the curbs, gutters, and permanent drainage installed. Used in conjunction with sand bags, or other temporary diversion devices, these will prevent massive amounts of sediment from leaving a project.

Pipe slope drains can serve the following purposes:

- Connection to new catch basins and temporarily use until all permanent piping is installed.
- Drainage of water collected from aquifers exposed on cut slopes and conveyance of the water to the base of the slope.
- Collection of clean runoff from plastic sheeting and routing the runoff away from exposed soil.
- Installation in conjunction with silt fence to drain collected water to a controlled area.
- Diversion of small seasonal streams away from construction. They have been used successfully on culvert replacement and extension jobs. Large flex pipe can be used on larger streams during culvert removal, repair, or replacement.
- Connection to existing downspouts and roof drains and diversion of water away from work areas during building renovation, demolition, and construction projects.

There are several commercially available collectors that attach to the pipe inlet and help prevent erosion at the inlet.

Design and Installation Specifications

See Figure 7.15: Pipe Slope Drain.

- Size the pipe to convey the projected flow:
    - Temporary pipe slope drains: Sized to handle the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short-duration storm.
    - Permanent pipe slope drains: The peak volumetric flow rate is calculated using a 10-minute time step shall be sized for the 25-year, 24-hour frequency storm.

- Use care in clearing vegetated slopes for installation.
- Reestablish cover immediately on areas disturbed by installation.
- Use temporary drains on new cut or fill slopes.
- Use BMP C200E: Interceptor Dike and Swale to collect water at the top of the slope.
- Ensure that the entrance area is stable and large enough to direct flow into the pipe.
- Piping of water through the berm at the entrance area is a common failure mode.
- The entrance shall consist of a standard flared end section for culverts 12 inches and larger with a minimum 6-inch metal toe plate to prevent runoff from undercutting the pipe inlet. The slope of the entrance shall be ≥ 3%. Sand bags may also be used at pipe entrances as a temporary measure.
- The soil around and under the pipe and entrance section shall be thoroughly compacted to prevent undercutting.
- The flared inlet section shall be securely connected to the slope drain and have watertight connecting bands.
- Slope drain sections shall be securely fastened together, be fused, or have gasketed watertight fittings and shall be securely anchored into the soil.
- Thrust blocks should be installed anytime 90 degree bends are used. Depending on size of pipe and flow, these can be constructed with sand bags, straw bales staked in place, “T” posts and wire, or ecology blocks.
- Pipe needs to be secured along its full length to prevent movement. This can be done with steel “T” posts and wire. Install a post on each side of the pipe and wire the pipe to the posts. This should be done every 10 to 20 feet of pipe length or so, depending on the size of the pipe and quantity of water to be diverted.
- BMP C200E: Interceptor Dike and Swale shall be used to direct runoff into a pipe slope drain. The height of the dike shall be ≥ 1 foot higher at all points than the top of the inlet pipe.
- The area below the outlet must be stabilized (see BMP C209E: Outlet Protection).
- If the pipe slope drain is conveying sediment-laden water, direct all flows into a sediment-trapping BMP.
- Materials specifications for any permanent piped system shall be set by the local jurisdiction.

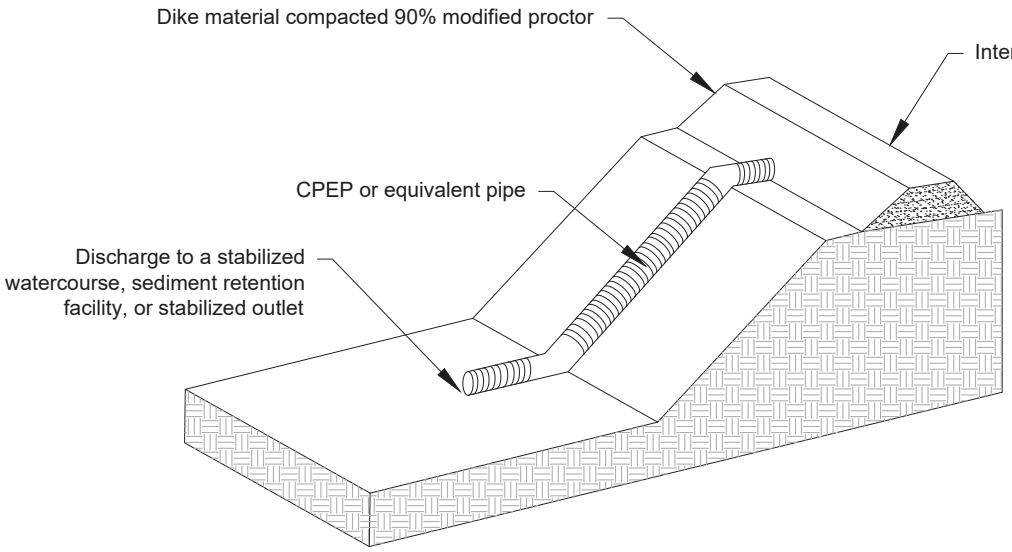
Maintenance Standards

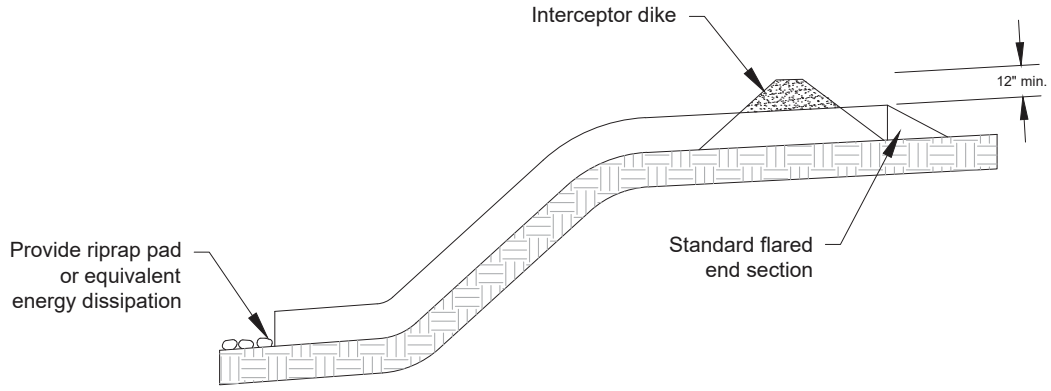
Check inlet and outlet points regularly, especially after storms.

- The inlet should be free of undercutting, and no water should be going around the point of entry. If there are problems, the headwall should be reinforced with compacted earth or sand bags.
- The outlet point should be free of erosion and installed with appropriate outlet protection.

- For permanent installations, inspect the pipe periodically for vandalism and physical distress such as slides and windthrow. Clean the pipe and outlet structure at the completion of construction.
- Normally the pipe slope is so steep that clogging is not a problem with smooth wall pipe, however, debris may become lodged in the pipe.

Figure 7.15: Pipe Slope Drain





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Notes:

1. Inlet and all sections must be securely fastened together with gasketed watertight fittings

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Pipe Slope Drain

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BMP C205E: Subsurface Drains

Purpose

The purpose of subsurface drains is to intercept, collect, and convey ground water to a satisfactory outlet, using a perforated pipe or other conduit below the ground surface. Subsurface drains are also known as "French drains." The perforated pipe provides a dewatering mechanism to drain excessively wet soils; providing a stable base for construction, improving the stability of structures with shallow foundations, or reducing hydrostatic pressure to improve slope stability.

Conditions of Use

Use subsurface drains when excessive water must be removed from the soil. The soil permeability, depth to water table, and impervious layers are all factors that may govern the use of subsurface drains.

Design and Installation Specifications

Subsurface Drain Type: Relief Drains

- Relief drains are used to lower the water table in large, relatively flat areas, to improve the growth of vegetation, or to remove surface water.
- Relief drains are installed along a slope and drain in the direction of the slope.
- Relief drains can be installed in a grid pattern, a herringbone pattern, or a random pattern.

Subsurface Drain Type: Interceptor Drains

- Interceptor drains are used to remove excess ground water from a slope, stabilize steep slopes, and lower the water table immediately below a slope to prevent the soil from becoming saturated.
- Interceptor drains are installed perpendicular to a slope and drain to the side of the slope.
- Interceptor drains usually consist of a single pipe or series of single pipes instead of a patterned layout.

Subsurface Drain Depth and Spacing

- The depth of a subsurface drain is determined primarily by the depth to which the water table is to be lowered or the depth to a confining layer. For practical reasons, the maximum depth is usually limited to 6 feet, with a minimum cover of 2 feet to protect the conduit.
- The soil should have depth and sufficient permeability to permit installation of an effective drainage system at a depth of 2 to 6 feet.

Subsurface Drain Sizing and Placement

- The quantity and quality of discharge needs to be accounted for in the receiving stream (additional detention may be required).

- The size of a subsurface drain is determined by first calculating the maximum rate of ground water flow to be intercepted and then choosing a subsurface drain pipe (or pipes) with enough capacity to convey that flow. Therefore, it is good practice to make complete subsurface investigations, including hydraulic conductivity of the soil, before designing a subsurface drainage system.
- Size subsurface drains to carry the required capacity without pressure flow. Minimum diameter for a subsurface drain is 4 inches.
- The minimum velocity in the pipe required to prevent silting is 1.4 feet per second (ft/sec). Grade the subsurface drain to achieve this velocity at a minimum. The maximum allowable velocity using a sand-gravel filter or envelope is 9 ft/sec.
- Filter material and fabric shall be used around all drains for proper bedding and filtration of fine materials. Envelopes and filters should surround the drain to a minimum thickness of 3 inches.
- The trench shall be constructed on a continuous grade with no reverse grades or low spots.
- Soft or yielding soils under the subsurface drain shall be stabilized with gravel or other suitable material.
- Backfilling shall be done immediately after placement of the pipe. No sections of pipe shall remain uncovered overnight or during a rainstorm. Backfill material shall be placed in the trench in such a manner that the drain pipe is not displaced or damaged.
- Do not install permanent drains near trees to avoid the tree roots that tend to clog the line. Use solid pipe with watertight connections where it is necessary to pass a subsurface drainage system through a stand of trees.

Subsurface Drain Outlets

- An adequate outlet for the subsurface drain must be available either by gravity or by pumping.
- The outlet of the subsurface drain shall empty into a sediment-trapping BMP through a catch basin. If free of sediment, it can then empty into a receiving channel, swale, or stable vegetated area adequately protected from erosion and undermining.
- Ensure that the outlet of a subsurface drain empties into a channel or other receiving water above the normal water level.
- Secure an animal guard to the outlet end of the pipe to keep out rodents.
- Use outlet pipe of corrugated metal, cast iron, or heavy-duty plastic without perforations and ≥ 10 feet long. Do not use an envelope or filter material around the outlet pipe, and bury ≥ two-thirds of the pipe length.
- When outlet velocities exceed those allowable for the receiving stream, outlet protection must be provided.

Maintenance Standards

Subsurface drains shall be checked periodically to ensure that they are free-flowing and have not become clogged with sediment or roots.

- The outlet shall be kept clean and free of debris.
- Surface inlets shall be kept open and free of sediment and other debris.
- Trees located too close to a subsurface drain often clog the system with their roots. If a drain becomes clogged, relocate the drain or remove the trees as a last resort. Drain placement should be planned to minimize this problem.
- Where drains are crossed by heavy vehicles, the line shall be checked to ensure that it is not crushed.

BMP C206E: Level Spreader

Purpose

The purpose of a level spreader as a construction stormwater BMP is to provide a temporary outlet for dikes and diversions and convert concentrated runoff to sheet flow prior to releasing it to stabilized areas.

Conditions of Use

Use level spreaders when a concentrated flow of water needs to be dispersed over a large area with existing stable vegetation.

- Use only where the slopes are gentle, the water volume is relatively low, and the soil will adsorb most of the low flow events.

There are two conditions to consider:

- What is the risk of erosion or damage if the flow may become concentrated?
- Is an easement required if the flow is discharged to adjoining property?

Design and Installation Specifications

- Use above undisturbed areas that are stabilized by existing vegetation.
- Discharge area below the outlet must be uniform with a slope of < 5H:1V.
- Do not allow any low points in the level spreader. If the level spreader has any low points, flow will concentrate, create channels, and may cause erosion.
- Ensure the outlet is level in a stable, undisturbed soil profile (not on fill).
- The runoff shall not reconcentrate on-site after release from the level spreader unless it is intercepted by another downstream measure.
- The grade of the channel for the last 20 feet of the dike or interceptor entering the level spreader shall be ≤ 1%. The grade of the level spreader shall be 0% to ensure uniform

spreading of runoff.

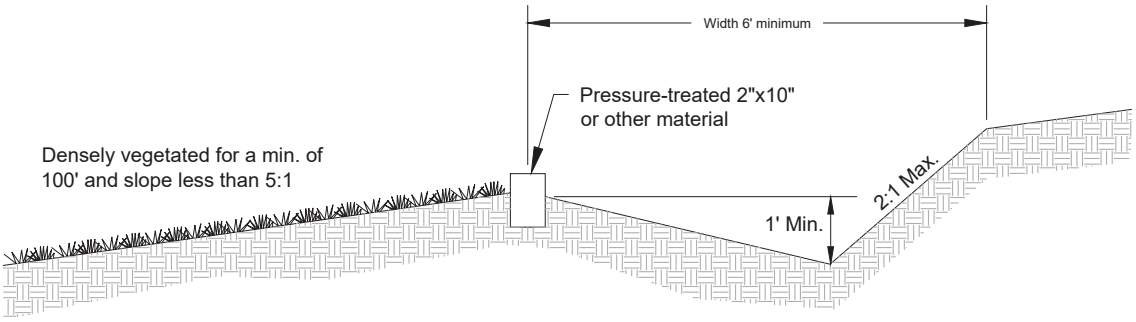
- A 6-inch-high gravel berm placed across the level lip shall consist of washed crushed rock, 2- to 4-inch or 0.75- to 1.5-inch size.
- The spreader length must handle the expected peak flow rate from a 6-month, 3-hour storm for the developed condition, referred to as the short-duration storm. The length of the spreader shall be a minimum of 15 feet for 0.1 cubic foot per second (cfs) and shall be 10 feet for each 0.1 cfs thereafter to a maximum of 0.5 cfs per spreader. Use multiple spreaders for higher flows.
- The width of the approach to spreader should be ≥ 6 feet.
- The depth of the spreader as measured from the lip should be ≥ 6 inches and it should be uniform across the entire length.
- Level spreaders shall be set back from the property line unless there is an easement for flow.
- Materials that can be used for level spreaders include sand bags, lumber, logs, concrete, pipe, and capped perforated pipe. To function properly, the material needs to be installed level and on contour.
- See Figure 7.16: Cross Section of Level-Spreader and Figure 7.17: Detail of Level Spreader.

Maintenance Standards

The level spreader should be inspected during and after runoff events to ensure that it is functioning correctly.

- The contractor should avoid the placement of any material on the level spreader and should prevent construction traffic from crossing over the level spreader.
- If the level spreader is damaged by construction traffic, it shall be immediately repaired.

Figure 7.16: Cross Section of Level-Spreader



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Cross Section of Level-Spreader

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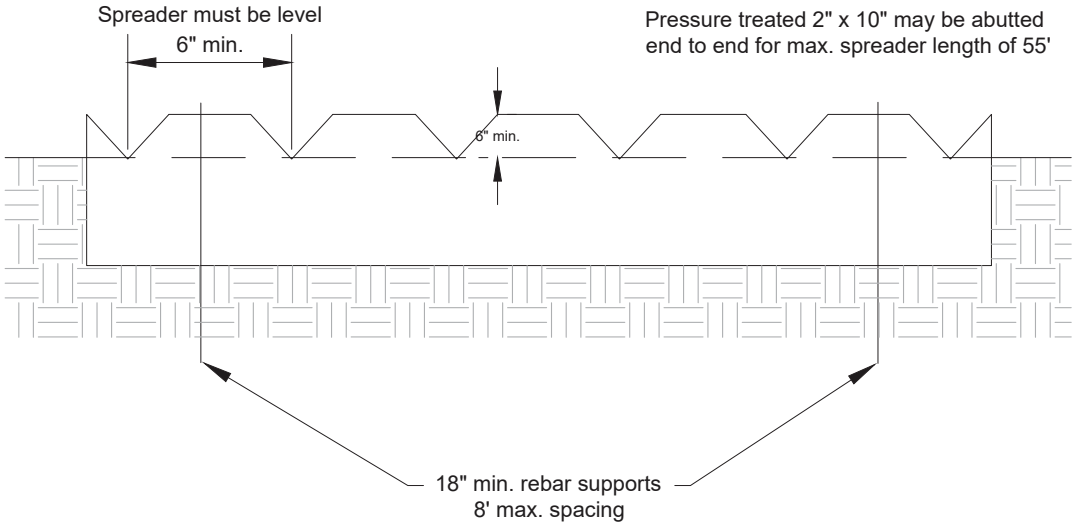
Figure 7.17: Detail of Level Spreader



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Detail of Level Spreader

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BMP C207E: Check Dams

Purpose

Construction of check dams across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam.

Conditions of Use

Use check dams where temporary channels or permanent channels are not yet vegetated, channel lining is infeasible, and velocity checks are required.

- Check dams may not be placed in streams unless approved by the Washington State Department of Fish and Wildlife.
- Check dams may not be placed in wetlands without approval from a permitting agency.
- Do not place check dams below the expected backwater from any salmonid-bearing water between October 1 and May 31 to ensure that there is no loss of high-flow refuge habitat for overwintering juvenile salmonids and emergent salmonid fry.

Design and Installation Specifications

- Construct rock check dams from appropriately sized rock. The rock used must be large enough to stay in place given the expected design flow through the channel. The rock must be placed by hand or by mechanical means (do not dump the rock to form the dam) to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges.
- Check dams may also be constructed of either rock or pea-gravel filled bags. Numerous new products are also available for this purpose. They tend to be reusable, quick and easy to install, effective, and cost efficient.
- Place check dams perpendicular to the flow of water.
- The check dam should form a triangle when viewed from the side. This prevents undercutting as water flows over the face of the check dam rather than falling directly onto the ditch bottom.
- Before installing a check dam, impound and bypass upstream water flow away from the work area. Options for bypassing include pumps, siphons, or temporary channels.
- Check dams combined with sumps work more effectively at slowing flow and retaining sediment than a check dam alone. A deep sump should be provided immediately upstream of the check dam.
- In some cases, if carefully located and designed, check dams can remain as permanent installations with very minor regrading. They may be left as either spillways, in which case accumulated sediment would be graded and seeded, or as check dams to prevent further sediment from leaving the site.
- The maximum spacing between the check dams shall be such that the downstream toe of the upstream dam is at the same elevation as the top of the downstream dam.

- Keep the maximum height at 2 feet at the center of the check dam.
- Keep the center of the check dam ≥ 12 inches lower than the outer edges at natural ground elevation.
- Keep the side slopes of the check dam at ≤ 2H:1V.
- Key the rock into the ditch banks and extend it beyond the abutments a minimum of 18 inches to avoid washouts from overflow around the dam.
- Use geotextile foundation under a rock or sand bag check dam. If a blanket ditch liner is used, geotextile is not necessary. A piece of organic or synthetic blanket cut to fit will also work for this purpose.
- In the case of grass-lined ditches and swales, all check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale—unless the slope of the swale is > 4%. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- Ensure that channel appurtenances, such as culvert entrances below check dams, are not subject to damage or blockage from displaced rocks.
- See Figure 7.18: Rock Check Dam.

Maintenance Standards

Check dams shall be monitored for performance and sediment accumulation during and after each rainfall that produces runoff. Sediment shall be removed when it reaches one-half the sump depth.

- Anticipate submergence and deposition above the check dam and erosion from high flows around the edges of the dam.
- If significant erosion occurs between dams, install a protective riprap liner in that portion of the channel. See BMP C202E (Riprap Channel Lining).

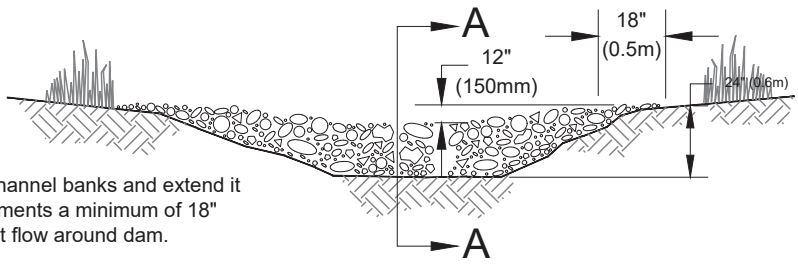
Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept these products or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

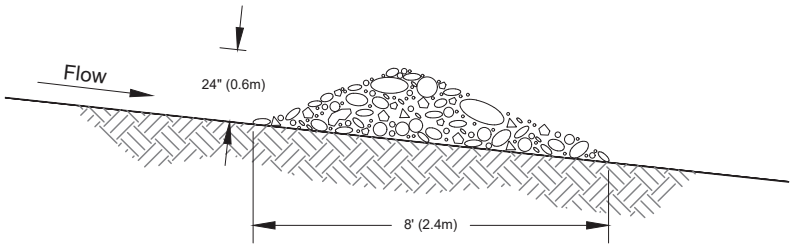
Figure 7.18: Rock Check Dam

View Looking Upstream



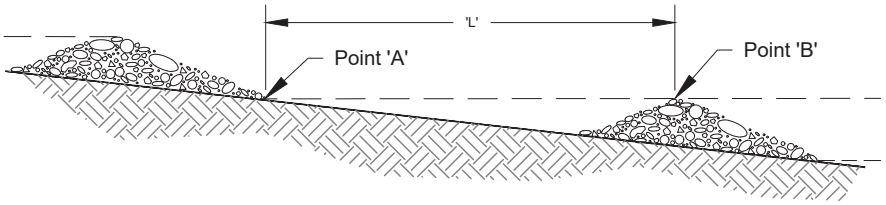
Note:
Key stone into channel banks and extend it beyond the abutments a minimum of 18" (0.5m) to prevent flow around dam.

Section A-A



Spacing Between Check Dams

'L' = the distance such that points 'A' and 'B' are of equal elevation.



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Rock Check Dam

Revised June 2016

BMP C208E: Triangular Silt Dike (TSD)

Purpose

Triangular silt dikes (TSDs) may be used as check dams, for perimeter protection, for temporary soil stockpile protection, for drop inlet protection, or as a temporary interceptor dike.

Conditions of Use

- TSDs may be used on soil or pavement with adhesive or staples.
- TSDs have been used to build temporary BMPs:
    - BMP C241E: Sediment Pond (Temporary)
    - BMP C200E: Interceptor Dike and Swale
    - BMP C154E: Concrete Washout Area
    - BMP C203E: Water Bars
    - BMP C206E: Level Spreader
    - BMP C220E: Inlet Protection
    - BMP C207E: Check Dams
    - Curbing
    - Berms

Design and Installation Specifications

- TSDs are made of urethane foam sewn into a woven geosynthetic fabric.
- TSDs are triangular, 10 to 14 inches high in the center, with a 20- to 28-inch base. A 2-foot apron extends beyond both sides of the triangle along its standard section of 7 feet. A sleeve at one end allows attachment of additional sections as needed.
- Install with ends curved up to prevent water from flowing around the ends.
- The fabric flaps and check dam units are attached to the ground with wire staples. Wire staples should be No. 11 gauge wire and 200 to 300 millimeters in length.
- When multiple units are installed, the sleeve of fabric at the end of the unit shall overlap the abutting unit and be stapled.
- When TSDs are used as check dams, the following guidelines apply:
    - TSDs should be located and installed as soon as construction will allow.
    - TSDs should be placed perpendicular to the flow of water.
    - The leading edge of the TSD must be secured with rocks, sandbags, or a small key slot

and staples.

- In the case of grass-lined ditches and swales, check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is > 4%. The area beneath the check dams shall be seeded and mulched immediately after dam removal.

Maintenance Standards

- Inspect TSDs for performance and sediment accumulation during and after each rainfall that produces runoff. Remove sediments when it reaches one-half the height of the TSD.
- Anticipate submergence and deposition above the TSD and erosion from high flows around the edges of the TSD. Immediately repair any damage or any undercutting of the TSD.

BMP C209E: Outlet Protection

Purpose

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Conditions of Use

Use outlet protection at the outlets of all ponds, pipes, ditches, or other conveyances that discharge to a natural or constructed drainage feature such as a stream, wetland, lake, or ditch.

Design and Installation Specifications

- The receiving channel at the outlet of a culvert shall be protected from erosion bylining a minimum of 6 feet downstream and extending up the channel sides a minimum of 1 foot above the maximum tailwater elevation or 1 foot above the crown, whichever is higher. For pipes > 18 inches in diameter, the outlet protection lining of the channel shall be four times the diameter of the culvert.
- Standard wing walls, tapered outlets, and paved channels should also be considered when appropriate for permanent culvert outlet protection (see the latest version of the Washington State Department of Transportation Hydraulics Manual).
- BMP C122E: Nets and Blankets or BMP C202E: Riprap Channel Lining provides suitable options for lining materials.
- With low flows, BMP C201E: Grass-Lined Channels can be an effective alternative for lining material.
- The following guidelines shall be used for riprap outlet protection with riprap:
    - If the discharge velocity at the outlet is < 5 feet per second (ft/sec), use 2- to 8-inch riprap. Minimum thickness is 1 foot.
    - For a discharge velocity of 5 to 10 fps at the outlet, use 24- to 4-foot riprap. Minimum thickness is 2 feet.

- For outlets at the base of steep slope pipes (pipe slope > 10%), use an engineered energy dissipater.
- Geotextile or erosion control blankets should always be used under riprap to prevent scour and channel erosion. See BMP C122E: Nets and Blankets.

- Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a Hydraulic Project Approval (HPA) from the Washington State Department of Fish and Wildlife.

  For more information: See 1.4.9 Hydraulic Project Approvals.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipater if sediment builds up.

BMP C220E: Inlet Protection

Purpose

Inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use inlet protection at inlets that are operational before permanent stabilization of the disturbed areas that contribute runoff to the inlet. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless those inlets are preceded by a sediment–trapping BMP.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters can add significant amounts of sediment into the roof drain system. If possible, delay installing lawn and yard drains until just before landscaping, or cap these drains to prevent sediment from entering the system until completion of landscaping. Provide 18 inches of sod around each finished lawn and yard drain.

Table 7.18: Storm Drain Inlet Protection lists several options for inlet protection. All of the methods for inlet protection tend to become plugged and require a high frequency of maintenance. Limit contributing areas for an individual inlet to ≤ 1 acre. If possible, provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table 7.18: Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/ Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding will occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area requirement: 30-feet by 30-feet/acre
Block and gravel drop inlet protection	Yes	Paved or earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No	Paved or earthen	Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with a wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap	Not applicable	Not applicable	18-month expected life.

Design and Installation Specifications

Excavated Drop Inlet Protection

Excavated drop inlet protection consists of an excavated impoundment around the storm drain inlet. Sediment settles out of the stormwater prior to entering the storm drain. Design and installation specifications for excavated drop inlet protection include:

- Provide a depth 1 to 2 feet as measured from the crest of the inlet structure.
- Side slopes of excavation should be ≤ 2H:1V.
- Minimum volume of excavation is 35 cubic yards.
- Shape the excavation to fit the site, with the longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water.
- Clear the area of all debris.
- Grade the approach to the inlet uniformly.

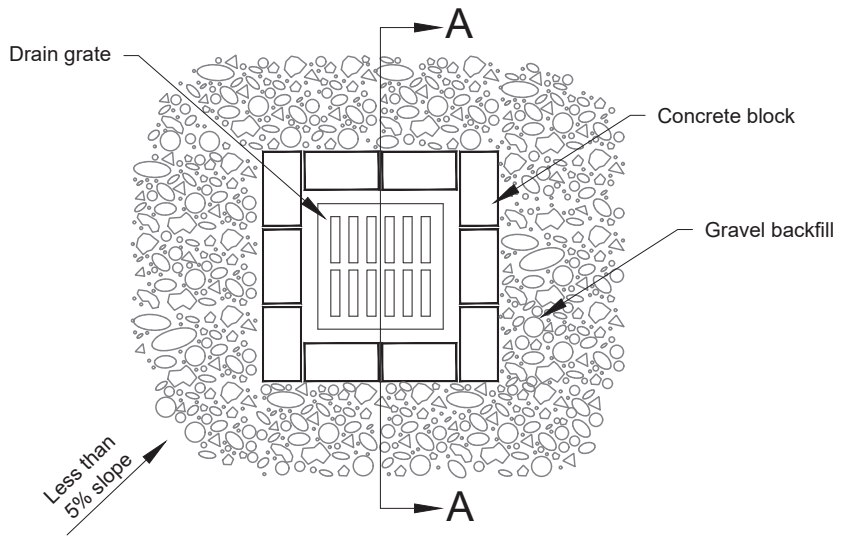
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.
- Build a temporary dike, if necessary, to the downslope side of the structure to prevent bypass flow.

Block and Gravel Filter

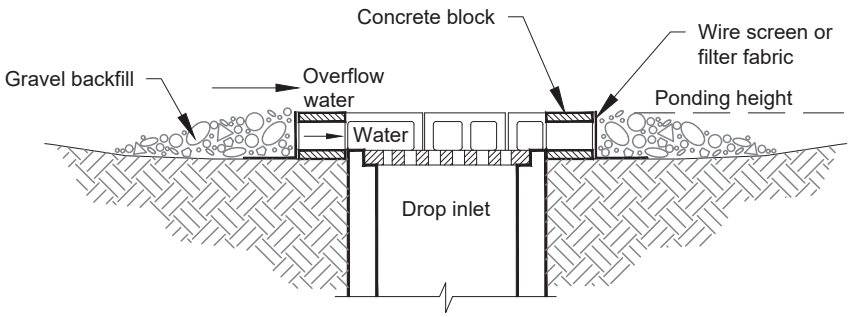
A block and gravel filter is a barrier formed around the inlet with standard concrete blocks and gravel. See Figure 7.19: Block and Gravel Filter. Design and installation specifications for block and gravel filters include:

- Provide a height 1 to 2 feet above the inlet.
- Recess the first row of blocks 2 inches into the ground for stability.
- Support subsequent courses by placing a piece of pressure-treated wood (2x4) through the block opening.
- Do not use mortar.
- Lay some blocks in the bottom row on their side to allow for dewatering the pool.
- Place hardware cloth or comparable wire mesh with 0.5-inch openings over all block openings.
- Place gravel to just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel berm surrounding the inlet, as follows:
    - Provide a slope of 3H:1V on the upstream side of the berm.
    - Provide a slope of 2H:1V on the downstream side of the berm.
    - Provide a 1-foot-wide level rock area between the gravel berm and the inlet.
    - Use rocks ≥ 3 inches in diameter on the upstream slope of the berm.
    - Use gravel with a diameter of 0.5 to 0.75 inches at a minimum thickness of 1 foot on the downstream slope of the berm.

Figure 7.19: Block and Gravel Filter



Plan View



Section A-A

Notes:

1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

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Block and Gravel Filter

Revised June 2016

Gravel and Wire Mesh Filter

Gravel and wire mesh filters are gravel barriers placed over the top of the inlet. This method does not provide an overflow. Design and installation specifications for gravel and wire mesh filters include:

- Use a hardware cloth or comparable wire mesh with 0.5-inch openings.
    - Place wire mesh over the drop inlet so that the wire extends a minimum of 1 foot beyond each side of the inlet structure.
    - Overlap the strips if more than one strip of mesh is necessary.
- Place coarse aggregate over the wire mesh.
    - Provide ≥ 12-inch depth of aggregate over the entire inlet opening and extend ≥ 18 inches on all sides.

Catch Basin Filters

Catch basin filters are designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements, combine a catch basin filter with another type of inlet protection. This combined inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way. Design and installation specifications for catch basin filters include:

- Provide 5 cubic feet of storage.
- Require dewatering provisions.
- Provide a high-flow bypass that will not become clogged under normal use at a construction site.
- Insert the catch basin filter in the catch basin just below the grating.

Curb Inlet Protection With Wooden Weir

Curb inlet protection with wooden weir is an option that consists of a barrier formed around a curb inlet with a wooden frame and gravel. Design and installation specifications for curb inlet protection with wooden weirs include:

- Use wire mesh with 0.5-inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against the wire and fabric.
- Place weight on the frame anchors.

Block and Gravel Curb Inlet Protection

Block and gravel curb inlet protection is a barrier formed around a curb inlet with concrete blocks and gravel. See Figure 7.20: Block and Gravel Curb Inlet Protection. Design and installation specifications for block and gravel curb inlet protection include:

- Use wire mesh with 0.5-inch openings.
- Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
- Place a 2x4 stud through the outer holes of each spacer block to align the front blocks.
- Place blocks on their sides across the front of the inlet and abutting the spacer blocks.
- Place wire mesh over the outside vertical face.
- Pile coarse aggregate against the wire to the top of the barrier.

Curb and Gutter Sediment Barrier

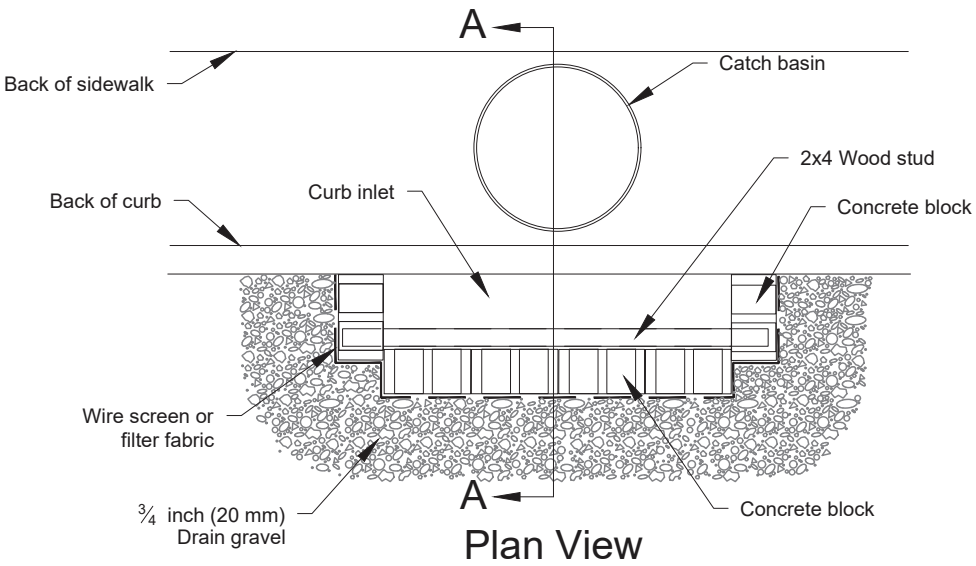
A curb and gutter sediment barrier is a sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure 7.21: Curb and Gutter Barrier. Design and installation specifications for curb and sediment barriers include:

- Construct a horseshoe-shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, ≥ 2 feet from the inlet.
- Construct a horseshoe-shaped sedimentation trap on the upstream side of the berm. Size the trap to sediment trap standards for protecting a culvert inlet.

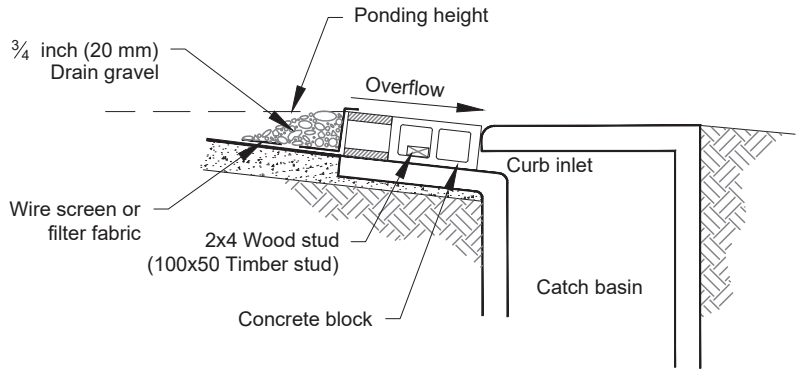
Maintenance Standards

- Inspect all forms of inlet protection frequently, especially after storm events. Clean and replace clogged catch basin filters. For rock and gravel filters, pull, away the rocks from the inlet and clean or replace. An alternative approach is to use the clogged rock as fill and put fresh rock around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

Figure 7.20: Block and Gravel Curb Inlet Protection



Plan View



Section A-A

Notes:

1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

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Block and Gravel Curb Inlet Protection

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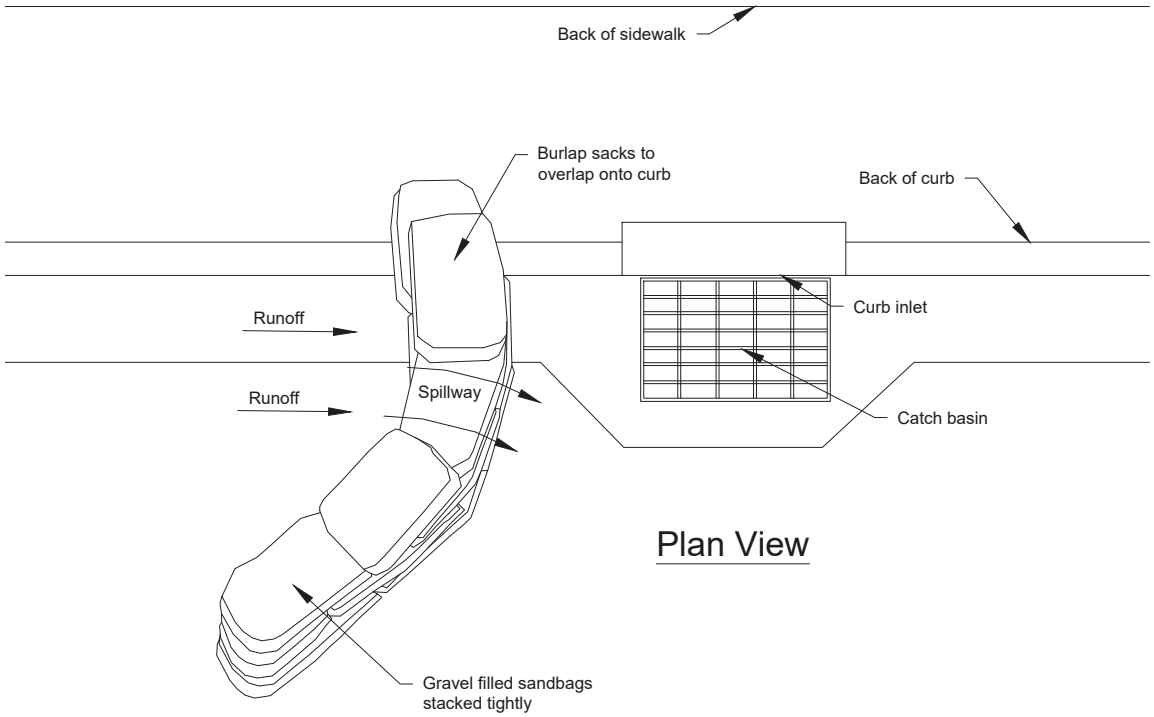
Figure 7.21: Curb and Gutter Barrier



Notes:

1. Place curb type sediment barriers on gently sloping street segments, where water can pond and allow sediment to separate from runoff.
2. Sandbags of either burlap or woven 'geotextile' fabric, are filled with gravel, layered and packed tightly.
3. Leave a one sandbag gap in the top row to provide a spillway for overflow.
4. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

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Curb and Gutter Barrier

Revised June 2016

Approved as Functionally Equivalent

Ecology has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept these products or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

BMP C231E: Brush Barrier

Purpose

The purpose of brush barriers is to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Brush barriers may be used downslope of disturbed areas that are < 0.25 acres.
- Brush barriers are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be directed to a sediment-trapping BMP. The only circumstance in which overland flow can be treated solely by a brush barrier, rather than a sediment-trapping BMP, is when the area draining to the barrier is small.
- Brush barriers should only be installed on contours.

Design and Installation Specifications

- Height: 2 feet (minimum) to 5 feet (maximum).
- Width: 5 feet at base (minimum) to 15 feet (maximum).
- Geotextile may be anchored over the brush berm to enhance the filtration ability of the barrier. Use of 10-ounce burlap is an adequate alternative to geotextile.
- Chipped site vegetation, composted mulch, or wood-based mulch (hog fuel) is an acceptable material for constructing brush barriers.
- A 100% biodegradable installation can be constructed using 10-ounce burlap held in place by wooden stakes.
- See Figure 7.22: Typical Brush Barrier.

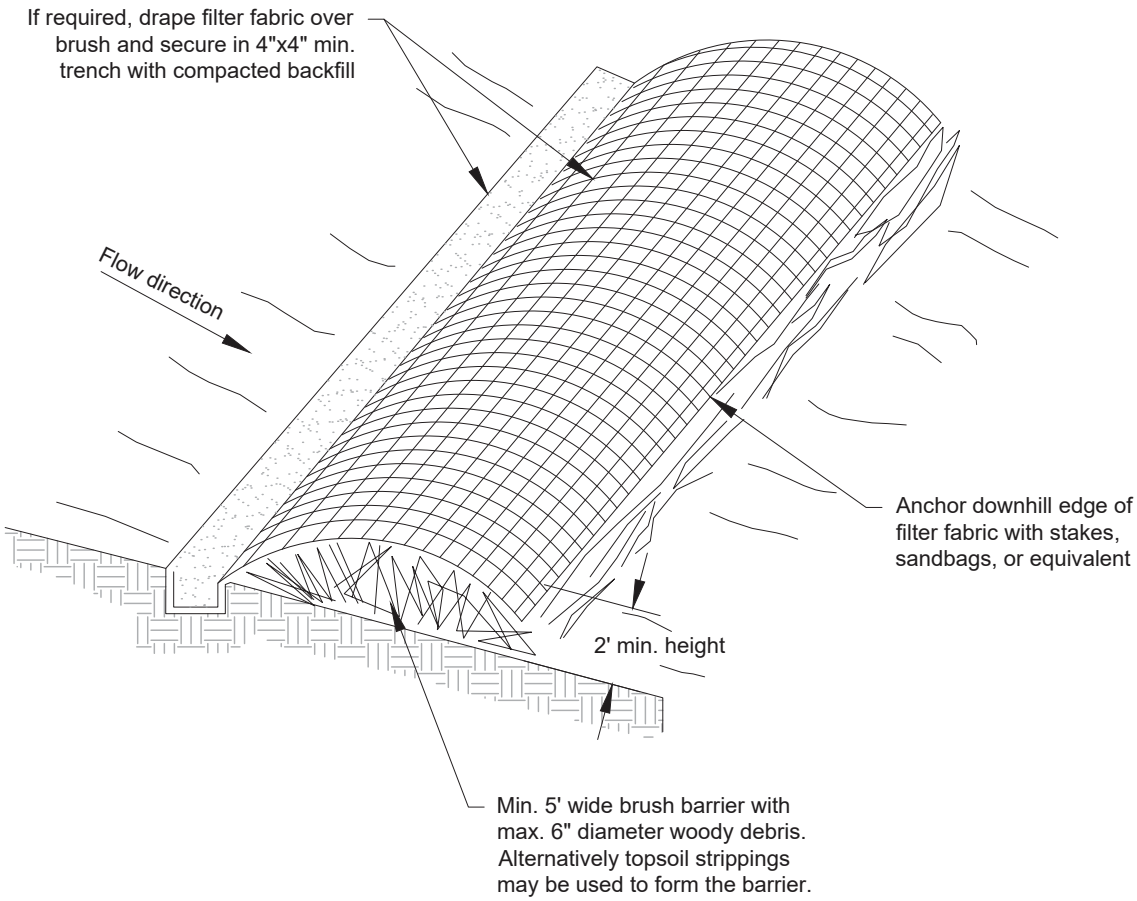
Maintenance Standards

- There shall be no signs of erosion or concentrated runoff under or around the barrier. If concentrated flows are bypassing the barrier, it must be expanded or augmented by toed-in

geotextile.

- The dimensions of the barrier must be maintained.

Figure 7.22: Typical Brush Barrier



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Typical Brush Barrier

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BMP C232E: Gravel Filter Berm

Purpose

A gravel filter berm retains sediment by filtering runoff through a berm of gravel or crushed rock.

Conditions of Use

- Use a gravel filter berm where a temporary measure is needed to retain sediment from construction sites.
- Do not place gravel filter berms in traffic areas; gravel filter berms are not intended to be driven over.
- Place gravel filter berms perpendicular to the flow of runoff, such that the runoff will filter through the berm prior to leaving the site.

Design and Installation Specifications

- Berm material shall be 0.75 to 3 inches in size, washed well-graded gravel, or crushed rock with < 5% fines. Do not use crushed concrete.
- Spacing of berms:
    - Every 300 feet on slopes < 5%
    - Every 200 feet on slopes between 5% and 10%
    - Every 100 feet on slopes > 10%
- Berm dimensions:
    - 1 foot high with 3H:1V side slopes
    - 8 linear feet per 1 cubic foot per second runoff based on the 10-year, 24-hour design storm
- See Figure 7.23: Gravel Filter Berm.

Maintenance Standards

Regular inspection is required. Sediment shall be removed and filter material replaced as needed.

Figure 7.23: Gravel Filter Berm

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Gravel Filter Berm

Revised June 2016

BMP C233E: Silt Fence

Purpose

Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Silt fence may be used downslope of all disturbed areas.
- Silt fence shall prevent sediment carried by runoff from going beneath, through, or over the top of the silt fence but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment-trapping BMP.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

Design and Installation Specifications

- Contributing area of ≤ 1 acre or in combination with sediment basin in a larger site.
- Use in combination with other construction stormwater BMPs.
- Maximum slope steepness (perpendicular to the silt fence line) of 1H:1V.
- Maximum sheet or overland flow path length to the silt fence of 100 feet.
- Do not allow flows > 0.5 cubic feet per second.
- Use geotextile fabric that meets the standards indicated in Table 7.19: Geotextile Fabric Standards for Silt Fence. All of the listed geotextile properties are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table Table 7.19: Geotextile Fabric Standards for Silt Fence).

Table 7.19: Geotextile Fabric Standards for Silt Fence

Geotextile Property	Minimum Average Roll Value
Polymeric Mesh Apparent Opening Size (ASTM D4751)	0.60 mm maximum for slit film wovens (No. 30 sieve) 0.30 mm maximum for all other geotextile types (No. 50 sieve) 0.15 mm minimum for all fabric types (No. 100 sieve)
Water Permittivity (ASTM D4491)	0.02 sec-1 minimum
Grab Tensile Strength (ASTM D4632)	180 lb minimum for extra strength fabric 100 lb minimum for standard strength fabric
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength geotextiles shall be supported with wire mesh, chicken wire, 2- by 2-inch wire, safety fence, or jute mesh to increase the strength of the geotextile Silt fence materials are available that have synthetic mesh backing attached.
- Silt fence material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0°F to 120°F.
- 100% biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by the local jurisdiction.
- See Figure 7.24: Silt Fence. Include the following standard notes for silt fence on construction plans and specifications:

    1. The contractor shall install and maintain temporary silt fences at the locations shown in the plans.
    2. Construct silt fences in the areas of clearing, grading, or drainage prior to starting those activities.
    3. The silt fence shall have a 2-foot minimum and a 2.5-foot maximum height above the original ground surface.
    4. The geotextile fabric shall be sewn together at the point of manufacture to form fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided the contractor can demonstrate, to the satisfaction of the licensed professional, that the overlap is long enough and that the adjacent silt fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.
    5. Attach the geotextile fabric on the upslope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the geotextile fabric to the posts in a manner that reduces the potential for tearing.
    6. Support the geotextile fabric with wire or plastic mesh, dependent on the properties of

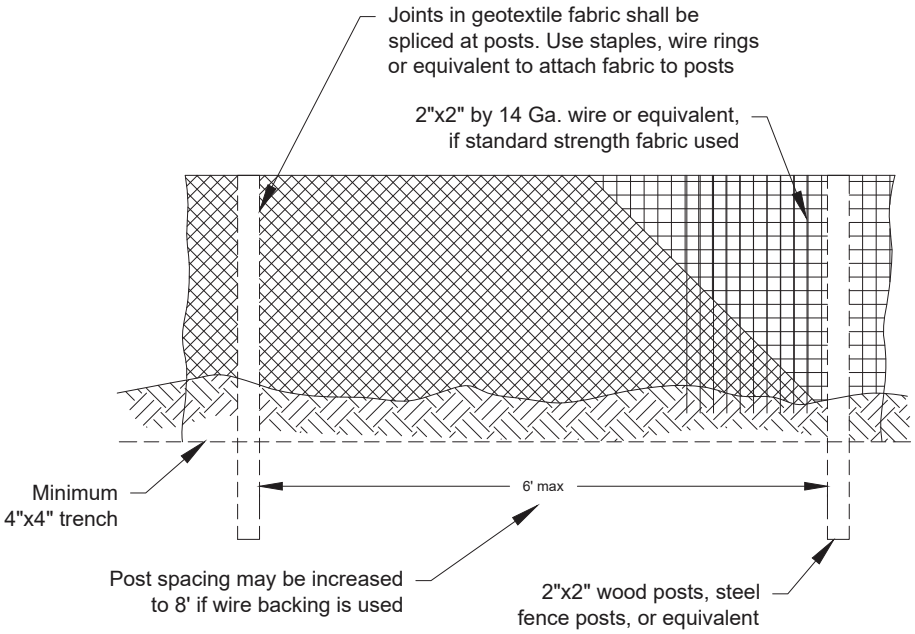
the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the upslope of the posts with the geotextile fabric upslope of the mesh.

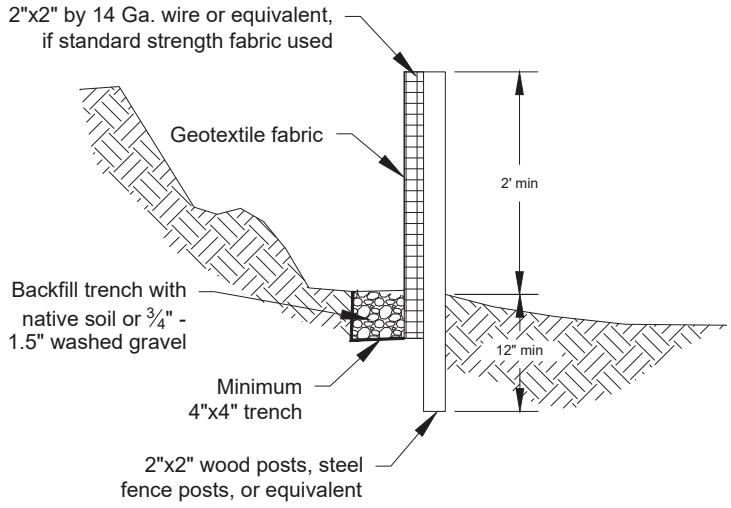
7. Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2 inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be ≥ 180 pounds grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the geotextile fabric it supports.
8. Bury the bottom of the geotextile fabric 4 inches minimum below the ground surface. Backfill and tamp soil in place over the buried portion of the geotextile fabric, so that no flow can pass beneath the silt fence and scouring cannot occur. When wire or polymeric support mesh is used, the wire or polymeric mesh shall extend into the ground 3 inches minimum.
9. Drive or place the silt fence posts into the ground 18 inch minimum. A 12-inch minimum depth is allowed if topsoil or other soft subgrade soil is not present and 18 inches cannot be reached. Increase fence post minimum depths by 6 inches if the fence is located on slopes of ≥ 3H:1V and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.
10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6 feet. Posts shall consist of one of the following:
    - Wood with minimum dimensions of 2 inches by 2 inches by 3 feet. Wood shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A120 steel pipe with a minimum diameter of 1 inch.
    - U-, T-, L-, or C-shaped steel posts with a minimum weight of 1.35 pounds per foot.
    - Other steel posts having strength and bending resistance equivalent to the post sizes listed above.
11. Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.
12. If the fence must cross contours, with the exception of the ends of the fence, place check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall be ≤ 3H:1V.
    - Check dams shall be approximately 1 foot deep at the back of the fence and shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
    - Check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast and shall be located every 10 feet along the fence where the fence must cross contours.

- See Figure 7.25: Silt Fence Installation by Slicing Method for slicing method details. The following are specifications for silt fence installation using the slicing method:

    1. The base of both end posts must be ≥ 2 to 4 inches above the top of the geotextile fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
    2. Install posts 3 to 4 feet apart in critical retention areas and 6 to 7 feet apart in standard applications.
    3. Install posts 24 inches deep on the downstream side of the silt fence, and as close as possible to the geotextile fabric, enabling posts to support the geotextile fabric from upstream water pressure.
    4. Install posts with the nipples facing away from the geotextile fabric.
    5. Attach the geotextile fabric to each post with three ties, all spaced within the top 8 inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture ≥ 1 inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.
    6. Wrap approximately 6 inches of the geotextile fabric around the end posts and secure with three ties.
    7. No more than 24 inches of a 36-inch geotextile fabric is allowed above ground level.
    8. Compact the soil immediately next to the geotextile fabric with the front wheel of the tractor, skid steer, or roller exerting ≥ 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the installation for any deviation before compaction. Use a flat-bladed shovel to tuck fabric deeper into the ground if necessary.

Figure 7.24: Silt Fence





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Silt Fence

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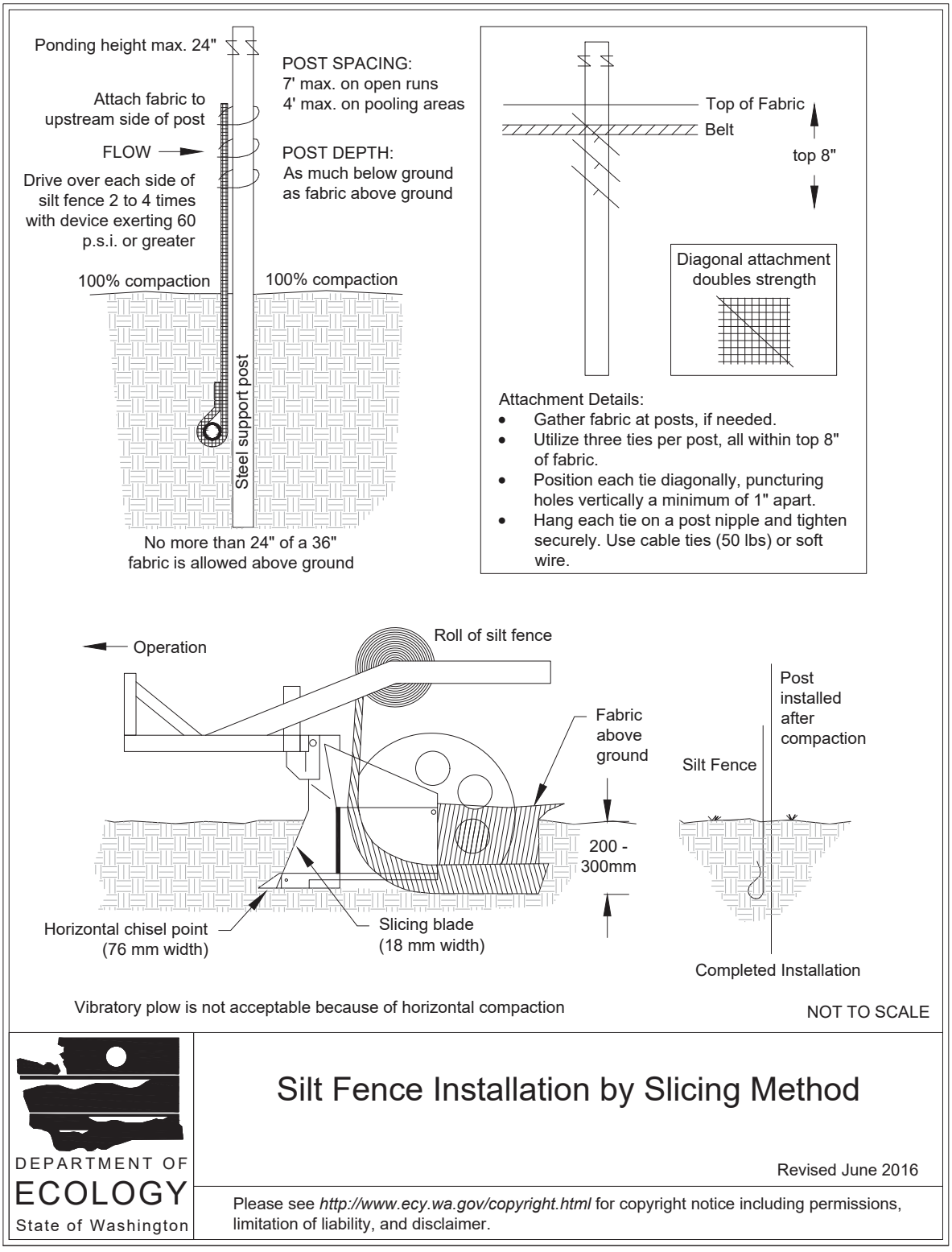
Figure 7.25: Silt Fence Installation by Slicing Method



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Silt Fence Installation by Slicing Method

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Maintenance Standards

- Repair any damage immediately.
- If concentrated flows are evident uphill of the fence, they must be intercepted and conveyed to a sediment-trapping BMP.
- It is important to check the uphill side of the silt fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence and remove the trapped sediment.
- Remove sediments deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace geotextile fabric that has deteriorated due to ultraviolet breakdown.

BMP C234E: Vegetated Strip

Purpose

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Vegetated strips may be used downslope of all disturbed areas.
- Vegetated strips are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to BMP C241E: Sediment Pond (Temporary) or other sediment-trapping BMP. The only circumstance in which overland flow can be treated solely by a vegetated strip rather than a sediment-trapping BMP, is when the following criteria are met (see Table 7.20: Contributing Area for Vegetated Strips):

Table 7.20: Contributing Area for Vegetated Strips

Average Contributing Area Slope	Average Contributing Area Percentage Slope	Maximum Contributing Area Flow Path Length (feet)
≤ 1.5H:1V	≤ 67	100
≤ 2H:1V	≤ 50	115
≤ 4H:1V	≤ 25	150
≤ 6H:1V	≤ 16.7	200
≤ 10H:1V	≤ 10	250

Design and Installation Specifications

- The vegetated strip shall consist of a continuous strip of dense vegetation with topsoil for a minimum length of 25 feet along the flow path. Grass-covered, landscaped areas are generally not adequate because the volume of sediment overwhelms the grass. Ideally,

vegetated strips shall consist of undisturbed native growth with a well-developed soil that allows for infiltration of runoff.

- The slope within the vegetated strip shall be ≤ 4H:1V.
- The uphill boundary of the vegetated strip shall be delineated with clearing limits.

Maintenance Standards

- Any areas damaged by erosion or construction activity shall be seeded immediately and protected by mulch.
- If > 5 feet of the original vegetated strip width has had vegetation removed or is being eroded, sod must be installed.
- If there are indications that concentrated flows are traveling across the vegetated strip, stormwater runoff controls must be installed to reduce the flows entering the vegetated strip, or additional perimeter protection must be installed.

BMP C235E: Wattles

Purpose

Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff and can capture and retain sediment.

Conditions of Use

- Use wattles under the following conditions:
    - In disturbed areas that require immediate erosion protection
    - On exposed soils during the period of short construction delays or over winter months
    - On slopes requiring stabilization until permanent vegetation can be established
- The material used dictates the effectiveness period of the wattle. Generally, wattles are effective for one to two seasons.
- Prevent rilling beneath wattles by entrenching and overlapping wattles to prevent water from passing between them.

Design Criteria

- See Figure 7.26: Wattles for typical construction details.
- Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length.
- Install wattles perpendicular to the flow direction and parallel to the slope contour.
- Place wattles in shallow trenches staked along the contour of disturbed or newly constructed slopes. Dig narrow trenches across the slope (on contour) to a depth of 3 to 5 inches on clay

soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches should be dug to a depth of 5 to 7 inches or one-half to two-thirds the thickness of the wattle.

- Start building trenches and installing wattles from the base of the slope and work up. Spread excavated material evenly along the uphill slope and compact it using hand tamping or other methods.
- Construct trenches at contour intervals of 3 to 30 feet apart depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.
- Install the wattles snugly into the trenches and overlap the ends of adjacent wattles 12 inches behind one another.
- Install stakes at each end of the wattle and at 4-foot centers along entire length of wattle.
- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.
- Wooden stakes should be 0.75 by 0.75 by 24 inches minimum. Willow cuttings or 3/8-inch rebar can also be used for stakes.
- Stakes should be driven through the middle of the wattle, leaving 2 to 3 inches of the stake protruding above the wattle.

Maintenance Standards

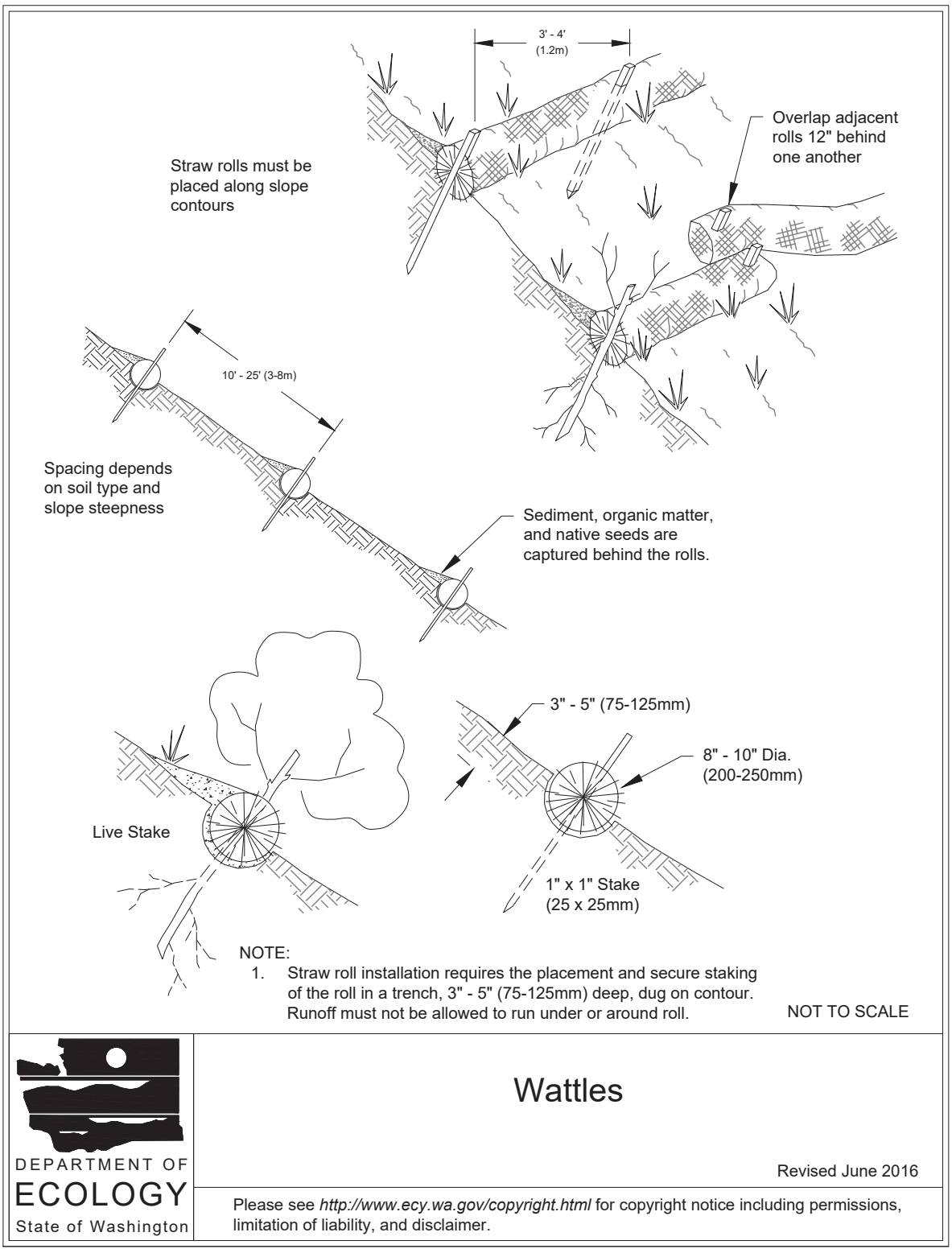
- Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils.
- Inspect the slope after significant storms and repair any areas where wattles are not tightly abutted or water has scoured beneath the wattles.

Approved as Functionally Equivalent

The Washington State Department of Ecology (Ecology) has approved products as able to meet the requirements of this BMP. The products did not pass through the Technology Assessment Protocol–Ecology (TAPE) process. Local jurisdictions may choose not to accept these products or may require additional testing prior to consideration for local use. Products that Ecology has approved as functionally equivalent are available for review on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

Figure 7.26: Wattles



BMP C236E: Vegetative Filtration

Purpose

Vegetative filtration as a BMP is used in conjunction with BMP C241E: Sediment Pond (Temporary), BMP C206E: Level Spreader, and a pumping system with surface intake. Vegetative filtration improves turbidity levels of stormwater discharges by filtering runoff through existing vegetation where undisturbed forest floor duff layer or established lawn with thatch layer are present. Vegetative filtration can also be used to infiltrate dewatering waste from foundations, vaults, and trenches as long as runoff does not occur.

Conditions of Use

- For every 5 acres of disturbed soil, use 1 acre of grass field, farm pasture, or wooded area. Reduce or increase this area depending on project size, ground water table height, and other site conditions.
- Wetlands shall not be used for vegetative filtration.
- Do not use this BMP in areas with a high ground water table or in areas that will have a high seasonal ground water table during the use of this BMP.
- This BMP may be less effective on soils that prevent the infiltration of the water, such as hard till.
- Using other effective source control measures throughout a construction site will prevent the generation of additional highly turbid water and may reduce the time period or area need for this BMP.
- Stop distributing water into the vegetated filtration area if standing water or erosion results.
- On large projects that phase the clearing of the site, areas retained with native vegetation may be used as a temporary vegetative filtration area.

Design Criteria

- Find land adjacent to the project site that has a vegetated field, preferably a farm field or wooded area.
- If the site does not contain enough vegetated field area, consider obtaining permission from adjacent landowners (especially for farm fields).
- Install a pump and downstream distribution manifold depending on the project size. Generally, the main distribution line should reach 100 to 200 feet long (large projects, or projects on tight soil, will require systems that reach several thousand feet long, with numerous branch lines off the main distribution line).
- The manifold should have several valves, allowing for control over the distribution area in the field.
- Install several branches of 4-inch-diameter Schedule 20 polyvinyl chloride (PVC), swaged-fit common septic tight-lined sewer line, or 6-inch-diameter fire hose, which can convey the

turbid water out to various sections of the field. See Figure 7.27: Manifold and Branches in a Wooded, Vegetated Spray Field.

- Determine the branch length based on the field area geography and number of branches using Table 7.21: Flow Path Guidelines for Vegetative Filtration. Typically, branches stretch from 200 feet to several thousand feet. Lay the branches on contour with the slope.
- On uneven ground, sprinklers perform well. Space sprinkler heads so that spray patterns do not overlap.
- On relatively even surfaces, a level spreader using 4-inch-diameter perforated pipe may be used as an alternative to the sprinkler head setup. Install drain pipe at the highest point on the field and at various lower elevations to ensure full coverage of the filtration area. Place the pipe with the holes up to allow for a gentle weeping evenly out all holes. Leveling the pipe by staking and using sandbags may be required.
- To prevent oversaturation of the vegetative filtration area, rotate the use of branches or spray heads. Repeat as needed based on monitoring of the spray field.

Table 7.21: Flow Path Guidelines for Vegetative Filtration

Average Slope	Average Area Percentage Slope	Estimated Flow Path Length (feet)
1.5H:1V	67	250
2H:1V	50	200
4H:1V	25	150
6H:1V	16.7	115
10H:1V	10	100

Figure 7.27: Manifold and Branches in a Wooded, Vegetated Spray Field

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Manifold and Branches in a Wooded, Vegetated Spray Field

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Maintenance Standards

- Monitor the spray field on a daily basis to ensure that oversaturation of any portion of the field does not occur at any time. The presence of standing puddles of water or creation of concentrated flows visually signify that oversaturation of the field has occurred.
- Monitor the vegetated spray field all the way down to the nearest receiving water, or farthest spray area to ensure that the water has not caused overland or concentrated flows and has not created erosion around the spray nozzle(s).
- Do not exceed water quality standards for turbidity.
- The Washington State Department of Ecology (Ecology) recommends that a separate inspection log be developed, maintained, and kept with the existing site logbook to aid the operator who conducts inspections. This separate "Field Filtration Logbook" can also aid in demonstrating compliance with permit conditions.
- Inspect the spray nozzles daily, at a minimum, for leaks and plugging from sediment particles.
- If erosion, concentrated flows, or oversaturation of the field occurs, rotate the use of branches or spray heads or move the branches to a new field location.
- Check all branches and the manifold for unintended leaks.

BMP C240E: Sediment Trap

Purpose

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites during construction. Sediment traps, along with other perimeter controls, shall be installed before any land disturbance takes place in the contributing area.

Conditions of Use

- Sediment traps are intended for use on sites where the contributing area is < 3 acres, with no unusual drainage features, and a projected build-out time of 6 months or less. The sediment trap is a temporary measure (with a design life of approximately 6 months) and shall be maintained until the tributary area is permanently protected against erosion by vegetation and/or structures.
- Sediment traps are effective in removing sediment only down to about the medium silt size fraction. Runoff with sediment of finer grades (fine silt and clay) will pass through untreated, emphasizing the need to control erosion to the maximum extent first.
- Projects that are constructing permanent flow control BMPs may use the rough-graded or final-graded permanent flow control BMP footprint for the temporary sediment trap. When permanent flow control BMP footprints are used as temporary sediment traps, the surface area requirement of the sediment trap must be met. If the surface area requirement of the sediment trap is larger than the surface area of the permanent flow control BMP, the sediment trap shall be enlarged beyond the permanent flow control BMP footprint to comply with the surface area requirement.

- A floating pond skimmer may be used for the sediment trap outlet if approved by the local permitting authority
- Sediment traps may not be feasible on utility projects due to the limited work space or the short-term nature of the work. Portable tanks may be used in place of sediment traps for utility projects.

Design and Installation Specifications

- See Figure 7.28: Cross-Section of Sediment Trap and Figure 7.29: Sediment Trap Outlet for details.
- To determine the sediment trap geometry, first calculate the design surface area of the trap, measured at the invert of the weir, using the following equation:

Equation 7.2: Sediment Trap Surface Area

$$SA = FS * (Q_2/V_s)$$

where:

SA = design surface area of the trap (square feet [sf])

FS = A safety factor of 2 to account for nonideal settling

Q_2 = Peak volumetric flow rate (cubic feet [cf])

- Option 1 – single-event hydrograph method

  Calculate Q_2 using a 10-minute time step for a 2-year, 24-hour frequency storm for the developed condition. The 10-year peak volumetric flow rate shall be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection.

- Option 2 – For construction sites < 1 acre, the Rational Method may be used to determine Q_2.

V_s = settling velocity of the soil particle of interest (feet per second [ft/sec])

The 0.02-millimeter (medium silt) particle with an assumed density of 2.65 grams per cubic centimeter has been selected as the particle of interest and has a settling velocity of 0.00096 ft/sec.

Therefore, the equation for computing sediment trap surface area becomes:

Equation 7.3: Simplified Sediment Trap Surface Area

$$SA = 2 \times Q_2/0.00096$$

or

2,080 sf per cubic foot per second (cfs) of inflow

where:

SA = design surface area of the trap (sf)

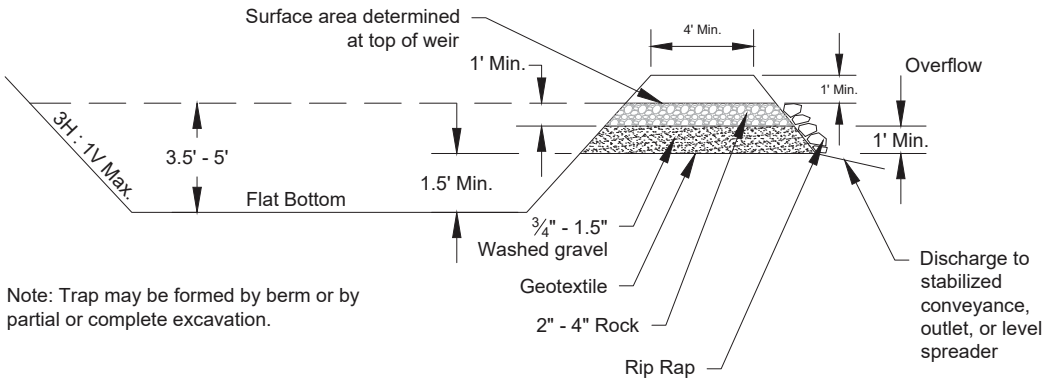
Q_2 = Peak volumetric flow rate (cf)

- Sediment trap depth shall be 3.5 feet minimum from the bottom of the trap to the top of the overflow weir.
- To aid in determining sediment depth, all sediment traps shall have a staff gauge with a prominent mark 1 foot above the bottom of the trap.
- Design the discharge from the sediment trap using the guidance for discharge from temporary sediment ponds in BMP C241E: Sediment Pond (Temporary).

Maintenance Standards

- Sediment shall be removed from the trap when it reaches 1 foot in depth.
- Any damage to the trap embankments or slopes shall be repaired.

Figure 7.28: Cross-Section of Sediment Trap



Note: Trap may be formed by berm or by partial or complete excavation.

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Cross-Section of Sediment Trap

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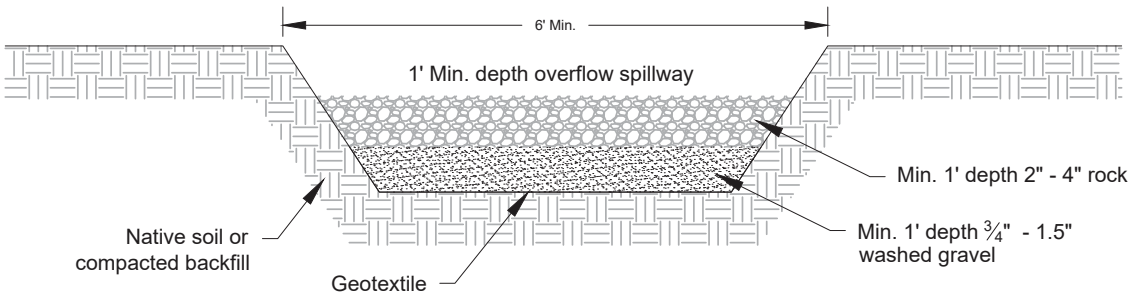
Figure 7.29: Sediment Trap Outlet



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Sediment Trap Outlet

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BMP C241E: Sediment Pond (Temporary)

Purpose

Sediment ponds are temporary ponds used during construction to remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 millimeters). Consequently, they usually reduce turbidity only slightly.

Conditions of Use

- Use a sediment pond where the contributing area to the pond is ≥ 3 acres. Ponds must be used in conjunction with other construction stormwater BMPs to reduce the amount of sediment flowing into the pond.
- Do not install sediment ponds on sites where failure of the BMP would result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. Also, sediment ponds are attractive to children and can be dangerous. Compliance with local ordinances regarding health and safety must be addressed. If fencing of the pond is required, show the type of fence and its location on the drawings in the Construction Stormwater Pollution Prevention Plan (SWPPP).
- Sediment ponds that can impound ≥ 10 acre-feet (435,600 cubic feet [cf]) or have an embankment height of > 6 feet at the downstream toe, are subject to the Washington Dam Safety Regulations (Chapter 173-175 WAC). See BMP F6.10: Detention Ponds for more information regarding dam safety considerations for detention ponds.
- Projects that are constructing permanent flow control BMPs may use the rough-graded or final-graded permanent flow control BMP footprint for the temporary sediment pond. When permanent BMP footprints are used as temporary sediment ponds, the surface area requirement of the temporary sediment pond must be met. If the surface area requirement of the sediment pond is larger than the surface area of the permanent flow control BMP, then the sediment pond shall be enlarged beyond the permanent flow control BMP footprint to comply with the surface area requirement.

The permanent control structure must be temporarily replaced with a control structure that only allows water to leave the temporary sediment pond from the surface or by pumping. Alternatively, the permanent control structure may be used if it is temporarily modified by plugging any outlet holes below the riser. The permanent control structure must be installed as part of the permanent flow control BMP after the site is fully stabilized.

Design and Installation Specifications

General

- See Figure 7.30: Sediment Pond Plan View, Figure 7.31: Sediment Pond Cross Section, and Figure 7.32: Sediment Pond Riser Detail for details.
- Use of permanent infiltration BMP footprints for temporary sediment ponds during construction tends to clog the soils and reduce their capacity to infiltrate. If permanent

infiltration BMP footprints are used, the sides and bottom of the temporary sediment pond must only be rough excavated to a minimum of 2 feet above final grade of the permanent infiltration BMP. Final grading of the permanent infiltration BMP shall occur only when all contributing areas are fully stabilized. Any proposed permanent pretreatment BMP prior to the infiltration BMP should be fully constructed and used with the temporary sediment pond to help prevent clogging of the soils.

For more information: See Element #13: Protect Low Impact Development BMPs (Infiltration BMPs) for more information about protecting permanent infiltration BMPs.

- The pond shall be divided into two roughly equal-volume cells by a permeable divider that will reduce turbulence while allowing movement of water between the cells. The divider shall be ≥ one-half the height of the riser, and ≥ 1 foot below the top of the riser. Wire-backed, 2- to 3-foot-high, high-strength geotextile fabric supported by treated 4x4s can be used as a divider. Alternatively, staked straw bales wrapped with geotextile fabric may be used. If the pond is > 6 feet deep, a different divider design must be proposed. A riprap embankment is one acceptable method of separation for deeper ponds. Other designs that satisfy the intent of this provision are allowed as long as the divider is permeable, structurally sound, and designed to prevent erosion under or around the divider.
- The most common structural failure of sedimentation basins is caused by piping. Piping refers to two phenomena:
    1. water seeping through fine-grained soil, eroding the soil grain by grain and forming pipes or tunnels; and
    2. water under pressure flowing upward through a granular soil with a head of sufficient magnitude to cause soil grains to lose contact and capability for support.
- The most critical construction sequences to prevent piping are the following:
    - Tight connections between riser and outlet pipe, and other pipe connections
    - Adequate anchoring of riser
    - Proper soil compaction of the embankment and riser footing
    - Proper construction of antiseep devices

Sediment Pond Geometry

To determine the sediment pond geometry, first calculate the surface area of the pond, measured at the top of the riser pipe, using the following equation:

Equation 7.4: Pond Surface Area

$$SA = 2 \times Q_2/0.00096$$

or

2,080 square feet (sf) per cubic foot per second (cfs) of inflow

where:

SA = design surface area of the trap (sf)

Q_2 = Peak volumetric flow rate (cf)

See BMP C240E: Sediment Trap for more information on Equation 7.4: Pond Surface Area.

The basic geometry of the pond can now be determined using the following design criteria:

- Required surface area from Equation 7.4: Pond Surface Area at the top of the riser.
- Minimum 3.5-foot depth from the top of the riser to the bottom of the pond.
- Maximum 3H:1V interior side slopes and maximum 2H:1V exterior slopes. The interior slopes can be increased to a maximum of 2H:1V if fencing is provided at or above the maximum water surface.
- One foot of freeboard between the top of the riser and the crest of the emergency spillway.
- Flat bottom.
- Minimum 1-foot-deep spillway.
- Length-to-width ratio between 3:1 and 6:1.

Sediment Pond Discharge

The outlet for the pond consists of a combination of principal and emergency spillways. These outlets must pass the peak runoff expected from the contributing area for a 100-year storm. If, due to site conditions and basin geometry, a separate emergency spillway is not feasible, the principal spillway must pass the entire peak runoff expected from the 100-year storm. However, an attempt to provide a separate emergency spillway should always be made. Base the runoff calculations on the site conditions during construction. The flow through the dewatering orifice cannot be used when calculating the 100-year storm elevation because of its potential to become clogged; therefore, available spillway storage must begin at the principal spillway riser crest.

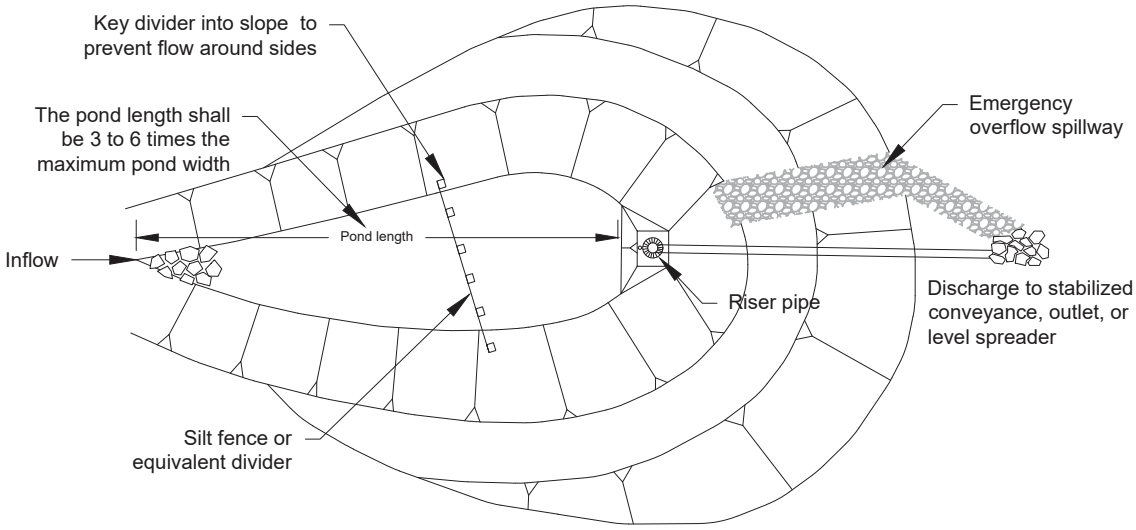
The principal spillway designed by the procedures will result in some reduction in the peak rate of runoff. However, the design will not control the basin discharge flow rates to the extent required to comply with 2.7.7 Core Element #6: Flow Control. The size of the contributing basin, the expected life of the construction project, the anticipated downstream effects, and the anticipated weather conditions during construction should be considered to determine the need for additional discharge control.

Principal Spillway

Determine the required diameter for the principal spillway (riser pipe). The diameter shall be the minimum necessary to pass the peak volumetric flow rate using a 10-minute time step for a 10-year, 24-hour frequency storm for the developed condition. Use Figure 7.33: Riser Inflow Curves to determine the riser diameter.

Note: To aid in determining sediment depth, 1-foot intervals should be prominently marked on the riser.

Figure 7.30: Sediment Pond Plan View



Note: Pond may be formed by berm or by partial or complete excavation

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Sediment Pond Plan View

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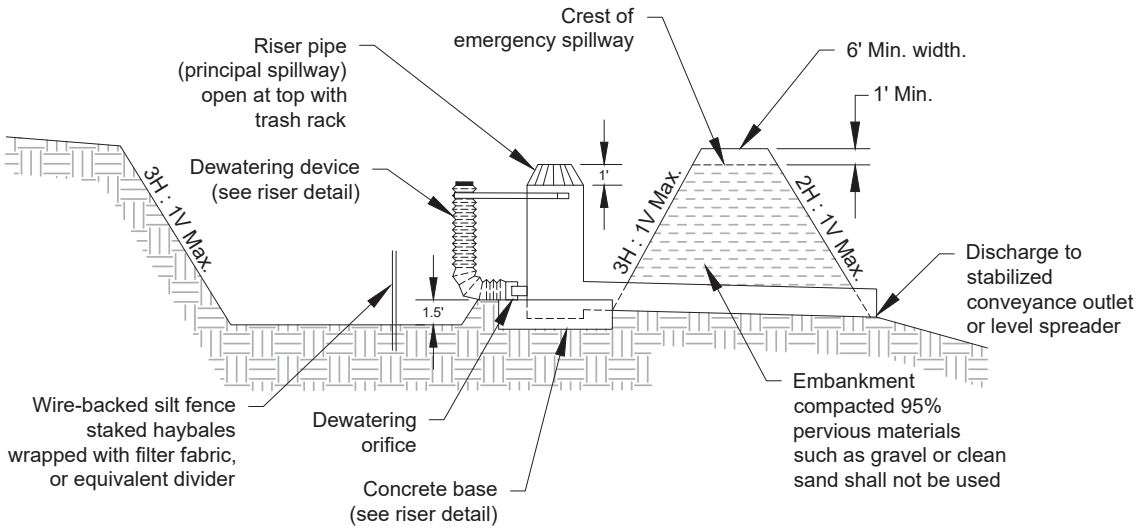
Figure 7.31: Sediment Pond Cross Section



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Sediment Pond Cross Section

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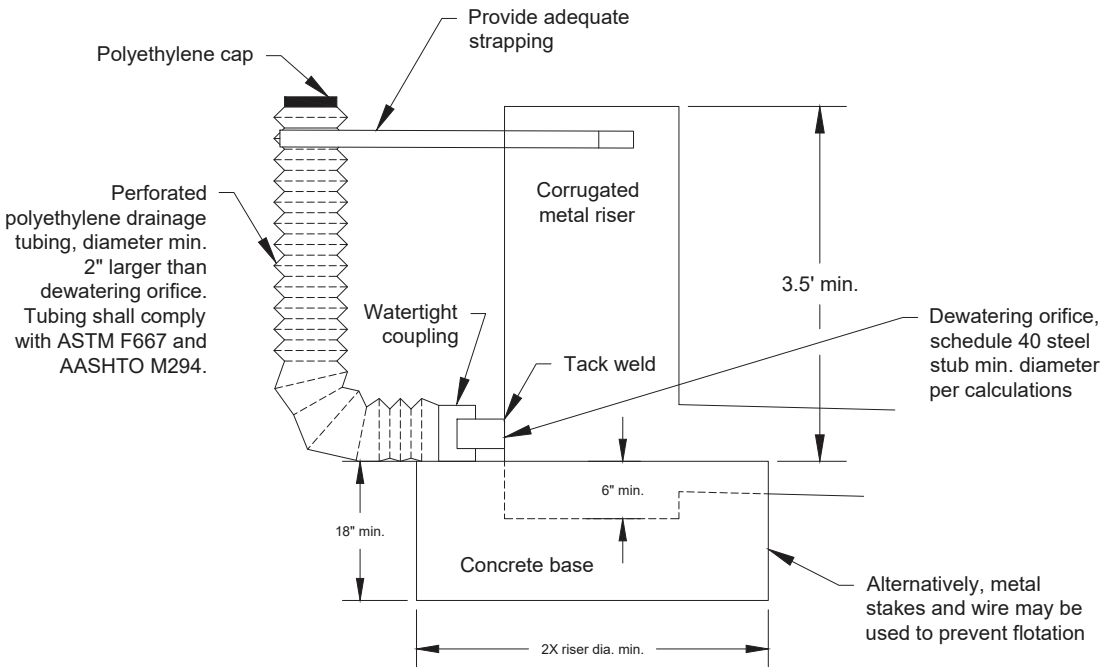
Figure 7.32: Sediment Pond Riser Detail



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Sediment Pond Riser Detail

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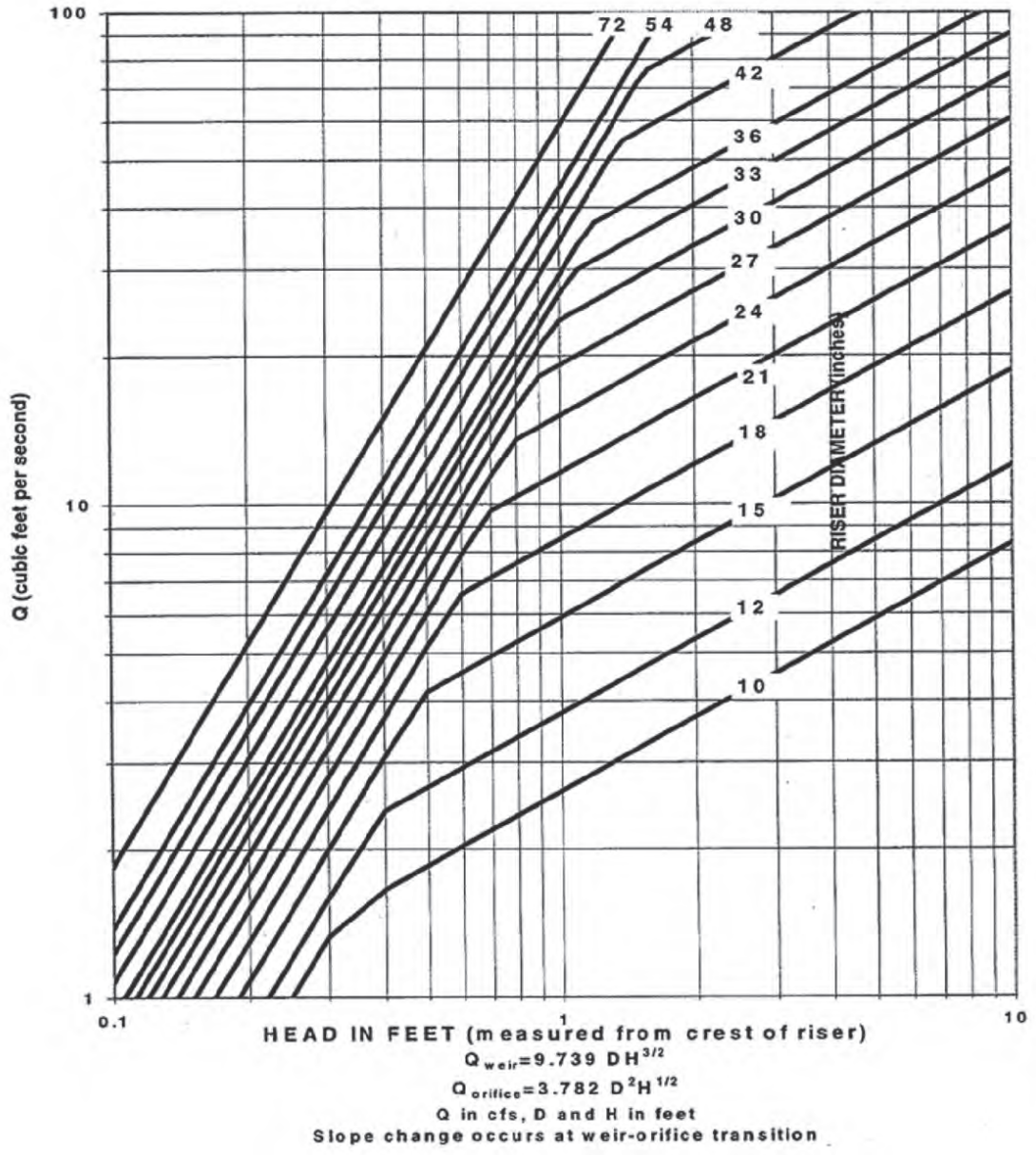
Figure 7.33: Riser Inflow Curves



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Riser Inflow Curves

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Emergency Overflow Spillway

Size the emergency overflow spillway for the peak volumetric flow rate using a 10-minute time step from a Type 1A, 100-year, 24-hour frequency storm for the developed condition. See BMP F6.10: Detention Ponds for additional guidance for emergency overflow spillway design.

Dewatering Orifice

Size the dewatering orifice(s) (minimum 1-inch-diameter) using a modified version of the discharge equation for a vertical orifice and a basic equation for the area of a circular orifice. Determine the required area of the orifice with the following equation:

Equation 7.5: Dewatering Orifice Area

$$A_o = \frac{A_s * (2h)^{0.5}}{0.6 * 3600 * T * g^{0.5}}$$

where:

A_o = orifice area (sf)

A_s = pond surface area (sf)

h = head of water above orifice (height of riser) (feet)

T = dewatering time (24 hours)

g = acceleration of gravity (32.2 feet/second^2)

Convert the orifice area to the orifice diameter (D):

Equation 7.6: Dewatering Orifice Diameter

$$D = 24 * \sqrt{\frac{A_o}{\pi}} = 13.54 * \sqrt{A_o}$$

where:

D = orifice diameter (inches)

A_o = orifice area (sf)

The vertical, perforated tubing connected to the dewatering orifice must be ≥ 2 inches larger in diameter than the orifice to improve flow characteristics. The size and number of perforations in the tubing should be large enough so that the tubing does not restrict flow. The orifice should control the flow rate.

Maintenance Standards

- Remove sediment from the pond when it reaches 1 foot in depth.
- Repair any damage to the pond embankments or slopes.

BMP C250E: Construction Stormwater Chemical Treatment

Purpose

This BMP applies when using stormwater chemicals in batch treatment or flow-through treatment.

Turbidity is difficult to control once fine particles are suspended in stormwater runoff from a construction site. BMP C241E: Sediment Pond (Temporary) is effective at removing larger particulate matter by gravity settling but is ineffective at removing smaller particulates such as clay and fine silt. Traditional construction stormwater BMPs may not be adequate to ensure compliance with the water quality standards for turbidity in the receiving water.

Chemical treatment can reliably provide exceptional reductions of turbidity and associated pollutants. Chemical treatment may be required to meet turbidity stormwater discharge requirements, especially when construction proceeds through the wet season.

Conditions of Use

Formal written approval from Ecology is required for the use of chemical treatment regardless of site size. See the Washington State Department of Ecology's (Ecology's) Request for Chemical Treatment form at the following web address:

https://fortress.wa.gov/ecy/publications/SummaryPages/ecy070258.html

The local jurisdiction may also require review and approval. When approved, the chemical treatment systems must be included in the Construction Stormwater Pollution Prevention Plan (SWPPP).

Chemically treated stormwater discharged from construction sites must be nontoxic to aquatic organisms. The Chemical Technology Assessment Protocol–Ecology (CTAPE) must be used to evaluate chemicals proposed for stormwater treatment. Only chemicals approved by Ecology under CTAPE may be used for stormwater treatment. The approved chemicals, their allowable application techniques (batch treatment or flow-through treatment), allowable application rates, and conditions of use can be found at Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page at the following address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

Background on Chemical Treatment Systems

Coagulation and flocculation have been used for over a century to treat water. It is used less frequently for the treatment of wastewater. The use of coagulation and flocculation for treating stormwater is a very recent application. Experience with the treatment of water and wastewater has resulted in a basic understanding of the process, in particular factors that affect performance. This experience can provide insights as to how to most effectively design and operate similar systems in the treatment of stormwater.

Fine particles suspended in water give it a milky appearance, measured as turbidity. Their small size, often much less than 1 micron in diameter, give them a very large surface area relative to their volume. These fine particles typically carry a negative surface charge. Largely because of these two factors, small size and negative charge, these particles tend to stay in suspension for extended

periods of time. Thus, removal is not practical by gravity settling. These are called stable suspensions. Polymers, as well as inorganic chemicals such as aluminum sulfate (alum), speed the process of clarification. The added chemical destabilizes the suspension and causes the smaller particles to agglomerate. The process consists of three steps: coagulation, flocculation, and settling (or clarification). Ecology requires a fourth step, filtration, on all stormwater chemical treatment systems to reduce floc discharge and to provide monitoring prior to discharge.

General Design and Installation Specifications

- Chemicals approved for use in Washington State are listed on Ecology's Emerging Stormwater Treatment Technologies (TAPE) web page under the "Construction" tab:

  https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies

- Care must be taken in the design of the withdrawal system to minimize outflow velocities and to prevent floc discharge. Stormwater that has been chemically treated must be filtered through BMP C251E: Construction Stormwater Filtration for filtration and monitoring prior to discharge.
- System discharge rates must take into account downstream conveyance integrity.
- The following equipment should be located on-site in a lockable shed:
  - The chemical injector
  - Secondary containment for acid, caustic, buffering compound, and treatment chemical
  - Emergency shower and eyewash
  - Monitoring equipment, which consists of a pH meter and a turbidimeter
- There are two types of systems for applying the chemical treatment process to stormwater: the batch chemical treatment system and the flow-through chemical treatment system. See subsequent text for further details of both types of systems.

Batch Chemical Treatment Systems

A batch chemical treatment system consists of four steps: coagulation, flocculation, clarification, and polishing and monitoring by filtration.

Step 1: Coagulation

Coagulation is the process by which negative charges on the fine particles are disrupted. By disrupting the negative charges, the fine particles are able to flocculate. Chemical addition is one method of destabilizing the suspension, and polymers are one class of chemicals that are generally effective. Chemicals that are used for this purpose are called coagulants. Coagulation is complete when the suspension is destabilized by the neutralization of the negative charges. Coagulants perform best when they are thoroughly and evenly dispersed under relatively intense mixing. This rapid mixing involves adding the coagulant in a manner that promotes rapid dispersion, followed by a short time period for destabilization of the particle suspension. The particles are still very small and are not readily separated by clarification until flocculation occurs.

Step 2: Flocculation

Flocculation is the process by which fine particles that have been destabilized bind together to form larger particles that settle rapidly. Flocculation begins naturally following coagulation but is enhanced by gentle mixing of the destabilized suspension. Gentle mixing helps to bring particles in contact with one another such that they bind and continually grow to form "flocs." As the size of the flocs increases, they become heavier and settle.

Step 3: Clarification

The final step is the settling of the particles, or clarification. Particle density, size and shape are important during settling. Dense, compact flocs settle more readily than less dense, fluffy flocs. Because of this, flocculation to form dense, compact flocs is particularly important during water treatment. Water temperature is important during settling. Both the density and viscosity of water are affected by temperature; these in turn affect settling. Cold temperatures increase viscosity and density, thus slowing down the rate at which the particles settle.

The conditions under which clarification is achieved can affect performance. Currents can affect settling. Currents can be produced by wind, by differences between the temperature of the incoming water and the water in the clarifier, and by flow conditions near the inlets and outlets. Quiescent water, such as that which occurs during batch clarification provides a good environment for effective performance as many of these factors become less important in comparison to typical sedimentation basins. One source of currents that is likely important in batch systems is movement of the water leaving the clarifier unit. Because flocs are relatively small and light, the velocity of the water must be as low as possible. Settled flocs can be resuspended and removed by fairly modest currents.

Step 4: Filtration

After clarification, Ecology requires stormwater that has been chemically treated to be filtered and monitored prior to discharge. The sand filtration system continually monitors the stormwater effluent for turbidity and pH. If the discharge water is ever out of an acceptable range for turbidity or pH, the water is returned to the untreated stormwater pond where it will begin the treatment process again.

Design and Installation of Batch Chemical Treatment Systems

A batch chemical treatment system consists of the stormwater collection system (either temporary diversion or the permanent site drainage system), a storage pond, pumps, a chemical feed system, treatment cells, and interconnecting piping.

The batch treatment system uses a storage pond for untreated stormwater followed by a minimum of two lined treatment cells. Multiple treatment cells allow for clarification of chemically treated water in one cell, while other cells are being filled or emptied. Treatment cells may be ponds or tanks. Ponds that impound > 10 acre-feet or have an embankment height of > 6 feet at the downstream toe are subject to the Washington Dam Safety Regulations (Chapter 173-175 WAC). See BMP F6.10: Detention Ponds for more information regarding dam safety considerations for ponds.

Stormwater is collected at interception point(s) on the site and is diverted by gravity or by pumping to an untreated stormwater storage pond or other untreated stormwater holding area. The stormwater is stored until treatment occurs. It is important that the storage pond be large enough to provide adequate storage.

The first step in the treatment sequence is to check the pH of the stormwater in the untreated stormwater storage pond. The pH is adjusted by the application of carbon dioxide or a base until the stormwater in the storage pond is within the desired pH range, 6.5 to 8.5. When used, carbon dioxide is added immediately downstream of the transfer pump. Typically sodium bicarbonate (baking soda) is used as a base, although other bases may be used. When needed, base is added directly to the untreated stormwater storage pond. The stormwater is recirculated with the treatment pump to provide mixing in the storage pond. Initial pH adjustments should be based on daily bench tests. Further pH adjustments can be made at any point in the process. See BMP C252E: Treating and Disposing of High pH Water for more information on pH adjustments as a part of chemical treatment.

Once the stormwater is within the desired pH range (which is dependent on the coagulant being used), the stormwater is pumped from the untreated stormwater storage pond to a lined treatment cell as a coagulant is added. The coagulant is added upstream of the pump to facilitate rapid mixing.

The water is kept in a lined treatment cell for clarification. In a batch mode process, clarification typically takes from 30 minutes to several hours. Prior to discharge, samples are withdrawn for analysis of pH, coagulant concentration, and turbidity. If these levels are acceptable, the treated water is withdrawn, filtered, and discharged.

Several configurations have been developed to withdraw treated water from the treatment cell. The original configuration is a device that withdraws the treated water from just beneath the water surface using a float with adjustable struts that prevent the float from settling on the cell bottom. This reduces the possibility of picking up sediment-floc from the bottom of the cell. The struts are usually set at a minimum clearance of about 12 inches; that is, the float will come within 12 inches of the bottom of the cell. Other systems have used vertical guides or cables which constrain the float, allowing it to drift up and down with the water level. More recent designs have an H-shaped array of pipes, set on the horizontal. This scheme provides for withdrawal from four points rather than one. This configuration reduces the likelihood of sucking settled solids from the bottom. It also reduces the tendency for a vortex to form. Inlet diffusers, a long floating or fixed pipe with many small holes in it, are also an option.

Safety is a primary concern. Design should consider the hazards associated with operations, such as sampling. Facilities should be designed to reduce slip hazards and drowning. Tanks and ponds should have life rings, ladders, or steps extending from the bottom to the top.

Sizing Batch Chemical Treatment Systems

Chemical treatment systems must be designed to control the velocity and peak volumetric flow rate that is discharged from the system and consequently the project site. See Element #3 (Control Flow Rates) for further details on this requirement.

The total volume of the untreated stormwater storage pond and treatment cell must be large enough to treat stormwater that is produced during multiple day storm events. It is recommended that at a minimum the storage pond or other holding area should be sized to hold 1.5 times the volume of runoff generated from the site during the 10-year, 24-hour storm event. Bypass should be provided around the chemical treatment system to accommodate extreme storm events. Runoff volume shall be calculated using the methods presented in Chapter 4. If no hydrologic analysis is required for the site, the Rational Method may be used.

Primary settling should be encouraged in the untreated stormwater storage pond. A forebay with access for maintenance may be beneficial.

There are two opposing considerations in sizing the treatment cells. A larger cell is able to treat a larger volume of water each time a batch is processed. However, the larger the cell the longer the time required to empty the cell. A larger cell may also be less effective at flocculation and therefore require a longer settling time. The simplest approach to sizing the treatment cell is to multiply the allowable discharge flow rate (as determined by the guidance in Element #3: Control Flow Rates) times the desired drawdown time. A 4-hour drawdown time allows one batch per cell per 8-hour work period, given 1 hour of flocculation followed by 2 hours of settling.

For more information: See BMP C251E: Construction Stormwater Filtration for details on sizing the filtration system at the end of the batch chemical treatment system.

Background on Flow-Through Chemical Treatment Systems

A flow-through chemical treatment system adds a sand filtration component to the batch chemical treatment system's treatment train following flocculation. The coagulant is added to the stormwater upstream of the sand filter so that the coagulation and flocculation step occur immediately prior to the filter. The advantage of a flow-through chemical treatment system is the time saved by immediately filtering the water, as opposed to waiting for the clarification process necessary in a batch chemical treatment system. See BMP C251E: Construction Stormwater Filtration for more information on filtration.

Design and Installation of Flow-Through Chemical Treatment Systems

At a minimum, a flow-through chemical treatment system consists of the stormwater collection system (either temporary diversion or the permanent site drainage system), an untreated stormwater storage pond, and the chemically enhanced sand filtration system.

As with a batch treatment system, stormwater is collected at interception point(s) on the site and is diverted by gravity or by pumping to an untreated stormwater storage pond or other untreated stormwater holding area. The stormwater is stored until treatment occurs. It is important that the holding pond be large enough to provide adequate storage.

Stormwater is then pumped from the untreated stormwater storage pond to the chemically enhanced sand filtration system where polymer is added. Adjustments to pH may be necessary before chemical addition. The sand filtration system continually monitors the stormwater for turbidity and pH. If the discharge water is ever out of an acceptable range for turbidity or pH, the water is recycled to the untreated stormwater pond where it will begin the treatment process again.

Sizing Flow-Through Chemical Treatment Systems

See BMP C251E: Construction Stormwater Filtration for sizing requirements of flow-through chemical treatment systems.

Factors Affecting the Chemical Treatment Process

Coagulants

Cationic polymers can be used as coagulants to destabilize negatively charged turbidity particles present in natural waters, wastewater and stormwater. Polymers are large organic molecules that are made up of subunits linked together in a chain-like structure. Attached to these chain-like structures are other groups that carry positive or negative charges, or have no charge. Polymers that carry groups with positive charges are called cationic, those with negative charges are called anionic, and those with no charge (neutral) are called nonionic. In practice, the only way to determine whether a polymer is effective for a specific application is to perform preliminary or on-site testing.

Alum can also be used as this chemical becomes positively charged when dispersed in water.

Polymers are available as powders, concentrated liquids, and emulsions (which appear as milky liquids). The latter are petroleum based, which are not allowed for construction stormwater treatment. Polymer effectiveness can degrade with time and also from other influences. Thus, manufacturers' recommendations for storage should be followed. Manufacturer's recommendations usually do not provide assurance of water quality protection or safety to aquatic organisms. Consideration of water quality protection is necessary in the selection and use of all polymers.

Application

Application of coagulants at the appropriate concentration or dosage rate for optimum turbidity removal is important for management of chemical cost, for effective performance, and to avoid aquatic toxicity. The optimum dose in a given application depends on several site-specific features. Turbidity of untreated water can be important with turbidities > 5,000 nephelometric turbidity units (NTUs). The surface charge of particles to be removed is also important. Environmental factors that can influence dosage rate are water temperature, pH, and the presence of constituents that consume or otherwise affect polymer effectiveness. Laboratory experiments indicate that mixing previously settled sediment (floc sludge) with the untreated stormwater significantly improves clarification, therefore reducing the effective dosage rate. Preparation of working solutions and thorough dispersal of polymers in water to be treated is also important to establish the appropriate dosage rate.

For a given water sample, there is generally an optimum dosage rate that yields the lowest residual turbidity after settling. When dosage rates below this optimum value (underdosing) are applied, there is an insufficient quantity of coagulant to react with, and therefore destabilize, all of the turbidity present. The result is residual turbidity (after flocculation and settling) that is higher than with the optimum dose. Overdosing, application of dosage rates greater than the optimum value, can also adversely impact performance. Like underdosing, the result of overdosing is higher residual turbidity than that with the optimum dose.

Mixing

The G-value, or just "G," is often used as a measure of the mixing intensity applied during coagulation and flocculation. The letter G stands for "velocity gradient," which is related in part to the degree of turbulence generated during mixing. High G-values mean high turbulence, and vice versa.

High G-values provide the best conditions for coagulant addition. With high G-values, turbulence is high and coagulants are rapidly dispersed to their appropriate concentrations for effective destabilization of particle suspensions.

Low G-values provide the best conditions for flocculation. Here, the goal is to promote formation of dense, compact flocs that will settle readily. Low G-values provide low turbulence to promote particle collisions so that flocs can form. Low G-values generate sufficient turbulence such that collisions are effective in floc formation but do not break up flocs that have already formed.

Adjustment of pH

The pH must be in the proper range for the polymers to be effective, which is typically 6.5 to 8.5. As polymers tend to lower the pH, it is important that the stormwater have sufficient buffering capacity. Buffering capacity is a function of alkalinity. Without sufficient alkalinity, the application of the polymer may lower the pH to < 6.5. A pH < 6.5 not only reduces the effectiveness of the polymer as a coagulant, but it may also create a toxic condition for aquatic organisms. Stormwater may not be discharged without readjustment of the pH to > 6.5. The target pH should be within 0.2 standard units of the receiving water's pH.

Experience gained at several projects in the city of Redmond has shown that the alkalinity needs to be ≥ 50 milligrams per liter (mg/L) to prevent a drop in pH to < 6.5 when the polymer is added.

Maintenance Standards

Monitoring

At a minimum, the following monitoring shall be conducted. Test results shall be recorded on a daily log kept on-site. Additional testing may be required by the Construction Stormwater General Permit (CSWGP) or the Phase II Municipal Stormwater National Pollutant Discharge Elimination System Permit for eastern Washington (Municipal Stormwater Permit) based on site conditions.

- Operational Monitoring:
    - Total volume treated and discharged
    - Continuous monitoring and recording of flow at intervals ≤ 15 minutes
    - Type and amount of chemical used for pH adjustment
    - Amount of polymer used for treatment
    - Settling time
- Compliance Monitoring:
    - Continuous monitoring and recording of influent and effluent pH, flocculent chemical concentration, and turbidity at intervals ≤ 15 minutes
    - The pH and turbidity of the receiving water
- Biomonitoring:
    - Treated stormwater must be nontoxic to aquatic organisms. Treated stormwater must be tested for aquatic toxicity or residual chemicals. Frequency of biomonitoring will be determined by Ecology.
    - Residual chemical tests must be approved by Ecology prior to their use.

- If testing treated stormwater for aquatic toxicity, it must be tested for acute (lethal) toxicity. Bioassays shall be conducted by a laboratory accredited by Ecology, unless otherwise approved by Ecology. Acute toxicity tests shall be conducted per CTAPE and Appendix G of *Whole Effluent Toxicity Testing Guidance and Test Review Criteria* (Marshall, 2016).

Discharge Compliance

Prior to discharge, treated stormwater must be sampled and tested for compliance with the limits for pH, flocculent chemical concentration, and turbidity. These limits may be established by the CSWGP or a site-specific discharge permit. Sampling and testing for other pollutants may also be necessary at some sites. The pH reading must be within the range of 6.5 to 8.5 and not cause a change in the pH of the receiving water of > 0.2.

Treated stormwater samples and measurements shall be taken from the discharge pipe or another location representative of the nature of the treated stormwater discharge. Samples used for determining compliance with the water quality standards in the receiving water shall not be taken from the treatment pond prior to decanting. Compliance with the water quality standards is determined in the receiving water.

Operator Training

Each site using chemical treatment must have an operator trained and certified by an organization approved by Ecology. For applications of chitosan-enhanced sand filtration (CESF), organizations approved for operator training are found on Ecology's web page for guidance on contaminated water on construction sites, under frequently asked questions at the following web address:

https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Contaminated-water-on-construction-sites

Sediment Removal and Disposal

- Sediment shall be removed from the untreated stormwater storage pond and treatment cells as necessary. Typically, sediment removal is required at least once during a wet season and at the decommissioning of the chemical treatment system. Sediment remaining in the cells between batches may enhance the settling process and reduce the required chemical dosage.
- Sediment that is known to be nontoxic may be incorporated into the site away from drainages.

BMP C251E: Construction Stormwater Filtration

Purpose

Filtration removes sediment from runoff originating from disturbed areas of the site.

Conditions of Use

Traditional construction stormwater BMPs used to control soil erosion and sediment loss from sites under development may not be adequate to ensure compliance with the water quality standard for

turbidity in the receiving water. Filtration may be used in conjunction with gravity settling to remove sediment as small as fine silt (0.5 microns). The reduction in turbidity will be dependent on the particle size distribution of the sediment in the stormwater. In some circumstances, sedimentation and filtration may achieve compliance with the water quality standard for turbidity.

The use of construction stormwater filtration does not require approval from the Washington State Department of Ecology (Ecology) as long as treatment chemicals are not used. Filtration in conjunction with BMP C250E: Construction Stormwater Chemical Treatment requires testing under the Chemical Technology Assessment Protocol–Ecology (CTAPE) before it can be initiated. Approval from the appropriate regional Ecology office must be obtained at each site where polymer use is proposed prior to its use. See Ecology's Request for Chemical Treatment form at the following web address:

https://fortress.wa.gov/ecy/publications/SummaryPages/ecy070258.html

Design and Installation Specifications

Two types of filtration systems may be applied to construction stormwater treatment: rapid and slow.

Rapid filtration systems are the typical system used for water and wastewater treatment. They can achieve relatively high hydraulic flow rates, on the order of 2 to 20 gallons per minute per square foot (gpm/sf), because they have automatic backwash systems to remove accumulated solids.

Slow filtration systems have very low hydraulic rates, on the order of 0.02 gpm/sf, because they do not have backwash systems. Slow sand filtration has generally been used as a postconstruction BMP to treat stormwater (see filtration BMPs in Chapter 5 - Runoff Treatment BMP Design). Slow filtration is mechanically simple in comparison to rapid sand filtration but requires a much larger filter area.

Filtration Equipment

Sand media filters are available with automatic backwashing features that can filter to a particle size of 50 microns. Screen or bag filters can filter down to 5 microns. Fiber wound filters can remove particles down to 0.5 microns. Filters should be sequenced from the largest to the smallest pore opening. Sediment removal efficiency will be related to particle size distribution in the stormwater.

Treatment Process and Description

Stormwater is collected at interception point(s) on the site and diverted to a sediment pond or tank for removal of large sediment particles and storage of the stormwater before it is treated by the filtration system. In a rapid filtration system, the untreated stormwater is pumped from the trap, pond, or tank through the filtration media. Slow filtration systems are designed using gravity to convey water from the pond or tank through the filtration media.

Sizing

Filtration treatment systems must be designed to control the velocity and peak volumetric flow rate that is discharged from the system and consequently the project site. See Element #3: Control Flow Rates for further details on this requirement.

The sediment pond or tank should be sized to hold 1.5 times the volume of runoff generated from the site during the 6-month, 3-hour storm for the developed condition, referred to as the short-duration storm, minus the filtration treatment system flow rate for an 8-hour period. For a chitosan-enhanced sand filtration system (CESF), the filtration treatment system flow rate should be sized using a hydraulic loading rate between 6 and 8 gpm/sf. Other hydraulic loading rates may be more appropriate for other systems. Bypass should be provided around the filtration treatment system to accommodate extreme storm events. Runoff volume shall be calculated using the methods presented in Chapter 4 - Hydrologic Analysis and Design.

If the filtration treatment system design does not allow discharge at the rates required by Element #3: Control Flow Rates and if the site has a permanent flow control BMP that will serve the planned development, the discharge from the filtration treatment system may be directed to the permanent flow control BMP to comply with Element #3: Control Flow Rates. In this case, all discharge (including water passing through the treatment system and stormwater bypassing the treatment system) will be directed into the permanent flow control BMP. If site constraints make locating the sediment pond or tank difficult, the permanent flow control BMP may be divided to serve as the sediment pond or tank and the posttreatment temporary flow control pond. In this case, a berm or barrier must be used to prevent the untreated water from mixing with the treated water. Both untreated stormwater storage requirements and adequate posttreatment flow control must be achieved. The designer must document in the Construction Stormwater Pollution Prevention Plan (SWPPP) how the permanent flow control BMP is able to attenuate the discharge from the site to meet the requirements of Element #3: Control Flow Rates. If the design of the permanent flow control BMP was modified for temporary construction flow control purposes, the construction of the permanent flow control BMP must be finalized, as designed for its permanent function, at project completion.

Maintenance Standards

- Rapid sand filters typically have automatic backwash systems that are triggered by a preset pressure drop across the filter. If the backwash water volume is not large or substantially more turbid than the untreated stormwater stored in the holding pond or tank, backwash return to the sediment pond or tank may be appropriate. However, other means of treatment and disposal may be necessary.
- Screen, bag, and fiber filters must be cleaned and/or replaced when they become clogged.
- Disposal of filtration equipment must comply with applicable local, state, and federal regulations.
- Sediment shall be removed from the sediment pond or tank as necessary. Typically, sediment removal is required once or twice during a wet season and at the decommissioning of the pond or tank.

BMP C252E: Treating and Disposing of High pH Water

Purpose

When pH levels in stormwater increase to >8.5, it is necessary to lower the pH levels to the acceptable range of 6.5 to 8.5 prior to discharge to surface or ground water. A pH range of 6.5 to 8.5 is typical for most natural receiving waters, and this neutral pH is required for the survival of aquatic

organisms. Should the pH deviate from this range, fish and other aquatic organisms may become stressed and may die.

Conditions of Use

- The water quality standard for pH in Washington State is in the range of 6.5 to 8.5. Stormwater with pH levels exceeding water quality standards may be either neutralized on-site or disposed of in a sanitary sewer or concrete batch plant with pH neutralization capabilities.
- Neutralized stormwater may be discharged to receiving waters under the Construction Stormwater General Permit.
- Neutralized process water such as concrete truck washout, hydrodemolition, or sawcutting slurry must be managed to prevent discharge to receiving waters. Any stormwater contaminated during concrete work is considered process wastewater and must not be discharged to receiving waters or drainage systems.
- The process used for neutralizing and/or disposing of high pH stormwater from the site must be documented in the Construction Stormwater Pollution Prevention Plan (SWPPP).

Causes of High pH

High pH at construction sites is most commonly caused by the contact of stormwater with poured or recycled concrete, cement, mortars, and other Portland cement or lime containing construction materials. (See BMP C151E: Concrete Handling for more information on concrete-handling procedures.) The principal caustic agent in cement is calcium hydroxide (free lime).

Calcium hardness can contribute to high pH values and cause toxicity that is associated with high pH conditions. A high level of calcium hardness in waters of the state is not allowed. Ground water standard for calcium and other dissolved solids in Washington State is < 500 milligrams per liter (mg/L).

Treating High pH Stormwater by Carbon Dioxide Sparging

Advantages of Carbon Dioxide Sparging

- Rapidly neutralizes water with a high pH.
- Cost effective and safer to handle than acid compounds.
- Carbon dioxide (CO_2) is self-buffering. It is difficult to overdose and create harmfully low pH levels.
- Material is readily available.

Chemical Process of Carbon Dioxide Sparging

When CO_2 is added to water (H_2O), carbonic acid (H_2CO_3) is formed, which can further dissociate into a proton (H^+) and a bicarbonate anion (HCO_3) as shown:

$$CO_2 + H_2O \leftrightarrow H_2CO_3 \leftrightarrow H^+ + HCO_3^-$$

The free proton is a weak acid that can reduce the pH. Water temperature has an effect on the reaction as well. The colder the water temperature is, the slower the reaction. The warmer the water temperature is, the quicker the reaction. Most construction applications in Washington State have water temperatures of ≥ 50°F; therefore, the reaction is almost simultaneous.

Treatment Process of Carbon Dioxide Sparging

High pH water may be treated using continuous treatment, continuous discharge systems. These manufactured systems continuously monitor influent and effluent pH to ensure that pH values are within an acceptable range before being discharged. All systems must have fail-safe automatic shutoff switches in the event that pH is not within the acceptable discharge range. Only trained operators may operate manufactured systems. System manufacturers often provide trained operators or training on their devices.

The following procedure may be used when not using a continuous discharge system:

1. Prior to treatment, the appropriate jurisdiction should be notified in accordance with the regulations set by the jurisdiction.
2. Every effort should be made to isolate the potential high pH water in order to treat it separately from other stormwater on-site.
3. Water should be stored in an acceptable storage facility, detention pond, or containment cell prior to pH treatment.
4. Transfer water to be treated for pH to the pH treatment structure. Ensure that the pH treatment structure size is sufficient to hold the amount of water that is to be treated. Do not fill the pH treatment structure completely; allow ≥ 2 feet of freeboard.
5. The operator samples the water within the pH treatment structure for pH and notes the clarity of the water. As a rule of thumb, less CO_2 is necessary for clearer water. The results of the samples and water clarity observations should be recorded.
6. In the pH treatment structure, add CO_2 until the pH falls into the range of 6.9 to 7.1. Adjusting pH to within 0.2 standard units of receiving water (background pH) is recommended. It is unlikely that pH can be adjusted to within 0.2 standard units using dry ice. Compressed CO_2 gas should be introduced to the water using a CO_2 diffuser located near the bottom of the pH treatment structure, this will allow CO_2 to bubble up through the water and diffuse more evenly.
7. Slowly discharge the water, making sure water does not get stirred up in the process. Release about 80% of the water from the pH treatment structure, leaving any sludge behind. If turbidity remains above the maximum allowable, consider adding filtration to the treatment train. See BMP C251E: Construction Stormwater Filtration.
8. Discharge treated water through a pond or drainage system.
9. Excess sludge needs to be disposed of properly as concrete waste. If several batches of water are undergoing pH treatment, sludge can be left in the treatment structure for the next batch treatment. Dispose of sludge when it fills 50% of the treatment structure volume. Disposal must comply with applicable local, state, and federal regulations.

Treating High pH Stormwater by Food-Grade Vinegar

Food-grade vinegar that meets Food and Drug Administration standards may be used to neutralize high pH water. Food-grade vinegar is only 4% to 18% acetic acid with the remainder being water. Food-grade vinegar may be used if the dose is just enough to lower pH sufficiently. Use a treatment process as described above for CO_2 sparging, but add food-grade vinegar instead of CO_2.

This treatment option for high pH stormwater does not apply to anything but food-grade vinegar. Acetic acid does not equal vinegar. Any other product or waste containing acetic acid must go through the evaluation process in Appendix G of *Whole Effluent Toxicity Testing Guidance and Test Review Criteria* (Marshall, 2016).

Disposal of High pH Stormwater

Sanitary Sewer Disposal

- Local sewer authority approval is required prior to disposal via the sanitary sewer.

Concrete Batch Plant Disposal

- Only permitted facilities may accept high pH water.
- Contact the facility to ensure it can accept the high pH water.

Maintenance Standards

Safety and Materials Handling

- All equipment should be handled in accordance with Occupational Safety and Health Administration (OSHA) rules and regulations.
- Follow manufacturer's guidelines for materials handling.

Each operator should provide the following:

- A diagram of the monitoring and treatment equipment
- A description of the pumping rates and capacity the treatment equipment is capable of treating

Each operator should keep a written record of the following:

- Client name and phone number
- Date of treatment
- Weather conditions
- Project name and location
- Volume of water treated
- pH of untreated water
- Amount of CO_2 or food-grade vinegar needed to adjust water to a pH range of 6.9 to 7.1

- pH of treated water
- Discharge point location and description

A copy of this record should be given to the client/contractor, who should retain the record for 3 years.

Appendix 7-A: Recommended Standard Notes for Construction SWPPP Drawings

The standard notes provided in this appendix are suggested for use in Construction Stormwater Pollution Prevention Plans (SWPPPs) also referred to as erosion and sediment control (ESC) plans. Local jurisdictions may have other mandatory notes that are applicable. Drawings should also identify, with phone numbers, the person or firm responsible for the preparation of and maintenance of the Construction SWPPP drawings.

The following are recommended as standard notes for Construction SWPPP drawings:

- Approval of this ESC plan does not constitute an approval of permanent road or drainage design (e.g., size and location of roads, pipes, restrictors, channels, retention facilities, utilities, etc.).
- The implementation of this ESC plan and the construction, maintenance, replacement, and upgrading of these ESC BMPs is the responsibility of the applicant until all construction is completed and approved and vegetation/landscaping is established.
- Clearly flag the boundaries of the clearing limits shown on this plan in the field prior to construction. During the construction period, no disturbance beyond the flagged clearing limits shall be permitted. The flagging shall be maintained by the applicant for the duration of construction.
- Construct the ESC BMPs shown on this plan in conjunction with all clearing and grading activities, and in such a manner as to ensure that sediment and sediment laden water do not enter the drainage system, roadways, or violate applicable water standards.
- The ESC BMPs shown on this plan are the minimum requirements for anticipated site conditions. During the construction period, upgrade these ESC BMPS as needed for unexpected storm events and to ensure that sediment and sediment-laden water do not leave the site.
- The applicant shall inspect the ESC BMPs daily and maintain them as necessary to ensure their continued functionality.
- Inspect and maintain the ESC BMPs on inactive sites a minimum of once a month or within the 48 hours following a major storm event (24-hour storm event with a 10-year or greater recurrence interval).
- At no time shall the sediment exceed 60 percent of the sump depth or have less than 6 inches of clearance from the sediment surface to the invert of the lowest pipe. All catch basins and conveyance lines shall be cleaned prior to paving. The cleaning operation shall not flush sediment laden water into the downstream system.
- Install stabilized construction entrances at the beginning of construction and maintain for the duration of the project. Additional measures may be required to ensure that all paved areas are kept clean for the duration of the project.

Appendix C: Correspondence

Contractor to include record of correspondence

with regard to any stormwater issues

that occur during construction

Appendix D: Site Inspection Form

Construction Stormwater Site Inspection Form

Project Name _____ Permit # _____ Inspection Date _____ Time _____

Name of Certified Erosion Sediment Control Lead (CESCL) or qualified inspector if *less than one acre*
Print Name: _____

Approximate rainfall amount since the last inspection (in inches): _____

Approximate rainfall amount in the last 24 hours (in inches): _____

Current Weather Clear ☐ Cloudy ☐ Mist ☐ Rain ☐ Wind ☐ Fog ☐

A. Type of inspection: Weekly ☐ Post Storm Event ☐ Other ☐

B. Phase of Active Construction (*check all that apply*):

Pre Construction/installation of erosion/sediment controls	☐	Clearing/Demo/Grading	☐	Infrastructure/storm/roads	☐
Concrete pours	☐	Vertical Construction/buildings	☐	Utilities	☐
Offsite improvements	☐	Site temporary stabilized	☐	Final stabilization	☐

C. Questions:

1. Were all areas of construction and discharge points inspected? Yes ___ No ___
2. Did you observe the presence of suspended sediment, turbidity, discoloration, or oil sheen Yes ___ No ___
3. Was a water quality sample taken during inspection? (*refer to permit conditions S4 & S5*) Yes ___ No ___
4. Was there a turbid discharge 250 NTU or greater, or Transparency 6 cm or less?* Yes ___ No ___
5. If yes to #4 was it reported to Ecology? Yes ___ No ___
6. Is pH sampling required? pH range required is 6.5 to 8.5. Yes ___ No ___

If answering yes to a discharge, describe the event. Include when, where, and why it happened; what action was taken, and when.

_____

_____

_____

_____

*If answering yes to # 4 record NTU/Transparency with continual sampling daily until turbidity is 25 NTU or less/ transparency is 33 cm or greater.

Sampling Results: Date: _____

Parameter	Method (circle one)	Result			Other/Note
		NTU	cm	pH	
Turbidity	tube, meter, laboratory				
pH	Paper, kit, meter				

D. Check the observed status of all items. Provide "Action Required "details and dates.

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
1 Clearing Limits	Before beginning land disturbing activities are all clearing limits, natural resource areas (streams, wetlands, buffers, trees) protected with barriers or similar BMPs? (high visibility recommended)						
2 Construction Access	Construction access is stabilized with quarry spalls or equivalent BMP to prevent sediment from being tracked onto roads?						
	Sediment tracked onto the road way was cleaned thoroughly at the end of the day or more frequent as necessary.						
3 Control Flow Rates	Are flow control measures installed to control stormwater volumes and velocity during construction and do they protect downstream properties and waterways from erosion?						
	If permanent infiltration ponds are used for flow control during construction, are they protected from siltation?						
4 Sediment Controls	All perimeter sediment controls (e.g. silt fence, wattles, compost socks, berms, etc.) installed, and maintained in accordance with the Stormwater Pollution Prevention Plan (SWPPP).						
	Sediment control BMPs (sediment ponds, traps, filters etc.) have been constructed and functional as the first step of grading.						
	Stormwater runoff from disturbed areas is directed to sediment removal BMP.						
5 Stabilize Soils	Have exposed un-worked soils been stabilized with effective BMP to prevent erosion and sediment deposition?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
5 Stabilize Soils Cont.	Are stockpiles stabilized from erosion, protected with sediment trapping measures and located away from drain inlet, waterways, and drainage channels?						
	Have soils been stabilized at the end of the shift, before a holiday or weekend if needed based on the weather forecast?						
6 Protect Slopes	Has stormwater and ground water been diverted away from slopes and disturbed areas with interceptor dikes, pipes and or swales?						
	Is off-site storm water managed separately from stormwater generated on the site?						
	Is excavated material placed on uphill side of trenches consistent with safety and space considerations?						
	Have check dams been placed at regular intervals within constructed channels that are cut down a slope?						
7 Drain Inlets	Storm drain inlets made operable during construction are protected.						
	Are existing storm drains within the influence of the project protected?						
8 Stabilize Channel and Outlets	Have all on-site conveyance channels been designed, constructed and stabilized to prevent erosion from expected peak flows?						
	Is stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream conveyance systems?						
9 Control Pollutants	Are waste materials and demolition debris handled and disposed of to prevent contamination of stormwater?						
	Has cover been provided for all chemicals, liquid products, petroleum products, and other material?						
	Has secondary containment been provided capable of containing 110% of the volume?						
	Were contaminated surfaces cleaned immediately after a spill incident?						
	Were BMPs used to prevent contamination of stormwater by a pH modifying sources?						

Construction Stormwater Site Inspection Form

Element #	Inspection	BMPs Inspected			BMP needs maintenance	BMP failed	Action required (describe in section F)
		yes	no	n/a			
9 Cont.	Wheel wash wastewater is handled and disposed of properly.						
10 Control Dewatering	Concrete washout in designated areas. No washout or excess concrete on the ground.						
	Dewatering has been done to an approved source and in compliance with the SWPPP.						
	Were there any clean non turbid dewatering discharges?						
11 Maintain BMP	Are all temporary and permanent erosion and sediment control BMPs maintained to perform as intended?						
12 Manage the Project	Has the project been phased to the maximum degree practicable?						
	Has regular inspection, monitoring and maintenance been performed as required by the permit?						
	Has the SWPPP been updated, implemented and records maintained?						
13 Protect LID	Is all Bioretention and Rain Garden Facilities protected from sedimentation with appropriate BMPs?						
	Is the Bioretention and Rain Garden protected against over compaction of construction equipment and foot traffic to retain its infiltration capabilities?						
	Permeable pavements are clean and free of sediment and sediment laden-water runoff. Muddy construction equipment has not been on the base material or pavement.						
	Have soiled permeable pavements been cleaned of sediments and pass infiltration test as required by stormwater manual methodology?						
	Heavy equipment has been kept off existing soils under LID facilities to retain infiltration rate.						

E. Check all areas that have been inspected. ✔

All in place BMPs ☐ All disturbed soils ☐ All concrete wash out area ☐ All material storage areas ☐
All discharge locations ☐ All equipment storage areas ☐ All construction entrances/exits ☐

F. Elements checked "Action Required" (section D) describe corrective action to be taken. List the element number; be specific on location and work needed. Document, initial, and date when the corrective action has been completed and inspected.

Element #	Description and Location	Action Required	Completion Date	Initials

Attach additional page if needed

Sign the following certification:

"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief"

Inspected by: (print) _____ (Signature) _____ Date: _____

Title/Qualification of Inspector: _____

Appendix E: Construction Stormwater General Permit (CSWGP)

Deleted from SWPPP Appendix. The Construction Stormwater Permit and Administrative Order for the Project is included in Appendix B of the Engineering Design Report.

Appendix F: 303(d) List Waterbodies/ TMDL Waterbodies Information

303(d) Impairments / TMDL Waterbodies List

LISTING ID	CATEGORY CURRENT	TMDL NAME	WATERBODY NAME	PARAMETER NAME	MEDIUM NAME
8202	5		SPOKANE RIVER	Polychlorinated Biphenyls (PCBs)	Tissue
15187	4A	Spokane River Dissolved Oxygen TMDL	SPOKANE RIVER	Dissolved Oxygen	Water
15552	4A	Spokane River Metals TMDL	SPOKANE RIVER	Lead	Water
15553	4A	Spokane River Metals TMDL	SPOKANE RIVER	Zinc	Water

* The above list is the 303(d) Impairments and TMDL Waterbodies from the Department of Ecology Water Quality Atlas Map for the portion of the Spokane River that is along the site

* Per Department of Ecology, the following are the Water Quality Assessment Categories regarding impairments and TMDLs:

Category 4: Impaired waters that do not require a TMDL

Waters that have impairment problems that are being resolved in one of three ways:

- **Category 4a** — already has an EPA-approved TMDL plan in place and implemented.
- **Category 4b** — has a pollution control program, similar to a TMDL plan, that is expected to solve the pollution problems.
- **Category 4c** — is impaired by causes that cannot be addressed through a TMDL plan. Impairments in these water bodies include low water flow, stream channelization, and dams. These problems, while not pollutants, require complex solutions to help restore water bodies to more natural conditions.

Category 5: Polluted waters that require a water improvement project

This is the list of impaired water bodies traditionally known as the 303(d) list. Starting with the 2004 Water Quality Assessment, Washington's 303(d) list of polluted waters were placed under category 5 in the approved assessment. TMDLs or other approved water quality improvement projects are required for the water bodies in this category.

If a water body is in this category it means that we have data showing that the water quality standards have been violated for one or more pollutants, and there is no TMDL— or pollution control program — in place.

Spokane River Dissolved Metals Total Maximum Daily Load

Submittal Report

May 1999
Publication No. 99-49-WQ


Printed on Recycled Paper

Description of Pollutant Sources

Seven wastewater treatment facilities legally discharge to the river. In Idaho, EPA permits the following discharges (proceeding downstream from the river source):

- City of Coeur d'Alene Advanced Wastewater Treatment Plant
- Hayden Area Regional Sewer Board Publicly-owned Treatment Works
- City of Post Falls Publicly-owned Treatment Works

Continuing downstream, Ecology permits discharges from:

- Liberty Lake Publicly-owned Treatment Works
- Kaiser Aluminum Industrial Wastewater Treatment Plant
- Inland Empire Paper Company Industrial Wastewater Treatment Plant
- City of Spokane Advanced Wastewater Treatment Plant

Applicable Criteria

Description of the Applicable Water Quality Standards and Numeric Water Quality Target

Within The State of Washington, water quality standards are published pursuant to Chapter 90.48 of the Revised Code of Washington (RCW). Authority to adopt rules, regulations, and standards as are necessary to protect the environment is vested with the Department of Ecology. Under the federal Clean Water Act, the EPA Regional Administrator must approve the water quality standards adopted by the State (Section 303(c)(3)). Through adoption of these water quality standards, Washington has designated certain characteristic uses to be protected and the criteria necessary to protect these uses [Washington Administrative Code (WAC), Chapter 173-201A). These standards were last adopted in November 1997.

This TMDL is designed to address impairments of characteristic uses caused by toxic effects of metals. The characteristic uses designated for protection in the Spokane River are as follows:

"Characteristic uses. Characteristic uses shall include, but not be limited to, the following:

(i) Water supply (domestic, industrial, agricultural).

(ii) Stock watering.

(iii) Fish and shellfish:

Salmonid migration, rearing, spawning, and harvesting.

Other fish migration, rearing, spawning, and harvesting.

Clam and mussel rearing, spawning, and harvesting.

Crayfish rearing, spawning, and harvesting.

(iv) Wildlife habitat.

(v) Recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment).

(vi) Commerce and navigation."

[WAC 173-201A-030(2)]

The water quality standards describe criteria for metals for the protection of characteristic uses. The Spokane River TMDL establishes allocations for cadmium, lead, and zinc. The chronic and acute criteria of these metals apply to the dissolved form and are calculated using water hardness (in mg/L as $CaCO_3$) based on the following equations:

Dissolved Cadmium

Chronic $\leq$ (1.101672-((ln(hardness))(0.041838)))*EXP(0.7852*(ln(hardness))-3.49)*

Acute $\leq$ (1.136672-((ln(hardness))(0.041838)))*EXP(1.128*(ln(hardness))-3.828)*

Dissolved Lead

Chronic $\leq$ (1.46203-((ln(hardness))(0.145712)))*EXP(1.273*(ln(hardness))-4.705)*

Acute $\leq$ (1.46203-((ln(hardness))(0.145712)))*EXP(1.273*(ln(hardness))-1.46)*

Dissolved Zinc

*Chronic $\leq$ 0.986*EXP(0.8473*(ln(hardness))+0.7614)*

*Acute $\leq$ 0.978*EXP(0.8473*(ln(hardness))+0.8604)*

[WAC 173-201A-040]

Water Quality Impairments

As a result of measurements made that show criteria are exceeded, the Spokane River (representing 18 segments) is included on Washington's 1998 Section 303(d) list (Table 1).

Table 1. Spokane River 1998 Section 303(d) Listed Segments

Listed Parameter	**Segment Location (Township-Range-Section)**
Cadmium	25N-46E-06
Lead	25N-42E-14, 26N-42E-20, 25N-46E-06
Zinc	25N-42E-14, 26N-42E-20, 26N-42E-33, 25N-44E-03, 25N-46E-06
PCBs*	27N-40E-22, 26N-42E-05, 26N-42E-07, 28N-37E-33
Chromium*	25N-42E-04
Arsenic*	25N-46E-06
Sediment Bioassay*	28N-37E-33, 25N-43E-01
Dissolved Oxygen*	25N-44E-06, 25N-46E-06
pH*	28N-36E-20
Temperature*	28N-36E-20
Total Phosphorus*	26N-42E-07

- not addressed in this TMDL

Seasonal Variation

Data on total recoverable cadmium, lead, zinc, and hardness collected by Ecology at the Washington-Idaho border between 1991 and 1998 were compiled and descriptive statistics generated (Table 2). Sufficient dissolved metals data of which the TMDL is based were not available to compute similar statistics. However, similar patterns are observed with total recoverable metals and are used here only for presentation. Additional information regarding the relationship of dissolved metals with flows is presented in Pelletier and Merrill (1998). The dissolved metals vary with the seasonal flows.

Water quality data on total recoverable metals collected in the Spokane River show seasonal variation at the Washington-Idaho border. The total recoverable metals data show increasing trends as river flows increase in the spring. Water quality data on hardness collected in the Spokane River do not show significant seasonal variation at the Washington-Idaho border. However, hardness in the river does exhibit a large summer variation in the lower reaches downstream of where significant groundwater contributions to the river are observed (Table 3).

Table 2. Seasonal Statistics of the Spokane River Total Recoverable Metals at Washington-Idaho Border

Time Period	Cadmium (µg/L)		Lead (µg/L)		Zinc (µg/L)	
	Median	Standard Deviation	Median	Standard Deviation	Median	Standard Deviation
Winter (December-February)	0.3	0.8	1.5	6.2	86.5	12.3
Spring (March-May)	0.4	0.0	3.1	6.4	89.6	10.3
Summer (June-August)	0.3	0.1	1.6	3.1	47.0	18.0
Fall (September-November)	0.2	0.1	1.2	0.7	49.0	23.7
Annual (January-December)	0.3	0.5	1.5	4.6	79.5	23.0

Table 3. Seasonal Statistics of the Spokane River Hardness (in mg/L as $CaCO_3$)

Time Period	River Mile 100.7		River Mile 96.0		River Mile 85.3		River Mile 66.0	
	Median	Standard Deviation	Median	Standard Deviation	Median	Standard Deviation	Median	Standard Deviation
Winter (December-February)	22.0	1.7	23.0	1.1	27.0	3.1	37.0	6.3
Spring (March-May)	23.0	2.2	23.0	0.6	26.0	1.6	36.0	2.3
Summer (June-August)	20.0	2.6	20.0	1.7	59.5	29.9	72.0	26.3
Fall (September-November)	21.0	2.0	20.5	0.7	37.0	3.4	58.0	6.3
Annual (January-December)	22.0	2.3	22.0	1.4	32.5	20.4	48.5	20.7

Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load

Water Quality Improvement Report

DEPARTMENT OF ECOLOGY
State of Washington

Revised February 2010
Publication No. 07-10-073

Load and Wasteload Allocations

Wasteload allocations

The seasonal (March to October) wasteload allocations for municipal wastewater treatment plants and industrial dischargers are all based on meeting a maximum monthly average concentration of 50 µg/L total phosphorus (see Table 3) and are shown in Table 5. These wasteload allocations, when combined with load allocations and Avista's dissolved oxygen responsibility and the reductions assumed for the Idaho NPDES permits, will result in water quality standards being met in the Spokane River and Lake Spokane. The following factors and goals were considered in setting the wasteload allocations:

- The limited loading capacity of the river requires that point sources, nonpoint sources, and Avista significantly reduce their impact on water quality impairments;
- Point source reductions should be equitably distributed among point sources, with a goal of establishing achievable reductions.

Wasteload allocations are based on modeling of seasonal average effluent pollutant concentrations for the critical period (March to October) and projected effluent flow rates for 2027. The seasonal average concentrations are less than 50 µg/L because effluent concentrations are not constant over time. Therefore, a discharger's seasonal average concentration will be somewhat less than its maximum monthly average concentration. Modeling assumptions about future municipal effluent quality are consistent for all facilities, and variation in monitoring frequency is factored into the analysis. Statistics may be used in the NPDES permitting process to calculate maximum monthly and daily or weekly effluent limits that consider facility-specific effluent variability, are consistent with these seasonal average wasteload allocations, and comply with NPDES regulations. Effluent limits that implement wasteload allocations in NPDES permits need not be identical to the wasteload allocations in order to be consistent with the wasteload allocations (EPA Environmental Appeals Board, 10 E.A.D. 135, 2001). The long term average loads included in Table 5 were calculated using the following equation:

Equation 1. Wasteload allocations for point sources.

2027 Effluent Flow *(MGD)* × Seasonal Avg. Conc. in Table 5 *(ppm)* × 8.3454 lbs/gal

During the Spokane TMDL Collaboration, phosphorus concentrations were translated into pounds per day wasteload allocations based on discharge volume estimates. Ecology used the discharger-supplied flow estimates to calculate pounds per day wasteload allocations for ammonia and CBOD. Equation 1 is used to convert phosphorus, ammonia, and CBOD concentrations for each of the Dischargers into pounds per day wasteload allocations based on projected flows. The NPDES permits will require reporting of actual flows, not projected flows, to determine compliance with the wasteload allocations.

Table 5. Wasteload allocations for Washington Dischargers, including stormwater. *Wasteload to lbs/day by Equation 1. Seasonal (March to October) average loads shown in the table can be converted to appropriate monthly and maximum daily loads in the Dischargers' NPDES permits.*

Point Source Discharge	2027 Projected Flow Rates (MGD) [1]	NH3-N		TP		$CBOD_5$ [2]	
		mg/L	lbs/day (WLA)	mg/L	lbs/day (WLA)	mg/L	lbs/day (WLA)
Liberty Lake	1.5	variable[3]	variable[3]	0.036	0.45	3.6	45.1
Kaiser[4]	15.4	0.07	9.0	0.025	3.21	3.6	462.7
Inland Empire Paper Company	4.1	0.71	24.29	0.036	1.23	3.6	123.2
City of Spokane	50.8	variable[3]	variable[3]	0.042	17.81	4.2	1780.6
Spokane County (new plant)	8	variable[3]	variable[3]	0.042	2.80	4.2	280.4
Stormwater[5]	2.36	0.05	0.98	0.310	6.1	3.0	59.1
CSO	0.12	1.0	1.0	0.95	0.95	30.0	30.0

Notes:
1- Actual, not projected flows, will determine compliance with wasteload allocations in NPDES permits. See footnote in Table 3 for existing (2001) flows and concentrations.

2- NPDES permit limits will use $CBOD_5$ (as shown) rather than $CBOD_{ult}$ (as modeled and shown in Table 3).

3-Ammonia wasteload allocations for these facilities vary depending on the season based on the following effluent concentrations (loading limits use these concentrations and the design flow):

Liberty Lake:
March-May, October: 0.71 mg/L
June-September: 0.18 mg/L

City of Spokane and Spokane County:
March-May, October: 0.83 mg/L
June-September: 0.21 mg/L

4 - Wasteload allocations for Kaiser are lower than other dischargers due to non-contact groundwater, which is low in nutrients, comprising a significant portion of that facility's discharge.

5 -Stormwater wasteload allocation is for Washington sources only and is based on average existing flows, not 2027 projected flows. Idaho sources were estimated in the stormwater analysis using the Simple Method described in Appendix K.

Loading from sources in Idaho

Because EPA will develop and issue NPDES permits for Idaho point sources, Ecology worked closely with EPA to develop very specific assumptions about the anticipated permit-driven reductions of anthropogenic loading of phosphorus, CBOD, and ammonia from wastewater treatment plants and stormwater in Idaho. These assumptions are based on point sources

TMDL limits for Dissolve Metals on the Spokane River

	River Hardness$_1$ at River Mile Locations (m/L as $CaCO_3$)			Dissolved Lead (m/L as CaCO3)		Dissolved Zinc (m/L as CaCO3)	
Time Period	River Mile 85.3	River Mile 66.0	River Mile$_2$ 75.5	Chronic$_3$	Acute$_3$	Chronic$_4$	Acute$_4$
Winter (December-February)	27.0	37.0	32.1	**0.72**	**18.37**	**39.88**	**43.67**
Spring (March-May)	26.0	36.0	31.1	**0.69**	**17.73**	**38.82**	**42.52**
Summer (June-August)	59.5	72.0	65.8	**1.59**	**40.86**	**73.35**	**80.33**
Fall September-November)	37.0	58.0	47.7	**1.11**	**28.58**	**55.78**	**61.08**
Annual (January-December)	32.5	48.5	40.6	**0.93**	**23.92**	**48.72**	**53.35**

1 - Median Values from Department of Ecology Publication No. 99-49-WQ during different time periods at River Mile 85.3 and River Mile 66.0 of the Spokane River

2 - Approximate River Mile along the Spokane River for the proposed property

3 - Chronic and acute values for dissolved lead are based on the following equations:

- Chronic < (1.46203-((ln(hardness))*(0.145712)))*EXP(1.273*(ln(hardness))-4.705)
- Acute < (1.46203-((ln(hardness))*(0.145712)))*EXP(1.273*(ln(hardness))-1.46)

4 - Chronic and acute values for dissolved zinc are based on the following equations:

- Chronic < 0.986*EXP(0.8473*(ln(hardness))+0.7614)
- Acute < 0.978*EXP(0.8473*(ln(hardness))+0.8604)

Appendix G: Contaminated Site Information

Deleted from SWPPP Appendix to Washington State Department of Ecology Engineering Design Report deliverable required by PPCD No. 21200059-32 to reduce file size.

APPENDIX D

Contaminated Media Management Plan

CONTAMINATED MEDIA MANAGEMENT PLAN

District on the River Redevelopment
PPCD No. 21200059-32

Prepared for: Sagamore Spokane, LLC

Project No. 190210 • April 29, 2021 FINAL

Aspect CONSULTING

earth + water

CONTAMINATED MEDIA MANAGEMENT PLAN

District on the River Redevelopment
PPCD No. 21200059-32

Prepared for: Sagamore Spokane, LLC

Project No. 190210 • April 29, 2021 FINAL

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\\seafps\Deliverables\190210 Sagamore Spokane\Deliverables\Engineering Design Report\FINAL\Appendix D CMMP\Sagamore CMMP_Final_042921.docx

Contents

Tables

List of Figures

List of Appendices

1 Introduction

This Contaminated Media Management Plan (CMMP) prepared by Aspect Consulting, LLC (Aspect) on behalf of Sagamore Spokane, LLC (Sagamore) presents the requirements of managing contaminated media during cleanup and redevelopment activities to be conducted at properties located at 111 North Erie Street in Spokane, Washington (Property). Redevelopment of the Property includes portions of the Hamilton Street Bridge Site (the Site), as well as portions of the Property outside the Site (Figure 1). A manufactured gas plant (MGP) formerly operated at the Site resulting in MGP contamination of soil and groundwater. This CMMP is prepared as an appendix to the Engineering Design Report (EDR) and intended to outline the management requirements for the contaminated media to be handled during construction.

The goal of this CMMP is the protection of human health and the environment from hazardous substances at the Site during redevelopment, in accordance with the cleanup standards and other requirements of the Washington State Model Toxics Control Act (MTCA), Chapter 70.105D RCW and WAC 174-340. This CMMP was developed by Aspect who will have a field representative on Site during subsurface construction activities to oversee the excavations, deep foundations, soil categorization and segregation, and direct the disposition of soils.

The Contractor must comply with all requirements of this CMMP. The Contractor is solely responsible for creating and ensuring compliance with their own Health and Safety Plan (HASP) that meets the requirements of Ecology and all construction health and safety regulations and requirements. Aspect's Health and Safety Plan is included as Appendix A.

The management requirements described herein are based on available characterization data. A stockpile and profiling approach for each building footprint is proposed and actual category extents will be refined in the field during the excavation of contaminated fill. Soil sampling will be conducted along with field screening to facilitate appropriate disposal categories.

2 Site Background

Historically, parcels that comprise the Site were owned and/or operated for MGP production, railroad operations, and construction materials storage and recycling. Historical operations led to the investigation and cleanup of hazardous substances in soil and groundwater under the Washington State Model Toxics Control Act cleanup regulation (MTCA), Chapter 173-340 of the Washington Administrative Code (WAC 173-340). A final cleanup action was implemented at the Site under Consent Decree No. 0205445-0 between Ecology and PLPs: Avista Corporation, Burlington Northern Santa Fe Railway Company (BNSF), and Spokane River Properties (SRP). Soil and groundwater at the Site are contaminated with chemicals from the MGP operations. The

Indicator Hazardous Substances (IHSs) include: Total Petroleum Hydrocarbons (TPH), noncarcinogenic Polycyclic Aromatic Hydrocarbons (PAHs), carcinogenic PAHs, semivolatile Organic Compounds (sVOCs), metals, and cyanide.

The cleanup action completed by the PLPs consisted of a limited soil cap, stormwater management, streambank bioengineering, and monitoring well modifications, as reported in the 2006 *Cleanup Action Completion Report* (Landau, 2006). Subsequent to the cleanup action implementation, the Site has undergone two 5-year period reviews by Ecology in 2010 and 2015.

3 Construction and Safety Requirements

The following is a brief summary of construction and safety requirements to be employed at the Site during the cleanup action:

- All persons performing earthwork or subgrade activities where they may contact hazardous materials, must have completed Hazardous Waste Operations and Emergency Response (HAZWOPER) 24-hour or 40-hour training in accordance with the Occupational Safety and Health Administration Part 1910.120 of Title 29 of the Code of Federal Regulations, and be in possession of a current HAZWOPER certification card.
- The Contractor will prepare and operate under its own Site-specific Health and Safety Plan (HASP). The HASP should include guidelines to reduce the potential for injury, as well as incident preparedness and response procedures, emergency response and evacuation procedures, local and project emergency contact information, appropriate precautions for potential airborne contaminants and Site hazards, and expected characteristics of generated waste.
- A safety meeting will be conducted prior to the start of each workday to inform workers of changing work conditions and to reinforce key safety requirements.

All work must be conducted in a manner consistent with federal, state, and local construction and applicable health and safety standards. All Contractors are responsible for the health and safety of their own workers.

3.1 Roles and Responsibilities

Aspect is the remediation engineer of record (Engineer) for the Project and responsible for ensuring the cleanup actions are completed in accordance with the Cleanup Action Plan Amendment and the EDR. Aspect is also the geotechnical engineer of record (Geotechnical Engineer) and is responsible for geotechnical inspections. The civil engineer of record is DCI Engineers, and they are responsible for the Project civil bidding plan set included as Appendix F of the EDR. Sagamore's construction representative, and manager is OAC Services, Inc. (OAC), who is responsible for contracting and overseeing the General Contractor. The General Contractor selected for the project is Swinerton Inc.; Swinerton Inc. and all of their subcontractors are referred to herein as the Contractor. The Contractor is responsible for adhering to requirements outlined in this CMMP.

4 Subsurface Conditions

4.1 Soil Conditions

The Site geologic units in the most general classifications from youngest to oldest are soil cover (primarily sandy gravel), fill materials (including cinder, brick, basalt cobbles and boulders, and MGP infrastructure waste), unconsolidated alluvial sediment deposits, and Grande Ronde basalt bedrock. The fill materials are up to 30-feet thick and are the thickest along the western portion of the Site near the Spokane River. This area of the Site was formerly the Spokane River, but the southern bank was filled in the 1910s shifting the riverbank up to 230 feet north (Landau, 2001). Site cross sections showing the fill composition and depth variation across the Site are shown in Figures 3A through 3F in Appendix B.

4.2 Groundwater Conditions

Site groundwater and interactions with the Spokane River have been studied for decades (Landau, 2001). Groundwater is encountered at the Site at an average depth of approximately 13 feet bgs or an approximate elevation of 1873 feet.

5 Soil Generation

Shallow excavation of fill materials will occur in limited portions the footprints of Buildings 1A and 1B for geotechnical stability. Buildings 2A and 2B will have deep foundations constructed with grouted helical piles. The following sections outline soil management for each proposed building.

5.1 Building 1A Mat Foundation Limited Excavation

Building 1A will be grade-supported at elevations above existing grades. Grading at these locations would expose variable soil units that may include basalt fill, cinder fill, undifferentiated fill, and flood-channel deposits. The unsuitable fill (excluding dense basalt fill) and compressible silt overbank deposits will be excavated and replaced with structural fill for slab subgrade. Based on the subsurface explorations and current topography, an excavation to approximately 3 feet bgs is anticipated at the western end of Building 1A to remove geotechnically unsuitable fill (Figure 2). Excavated soils will be field segregated and temporarily stockpiled, pending profiling for disposition.

5.2 Building 1B Mat Foundation Limited Excavation

Building 1B will also be grade-supported at elevations above existing grades. Cinder and basalt fill are anticipated beneath this building footprint. Excavation will not be necessary below the majority of Building 1B due to the presence of shallow basalt fill, except at the

eastern end of the building footprint where thicker deposits of unsuitable fill exist. In this area, excavation to an approximate depth of 5.5 feet is required and will be backfilled with structural fill (Figure 2). Excavated soils will be field segregated and temporarily stockpiled, pending profiling for disposition.

5.2.1 Building 2A Deep Foundation Spoils

Building 2A is located within the extents of PAH-affected soils as shown on Figure 2 and any spoils produced during pile installation will be categorized as Contaminated Fill, as defined in Section 6.1 below.

5.2.2 Building 2B Deep Foundation Spoils

The majority of the Building 2B footprint is outside the extents of PAH-affected soils but will have deep foundation piles, which may produce spoils. Spoils without field indicators of contamination will be segregated as Potentially Noncontaminated Fill, and confirmed with analytical sampling prior to disposition. Fill with field indicators of contamination will be managed as Contaminated Fill, as defined in Section 6.1 below.

6 Monitoring Well Protection

All existing monitoring wells shown on Figure 2 will be protected in place using physical barriers (i.e., concrete jersey barriers) to prevent risk of damage during construction. Should any monitoring wells need to be decommissioned due to unforeseen circumstances during construction, both decommissioning and eventual replacement would be completed by a licensed driller and coordinated with Ecology and by Aspect.

7 Waste Management and Removal Plan

7.1 Soil Handling

An Aspect field representative will be on Site during excavation activities to screen soils, direct soil segregation, conduct sampling, and direct soil disposition. All waste produced during redevelopment will be handled and disposed of in accordance with Washington State Dangerous Waste Regulations (WAC 173-303).

7.1.1 Soil Categories

All soil to be generated from the activities described in Section 5 will be segregated, handled, and disposed or reused in three categories:

1) **Clean Crushed Rock** (estimated 300 cubic yards [CY], 510 tons). Crushed rock removed from the top 2 feet of existing soil cover. Clean crushed rock will be verified with no field indicators of contamination and will be segregated from other soil categories. This soil category may be reused, if approved by the Geotechnical Engineer, without chemical analytical testing. The areas of potential reuse are shown on Figure 2.

2) **Contaminated Fill** (estimated 500 CY, 850 tons). Contaminated Fill is anticipated based on the extents of PAH-affected soils overlying the excavation areas (Figure 2). These potentially contaminated soils will be segregated from other soil categories and will be sampled for waste characterization by the Engineer to confirm Contaminated Fill categorization. Once analytical testing confirms categorization, Contaminated Fill may be reused on Site if approved by the Geotechnical Engineer and Ecology OR disposed of as outlined in Section 7.4.

3) **Potentially Noncontaminated Fill** (estimated 700 CY, 1,190 tons). Noncontaminated is defined by soil with analytical results showing that concentrations of IHSs are below their respective Site cleanup levels (Ecology, 2001) and have no observed physical evidence of contamination (sheen, odor, or staining). Once analytical testing confirms categorization, Noncontaminated Fill may be reused on Site if approved by the Geotechnical Engineer and Ecology OR dumped at an off-Site location approved by the Engineer.

4) **Contaminated Debris.** During excavation to remove soil, debris may be encountered. Contaminated debris includes any non-wood debris whose largest dimension exceeds 1 foot, wood debris whose largest dimension exceeds 6 feet, or a total debris content that exceeds 10 percent by volume of the total waste stream (or based on disposal facility specific acceptance requirements). Any debris that does not meet these criteria will be segregated and managed as contaminated debris as directed by the Engineer. Debris will be disposed of offsite and is not eligible for reuse.

Table 1 (attached) contains estimates of Clean Crushed Rock, Potentially Noncontaminated Fill, and Contaminated Fill to be generated.

7.1.2 Soil Screening and Stockpiling

When evidence of MGP waste-contaminated fill is encountered, an Aspect field representative will use visual, olfactory, and photo-ionization detector (PID) field screening to direct the Contractor in real-time segregation of soil categories. Example of field indicators of contamination include:

- The presence of separate-phase petroleum hydrocarbon product or other chemicals
- The presence buried pipes, conduits, or tanks with sludge or trapped liquid indicating petroleum hydrocarbon presence
- The presence of tar or clinker debris (shiny, low density, sand-like material)
- The presence of oil-like odors
- PID screening results

Contaminated Fill and Potentially Noncontaminated Fill will be temporarily stockpiled for sampling prior to disposition. The Contractor will manage temporary stockpiles according to:

- Contaminated and Potentially Noncontaminated stockpiles will be lined with plastic sheeting of 10-mil minimum thickness, with adjacent sheeting sections overlapping a minimum of 3 feet. Clean Crushed Rock stockpiles will not be lined.
- The perimeter of stockpiles will be surrounded by a berm to prevent run-on and/or runoff of precipitation.
- All stockpiles will be covered with plastic sheeting of 6-mil minimum thickness when not in use, and the cover will be anchored to prevent it from being disturbed by wind.
- Potentially Contaminated Fill stockpiles will be stored under the Hamilton Street Bridge when possible to prevent precipitation onto the soils.
- Stockpiles will be located in consistent, separate places onsite for tracking purposes. Stockpiles will also be marked with colored survey flags indicating the status of the stockpile: Pending Analytical, Confirmed, Contaminated, Noncontaminated, and Clean Crushed Rock.

7.1.3 Soil Sampling and Analysis

Aspect will collect soil samples from temporary stockpiles for laboratory analysis for any of the following reasons:

- To confirm Potentially Noncontaminated Fill is below Site Cleanup Levels and eligible for reuse on Property and on Site
- To confirm Contaminated Fill Categorization
- For waste characterization of Contaminated Fill to be disposed at an off-Site disposal facility

Soil samples for laboratory analysis will be collected using U.S. Environmental Protection Agency (EPA) Method 5035 sampling kits and jars depending on the analysis. Five-point composite samples will be collected from temporary stockpiles. Section 5.3 discusses sampling requirements for stockpiles.

Laboratory analyses for disposal profiling will be limited to disposal facility acceptance requirements and will typically include the following:

- Arsenic by EPA Method 6020; if thallium is requested by the disposal facility it will also be by EPA Method 6020
- Mercury by EPA method 7471
- Other RCRA and MTCA Metals by EPA Method 6010/7471
- Low-level PAHs by method EPA 8270D SIM
- BTEX by EPA Method 8021 or 8260
- WAD Cyanide, if requested by the disposal facility, by Method 4500.
- Toxicity Characteristic Leaching Procedure (TCLP) for Lead and Benzene will be completed on select samples to confirm disposal profiling as nonhazardous, and as required by the disposal facility.

The most critical IHS at this Site is total carcinogenic PAHs for which the cleanup level is 1 mg/kg. The soil sampling and analysis activities will depend on field screening results, stockpile volumes, disposal facility profiling requirements, and other factors. Sampling and analysis requirements (e.g., number of samples, sampling locations, and analyses to be performed) will be determined by Aspect on a case-by-case basis.

Table 2 below provides the number of samples needed to characterize stockpiles of various sizes, per Table 6.9 of *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology, 2016):

Table 2. Typical Number of Samples Needed to Adequately Characterize Stockpiled Soil

Cubic Yards of Soil	Number of Samples for Chemical Analysis
0 to 100	3
101 to 500	5
501 to 1,000	7
1,001 to 2,000	10
>2,000	10 + 1 for each additional 500 cubic yards

7.1.4 Soil Disposition

The Clean Crushed Rock soil category may be reused. Noncontaminated and Contaminated Fill verified with analytical testing, if determined to be geotechnically suitable, may also be reused with Ecology sign-off. The Noncontaminated Fill not geotechnically suitable for reuse may require off-Site disposal. The areas for reuse are shown on Figure 2.

Contaminated Fill that is not eligible for reuse requires disposal in a permitted landfill. Soils with HIS concentrations above cleanup levels can be disposed at a Subtitle D Landfill. All contaminated material will be handled and disposed of in accordance to state Dangerous Waste and federal Hazardous Waste regulations. The Contaminated Fill category has the following handling and disposal requirements:

- **Temporary Stockpiling**. All Contaminated Fill will be temporarily stockpiled on Site for waste profiling. Waste profiling will occur via composite sampling by an Aspect field representative and is expected to take 1 to 2 weeks to complete waste profiling necessary for off-Site disposal.
- **Loading and Transportation/Trucking.** Contaminated Fill will be loaded into trucks, roll-off bins, or other container type for transport to the selected treatment/disposal facility. A tracking procedure must be developed and implemented, and transportation and disposal manifests and weight tickets for every truck or container must be provided to Aspect for Ecology reporting.
- **Disposal Facilities**. Excavated and loaded Contaminated Fill can be transported to the selected disposal facility after approval from the facility. For planning purposes, this is assumed to be a Subtitle D Landfill such as **Waste Management's Graham Road Landfill in Medical Lake, Washington**. Aspect

will coordinate with the Contractor to obtain the facility's approval to receive the Contaminated Fill.

- **Unanticipated MGP Waste.** Should liquid or tarry waste material be excavated as outlined in Section 5, the waste will be placed in a lined roll off box pending analytical results for profiling and disposal.

7.2 Discovery of Potentially Contaminated Materials

Should possibly contaminated materials be discovered when an Aspect field representative is not present, the Contractor should be familiar with and utilize the field-screening indicators indicated in Section 5.1, above. Any related discoveries should be reported to Aspect.

7.2.1 Suspected Impacted Soil

It is the responsibility of the Contractor to identify potentially impacted soil if discovered in unexpected locations. Equipment operators and laborers will be instructed to immediately report to their supervisors any potential evidence of contamination and cease work in that area pending evaluation by Aspect. Criteria to be used in identifying Potentially Contaminated Fill include (but are not limited to):

- Petroleum hydrocarbon staining, sheen, or chemical color hues in soil or standing water
- Soil material that is bluish in color or turns blue when exposed to air. This material may have a distinct, foul, almond-like odor and may be corrosive and cyanide containing
- The presence of separate-phase petroleum hydrocarbon product or other chemicals
- The presence of tar or clinker debris (shiny, low density, sand-like material).
- The presence of gasoline- or oil-like odors

If evidence of potential contamination in an unexpected location is identified, notify Aspect immediately. Aspect will assist the Contractor with environmental monitoring and evaluate the need for field screening and possible segregation of Contaminated Fill and Potentially Noncontaminated Fill. Section 10 of this CMMP provides contact information to be used upon discovery of suspect impacted soil.

7.2.2 Underground Storage Tanks

There are no documented underground storage tanks (USTs) present or anticipated. However, if an undocumented UST is discovered during earthworks, the following Ecology protocols for removing a UST will be followed:

1) Prior to removal, an International Code Council (ICC) Certified Site Assessor must provide notice of UST removal/closure to Ecology using the *30-Day Notice* form[1]. Ecology will provide written or verbal authorization to proceed with the UST removal.

[1] The requirement for 30-day advance notice of a UST closure will be waived if an unexpected UST is encountered, but the form must be filled out and submitted.

2) Prior to removal, an ICC-certified UST Decommissioner must empty and clean the tank of all liquids and accumulated sludges. The tank must be properly inerted of flammable vapors by a marine chemist, as directed by the International Fire Code. The Decommissioner must ensure the tank atmosphere and excavation area are regularly monitored for flammable vapor concentrations until the tank is removed from both the excavation and the Site.

3) The cleaned tank may be removed from the excavation, crushed, and transported from the Site (e.g., to a metals recycler). Once the tank is removed, the Decommissioner must ensure the tank atmosphere and excavation area are regularly monitored for flammable vapors until the tank is removed from the excavation and the redevelopment areas.

4) The UST Site assessor will photo document and visually inspect the tank prior to transportation, obtain confirmation soil samples from the excavated UST pit, and assist with the segregation and management of any suspected impacted soil identified during UST removal. The Decommissioner is required to fill out a Permanent Closure Notice that must also be signed by the Site owner.

5) Any removed tanks will be tracked to final destination to ensure no reuse. The fate of any removed USTs will be documented in the Construction Completion Report.

If there is no clear evidence of contamination, soil samples will be collected for laboratory analysis in accordance with the sampling requirements provided in Ecology's *Guidance for Site Checks and Site Assessments for Underground Storage Tanks* (Ecology, 2003). For example, if field screening does not indicate evidence of soil contamination in the excavation pit, one soil sample will be collected from beneath each UST and one from each of the four excavation pit sidewalls.

Aspect will complete a Site Check/Site Assessment Checklist and prepare either a Site assessment report (if no contamination is confirmed) or a Site characterization report (if contamination is confirmed) for submittal to Ecology[2].

7.2.3 Other Excavation Discoveries

Examples of other possible excavation discoveries of environmental concern include:

- An undocumented monitoring well
- An unknown underground facility, such as utility vaults or sumps
- A utility line exhibiting evidence of contamination
- Debris or buried waste material exhibiting evidence of contamination, such as drums, paint/oil cans, etc.

The Contractor is responsible for reporting any unanticipated discovery. Aspect is responsible for documenting any unanticipated discovery.

[2] These Aspect submittals will be prepared by an ICC-certified UST Site Assessor.

7.3 Water Management

Site cleanup and redevelopment activities are subject to adherence to the Construction Stormwater General Permit (CSWGP; WAR309537) and associated Administrative Order (AO; AO 19443), included as Appendix B of the EDR. Construction requires excavation for building mat foundations and utilities and pile installation for deep foundations. For excavations that expose Contaminated Fill, the Contractor shall use Best Management Practices (BMPs) to ensure that rainwater does not fall directly onto contaminated soils and that any stormwater does not flow into excavations. Required Actions and BMPs are listed in the AO and the Stormwater Pollution Prevention Plan (SWPPP) included as Appendix C of the EDR.

Key points from the AO and SWPPP include the following:

- Surficial stormwater runoff will not be permitted to come in contact with contaminated material prior to inducing runoff.
- All contaminated stockpiles will be stored in a covered condition.
- Potentially Noncontaminated Fill stockpiles will also be covered pending analytical results.
- Stormwater runoff will be directed to the existing northern swale during construction and infiltrated.

All Site runoff that reaches the swale will come from covered areas, not from exposed contaminated areas. Excavation will not extend below the water table, and contaminated groundwater is not expected to accumulate during construction. No excavation dewatering is planned for construction.

8 Backfill

The Building 1A and 1B building excavations will be backfilled to subgrade for building foundation construction with structural fill as specified in the Geotechnical Report (Appendix G of the EDR). Building subgrades will include the vapor mitigation as discussed in Section 6.

The Clean Crushed Rock soil category may be used as backfill in the existing western stormwater infiltration basin and the Building 2B footprint as subgrade material (Figure 2) without analytical testing.

Potentially Noncontaminated and/or Contaminated Fill may be temporarily stockpiled and reused on Site if deemed geotechnically suitable, as determined by the Geotechnical Engineer and approved by Ecology. The anticipated amount of on-Site reuse for this category is minimal as a majority of this fill is oversized (greater than 12 inches in diameter) or anticipated to not be geotechnically suitable (high fines content; see the Geotechnical Report [Appendix G of the EDR], Section 5.10.3 Structural Fill for specifications). Inert anthropogenic material (i.e., bricks) may also be reused as non-structural fill with Ecology approval; however, other Comminated Debris (i.e., large or treated wood, or MGP infrastructure) will not be reused as backfill.

Any utility trenches excavated into contaminated soils are to be lined with high density polyethylene liner and backfilled with Noncontaminated Fill approved by the Geotechnical Engineer, or with clean imported structural fill.

Imported clean structural fill from a certified source may be used without any prior sampling. This includes fill from a clean virgin source. All imported fill will be certified by the Contractor as clean, and be approved by Ecology before import.2015

9 Contact Information

This section lists key Project Contacts involved in implementation or changes to this CMMP. In the event of a discovery of USTs, suspected Contaminated Fill, or other possible conditions of environmental concern, the Aspect project managers listed below should be notified as soon as possible. Primary and backup points of contact are provided in the table below.

Project Team Contacts

Name		Title	Phone	Email
Aspect Consulting				
Primary Contact	Breeyn Greer	Environmental Engineer	612.232.7343	bgreer@aspectconsulting.com
Backup Contact	Spencer Ambauen	Geotechnical Engineer	206.949.6073	sambauen@aspectconsulting.com

Name		Title	Phone	Email
Primary Contact	Adam Griffin	Project Manager	206.780.7746	agriffin@aspectconsulting.com
Alternate Contact	Dave Cook	Principal	206.838.5837	dcook@aspectconsulting.com
Construction Management & Development Inc. — Owner's Construction Representative				
Primary Contact	Ron Steitzer	Senior Construction Manager	808.224.9997	rsteitzer@cmdintl.com
Backup Contact	Matt Cauley	Project Associate	772.321.3389	mcauley@cmdintl.com

10 References

Landau Associates, Inc. (Landau), 2001, Second Supplemental and Remedial Investigation, Hamilton Street Bridge Site, Spokane, Washington, February 9, 2001.

Landau Associates, Inc. (Landau), 2006, Cleanup Action Completion Report: Hamilton Street Bridge Site, Spokane, Washington, February 2, 2006.

Washington State Department of Ecology (Ecology), 2001, Final Cleanup Action Plan, Hamilton Street Bridge Site, Spokane, WA, August 10, 2001.

Washington State Department of Ecology (Ecology), 2003, Guidance for Site Checks and Site Assessments for Underground Storage Tanks, Underground Storage Tank Program Publication No. 90-52, Revised April 2003.

Washington State Department of Ecology (Ecology), 2015, Second Periodic Review: Hamilton Street Bridge Site, Facility/Site ID#: 84461527, Cleanup Site ID # 3509, 111 North Erie Street, Spokane, Washington 99212, October 2015.

Washington State Department of Ecology (Ecology), 2016, Guidance for Remediation of Petroleum Contaminated Sites, Toxics Cleanup Program Publication No. 10-09-057, Revised June 2016.

11 Limitations

Work for this project was performed for Sagamore Spokane, LLC (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

TABLE

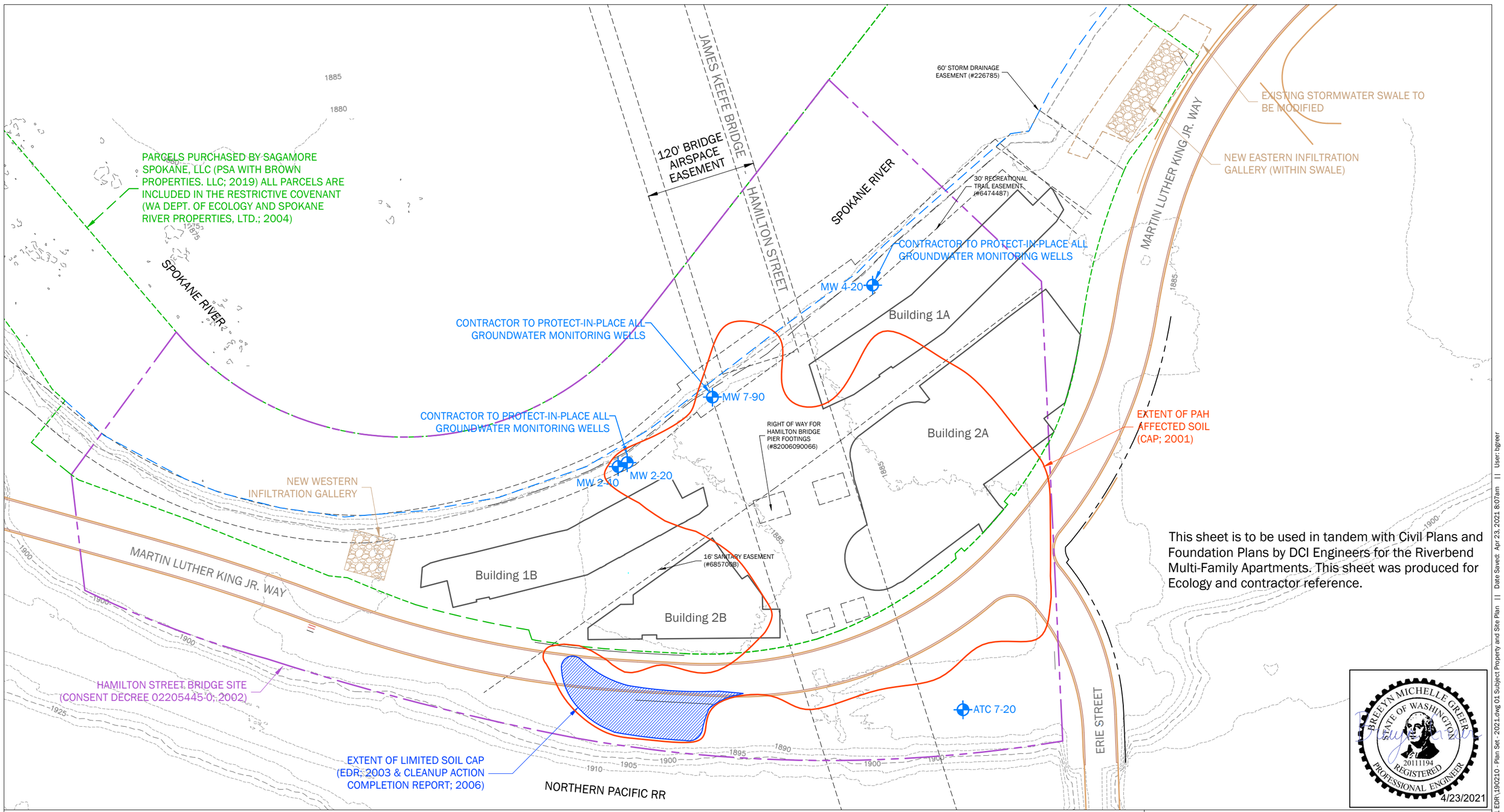
Table 1. Estimated Removal Quantities

Project No. 190210, Sagamore Spokane, LLC, Spokane, Washington

		Clean Crushed Rock	Potentially Non-Contaminated Fill	Contaminated Fill
		Material placed on surface during 2005 cleanup action, as-built survey showing extents and grades included as Figure 4 for reference only.	Fill soils that are outside the limits of contamination and eligible for reuse if determined to be geotechincally suitable, and verified clean with analytical sampling.	Fill soils and other materials that are within the limits of contamination and will require off-Site disposal at Subtitled D Facility. Waste characterization to be verified by Aspect during construction.
	Extent			
Building 1A - Mat Foundation Subexcavation	*3 feet over-excavation for ~10% of the building footprint area*	100 CY (170 tons)	200 CY (340 tons)	0 CY
Building 1B - Mat Foundation Subexcavation	*5.5 feet over-excavation in eastern 1/3 of the building footprint area*	200 CY (340 tons)	500 CY (850 tons)	500 CY (850 tons)
Building 2A & 2B - Deep Foundation Spoils	**Small quantities of spoils anticipated with selected grouted helical piles. Any spoils generated will be handled as contaminated fill. For bidding purposes, Contractor should assume 100 CY (170 tons) quantity for pricing.**			
Building 2B - Potential Removal of Concrete Slabs	**If concrete slabs need to be removed for deep foundations, overlying soil and concrete debris will be handled as contaminated fill. However, crushed rock that exists at the ground surface could be considered clean and reused. See Figure 2 for concrete slab extents.**			

Notes:
CY = cubic yards
Assumes 1.7 tons/BCY
Volume calculations using Civil3D to measure volumes from surveyed ground surface to bottom of remedial excavation.

FIGURES



This sheet is to be used in tandem with Civil Plans and Foundation Plans by DCI Engineers for the Riverbend Multi-Family Apartments. This sheet was produced for Ecology and contractor reference.

BREEYN MICHELLE GREER
STATE OF WASHINGTON
20111194
REGISTERED
PROFESSIONAL ENGINEER
4/23/2021

Legend

- Subject Property
- Proposed Buildings
- Hamilton Street Bridge Site
- Extent of PAH Affected Soil (CAP, 2001)
- Extent of Limited Soil Cap (EDR, 2003)
- Groundwater Compliance Monitoring Wells
- Ordinary High Water Mark
- Historical Features
- 1920 Existing Elevation Contours in Feet
- Existing Stormwater Features

CAP - Cleanup Action Plan
PAH - Polycyclic Aromatic Hydrocarbons
EDR - Engineering Design Report

0 100 200 Feet

Source: Surveyed base map provided by Druyea & Associates, dated November 2, 2019.

Elevation contour data from DEM file generated by ArcGIS™ software, March, 2018.

The Hamilton Street Bridge Site, Extent of PAH Affected Soil and Extent of Limited Soil CAP are approximated and have not been surveyed.

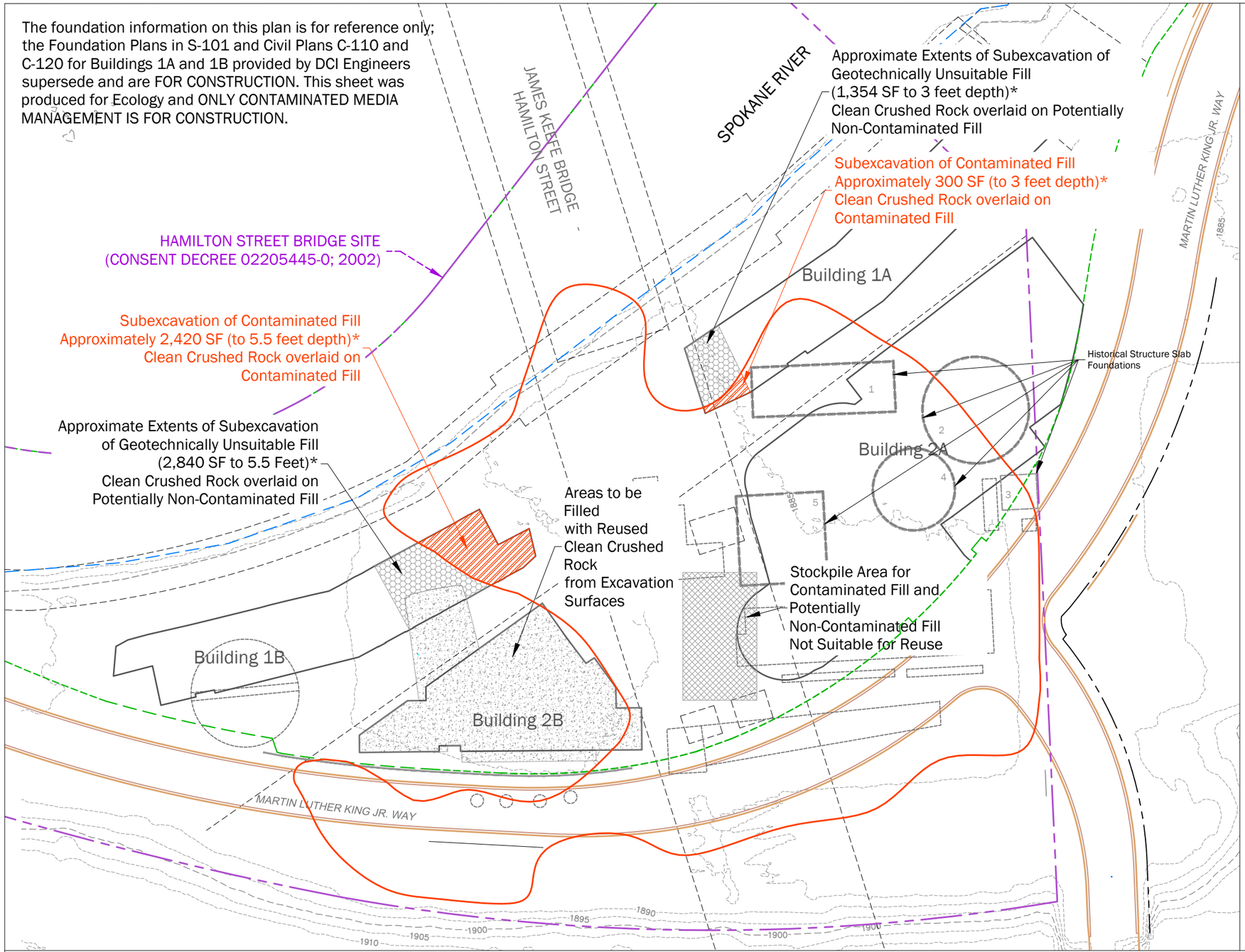
Subject Property and Site Plan

Engineering Design Report
Hamilton Street Bridge Site
Spokane, Washington

Aspect Consulting	April-26-2021	BY: BMG/CMV	FIGURE NO. 1
	PROJECT NO. 190210	REVISED BY: BMG	

CAD Path: Q:\Riverbend Redevelopment\2020-11 EDR\190210 - Plan Set - 2021.dwg 01 Subject Property and Site Plan || Date Saved: Apr 23, 2021 8:07am || User: bgreer

The foundation information on this plan is for reference only; the Foundation Plans in S-101 and Civil Plans C-110 and C-120 for Buildings 1A and 1B provided by DCI Engineers supersede and are FOR CONSTRUCTION. This sheet was produced for Ecology and ONLY CONTAMINATED MEDIA MANAGEMENT IS FOR CONSTRUCTION.



GENERAL NOTES

* Final subexcavation limits will be determined during construction by the Geotechnical Engineer.

MINIMUM HANDLING AND DISPOSAL REQUIREMENTS FOR CONTAMINATED MEDIA

1. All Contractor requirements for screening, handling, and disposal of contaminated soil is presented in the project Contaminated Media Management Plan (Appendix D of EDR).
2. Excavated soil will be segregated by the Geotechnical Engineer via field screening methods. Soil segregation categories are 1) Potentially Non-Contaminated Fill, 2) Contaminated fill, 3) Clean Crushed Rock, and 4) Contaminated Debris. Categories 1 and 2 will be verified during construction by the Geotechnical Engineer via analytical testing. Oversized material (>12 inches diameter) will be segregated and handled as Contaminated Debris.
3. Temporary stockpiling of all category 1 and 2 soils will be necessary pending analytical results. Stockpile locations are also shown in the Civil Plan C-110; deviations in stockpile locations will be approved by the Engineer. All stockpiles will be underlain and covered by plastic sheeting and managed in accordance with the requirements of the Stormwater Pollution Prevention Plan (SWPPP).
4. The Remediation Engineer will direct the disposal requirements for any Contaminated Fill or Debris requiring off-Site disposal. Trucks hauling contaminated material must be covered during transport.

POTENTIAL REUSE OF NON-CONTAMINATED MEDIA

1. Clean Crushed Rock (1.25-inch minus rock meeting WSDOT Standard Specs.) is the existing Site covering. This material may be segregated and reused if it does not come in contact with contaminated media.
2. Analytically confirmed Non-Contaminated material may also be reused onsite if geotechnically suitable as determined by the Geotechnical Engineer and Ecology. It is anticipated that the amount of reusable Non-Contaminated material is minimal as most of it is anticipated to be oversized or geotechnically unsuitable.
3. Locations for Clean Crushed Rock reuse are shown on the plan.

HISTORICAL SLAB FOUNDATION INFORMATION

1. 3,940 SF, top of slab 6 feet deep.
2. 4,925 SF, top of slab 3 feet deep.
3. 680 SF, top of slab 5 feet deep.
4. 2,920 SF, top of slab 4 feet deep.
5. 4,310 sf, top of slab 4 feet deep.

Each historical slab area has about 1 foot of clean crushed rock overlaid on Contaminated or Potentially Non-Contaminated Material.

BREEYN MICHELLE GREER
STATE OF WASHINGTON
20111194
REGISTERED
PROFESSIONAL ENGINEER
4/23/2021

Legend

- Subject Property
- Proposed Buildings
- Hamilton Street Bridge Site
- Extent of PAH Affected Soil (CAP, 2001)
- 1920 Existing Elevation Contours in Feet
- Contaminated Fill Removal
- Potentially Non-Contaminated Fill Removal
- Areas for Reuse of Clean Crushed Rock as Backfill
- Stockpile Area

CAP - Cleanup Action Plan
PAH - Polycyclic Aromatic Hydrocarbons
EDR - Engineering Design Report

0 80 100 Feet

Source: Surveyed base map provided by Druyea & Associates, dated November 2, 2019.

Elevation contour data from DEM file generated by ArcGIS™ software, March, 2018.

The Hamilton Street Bridge Site, Extent of PAH Affected Soil and Extent of Limited Soil CAP are approximated and have not been surveyed.

Contaminated Media Management

Engineering Design Report
Hamilton Street Bridge Site
Spokane, Washington

Aspect Consulting	April-26-2021	BY: BMG	FIGURE NO. 2
	PROJECT NO. 180003	REVISED BY: SCC / SJA	

CAD Path: Q:\Riverbend Redevelopment\2020-11 EDR\190210 - Plan Set - 2021.dwg 03 Contaminated Media Management || Date Saved: Apr 23, 2021 8:07am || User: bgreer

APPENDIX A

Aspect Health and Safety Plan

PROJECT-SPECIFIC HEALTH AND SAFETY PLAN

Property Name:	Hamilton Street Bridge Site – Riverbend Redevelopment		
Project Number:	190210		
Prepared By:	Breeyn Greer	Date:	12/15/2020
Reviewed By:	Adam Griffin	Date:	12/16/2020

1 INTRODUCTION

This project-specific health and safety plan establishes procedures and practices to protect employees of Aspect Consulting, LLC (Aspect) from potential hazards posed by field activities at the subject site. In this health and safety plan, measures are provided to minimize potential exposure, accidents, and physical injuries that may occur during daily activities and adverse conditions. Contingency arrangements are also provided for emergency situations.

2 EMERGENCY CONTACT INFORMATION

PROPERTY LOCATION	111 N Erie Street Spokane, WA 99202
NEAREST HOSPITAL	800 W 5th Ave Spokane, WA 99204 **Attached figure shows route to hospital.**
EMERGENCY RESPONDERS	Police, Ambulance, Fire ……**911**
OTHER CONTACTS	Aspect, Bob Hanford (mobile)……..(206) 276-9256 Aspect, Seattle Office ……(206) 328-7443 Environmental West, Zach Gourde……..(509) 818-6519 Spokane Enviro. Solutions, Jeff Heeter …… (509) 279-5559
IN EVENT OF EMERGENCY, CALL FOR HELP AS SOON AS POSSIBLE	Give the following information: ✓ **Where You Are:** address, cross streets, or landmarks ✓ **Phone Number** you are calling from ✓ **What Happened:** type of accident, injury ✓ **How Many Persons** need help ✓ **What is Being Done** for the victims ✓ **You Hang Up Last:** let whomever you called hang up first

In case of serious injuries or other emergency, immediately call Bob Hanford, Aspect Corporate Safety Officer, at (206) 780-7729 or (206)-276-9256. If no response, call Doug Hillman at (206) 328-7443 or Tim Flynn at (206) 780-9370.

3 PERSONNEL ORGANIZATION AND CHAIN OF COMMAND

The Aspect Project Manager assigns the Site Safety Supervisor and other field personnel for this project, and has ultimate responsibility for developing this project-specific health and safety plan and ensuring it is complied with during project execution. The Aspect Site Safety Supervisor has responsibility and authority for Aspect employees' safety during site activities. Other Aspect personnel on site have the responsibility to comply with this project-specific health and safety plan in coordination with the Site Safety Supervisor.

Aspect Personnel			
Role	**Name**	**Office Phone**	**Mobile/Cell Phone**
Associate Engineer	Adam Griffin	206-780-7746	865-696-7658
Principal Geologist	Dave Cook	206-838-5837	206-372-7637
Site Safety Supervisor	Eric Marhofer	206-780-6582	206-778-7022
Field Engineer	Breeyn Greer	206-812-4739	612-232-7343

Aspect will inform its subcontractors working onsite of potential fire, explosion, health, safety or other hazards associated with planned site activities, and can make available to them this project-specific health and safety plan. **However, all subcontractors are solely responsible for preparation of their own health and safety plan, and for the safety of their employees.**

4 SITE CONTROL PLAN

4.1 Property Description

Property Name:	Hamilton Street Bridge Site	
Property Location or Address:	111 N Erie Street, Spokane WA	
Owners/Tenants:	Eric Brown	
Current Property Use:	Vacant	
Past Use of Property (if different):	Manufacture gas plant (coal and oil), tar plant,	
Designated Hazardous Waste Site?	Yes	State Consent Decree: 02205445-0
Industrial Site?	Yes - former	
Topography:	Gently sloping to the east and west from crown in middle of site to drain away from waste	
Surround Land Use/Nearest Population:	Mixed commercial and Public	
Drinking Water/Sanitary Facilities:	None available	
Site Map:	Available in Test Pit and Vapor Points Work Plan	

4.2 Site Access Control

Describe controls to be used to prevent entry by unauthorized persons:

- Traffic cones, barriers, chain-link fence, and caution tape, as needed.

Describe how exclusion zones and contamination reduction zones will be designated:

- Drilling and test pitting activities will be performed in multiple areas of the property.

- The area immediately adjacent to each boring/test pit location will be considered an exclusion zone.
- The subcontractor will mark the limits of the exclusion zone using cones, caution tape, etc.
- The contamination reduction zone will be located adjacent to the driller's/excavation contractor's mobile decontamination trailer, and will include steam cleaning equipment for equipment decontamination.
- Aspect field personnel will remain vigilant about preventing unauthorized persons from approaching the exclusion zone.

4.3 Worker Hygiene Practices

Aspect personnel will use the following hygiene practices while working on site:

- No person will eat, drink, chew gum or tobacco in potentially contaminated areas. Drinking of replacement fluids for heat stress control will be permitted only in areas that are free from contamination, except in emergency situations.
- Smoking is prohibited except in designated areas of the site.
- Long hair will be secured away from the face so that it does not interfere with any activities.
- Personnel leaving potentially contaminated areas will shower (including washing hair) and change to clean clothing as soon as practical after leaving the property.

4.4 Worker Hygiene Practices (Special COVID-19 Virus Prevention Actions)

Along with normal hygiene practices commonly exercised by Aspect employees, workers must practice recommended infection prevention measures to avoid exposure and spreading of the COVID-19 virus. The Center for Disease Control (CDC) indicates that: *"COVID-19 is a respiratory illness that can spread from person to person."* Therefore, worker hygiene and distancing are critical elements to managing the virus' spread. The following is guidance that was used to develop this section of the HASP.

- Occupational Safety and Health Administration (OSHA) https://www.osha.gov/Publications/OSHA3990.pdf
- Centers for Disease Control (CDC) https://www.cdc.gov/coronavirus/2019-ncov/downloads/community-mitigation-strategy.pdf)
- World Health Organization (WHO) https://www.who.int/emergencies/diseases/novel-coronavirus-2019

Most COVID-19 guidance is geared toward protecting workers in office settings, whereas there is limited guidance for field work settings. Therefore, Aspect has adopted and enhanced the COVID-19 procedures outlined by OSHA under their guidelines for "Low Exposure Risk" work (https://www.osha.gov/Publications/OSHA3990.pdf). OSHA states that:

> *"The Occupational Safety and Health Administration (OSHA) developed this COVID-19 planning guidance based on traditional infection prevention and industrial hygiene*

practices. It focuses on the need for employers to implement engineering, administrative, and work practice controls and personal protective equipment (PPE), as well as considerations for doing so."

OSHA outlines three categories of Exposure Risk. Aspect personnel will evaluate each project under these three OSHA Risk Exposure Categories and follow the "ACTION" outlined below.

1) ***High or Very High Exposure Risk*** are those that are generally in the health profession and have a higher possibility of direct exposure to patients or those who are sick.

    a. ***ACTION. NO ASPECT WORK FALLS INTO THE HIGH OR VERY HIGH EXPOSURE RISK CATEGORY. NO ASPECT WORKERS SHOULD BE FOUND IN THE HIGH OR VERY HIGH EXPOSURE RISK WORK SITUATION.***

2) ***Medium Exposure Risk*** OSHA states that "Medium Exposure Risk" jobs are ones that *"that require frequent and/or close contact with (i.e., within 6 feet of) people who may be infected, but who are not known or suspected COVID-19 patients."* OSHA goes on to indicate that this includes *"areas where there is ongoing community transmission, workers in this category may have contact with the general public (e.g., in schools, high-population-density work environments, and some high-volume retail settings)."* The Puget Sound area (and Washington State and all states in the USA) fall into this category definition as of March 2020.

    a. ***ACTION. Aspect's field work (and workers) should not be completed in high-population-density settings. If this occurs and work meets the criteria of "Medium Exposure Risk" based on population density, the field worker should stop work and contact the PM and Principal immediately to see if there are engineering or administrative controls to reduce the risk to "Low Exposure Risk." If controls cannot be established, workers will not enter this project area. The "Low Exposure Risk" setting outlined below is the category that Aspect field workers will be eligible to conduct work.***

3) ***Low Exposure Risk.*** OSHA states that **"**Lower exposure risk (caution) jobs are those that do not require contact with people known to be, or suspected of being, infected with COVID-19 nor frequent close contact with (i.e., within 6 feet of) the general public. Workers in this category have minimal occupational contact with the public and other coworkers."

    a. ***ACTION.*** Aspect personnel will use the following hygiene practices while working on site to maintain Low Exposure Risk. Note that OSHA indicates for this category, that *"Additional PPE is not recommended for workers in the lower exposure risk group. Workers should continue to use the PPE, if any, that they would ordinarily use for other job tasks."* With this said, Aspect employees will use the following protocols to comply with established social distancing and sanitary hygiene directives.

4.4.1 Distancing Procedures

1. Workers, if working in a team, will take separate vehicles to the job site.

2. Workers will not congregate in groups of more than four other individuals

3. Workers will not be permitted to enter the site if they feel sick; exhibit any symptoms common to cold, flu, or COVID-19; or knowingly come into close contact with someone who is ill e.g., friend or family member.

4. A minimum distance of six feet should be maintained from other individuals.

5. No person will eat, drink, chew gum or tobacco in potentially contaminated areas or around other people. Drinking replacement fluids for heat stress control will be permitted only in areas that are free from contamination, except in emergency situations. Lunch should be eaten in a car or away from other individuals.

6. All personnel leaving potentially contaminated areas will wash their hands and face prior to entering any new area; particularly eating areas.

4.4.2 Hygiene Procedures

1. Nitrile gloves will always be worn and changed as often as needed.
2. Frequently touched objects (e.g., car doors, outhouse doors, gate lock) will be disinfected at least at the beginning and end of each day when workers are on site.
3. Workers will avoid sharing unsanitized equipment, including phones and laptop screens.
4. Hands should be washed with soap and water, or otherwise sanitized with hand-sanitizer after using the restroom, before and after lunch breaks, and after co-handling objects.
5. Smoking is prohibited except in designated areas of the site.

4.4.3 Overnight Accommodations

1. There are three questions that should be evaluated before overnight stays are conducted.
    - First – Can the work be postponed until after the Stay at Home Order is lifted?
    - Second – Can additional staff be put on the task to complete the job in a day?
    - Third – Does Aspect have local staff available to complete the work?
    - Fourth – Does the Aspect employee feel they can accomplish the work safely and agree to comply with social distancing and safety expectations outlined.

    If the answer to these questions is NO, then proceed with the following overnight stay protocol.

2. Make sure Aspect employee is comfortable with the work assignment. And if not, see if the protocol outlined below will increase the comfort level. The key to this protocol is reducing the potential risk of exposure (just like is done when a job is taken on near a local office where overnight stays are not needed)

3. If overnight stay is deemed essential, request Hotel COVID-19 procedures and attach to the HASP. For example, ask the hotel how often they sanitize common areas, clean rooms, and work to reduce exposures. If the hotel has no COVID-19 exposure procedures, evaluate another hotel. Aspect's field staff, PM and Principal in Charge (as needed) work to evaluate the hotel procedures in order to make an informed decision to stay there.
4. Aspect employees will follow all hygiene procedures above with the addition of disinfecting all door handles, and horizontal surfaces in the hotel room and wear gloves or wipe all exterior doors and card readers before entering building.
5. Avoid common areas in the hotel and use side entrances as appropriate.
6. All decisions regarding overnights stays must be elevated to the Principal -in-Charge in consultation with the Corporate Safety Officer and documented; similar to the go/no go procedure used to evaluate taking on a new project pursuit.

4.5 Emergency Communications

Aspect workers on site will have a mobile (cell) phone on site, which will be used for communications should an emergency arise. Phone numbers for Aspect site personnel are listed in Section 3: Personnel Organization and Chain of Command.

4.6 Nearest Medical Assistance

FIRST CALL 911. The route from the site to the nearest hospital is shown in the attached figure.

5 SITE WORK PLAN

Proposed Work Activities On Site:	• Hollow stem auger drilling. • Test Pits with an excavator. • Routine operation, maintenance, and monitoring. • Soil and vapor sampling using permanently installed vapor points.
Objectives of Site Activities:	Describe the nature and extent of potential site contamination.
Proposed Work Dates:	April 2020
Will On-site Personnel Potentially be Exposed to Hazardous Substances?	If yes, describe: The property historically included a manufactured gas plant processing both coal and oil, and a boat maintenance and storage facility. Surrounding facilities included two petroleum bulk plants with fuel unloading from marine ships and barges. Based on previous site investigations by others, potential chemical hazards include: • Petroleum hydrocarbons including polycyclic aromatic hydrocarbons (PAHs) and aromatic volatile organic compounds; • Creosote; and • Heavy metals (arsenic, lead and chromium).

Do Personnel Conducting Site Activities have Training in Accordance with WAC 296-843-200?	Yes

6 DECONTAMINATION

Goals	Procedures
To prevent the distribution of contaminants outside the exclusion zone or cross-contamination of samples, the following procedures will be used to decontaminate sample equipment.	• Decontamination process involving Alconox wash, tap water rinse, and deionized water rinse (with air dry). • Hexane rinse may be used only to remove organic chemicals that cannot be removed efficiently with soap and water (e.g., petroleum product). • Dedicated tubing used for groundwater sampling will be disposed of or retained (bagged) for future use, but not decontaminated.
To prevent the distribution of contaminants outside the exclusion zone, unnecessary vehicles will not be allowed inside the exclusion zone. For vehicles required in the exclusion zone (e.g., drill rig, excavator), the following decontamination procedures will be used to prevent contamination from leaving the exclusion zone:	• Steam clean drilling equipment and excavator bucket that advances below ground surface.
To minimize or prevent worker exposure to hazardous substances, all personnel working in the exclusion zone and contamination reduction zones will comply with the following decontamination procedures:	• Wash boots and rain gear that have come into contact with soil or groundwater with Alconox/tap water and air dry. • Dispose of disposable personal protective equipment (PPE such as gloves, Tyvek) into Department of Transportation (DOT) approved and appropriately labeled 55-gallon drums. • To prevent distribution of contaminants outside the exclusion zone, do not allow unnecessary vehicles inside the exclusion zone.
Soil cuttings and decontamination wastewater will be managed in the following manner:	• Soil will be put back in the test pits unless visibly contaminated with free product. Visibly contaminated soil and drill cuttings will be placed in 55-gallon drums for disposal. • Decon. wastewater will also be placed in 55-gal drums for disposal.

7 HAZARD ANALYSIS

The potential hazards and corresponding control measures for planned site work activities are as follows:

Work Activity	Primary Potential Hazards	Control Measures
Drilling borings/monitoring wells, soil sampling	• Getting hit by drill rig equipment, especially from overhead.	• Stay back from rig whenever possible and stay alert. • Modified Level D PPE (with hard hat, traffic vest, steel-toe boots).
	• Excessive noise.	• Wear hearing protection.
	• Chemical exposure (skin contact, ingestion, inhalation).	• Modified Level D PPE. • Air monitoring.
Test pits, soil sampling	• Getting hit by excavator.	• Wear traffic vest. • Stay back from excavator and maintain eye contact with operator.
	• Falling into open excavation.	• Do not enter excavation >4 feet deep unless properly shored or sloped. • Stay back from unstable slopes. • Sample from excavator bucket where needed.
	• Chemical exposure (skin contact, ingestion, inhalation).	• Modified Level D PPE. • Air monitoring.
Soil sampling by hand augers or surface grabs	• Chemical exposure (skin contact, ingestion, inhalation).	• Modified Level D PPE. • Air monitoring.
Soil Vapor Sampling	• Chemical exposure (skin or eye contact, ingestion).	• Modified Level D PPE.
All	• Getting hit by other trucks working on the property.	• Wear traffic vest. • Stay back from roads and stay alert.
	• Heat stress and hypothermia	• Take breaks, seek shade, adjust schedule, and increase fluid intake. Dress appropriately for weather conditions
	•	•

Potentially Hazardous Chemicals Known or Suspected at the Property and Permissible Exposure Limits (air)					
Substance	**Source Medium**	**OHSA PEL**	**OSHA STEL**	**IDLH**	**Carcinogen or Other Hazard**
Gasoline-Range Petroleum	Soil, GW	10 ppmv	15 ppmv	250 ppmv	T
Diesel- and Oil-Range Petroleum	Soil, GW	1 ppmv	5 ppmv	500 ppmv	T
cPAHS	Soil, GW	0.2 mg/m^3	--	--	C
Benzene	Soil, GW	1 ppmv	5 ppmv	500 ppmv	C
Toluene	Soil, GW	200 ppmv	--	500 ppmv	T
Ethylbenzene	Soil, GW	100 ppmv	--	800 ppmv	T
Xylenes	Soil, GW	100 ppmv	150 ppmv	900 ppmv	T
Ammonia	Soil, GW	50 ppmv	35 ppmv*	300 ppmv	T
Hydrogen Cyanide	Soil, GW	10 ppmv	--	50 ppmv	T
Heavy Metals (arsenic, lead, chromium, etc.)	Soil, GW	As: 0.01 mg/m^3 Pb: 0.05 mg/m^3 Cr: 0.5 mg/m^3	As: -- Pb: -- Cr: --	As: 0.01 mg/m^3 Pb: 0.05 mg/m^3 Cr: 0.5 mg/m^3	Arsenic: C

Notes:
-- = none established
C = carcinogen
cPAH = carcinogenic polycyclic aromatic hydrocarbon
GW = groundwater
IDLH = immediately dangerous to life or health
N/A = not applicable/not available
OHSA = Occupational Safety and Health Administration
T = toxic
PEL = permissible exposure level (8-hour time-weighted average)
STEL = short-term exposure level
* = Value from National Institute for Occupational Health and Safety

Chemicals Known or Suspected On-site (check box)			
Chemical Class	**Known**	**Possible**	**Unlikely**
Corrosive (if expected, specify)			x
Ignitable (if expected, specify)		x	
Reactive			x
Volatile		x	
Radioactive			x
Explosive			x
Biological Agent			x
Particulate or Fibers			x

Chemicals Known or Suspected On-site (check box)
If known or likely, describe:

8 PERSONAL PROTECTIVE EQUIPMENT

Based on the hazards identified above, the following personal protective equipment (PPE) will be required for the following field activities. This section specifies both an initial level of protection and a more protective (contingency) level or protection, in the event conditions should change. The contingency defines the PPE that will be available on site.

Work Activity	Level of Protection	
	Initial	Contingency
Drilling/test pits/soil sampling	D	Mod. D
Well development/groundwater sampling	D	Mod. D
Sample handling	D	Mod. D
Other activities (list): Slope reconnaissance	D	Mod. D

Each level of protection will incorporate the following equipment (specify type of protective clothing, boots, gloves, respiratory cartridges or other protection, safety glasses, hardhat, and hearing protection):

Level of Protection	Specific PPE
Level D	Work clothing, traffic vest, rubber (nitrile) gloves, steel toe and shank boots, safety glasses, hearing protection, and hardhat.
Modified D	Level D plus Tyvek coveralls or rain gear, and neoprene outer gloves.

NOTE: Project personnel are not permitted to deviate from the specified levels of protection without the prior approval of the Site Safety Supervisor. A traffic vest is not needed if work clothes are suitably visible (e.g., orange/yellow rain gear or white/yellow chemical protective clothing).

9 AIR MONITORING

Air monitoring will be conducted for all subsurface explorations (soil borings and test pit excavations) to identify potentially hazardous environments and determine reference or background concentrations. Air monitoring can be used to define exclusion zones. Air monitoring can also be conducted to evaluate relative concentrations of volatile organic chemicals in samples.

The following equipment will be used to monitor air quality in the breathing zone during work activities:

Monitoring Instrument	Calibration Frequency	Parameters of Interest	Sampling Frequency
PID	Daily	Volatile organic compounds	• During collection of each soil sample during drilling. • During excavation and trenching.
Handheld Gas Meter	N/A	Ammonia	• During excavation near historical slabs
Gas Detector Tubes	N/A	Hydrogen Cyanide	• Daily during excavation, trenching, and pile install within contamination.

Use the following action levels to determine the appropriate level of personal protection to be used during field activities:

Monitoring Instrument	Reading in Breathing Zone	Action	Comments
PID	10 PID units above background for 5 minutes	Use engineering controls (ventilation) or leave location and return later.	
PID	100 PID units above background for 5 minutes	Leave location pending further evaluation by Aspect Corporate Safety Officer.	
Handheld Gas Meter	>35 ppm for 10 minutes	Use engineering controls (ventilation) or leave location and return later.	Up to 50 ppm is below the PEL so work may continue but use caution.
Handheld Gas Meter	Instantaneous reading of >250 ppm	Leave location pending further evaluation by Aspect Corporate Safety Officer.	
Gas Detector Tube	Detection tube indicates >10 ppm, <50 ppm	Take another tube 10 minutes later	If results are persistent, increase engineering controls (ventilation) or leave location and return later.
Gas Detector Tube	Detection tube indicates >50 ppm	Use engineering controls (ventilation) and leave location.	Call Aspect Corporate Safety Officer

10 SAFETY EQUIPMENT

The following safety equipment will be on site during the proposed field activities:

Other Required Items (check items required)	
First aid kit	x
Eyewash (e.g., bottled water)	x
PID	x
Drinking water	x
Fire extinguisher	x
Brush fan	
Wind sox	

11 SPILL CONTAINMENT

Will the proposed field work include the handling of bulk chemicals?	Yes	No x
If yes, describe spill containment provisions for the property:		

12 CONFINED SPACE ENTRY

Will the proposed field work include confined space entry?	Yes	No x
If yes, attach to this plan the confined space entry checklist and permit.		

13 ASPECT TRAINING AND MEDICAL MONITORING

Aspect employees who perform site work are responsible for understanding potential health and safety hazards of the site. All Aspect site workers will have health and safety training for hazardous waste operations, in accordance with WAC 296-843-200. In addition, Aspect requires medical monitoring for all employees potentially exposed to chemical hazards in concentrations in excess of the permissible exposure limit (PEL) for more than 30 days per year, as required under WAC 296-843-210. Employees who use respirators for their work will have a respirator medical evaluation as required under Chapter 296-842-WAC.

14 DISCLAIMER

Aspect Consulting, LLC does not guarantee the health or safety of any person entering these property. Because of the potentially hazardous nature of this property and the activity occurring thereon, it is not possible to discover, evaluate, and provide protection for all possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury and illness at this property. The health and safety guidelines in this plan were prepared specifically for this site and should not be used on any other property without prior evaluation by trained health and safety personnel.

FIELD SAFETY PLAN CONSENT AGREEMENT

Aspect Consulting Employees

I have reviewed the project specific health and safety plan, dated April 20, 2018 for the Former Bremerton Gas Works Project fieldwork. I understand the purpose of the plan and I consent to adhere to its procedures and guidelines while conducting activities on site that are described in the plan.

Employee Printed Name	Signature	Date

Site Visitors

I have been briefed on the contents of the project-specific health and safety plan. I am responsible for my own health and safety.

Visitor Printed Name and Organization/Company	Signature	Date

FIELD SAFETY MEETING MINUTES

Site Name _____**Project No.** _____

Meeting Location _____

Meeting Date _____ **Time** _____ **Conducted by**_____

Pre-field Work Orientation_____ **Weekly Safety Meeting**_____ **Other**_____

Subject Discussed _____

_____

_____

_____

Site Safety Supervisor Comments _____

_____

_____

_____

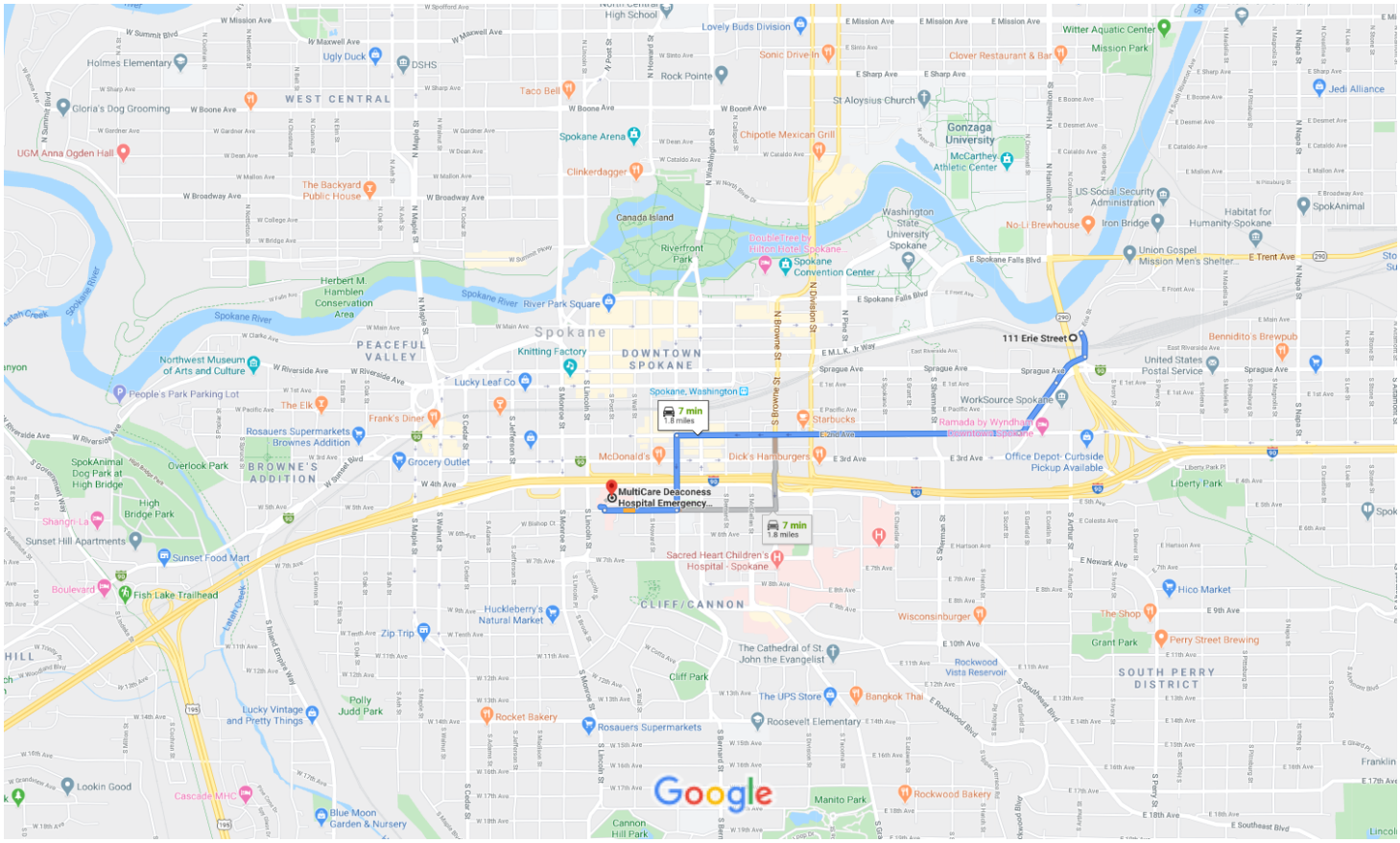
Participants

Printed Name (and company if subcontractor)	Signature

Google Maps

111 Erie St, Spokane, WA 99202 to MultiCare Deaconess Hospital Emergency Department

Drive 1.8 miles, 7 min



Map data ©2020 Google 1000 ft

111 Erie St

Spokane, WA 99202

1. Head southeast on Erie St toward N Sprague Access Way

371 ft

2. Turn right onto N Sprague Access Way

0.1 mi

3. Merge onto N Sprague Way

0.2 mi

4. Slight right onto E 2nd Ave

1.0 mi

5. Turn left onto S Stevens St

0.2 mi

6. Turn right onto W 5th Ave

0.2 mi

7. Turn right

Destination will be on the right

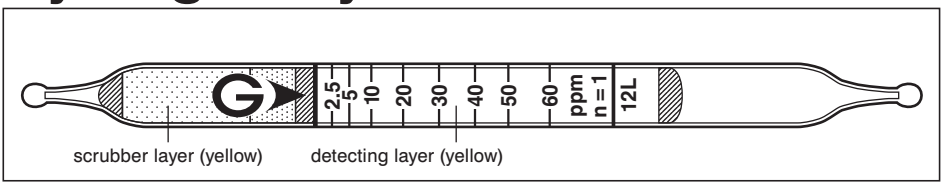
105 ft

MultiCare Deaconess Hospital Emergency Department

800 W 5th Ave, Spokane, WA 99204

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Hydrogen Cyanide HCN No.12L



Performance

Measuring range	0.5 to 1.25 ppm	1.25 to 2.5 ppm	2.5 to 60 ppm	60 to 150 ppm
Number of pump strokes	5 (500 ml)	2 (200 ml)	1 (100 ml)	1/2 (50 ml)
Correction factor	0.2	0.5	1	2.5
Sampling time	3.75 min	1.5 min	45 sec	30 sec

Detecting limit : 0.1 ppm (5 pump strokes)
Colour change : Yellow → Pink
Corrections for temperature & humidity : Temperature correction is necessary.
Relative standard deviation : 10 %(for 2.5 to 20 ppm), 5 %(for 20 to 60 ppm)
Shelf life : 2 years

Reaction principle

Hydrogen cyanide reacts with the reagent to form intermediate material which stains indicator pink.

Possible coexisting substances and their interferences

Substance	Concentration	Interference	Interference gas only
Ammonia	≧ 2.5 ppm	−	No
Hydrogen chloride	≧ 5.0 ppm	+	Pink (≧5.0 ppm)
Nitric acid	≧ 10.0 ppm	+	Pink (≧10.0 ppm)
Sulphur dioxide	≧ 1.0 ppm	+	Pink (≧0.8 ppm)
Nitrogen dioxide	≧ 10.0 ppm	+	Pink (≧8.0 ppm)
Hydrogen fluoride	≧ 25.0 ppm	+	Pink (≧21.0 ppm)
Hydrogen sulphide	0.5 ppm	+	Pink (≧0.5 ppm)

Hydrogen chloride, Hydrogen fluoride and Nitric acid are removed by the scrubber agent. If the scrubber agent is wholly discoloured to brown, they will give plus error of the tube reading.

Other substances measurable with this detector tube

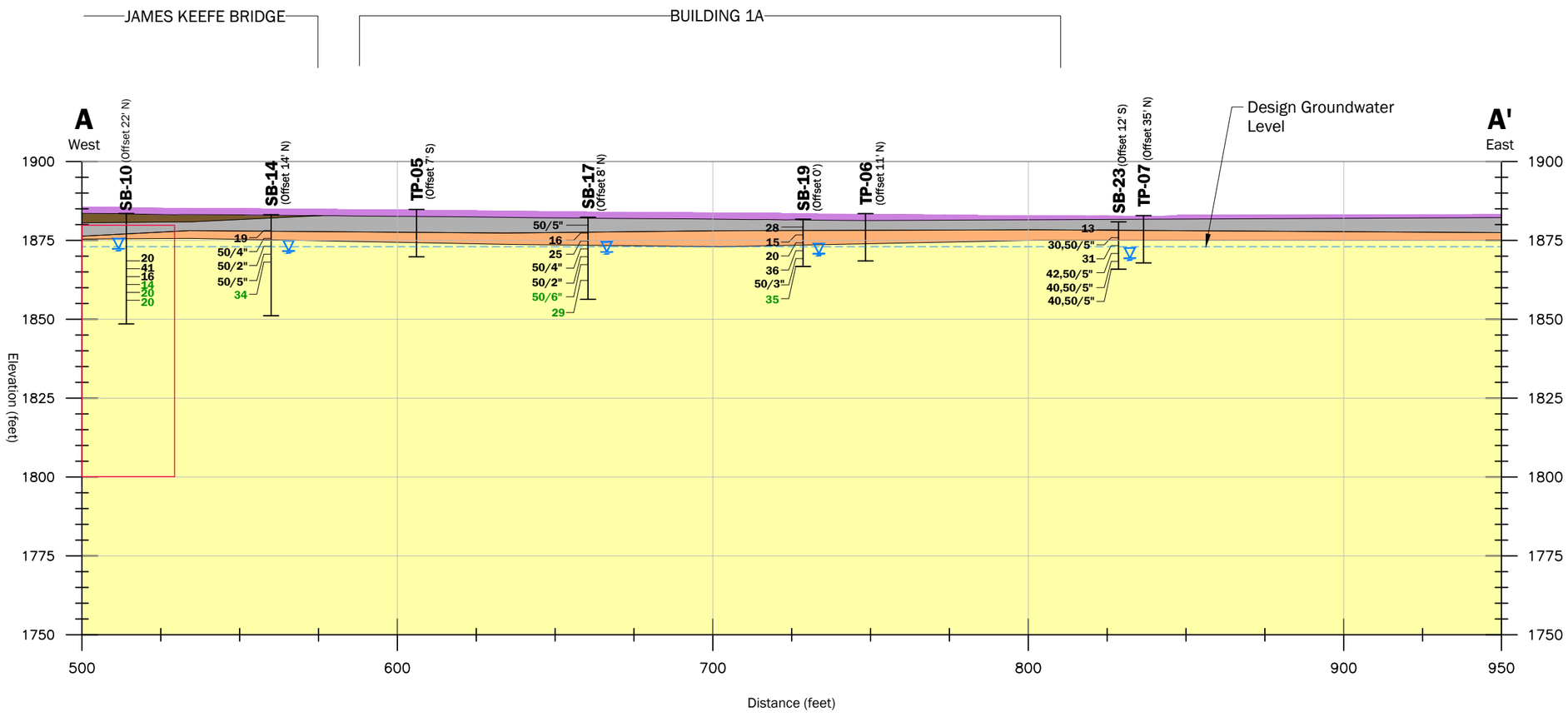
Substance	Correction	No. of pump strokes	Measuring range
Acetone cyanohydrin	Factor : 1.0	1	2.5 to 60 ppm
Boron trichloride	Factor : 0.9	1	2.25 to 54 ppm

Calibration gas generation

Permeation tube method

APPENDIX B

Cross Sections



0 40 80 Feet

Horizontal Scale: 1" = 40'
Vertical Scale: 1" = 40'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S)
— Offset and direction
— Borehole ID

Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23

Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer — 23

Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer — 23

Water Level at Time of Drilling

Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

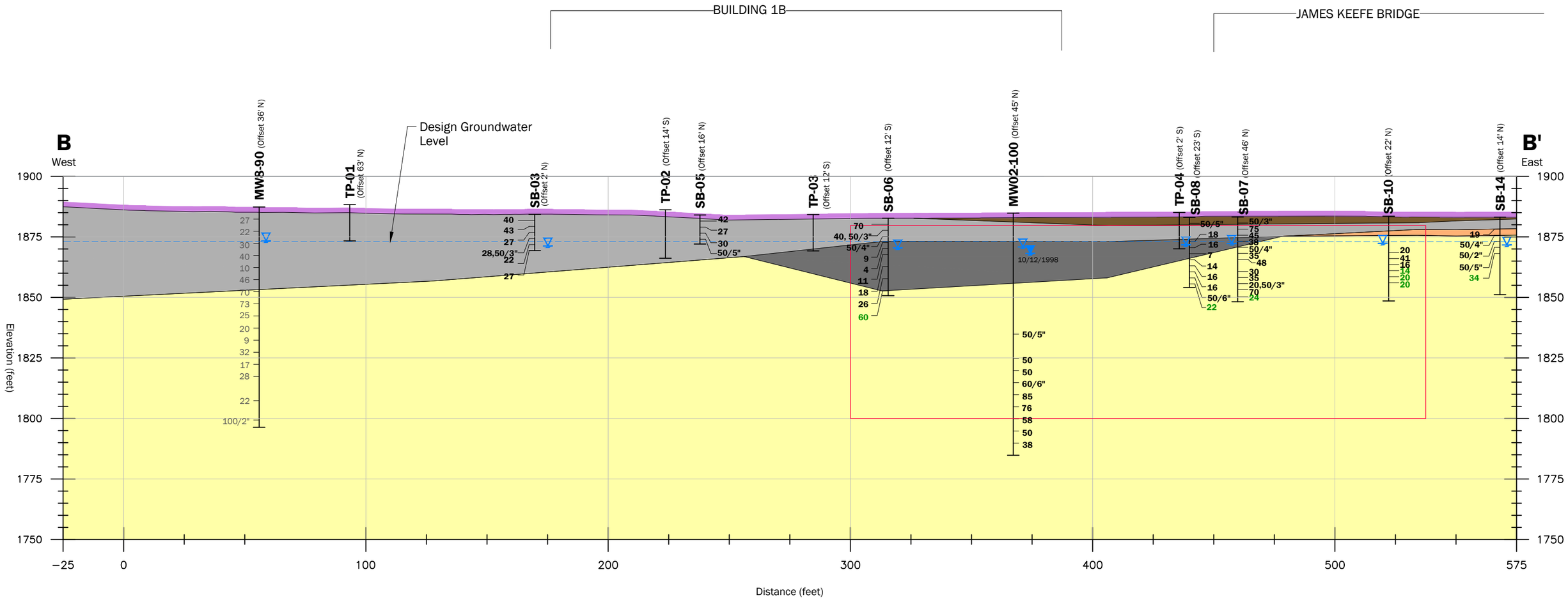
Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section A-A'
(West-East Subsurface, Building 1A)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 04
	PROJECT NO. 190210	REVISED BY: SCC	

CAD Path: Q:\Riverbend Redevelopment\Geotech 190210\190210-02.dwg Fig 4 || Date Saved: Apr 22, 2020 12:52pm || User: cvanslyke



0 40 80 Feet

Horizontal Scale: 1" = 40'
Vertical Scale: 1" = 40'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S)
- Offset and direction
- Borehole ID
- Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23
- Water Level at Time of Drilling
- **Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer** — 23
- Static Water Level and Date Measured 10/12/1998
- **Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer** — 23
- Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section B-B'
(West-East Subsurface, Building 1B)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 05
	PROJECT NO. 190210	REVISED BY: SCC	

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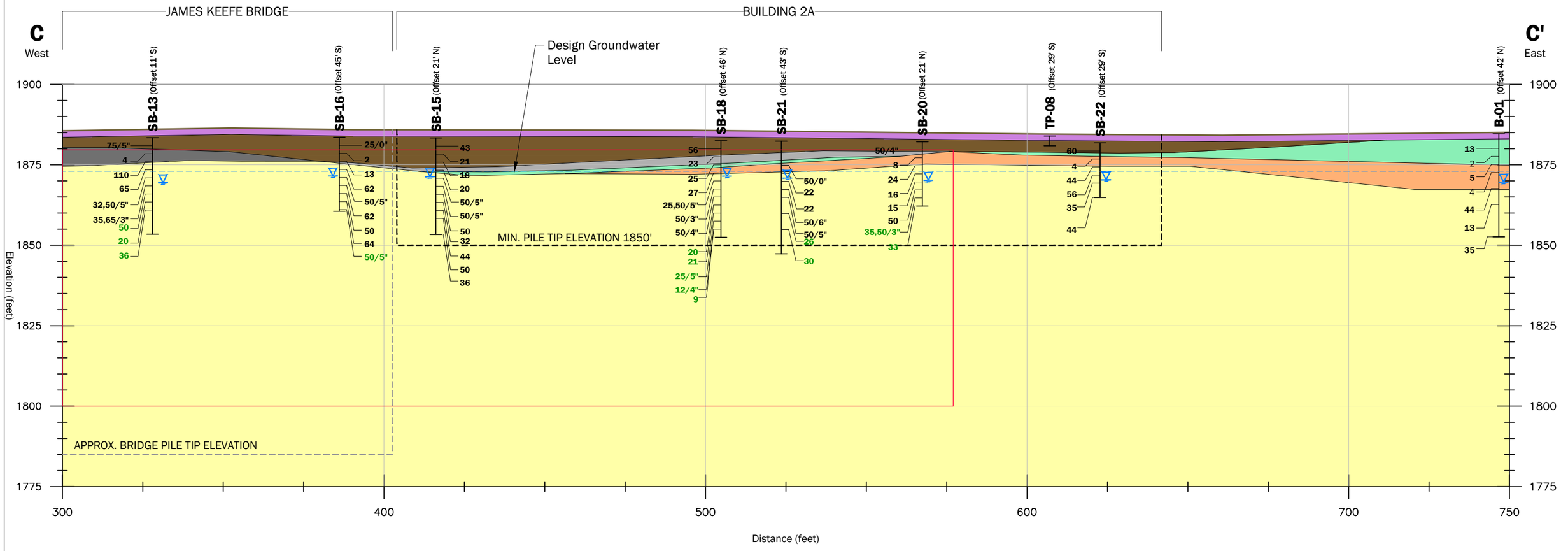


0 30 60 Feet

Horizontal Scale: 1" = 30'
Vertical Scale: 1" = 30'
Vertical Exaggeration 1x

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Legend

SB-03 (Offset 2' S)
- Offset and direction
- Borehole ID

Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23

Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer — 23

Water Level at Time of Drilling

Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer — 23

Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

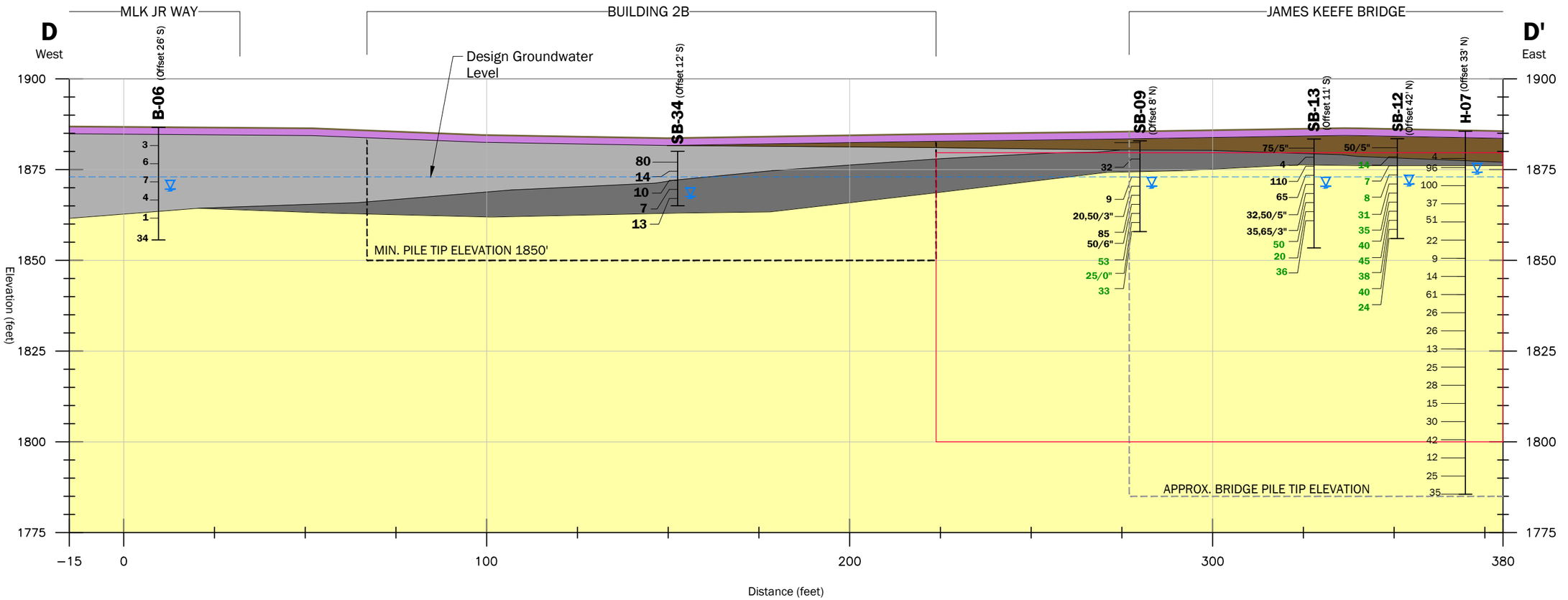
Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

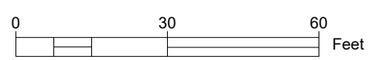
Cross Section C-C'
(West-East Subsurface Building 2A)

River Bend Developemnt
Spokane, Washington

Aspect CONSULTING	Apr-2020	BY: SJA/CMV	FIGURE NO. 06
	PROJECT NO. 190210	REVISED BY: SCC	

CAD Path: Q:\Riverbend Redevelopment\Geotech 190210\190210-02.dwg Fig 6 || Date Saved: Apr 22, 2020 12:52pm || User: cvanslyke





Horizontal Scale: 1" = 30'
Vertical Scale: 1" = 30'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S)
- Offset and direction
- Borehole ID

Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23

Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer — 23

Water Level at Time of Drilling

Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer — 23

Inferred Geologic Contact

Lithology
- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

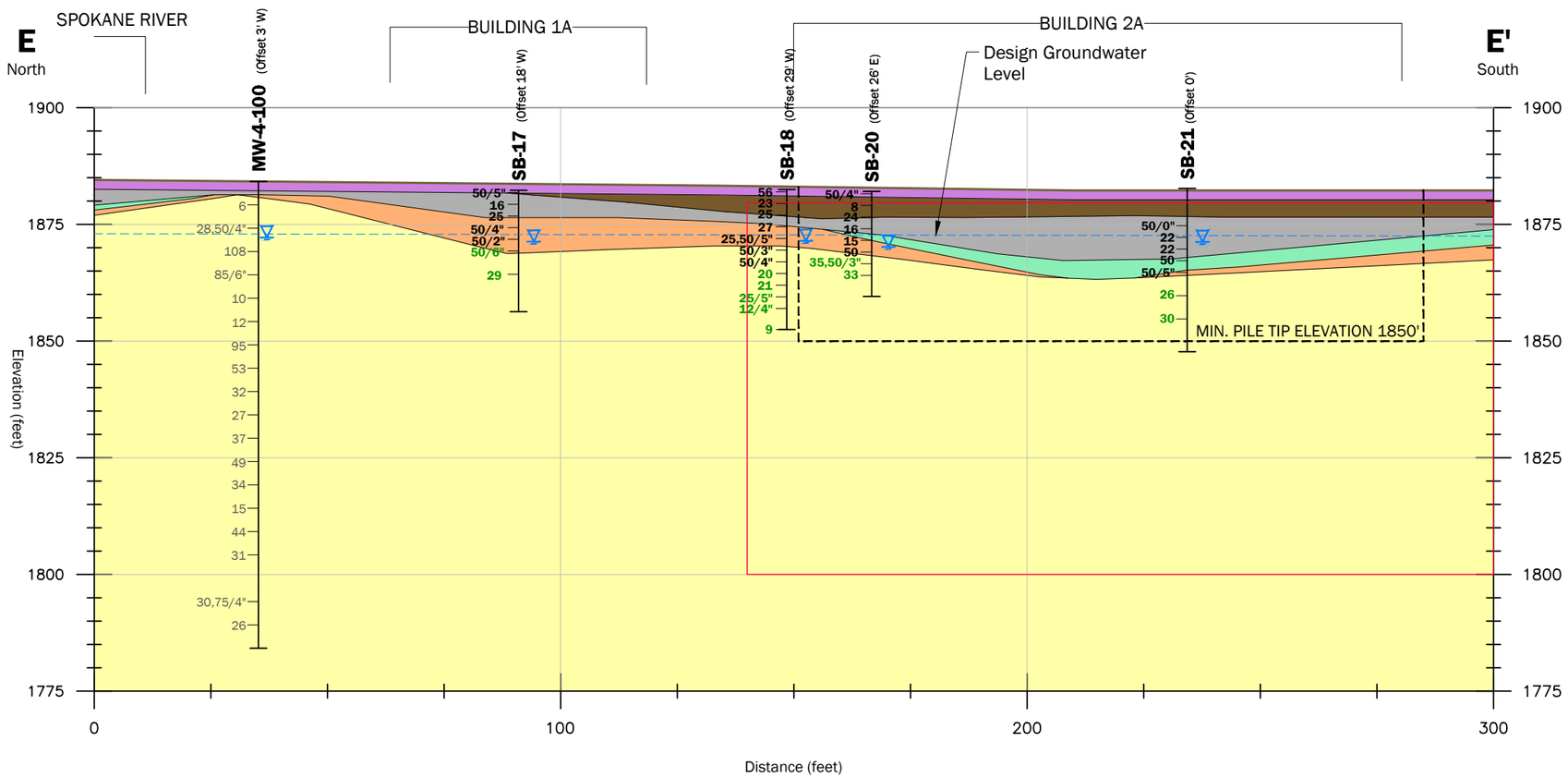
Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section D-D'
(West-East Subsurface, Building 2B)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 07
	PROJECT NO. 190210	REVISED BY: SCC	

CAD Path: Q:\Riverbend Redevelopment\Geotech 190210\190210-02.dwg Fig 7 || Date Saved: Apr 22, 2020 12:52pm || User: cvanslyke



0 30 60 Feet

Horizontal Scale: 1" = 30'
Vertical Scale: 1" = 30'
Vertical Exaggeration 1x

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Legend

SB-03 (Offset 2' S) — Offset and direction; Borehole ID

Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23

Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer — 23

Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer — 23

Water Level at Time of Drilling

Inferred Geologic Contact

Lithology

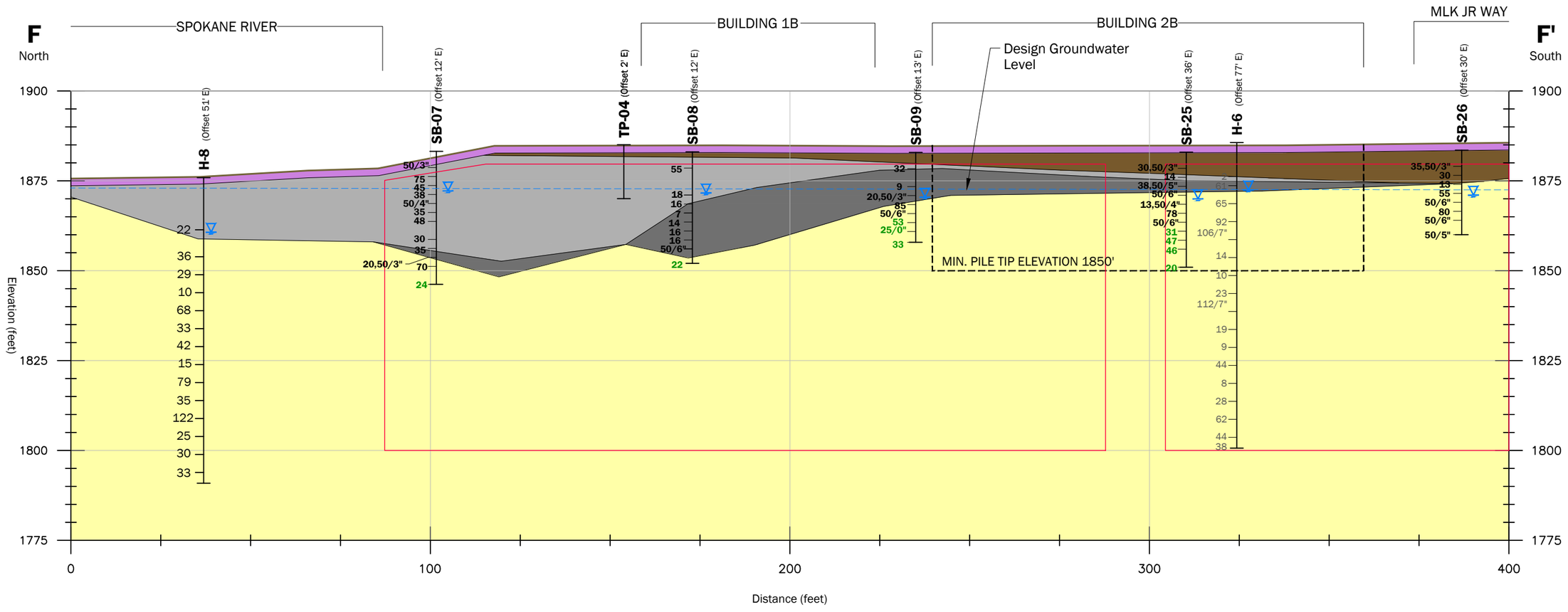
- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

Cross Section E-E'
(North-South Subsurface, Buildings 1A and 2A)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 08
	PROJECT NO. 190210	REVISED BY: SCC	



0 30 60 Feet

Horizontal Scale: 1" = 30'
Vertical Scale: 1" = 30'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S) — Offset and direction; Borehole ID

Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23

Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer — 23

Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer — 23

Water Level at Time of Drilling

Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section F-F'
(North-South Subsurface, Buildings 1B and 2B)

River Bend Developemnt
Spokane, Washington

Aspect Consulting			
	Apr-2020	BY: SJA/CMV	FIGURE NO. 09
	PROJECT NO. 190210	REVISED BY: SCC	

CAD Path: Q:\Riverbend Redevelopment\Geotech 190210\190210-02.dwg Fig 9 || Date Saved: Apr 22, 2020 12:53pm || User: cvanslyke

APPENDIX E

State Environmental Policy Act Determination

MITIGATED DETERMINATION OF NONSIGNIFICANCE "MDNS"

FILE NO(S): Z20-079SCUP

PROPONENT: River Bend Development, Ph. 2, Shoreline Conditional Use Permit – Sagamore Spokane, L.L.C.

DESCRIPTION OF PROPOSAL: The applicant is proposing new mufti-family residential housing for approximately 134 units in two (2) buildings located partially within the 200 foot shoreline designation.

LOCATION OF PROPOSAL, INCLUDING STREET ADDRESS, IF ANY: Parcel nos. 35174.0601 - .0608, site address 111, 115, 119, 225, & 229 N. Erie St., Spokane, WA 99202

LEAD AGENCY: CITY OF SPOKANE

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment if mitigated as stipulated below. An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

[ ] There is no comment period for this MDNS; pursuant to WAC 197-11-350(1).

[X] This MDNS is issued after using the optional DNS process in section 197-11-355 WAC. There is no further comment period on the MDNS.

[ ] This MDNS is issued under WAC 197-11-350 (2); the lead agency will not act on this proposal for at least 15 days from the date issued (below). Comments regarding this MDNS must be submitted no later than 5:00 p.m.,___, 20___ , if they are intended to alter the MDNS.

MITIGATING MEASURES:

1. "Under the Model Toxic Control Act (RCW Chapter 70.105D) the Applicant and WSDOE are addressing and mitigating the pre-existing environmental contamination through a Prospector Purchaser Consent Decree."

* *

Responsible Official: Tami Palmquist

Position/Title: Principal Planner, Planning and Development **Phone:** (509) 625-6157

Address: 808 W. Spokane Falls Blvd., Spokane, WA 99201

Tami Palmquist

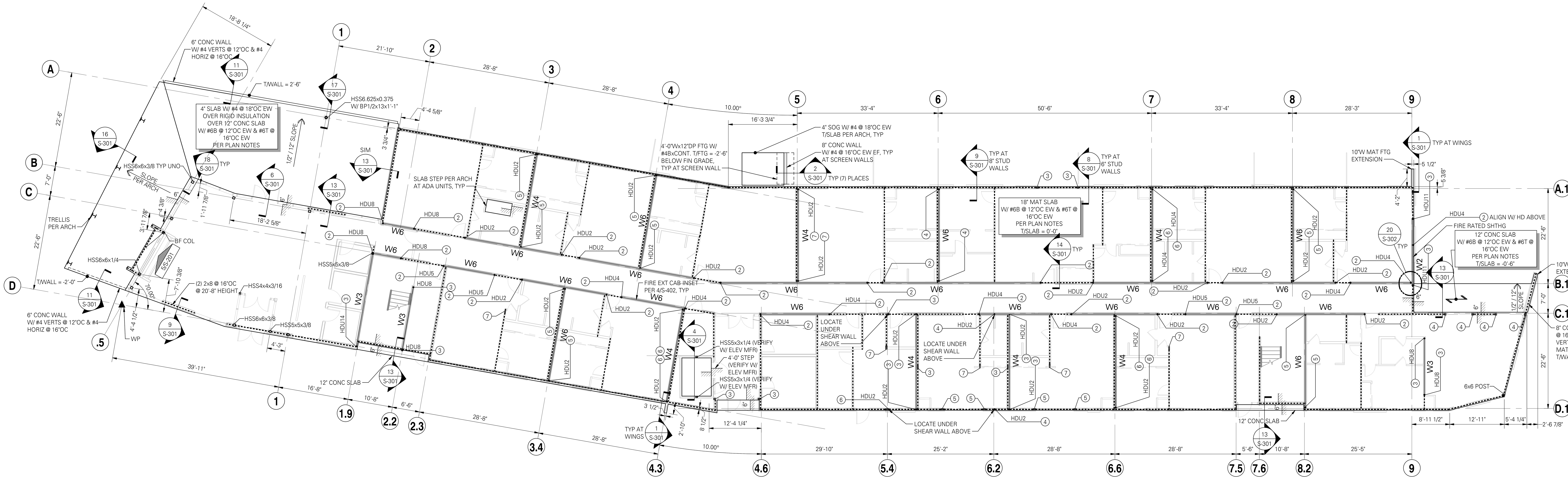
Date Issued: August 6, 2020 **Signature**:_____

* *

APPEAL OF THIS DETERMINATION, after it becomes final, may be made to the City of Spokane Hearing Examiner, 808 West Spokane Falls Blvd., Spokane, WA 99201. The appeal deadline is August 19. 2020 – fourteen (14) calendar days after the signing of the MDNS. This appeal must be on forms provided by the Responsible Official, make specific factual objections and be accompanied by the appeal fee. Contact the Responsible Official for assistance with the specifics of a SEPA appeal.

APPENDIX F

Civil Bidding Plan Set



ALSC ARCHITECTS
203 North Washington, Suite 400
Spokane, WA 99201
509.838.8568

6500 Mineral Drive, Suite 101
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DCI ENGINEERS®
707 W 2nd Avenue
Spokane, Washington 99201
P: (509) 455-4448 www.dci-engineers.com
CIVIL / STRUCTURAL

FOR BID (NOT FOR CONSTRUCTION)
These drawings have been released at the request of the client for the purpose of bidding. These drawings are not intended for purposes of obtaining a permit or construction.

JUSTIN B. COOK, STATE OF WASHINGTON, 37983, STRUCTURAL ENGINEER, PROFESSIONAL ENGINEER

BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND APARTMENTS

BID SET

STUD AND SHEAR WALL PLAN NOTES:

1. STRUCTURAL GENERAL NOTES, DESIGN CRITERIA, ABBREVIATIONS AND LEGEND PER S-001, S-002 AND S-003.
2. LUMBER GRADE PER STRUCTURAL GENERAL NOTES.
3. PARTY WALLS PER PLAN, PROVIDE 1" SPACE BETWEEN WALLS.
4. BALLOON FRAME ALL WALLS GREATER THAN ONE LEVEL 10'-0" WITH (2) 2x @ 16"OC.
5. ALL INTERIOR NON-BEARING, NON-STRUCTURAL WALL STUD REQUIREMENTS PER STRUCTURAL GENERAL NOTES.
6. HEADERS SHOWN ON FRAMING PLAN SHALL BE SUPPORTED BY (1) TRIMMER AND (1) KING STUD MINIMUM, UNO. WHERE MORE THAN (1) TRIMMER IS REQUIRED, THE NUMBER OF TRIMMER STUDS SHALL BE NOTED THUS: ■-(2) . TRIMMERS TO BE CONTINUOUS TO THE FOUNDATION. POST-TENSIONED SLAB. BLOCK SOLID AT FLOOR FRAMING.
7. BEAMS SHOWN ON FRAMING PLAN SHALL BE SUPPORTED BY (2) BUNDLED STUDS MINIMUM, UNO. WHERE MORE THAN (2) BUNDLED STUDS ARE REQUIRED, THE NUMBER OF BUNDLED STUDS SHALL BE NOTED THUS: ■-(3) . BUNDLED STUDS TO BE CONTINUOUS TO THE FOUNDATION. [POST-TENSIONED SLAB.] BLOCK SOLID AT FLOOR FRAMING.
8. SHEAR WALL AND NAILING REQUIREMENTS PER SHEAR WALL SCHEDULE 19/S-401.
9. ALL EXTERIOR WALLS REQUIRING WOOD SHEATHING PER THE ARCHITECT SHALL BE SHEAR WALL TYPE W6 UNO.
10. AT STAGGERED STUD WALLS, BUNDLED STUDS, TRIMMER STUDS, KING STUDS AND SHEAR WALL COMPRESSION STUDS ARE TO MATCH THE WIDTH OF THE WALL PLATES.
11. HD (-) INDICATES HOLD-DOWN TYPE PER HOLD-DOWN SCHEDULE 9/S-302. CIRCLED NUMBER INDICATES NUMBER OF FULL HEIGHT STUDS REQUIRED.
12. TYPICAL HOLD-DOWN ELEVATION PER 4/S-302.
13. ANCHOR BOLTS TO BE 5/8" DIA x 7" MINIMUM EMBEDMENT PER 2/S-401. PROVIDE HOT-DIPPED GALVANIZED ANCHOR BOLTS AT PRESSURE-TREATED SILL PLATES. HOT-DIPPED GALVANIZED ANCHOR BOLTS ARE NOT REQUIRED AT SODIUM BORATE PRESSURE TREATED PLATES PER STRUCTURAL GENERAL NOTES.
14. ALL WOOD FRAMING AND SHEATHING AT EXTERIOR WALLS TO BE FIRE RETARDANT TREATED (FRT) WOOD. ALL CONNECTORS (NAILS, SCREWS, HANGERS, AND ETC) TO BE HOT-DIPPED GALVANIZED AS REQUIRED BY TREATMENT MANUFACTURER.
15. ELEVATOR STEEL AND CONNECTIONS ARE PROVIDED FOR BUDGET PURPOSES ONLY AND ARE PRELIMINARY. THE PROPOSED STRUCTURAL MEMBERS AND THEIR CONNECTIONS SHALL BE CONFIRMED ONCE FINAL ELEVATOR REACTIONS ARE PROVIDED TO THE STRUCTURAL ENGINEER OF RECORD.
16. TYPICAL DETAILS PER:

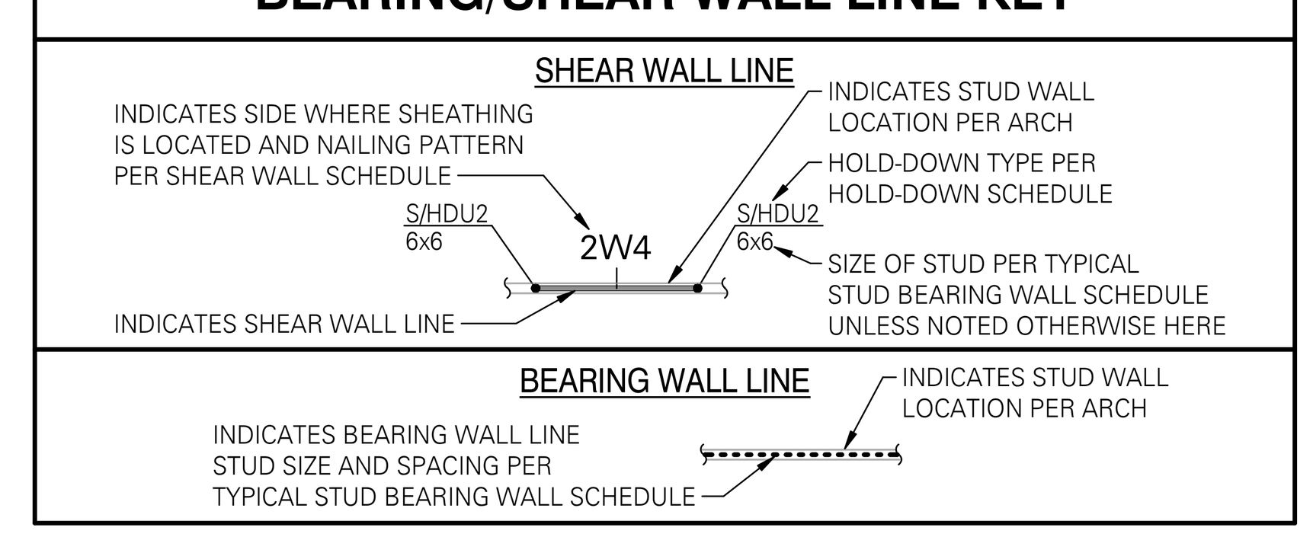
    14/S-302 TYPICAL HOLD-DOWN OR STRAP CONNECTION AT FLOOR FRAMING
    18/S-302 TYPICAL SHEAR WALL ELEVATION
    4/S-401 TYPICAL HOLES AND NOTCHES IN WOOD STUDS
    5/S-401 TYPICAL TOP PLATE SPLICE DETAIL
    17/S-401 TYPICAL STUD WALL OPENING (HEADER) DETAIL
    3/S-402 TYPICAL INTERIOR STAIRWELL ELEVATION
    7/S-402 NON-STRUCTURAL PARTITION WALL CONNECTION [I-JOIST]

FOUNDATION PLAN NOTES:

1. STRUCTURAL GENERAL NOTES, DESIGN CRITERIA, ABBREVIATIONS AND LEGEND PER S-001, S-002 AND S-003.
2. VERIFY ALL DIMENSIONS AND ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS.
3. CONTRACTOR SHALL LOCATE AND VERIFY THE FOLLOWING WITH OTHERS PRIOR TO POURING CONCRETE: ALL DOOR OPENINGS IN FOUNDATION WALLS; DRAINS AND SLOPES; BLOCKOUTS FOR [POOLS, SPAS, FREEZERS, COOLERS, PLUMBING, SPRINKLERS AND HVAC]. ALL DUCTS, CHASES AND PIPES PER MECHANICAL, PLUMBING, ELECTRICAL AND SPRINKLER DRAWINGS. STAIR DETAILS AND GUARDRAILS PER ARCHITECTURAL DRAWINGS.
4. TOP OF SLAB (T/SLAB) ELEVATION ASSUMED 0'-0". FOR ACTUAL T/SLAB ELEVATION REFER TO CIVIL AND ARCHITECTURAL DRAWINGS. PROVIDE 6 MIL VAPOR BARRIER BELOW SLAB AT INTERIOR SPACES. PROVIDE FREE-DRAINING GRANULAR FILL PER GEOTECH REPORT.
5. ALL SLABS TO BEAR ON COMPETENT NATIVE SOIL AND/OR STRUCTURAL FILL. SUBGRADE PREPARATION, STRUCTURAL FILL, FOOTING DRAINS, VAPOR BARRIER AND OTHER REQUIREMENTS PER GEOTECH REPORT AS NOTED IN THE STRUCTURAL GENERAL NOTES.
6. CJ INDICATES CONTROL JOINT PER PLAN.
7. MOISTURE PROOF ALL CONCRETE STEM AND BASEMENT WALLS PER ARCHITECT.
8. STEEL STAIRS SHALL BE BIDDER-DESIGNED, UNO. APPLICABLE DESIGN REQUIREMENTS PER STRUCTURAL GENERAL NOTES.
9. ELEVATOR STEEL AND CONNECTIONS ARE PROVIDED FOR BUDGET PURPOSES ONLY AND ARE PRELIMINARY. THE PROPOSED STRUCTURAL MEMBERS AND THEIR CONNECTIONS SHALL BE CONFIRMED ONCE FINAL ELEVATOR REACTIONS ARE PROVIDED TO THE STRUCTURAL ENGINEER OF RECORD.
10. TYPICAL DETAILS PER:

    10/S-301 TYPICAL LAP SPLICE SCHEDULE
    14/S-301 TYPICAL DEPRESSED SLAB DETAIL
    15/S-301 STANDARD HOOKS AND BAR BENDS
    4/S-302 TYPICAL HOLD-DOWN AT THICKENED SLAB FOOTING

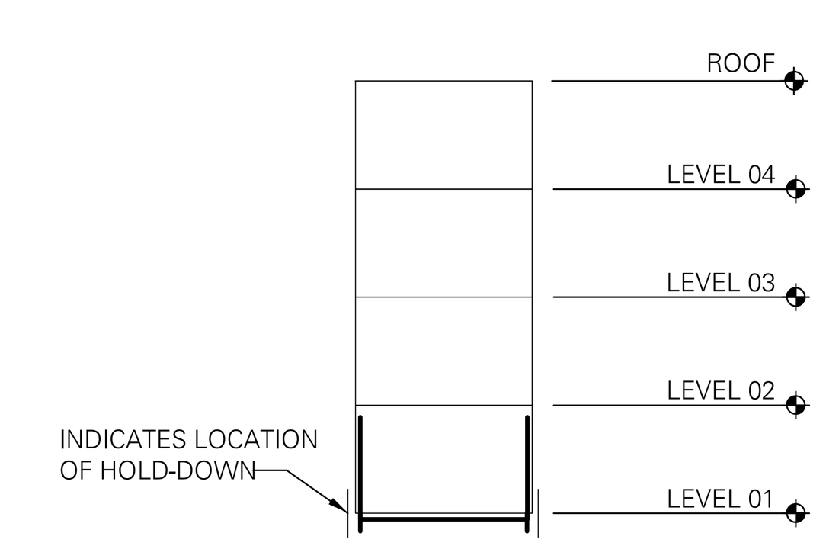
BEARING/SHEAR WALL LINE KEY



STUD WALL FRAMING SCHEDULE

FLOOR LEVEL	BEARING WALLS, UNO			
	EXTERIOR	CORRIDOR	INTERIOR	PARTY WALL
R-1	2x6 @ 16"OC (MIN)	2x6 @ 16"OC	(2) LVL1 3/4x3 1/2 @ 16"OC	2x4 @ 16"OC
R-2	2x6 @ 16"OC (MIN)	2x6 @ 16"OC	LVL1 3/4x3 1/2 @ 16"OC	2x4 @ 16"OC
R-3	2x6 @ 16"OC (MIN)	2x6 @ 16"OC	2x4 @ 12"OC	2x4 @ 16"OC
R-4	2x6 @ 16"OC (MIN)	2x6 @ 16"OC	2x4 @ 16"OC	2x4 @ 16"OC

NOTE: EXTERIOR STUDS AND PLATES TO BE FIRE TREATED LUMBER.



NOTE: DARKENED LINES DESIGNATE AREA OF WORK.

LEVEL 01 FOUNDATION PLAN
SCALE: 3/32" = 1'-0"

REV	DATE	DESCRIPTION
1	7/24/20	PERMIT RESPONSE

PROJ. NO. 18041-0341

PROJECT MANAGER KEA

DATE 03/01/2021

LEVEL 01 FOUNDATION PLAN

S-101

RIVERBEND APARTMENTS
PHASE 2
SAGAMORE SPOKANE LLC
SPOKANE, WASHINGTON

ABBREVIATIONS

ACP	ASPHALT CONCRETE PAVEMENT	FT (')	FOOT (FEET)
ADD'L	ADDITIONAL	FTG	FOOTING
AD	AREA DRAIN	G	GAS MAIN
ADJ	ADJACENT	GB	GRADE BREAK
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	GM	GAS METER
		GRD	GRADE
APPROX.	APPROXIMATE(LY)	GV	GATE VALVE
ARCH	ARCHITECT(URAL)	HB	HOSE BIB
ASSY	ASSEMBLY	HDPE	HIGH DENSITY POLYETHYLENE
BLDG	BUILDING	HORIZ(H)	HORIZONTAL
BM	BENCHMARK	HT	HEIGHT
BNDRY	BOUNDARY	HYD	HYDRANT
BOW	BOTTOM OF WALL (AT FINISHED GRADE)	ID	INSIDE DIAMETER
		I.E.	INVERT ELEVATION
BVC	BEGINNING OF VERTICAL CURVE	IN (")	INCH(ES)
CTV	CABLE TV	INV	INVERT
C&G	CURB AND GUTTER	IRR	IRRIGATION WATER
CB	CATCH BASIN	LB	POUND(S)
CC	CURB CUT	LCPE	LINED CORRUGATED POLYETHYLENE PIPE
CD	CONCRETE DRIVE		
CF	CUBIC FEET (FOOT)	LF	LINEAR FEET
CI	CAST IRON	MAT'L	MATERIAL
CJ	CONSTRUCTION JOINT	MAX	MAXIMUM
CL	CLASS	MFR	MANUFACTURER
CL	CENTER LINE	MH	MANHOLE
CMP	CORRUGATED METAL PIPE	MJ	MECHANICAL JOINT
CONC.	CONCRETE	MIN.	MINIMUM
CONST.	CONSTRUCTION	MISC.	MISCELLANEOUS
CPEP	CORRUGATED POLYETHYLENE PIPE	N	NORTH(ING)
CTR	CENTER(ED)	NO (#)	NUMBER
CY	CUBIC YARD	OC	ON CENTER
DCVA	DOUBLE CHECK VALVE ASSEMBLY	O/W	OIL WATER
DDCV	DOUBLE DETECTOR CHECK VALVE	P	POWER
DEPT.	DEPARTMENT	PC	POINT OF CURVATURE
DET	DETAIL	PIV	POST INDICATOR VALVE
D.I.	DUCTILE IRON	PP	POWER POLE
DIA (ø)	DIAMETER	PL	PROPERTY LINE
DIM	DIMENSION	PSF	POUNDS PER SQUARE FOOT
DS	DOWN SPOUT	PSI	POUNDS PER SQUARE INCH
DWG	DRAWING	PT	POINT OF TANGENCY
E	EAST(ING)	PVC	POLYVINYL CHLORIDE
EC	ELECTRICAL CONDUIT	PVI	POINT OF VERTICAL INFLECTION
ECC	EXTRUDED CONCRETE CURB	QTY.	QUANTITY
EL.=	ELEVATION	RAD (R)	RADIUS
EOP	EDGE OF PAVEMENT	RCP	REINFORCED CONCRETE PIPE
EQUIV.	EQUIVALENT	RD	ROAD
EVC	END OF VERTICAL CURVE	REF	REFERENCE
EXIST.	EXISTING	REQD.	REQUIRED
FD	FLOOR DRAIN	RET	RETAINING
FDC	FIRE DEPARTMENT CONNECTION	ROW	RIGHT OF WAY
FDN	FOUNDATION	SD	STORM DRAIN
FFE	FINISH FLOOR ELEVATION	S.F.	SQUARE FEET
FH	FIRE HYDRANT	SHT	SHEET
FL	FLANGED	SIM	SIMILAR
FLR	FLOOR	SPEC	SPECIFICATION(S)
FOC	FACE OF CURB	SQ	SQUARE
F.S.	FINISHED SURFACE	SS	SANITARY SEWER
		STA	STATION
		STD	STANDARD
		TOE	TOE OF WALL, OR SLOPE
		T	TELEPHONE WIRE
		TBM	TEMPORARY BENCH MARK
		T.C.	TOP OF CURB
		TG OR RIM	TOP OF GRATE
		TEMP.	TEMPORARY
		TOP	TOP OF SLOPE
		TOW	TOP OF WALL
		TV	TELEVISION WIRE
		TYP.	TYPICAL
		VC	VERTICAL CURVE
		VERT (V)	VERTICAL
		WM	WATER METER
		W/	WITH
		WT	WEIGHT
		WWF	WELDED WIRE FABRIC
		YD	YARD DRAIN

LEGEND

STORM PIPE — SD
NEW & EXISTING CATCH BASINS — CB / C.B.
NEW & EXISTING DRYWELLS — DW / DW
STORM MANHOLE — SDMH / SDMH
SANITARY SEWER PIPE — SS
SANITARY SEWER MANHOLE — SSMH / SSMH
WATER MAINS — W
FIRE HYDRANTS (NEW AND EXISTING) AND FDC — FH / FH
WATER METERS
WATER VALVES
FITTINGS WITH THRUST BLOCKS — TEE, 90°, 45°, 22.5°, 11.25°
SURFACE WTR AND PIPE DIRECTION FLOW — OR
EXISTING CONTOUR LABELS — (457)
PROPOSED CONTOUR LABELS — 457
EXISTING SURFACE ELEVATIONS — (XXX.XX) F.S. / (XXX.XX T.C.) (XXX.XX F.S.)
FINISHED SURFACE ELEVATIONS — XXX.XX F.S. / XXX.XX T.C. XXX.XX F.S.
NEW EASEMENT
NEW DITCH
TRAFFIC ARROWS
TOP OF WALL/BOTTOM OF WALL — TOW XXX.XX / XXX.XX BOW
SLOPE INDICATORS — 3:1, 2:1
RIP RAP
FILTER FABRIC FENCING
FOOTING DRAINS
DOWNSPOUTS — DS
CLEANOUTS (C.O.) SS, AND RWL (NEW AND EXISTING) — CO / CO
INTERCEPTOR AND BIO-SWALES
CEMENT CONCRETE
COORDINATES, & LEADERS — N 10000.00 E 5000.00
STUBBED & PLUGGED LINE
CONCRETE CURB
CONCRETE CURB & GUTTER
NEW ASPHALT/CONCRETE PAVEMENT
CURB INLET/UNDER SIDEWALK INLET
DRAINAGE SWALE
RETAINING WALL
STRAW BALE
ROCK CHECK DAM

GENERAL CONSTRUCTION NOTES:

1. UNLESS SPECIFICALLY EXCEPTED IN THE PLANS OR CONTRACT DOCUMENTS, ALL CONSTRUCTION METHODS AND MATERIALS SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND STANDARD PLANS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION PROMULGATED BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND THE WASHINGTON CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION (LATEST EDITION) AND THE CITY OF SPOKANE STANDARDS AND SPECIFICATIONS.

2. THE PLANS ARE SCHEMATIC AND ARE NOT INTENDED TO DEPICT ALL DETAILS OF THE WORK REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE TO FAMILIARIZE HIMSELF WITH ACTUAL SITE CONDITIONS, REQUIREMENTS AND FACTORS AFFECTING THE WORK. WHERE LACK OF DETAIL OR CONFLICT EXISTS BETWEEN THESE AND OTHER PLANS, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING. IF THE CONTRACTOR DISCOVERS ANY DISCREPANCIES BETWEEN THE PLANS AND EXISTING CONDITIONS ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER AND CITY OF SPOKANE ENGINEERING AND DEVELOPER SERVICES DEPARTMENT.

3. THIS PLAN MAY NOT SHOW ALL EXISTING UTILITIES. EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. PRIOR TO CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES. CALL THE UNDERGROUND UTILITY LOCATION SERVICE AT 811 BEFORE YOU DIG. ANY CONFLICTING UTILITIES SHALL BE RELOCATED PRIOR TO CONSTRUCTION. IN THE CASE WHERE RELOCATION IS REQUIRED, THE APPLICABLE UTILITY COMPANY SHALL BE NOTIFIED AND ANY COST REQUIRED FOR RELOCATION OR ADJUSTMENTS SHALL BE AGREED UPON.

4. THE ENGINEER HAS ATTEMPTED TO SHOW ALL EXISTING UNDERGROUND UTILITIES AND STRUCTURES. APPEARANCE ON THESE PLANS, HOWEVER, DOES NOT GUARANTEE THE ACCURACY AND COMPLETENESS OF THE LOCATION OR EXISTENCE OF THESE UTILITIES AND/OR SUBSTRUCTURES. THE CONTRACTOR IS REQUIRED TO TAKE ALL REQUIRED PRECAUTIONARY MEANS TO LOCATE AND PROTECT ALL EXISTING UTILITIES AND SUBSTRUCTURES WHETHER SHOWN OR NOT, PRIOR TO EXCAVATION IN ANY AREA. THE CONTRACTOR SHALL MEET AT THE JOB SITE WITH REPRESENTATIVES OF THE UTILITY DISTRICTS, COMPANIES, AND OTHER OWNERS THAT MAY HAVE EXISTING FACILITIES AT THE SITE, TO DISCUSS THEIR PROTECTION.

5. THE CONTRACTOR IS REQUIRED TO HAVE A COMPLETE SET OF APPROVED PLANS ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS. THE CONTRACTOR SHALL HAVE A RESPONSIBLE PARTY, WHO HAS THE AUTHORITY TO REPRESENT AND ACT FOR THE CONTRACTOR, AT THE JOB SITE DURING ALL WORKING HOURS.

6. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS AND APPROVALS FROM CITY OF SPOKANE AND OTHER JURISDICTIONS PRIOR TO THE START OF CONSTRUCTION. ABSENCE OF THE PERMIT MAY RESULT IN IMMEDIATE SHUT DOWN OF WORK AND POSSIBLE REMOVAL OF THE ITEMS CONSTRUCTED WITHOUT A PERMIT.

7. THE CONTRACTOR SHALL PROVIDE THE DESIGN ENGINEERS WITH RECORD DRAWINGS PRIOR TO FINAL APPROVAL. ALL DEVIATIONS FROM THE ORIGINAL PLANS MADE DURING THE COURSE OF THE CONSTRUCTION INCLUDING LOCATION, INVERTS, AND DEPTHS OF UTILITIES SHALL BE CLEARLY MARKED ON THE RECORD DRAWINGS. THE ENGINEER SHALL PROVIDE THE CITY ENGINEER WITH "RECORD DRAWINGS" AS REQUIRED.

8. THE EXISTING SITE CONDITIONS SHOWN ARE FOR INFORMATIONAL PURPOSES ONLY. NO CERTIFICATIONS ARE EXPRESSED OR IMPLIED. THE TOPOGRAPHIC SURVEY WAS PROVIDED BY DURYEA AND ASSOCIATES.

9. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT TO CONSTRUCT AND INSTALL TO PROPER WORKING ORDER, THE DESIGN SHOWN, AS DETAILED OR CALLED OUT IN THESE PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR BEING FAMILIAR WITH THE PROVISIONS AND REQUIREMENTS CONTAINED IN THE STANDARD SPECIFICATIONS.

10. IF CONSTRUCTION IS TO TAKE PLACE IN PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE GOVERNING MUNICIPALITY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLAN(S) IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS REQUIRED. PRIOR TO DISRUPTION OF ANY TRAFFIC, A TRAFFIC PLAN SHALL BE PREPARED AND SUBMITTED TO THE CITY OF SPOKANE FOR APPROVAL. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.

11. A PRE-CONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF SPOKANE CONSTRUCTION INSPECTOR PRIOR TO THE START OF CONSTRUCTION.

12. ANY CHANGES TO THE DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE DESIGN ENGINEER AND THE CITY OF SPOKANE.

13. ALL TESTING SHALL BE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATIONS (LATEST EDITION) AND GEOTECHNICAL REPORT BY ASPECT CONSULTING, LLC. DATED OCTOBER 25, 2019.

14. EXCAVATION AND EMBANKMENT SHALL BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF SECTION 2-03 OF THE WSDOT STANDARD SPECIFICATIONS. ALL COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 2-03.3(14)C, METHOD C FOR BUILDING PADS, METHOD B FOR OTHER AREAS, AND THE GEOTECHNICAL REPORTS.

15. ALL FINISHED GRADING ELEVATIONS SHALL MATCH EXISTING ELEVATIONS AT THE SITE'S BOUNDARY, EXCEPT AS SHOWN OTHERWISE ON THE GRADING PLAN. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING.

16. THE CONTRACTOR SHALL REMOVE ALL WASTE MATERIAL.

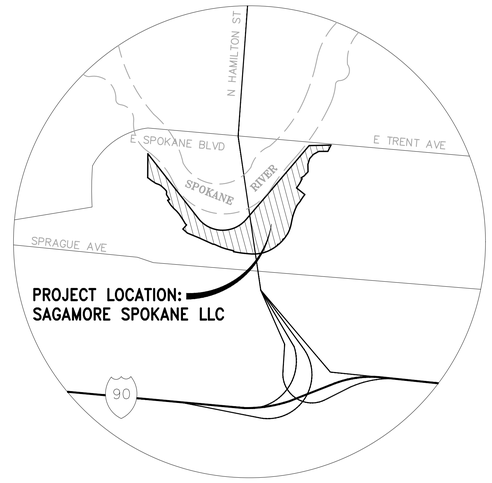
17. GRADING: ALL GRADING SHALL BE LIMITED TO THE AREAS IDENTIFIED ON THE GRADING PLAN AND SHALL NOT INFRINGE ON ADJACENT OWNERSHIPS, EXCEPT AS SHOWN OTHERWISE ON THE PLANS.

18. THE CONTRACTOR SHALL PROTECT ALL CATCH BASINS, DRYWELLS, AND OTHER STORM WATER STRUCTURES FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC OVER THE METAL FRAME DURING CONSTRUCTION AND KEEPING IT IN PLACE UNTIL THE SITE HAS BEEN PAVED AND CLEANED.

19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING DIRT, MUD, AND OTHER CONSTRUCTION DEBRIS THAT MAY ACCUMULATE ON PAVED STREETS ADJACENT TO THE SITE AS A RESULT OF CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MATERIALS THAT SPILL ONTO LOCAL STREETS DURING THE TRANSPORTATION OF EQUIPMENT, MATERIALS, ETC. SHOULD A SPILL OCCUR, THE CONTRACTOR SHALL REMOVE THE MATERIAL BY THE END OF THE WORK DAY. NO MATERIAL SHALL BE ALLOWED TO SET, DRY, OR BE WASHED INTO ADJACENT STORM WATER FACILITIES. CLEANING SHALL BE ON AN "AS NEEDED" BASIS USING WATER UNDER PRESSURE. SWEEPING AND WATER SHALL BE USED WHEN WATER PRESSURE ALONE WILL NOT WASH THE CONSTRUCTION DEBRIS FROM THE STREET. THE CONTRACTOR MUST PROTECT ALL EXISTING STORM WATER FACILITIES FROM DIRT/DEBRIS.

20. ANY BROKEN, HEAVED, OR SUNKEN SIDEWALK AND/OR CURB ALONG THE PROJECT PROPERTY FRONTAGE MUST BE REPLACED TO CITY STANDARDS, WHETHER EXISTING OR CAUSED DURING CONSTRUCTION. (SMC 12.01.010)

21. CONSTRUCTION OPERATIONS, INCLUDING EQUIPMENT WARM UP AND OPERATION, ARE RESTRICTED TO THE TIME LIMITS OUTLINED IN THE CITY NOISE ORDINANCE.



VICINITY MAP

NOT TO SCALE

SE 1/4 SEC. 17, T. 25 N., R. 43 E., W.M.

PROJECT TEAM:

OWNER:
SAGAMORE SPOKANE LLC
1 E CAMELBACK RD STE 200
PHOENIX, AZ 85012
PHONE: (212) 446-6980

ARCHITECT:
ALSC ARCHITECTS
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SPOKANE, WA 99201
CONTACT: RUSTIN HALL
PHONE: (509) 838-8568

CIVIL ENGINEER:
DCI ENGINEERS
707 W. 2ND AVENUE
SPOKANE, WA 99201
CONTACT: MATT GIBB, P.E.
PHONE: (509) 227-5721

UTILITY PURVEYORS:

SEWER:
CITY OF SPOKANE
909 E. SPRAGUE AVE.
SPOKANE, WA 99202
PHONE: (509) 625-7900

WATER:
CITY OF SPOKANE
914 E. NORTH FOOTHILLS DRIVE
SPOKANE, WA 99207
PHONE: (509) 625-7800

POWER/GAS:
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1411 E. MISSION AVE.
SPOKANE, WA 99252
POWER CONTACT: NICK HARMON
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SHEET INDEX

CONTRACTOR NOTE

ALL EXISTING UTILITIES SHOWN ON PLANS ARE TO BE VERIFIED HORIZONTALLY AND VERTICALLY PRIOR TO ANY CONSTRUCTION. ALL EXISTING FEATURES INCLUDING BURIED UTILITIES ARE SHOWN AS INDICATED ON RECORD MAPS AND SURVEYS FURNISHED BY OTHERS. WE ASSUME NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS AND SURVEYS. CONTACT THE UTILITY OWNER/AGENCY FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO CONSTRUCTION.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

ALSC ARCHITECTS
203 North Washington, Suite 9400
Spokane, WA 99201
509.838.8568
6500 Mineral Drive, Suite 101
Coure d' Alene, Idaho 83815
208.676.8292
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MATTHEW R. GIBB — STATE OF WASHINGTON — 21809 — REGISTERED PROFESSIONAL ENGINEER

3/11/2021

DCI ENGINEERS
707 W. 2ND AVENUE
SPOKANE, WASHINGTON 99201
PHONE: (509) 455-4448 • FAX: (509) 455-7492
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CIVIL / STRUCTURAL

BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GENERAL CIVIL INFORMATION

C-000

SPOKANE REGIONAL STORM WATER MANUAL APPENDIX 9A- ESC STANDARD PLAN NOTES:

THE FOLLOWING ESC STANDARD PLAN NOTES ORIGINATE FROM SECTION 9.4.3. THESE NOTES ARE AN OVERALL SET; USE ONLY WHAT APPLIES TO THE GIVEN PROJECT.

1. THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE FOLLOWED IN ORDER TO BEST MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION CONTROL PROBLEMS:

(A) CLEAR AND GRUB SUFFICIENTLY FOR INSTALLATION OF TEMPORARY ESC BMPS;
(B) INSTALL TEMPORARY ESC BMPS, CONSTRUCTING SEDIMENT TRAPPING BMPS AS ONE OF THE FIRST STEPS PRIOR TO GRADING;
(C) CLEAR, GRUB AND ROUGH GRADE FOR ROADS, TEMPORARY ACCESS POINTS AND UTILITY LOCATIONS;
(D) STABILIZE ROADWAY APPROACHES AND TEMPORARY ACCESS POINTS WITH THE APPROPRIATE CONSTRUCTION ENTRY BMP;
(E) CLEAR, GRUB AND GRADE INDIVIDUAL LOTS OR GROUPS OF LOTS;
(F) TEMPORARILY STABILIZE, THROUGH RE-VEGETATION OR OTHER APPROPRIATE BMPS, LOTS OR GROUPS OF LOTS IN SITUATIONS WHERE SUBSTANTIAL CUT OR FILL SLOPES ARE A RESULT OF THE SITE GRADING;
(G) CONSTRUCT ROADS, BUILDINGS, PERMANENT STORM WATER FACILITIES (I.E. INLETS, PONDS, UIC FACILITIES, ETC.);
(H) PROTECT ALL PERMANENT STORM WATER FACILITIES UTILIZING THE APPROPRIATE BMPS;
(I) INSTALL PERMANENT ESC CONTROLS, WHEN APPLICABLE; AND,
(J) REMOVE TEMPORARY ESC CONTROLS WHEN:

2. PERMANENT ESC CONTROLS, WHEN APPLICABLE, HAVE BEEN COMPLETELY INSTALLED;

3. ALL LAND-DISTURBING ACTIVITIES THAT HAVE THE POTENTIAL TO CAUSE EROSION OR SEDIMENTATION PROBLEMS HAVE CEASED; AND,

4. VEGETATION HAD BEEN ESTABLISHED IN THE AREAS NOTED AS REQUIRING VEGETATION ON THE ACCEPTED ESC PLAN ON FILE WITH THE LOCAL JURISDICTION.

5. INSPECT ALL ROADWAYS, AT THE END OF EACH DAY, ADJACENT TO THE CONSTRUCTION ACCESS ROUTE. IF IT IS EVIDENT THAT SEDIMENT HAS BEEN TRACKED OFF SITE AND/OR BEYOND THE ROADWAY APPROACH, CLEANING IS REQUIRED.

6. IF SEDIMENT REMOVAL IS NECESSARY PRIOR TO STREET WASHING, IT SHALL BE REMOVED BY SHOVELING OR PICKUP SWEEPING AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.

7. IF STREET WASHING IS REQUIRED TO CLEAN SEDIMENT TRACKED OFF SITE, ONCE SEDIMENT HAS BEEN REMOVED, STREET WASH WASTEWATER SHALL BE CONTROLLED BY PUMPING BACK ON-SITE OR OTHERWISE PREVENTED FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.

8. RESTORE CONSTRUCTION ACCESS ROUTE EQUAL TO OR BETTER THAN THE PRE-CONSTRUCTION CONDITION.

9. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICAL.

10. INSPECT SEDIMENT CONTROL BMPS WEEKLY AT A MINIMUM, DAILY DURING A STORM EVENT, AND AFTER ANY DISCHARGE FROM THE SITE (STORM WATER OR NON-STORMWATER). THE INSPECTION FREQUENCY MAY BE REDUCED TO ONCE A MONTH IF THE SITE IS STABILIZED AND INACTIVE.

11. CONTROL FUGITIVE DUST FROM CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE STATE AND/OR LOCAL AIR QUALITY CONTROL AUTHORITIES WITH JURISDICTION OVER THE PROJECT AREA.

12. STABILIZE EXPOSED UNWORKED SOILS (INCLUDING STOCKPILES), WHETHER AT FINAL GRADE OR NOT, WITHIN 10 DAYS DURING THE REGIONAL DRY SEASON (JULY 1 THROUGH SEPTEMBER 30) AND WITHIN 5 DAYS DURING THE REGIONAL WET SEASON (OCTOBER 1 THROUGH JUNE 30). SOILS MUST BE STABILIZED AT THE END OF A SHIFT BEFORE A HOLIDAY WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. THIS TIME LIMIT MAY ONLY BE ADJUSTED BY A LOCAL JURISDICTION WITH A "QUALIFIED LOCAL PROGRAM," IF IT CAN BE DEMONSTRATED THAT THE RECENT PRECIPITATION JUSTIFIES A DIFFERENT STANDARD AND MEETS THE REQUIREMENTS SET FOURTH IN THE CONSTRUCTION STORM WATER GENERAL PERMIT.

13. PROTECT INLETS, DRYWELLS, CATCH BASINS AND OTHER STORM WATER MANAGEMENT FACILITIES FROM SEDIMENT, WHETHER OR NOT FACILITIES ARE OPERABLE.

14. KEEP ROADS ADJACENT TO INLETS CLEAN.

15. INSPECT INLETS WEEKLY AT A MINIMUM AND DAILY DURING STORM EVENTS.

16. CONSTRUCT STORM WATER CONTROL FACILITIES (DETENTION/RETENTION STORAGE POND OR SWALES) BEFORE GRADING BEGINS. THESE FACILITIES SHALL BE OPERATIONAL BEFORE THE CONSTRUCTION OF IMPERVIOUS SITE IMPROVEMENTS.

17. STOCKPILE MATERIALS (SUCH AS TOPSOIL) ON SITE, KEEPING OFF OF ROADWAY AND SIDEWALKS.

18. COVER, CONTAIN AND PROTECT ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCT, AND NON-INERT WASTES PRESENT ON SITE FROM VANDALISM (SEE CHAPTER 173-304 WAC FOR THE DEFINITION OF INERT WASTE), USE SECONDARY CONTAINMENT FOR ON-SITE FUELING TANKS.

19. CONDUCT MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM REPAIRS, SOLVENT AND DE-GREASING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES THAT MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORM WATER RUNOFF USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CLEAN ALL CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. IF RAINING OVER EQUIPMENT OR VEHICLE, PERFORM EMERGENCY REPAIRS ON SITE USING TEMPORARY PLASTIC BENEATH THE VEHICLE.

20. CONDUCT APPLICATION OF AGRICULTURAL CHEMICALS, INCLUDING FERTILIZERS AND PESTICIDES, IN SUCH A MANNER, AND AT APPLICATION RATES, THAT INHIBITS THE LOSS OF CHEMICALS INTO STORM WATER RUNOFF FACILITIES. AMEND MANUFACTURER'S RECOMMENDED APPLICATION RATES AND PROCEDURES TO MEET THIS REQUIREMENT, IF NECESSARY.

21. INSPECT ON A REGULAR BASIS (AT A MINIMUM WEEKLY, AND DAILY DURING/AFTER A RUNOFF PRODUCING STORM EVENT) AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL BMPS TO ENSURE SUCCESSFUL PERFORMANCE OF THE BMPS. NOTE THAT INLET PROTECTION DEVICES SHALL BE CLEANED OR REMOVED AND REPLACE BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE.

22. REMOVE TEMPORARY ESC BMPS WITHIN 30 DAYS AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED. PERMANENTLY STABILIZE AREAS THAT ARE DISTURBED DURING THE REMOVAL PROCESS.

EROSION CONTROL NOTES:

1. AN EROSION/SEDIMENTATION CONTROL (ESC) PLAN IS REQUIRED FOR THIS PROJECT. IMPLEMENTATION OF THIS ESC PLAN, AND CONSTRUCTION, MAINTENANCE, AND UPGRADING OF THE ESC FACILITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND ACCEPTED BY THE CITY OF SPOKANE, OR UNTIL VEGETATION IS ESTABLISHED THROUGHOUT THE SITE, AND ACCEPTED BY THE CITY OF SPOKANE, WHICHEVER IS LATER.

2. APPROVAL OF THE ESC PLAN DOES NOT CONSTITUTE APPROVAL OF ANY OF THE PROPOSED ROAD, STORM WATER, GRADING, OR UTILITY DESIGN ELEMENTS SHOWN ON THE ESC PLAN.

3. THE EROSION/SEDIMENTATION CONTROL MEASURES SHOWN ARE THE MINIMUM REQUIREMENTS OF THE ANTICIPATED SITE CONDITIONS. THE CONTRACTOR SHALL INSPECT AND MAINTAIN THESE ESC MEASURES DAILY, AND SHALL MAINTAIN AND UPGRADE THESE MEASURES AS NECESSARY TO PREVENT SEDIMENT-LADEN WATER FROM EITHER FLOWING OFF-SITE, OR INTO NEW/EXISTING STORM WATER FACILITIES, SUCH AS DRYWELLS, CULVERTS, OR GRAVEL GALLERIES.

4. CONTRACTOR IS RESPONSIBLE FOR INSTALLING A ROCK CONSTRUCTION ENTRANCE AT ANY AND ALL LOCATIONS USED BY VEHICLES TO ENTER OR EXIT THE PROJECT SITE TO PREVENT SEDIMENTS FROM BEING TRACKED OFF THE SITE BY CONSTRUCTION TRAFFIC. .

5. ANY DISTURBED AREAS, EXCEPT FOR POND BOTTOMS AND SLOPES, THAT WILL BE LEFT BARE FOR MORE THAN 7 DAYS AND ARE NOT INTENDED TO BE REWORKED WITHIN 30-45 DAYS, SHALL BE SEEDED WITH A FAST STARTING NATIVE DRYLAND GRASS SUCH AS ANNUAL RYE, OR APPROVED EQUAL, AT A RATE OF 60 LBS./ACRE.

6. GRADED POND AREAS, THAT WILL BE LEFT BARE FOR MORE THAN 7 DAYS, SHALL HAVE A MULCH APPLIED AT A RATE OF TWO THOUSAND (2,000) POUNDS PER ACRE. MULCH SHALL BE A VIRGIN WOOD CELLULOSE FIBER SPECIALLY PROCESSED AS A HYDROSEEDING MULCH AND CONTAIN NO GROWTH OR GERMINATION INHIBITING FACTORS. IF POND CONSTRUCTION HAS BEEN COMPLETED, INCLUDING DRAINAGE STRUCTURES, AND HAVE RECEIVED FINAL INSPECTION APPROVAL, THEY SHALL BE SODDED.

7. DUST CONTROL: AN APPROVED METHOD OF DUST CONTROL, MEETING THE REQUIREMENTS OF LOCAL REGULATIONS, SHALL BE UTILIZED DURING CONSTRUCTION OF THIS PROJECT. THIS MAY REQUIRE THE USE OF WATER SPRAYS, TARPS, SPRINKLERS, OR SUSPENSION OF ACTIVITY DURING CERTAIN WEATHER CONDITIONS.

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MATERIALS THAT SPILL ONTO LOCAL STREETS DURING THE TRANSPORTATION OF EQUIPMENT. SHOULD A SPILL OCCUR, THE CONTRACTOR SHALL REMOVE THE MATERIAL BY THE END OF THE WORK DAY. NO MATERIAL SHALL BE ALLOWED TO SET, DRY, OR BE WASHED INTO ADJACENT STORM WATER FACILITIES.

9. GEOTEXTILE FABRIC IS TO BE PLACED ON THE RIMS OF DRYWELLS, CATCH BASINS, AND INLETS UNTIL SUCH TIME AS THE VEGETATION ON THE SITE IS ESTABLISHED AND THE THREAT OF SEDIMENT DEPOSITION INTO THE DRAINAGE SYSTEM IS MITIGATED.

10. THE CONTRACTOR SHALL PROTECT ALL CATCH BASINS, DRYWELLS, AND OTHER STORM WATER STRUCTURES FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC OVER THE METAL FRAME DURING CONSTRUCTION AND KEEPING IT IN PLACE UNTIL THE SITE/STREET HAS BEEN PAVED AND CLEANED.

11. ALL PONDS/SWALES SHALL BE SODDED AND IRRIGATED.

12. CONTRACTOR SHALL INSTALL FILTER FABRIC FENCE AS NEEDED ON-SITE TO PREVENT SEDIMENTS FROM LEAVING THE SITE.

13. CONTRACTOR IS RESPONSIBLE FOR DESIGNING A LOCATION WHERE CONCRETE TRUCKS AND EQUIPMENT CAN BE WASHED OUT. WASHOUT AREA SHALL NOT BE LOCATED NEAR OR DRAIN INTO A STORM DRAINAGE AREA, TREATMENT AREA, OR FACILITY.

EROSION CONTROL MAINTENANCE NOTES:

1. SEDIMENT BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL PRODUCING RUNOFF AND AT LEAST DAILY DURING PROLONGED RAINFALL OF 24 CONTINUOUS HOURS OR 48 HOURS IN ANY ONE WEEK.

2. NECESSARY REPAIRS TO BARRIERS OR REPLACEMENT OF BARRIERS SHALL BE ACCOMPLISHED PROMPTLY.

3. SEDIMENT MUST BE REMOVED WHEN IT REACHES A HEIGHT OF 6 INCHES UP THE BASE OF THE FILTER FABRIC BARRIER, THE DEPTH OF THE CUTOFF DITCH, OR THE SEDIMENT POND. ALL EROSION CONTROL SHALL BE CHECKED AFTER ANY RAIN STORM.

4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE ESC STRUCTURE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED, AND HYDRO/HAND SEEDED OR SODDED.

5. ALL TEMPORARY AND PERMANENT ESC PRACTICES SHALL BE MAINTAINED AND PREPARED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.

6. ALL TEMPORARY ESC MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON-SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL WITHOUT PERMISSION OF THE ENGINEER OR INSPECTOR THAT RESULTS IN CONTAMINATION OF THE DRYWELLS SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO REMEDY. REMEDY MAY ENTAIL DRYWELL CLEANING OR REMOVAL AND RECONSTRUCTION.

GRADING NOTES:

1. EXCAVATION AND EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL REPORTS FOR THIS PROJECT AND ALL APPLICABLE REQUIREMENTS OF THE THE CITY OF SPOKANE STANDARD SPECIFICATIONS AND THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION). ALL COMPACTION OF SUBGRADES, ROCK, AND ASPHALT SHALL BE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD SPECIFICATIONS AND THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION) AND THE GEOTECH REPORT.

2. ALL FINISHED GRADING ELEVATIONS SHALL MATCH EXISTING ELEVATIONS AT THE SITE'S BOUNDARY, EXCEPT AS SHOWN OTHERWISE ON THE GRADING PLAN. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING.

3. EARTHWORK QUANTITIES HAVE NOT BEEN CALCULATED TO DETERMINE ESTIMATED VOLUMES OF EXCAVATION AND EMBANKMENT ON THIS PROJECT. CONTRACTOR IS RESPONSIBLE FOR CALCULATING THEIR OWN EARTHWORK QUANTITIES.

4. GRADING: ALL GRADING SHALL BE LIMITED TO THE AREAS IDENTIFIED IN THE GRADING PLAN AND SHALL NOT INFRINGE ON ADJACENT OWNERSHIPS.

5. CUT SLOPES IN SOLID ROCK SHALL NOT EXCEED 0.5H:1V (HORIZONTAL:VERTICAL), AND SOIL CUT SLOPES SHALL NOT EXCEED 2H:1V, EXCEPT AS SHOWN OTHERWISE ON THE PLANS. TEMPORARY SOIL CUT SLOPES SHALL NOT EXCEED 2H:1V.

6. FILL SLOPES ACROSS THE PROPERTY SHOULD BE DESIGNED FOR A MAXIMUM SLOPE OF 2H:1V, EXCEPT AS SHOWN OTHERWISE ON THE PLANS.

7. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL REPORTS BY ASPECT CONSULTING, LLC. (OCTOBER 25, 2019), FOR EXISTING SOIL CONDITIONS AND EARTHWORK RECOMMENDATIONS.

PAVING NOTES:

1. ALL CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD DRAWINGS AND SPECIFICATIONS, WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION), AND THE GEOTECHNICAL REPORTS BY ASPECT CONSULTING, LLC. (OCTOBER 25, 2019).

2. CONTRACTOR SHALL CONTACT ALL APPROPRIATE UTILITY COMPANIES AND THE CITY OF SPOKANE TO OBTAIN NECESSARY LOCATES 48 HOURS BEFORE CONSTRUCTION BEGINS.

3. NO VARIANCE FROM THE SPECIFICATIONS AND NOTES SHALL BE ACCEPTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE CITY OF SPOKANE.

4. CONCRETE, AGGREGATE BASE, AND ASPHALT MIX DESIGN SHALL BE SUBMITTED BY THE SUPPLIER AND APPROVED IN WRITING BY THE ENGINEER OF RECORD PRIOR TO ANY ROAD OR PARKING LOT CONSTRUCTION. MATERIALS SHALL BE IN CONFORMANCE WITH THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT.

5. REMOVAL OF EXISTING PAVEMENT MARKINGS SHALL BE ACCOMPLISHED BY A METHOD THAT DOES NOT MATERIALLY DAMAGE THE SURFACE OR TEXTURE OF THE PAVEMENT OR SURFACING. THE PAVEMENT MARKINGS SHALL BE REMOVED TO THE EXTENT THAT THEY WILL NOT BE VISIBLE UNDER DAY OR NIGHT CONDITIONS.

6. ALL EXISTING PAVEMENT SHALL BE REMOVED IN THE SECTIONS REQUIRING REMOVAL AND REPLACEMENT. THE EXISTING BASE COURSE MATERIALS IN THESE SECTIONS SHALL BE COMPACTED TO A MINIMUM OF 95% OF MODIFIED PROCTOR DRY DENSITY AT OPTIMUM MOISTURE CONTENT. ALL COMPACTION SHALL BE DONE IN ACCORDANCE WITH ASTM D-1557. THE NEW PAVEMENT SHALL BE REPLACED TO A DEPTH OF THE PAVEMENT DETAIL SHOWN ON THESE PLANS.

7. ASPHALT/CONCRETE PAVING SHALL CONFORM TO WSDOT STANDARD SPECIFICATIONS (LATEST EDITION) DIVISION 9, HMA CLASS 1/2". ASPHALT PAVED AREAS SHALL BE ASPHALT/CONCRETE PAVEMENT PLACED OVER A FREE-DRAINING, COMPACT, GRANULAR BASE MATERIAL.

8. ALL AREAS TO BE PAVED SHALL BE CLEARED OF ALL GRASS, ROOTS, TRASH, METAL AND ORGANIC MATERIALS DOWN TO FULL DEPTH BELOW THE PAVING MAT. THE EXPOSED SURFACE SHOULD THEN BE PROOF ROLLED TO 90% OF MAXIMUM COMPACTION AS DETERMINED BY ASTM D-1557 USING A MECHANICAL VIBRATORY COMPACTOR. ANY BACK FILL MATERIAL SHOULD BE SIMILARLY COMPACTED.

9. BEFORE PLACING THE BASE MATERIAL, THE SURFACE OF THE SUBGRADE SHALL BE COMPACTED AS SPECIFIED IN THE GEOTECHNICAL REPORT.

10. BITUMINOUS TACK COAT SHALL BE APPLIED BETWEEN ASPHALT PAVING LIFTS AND SHALL BE USED PRIOR TO OVERLAY, (CSS-1H), 50:50 DILUTION, 0.05 GAL/SY TO 0.15 GAL/SY OR AS DIRECTED BY THE ENGINEER. ALL EDGES ABUTTING NEW PAVEMENT SHALL BE TACKED.

11. ALL PAVEMENT SHALL BE COMPACTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. TESTS SHALL BE CONDUCTED AT 100 FOOT INTERVALS OR 1 PER 3000 SQUARE FEET FOR EACH LIFT OR AS DIRECTED BY THE ENGINEER. ALL TEST REPORTS SHALL BE SUBMITTED TO THE CITY OF SPOKANE PRIOR TO PROOF ROLLS. SINGLE-AXLE 5-TON TRUCK PROOF ROLLS MONITORED BY THE CITY OF SPOKANE PRIOR TO PLACEMENT OF ROAD/PARKING LOT BASE AND ASPHALT ARE REQUIRED. CONCRETE AND ASPHALT TESTING SHALL BE AS DIRECTED BY THE CITY OF SPOKANE'S INSPECTOR.

12. ALL VALVE AND MANHOLE COVERS SHALL BE ADJUSTED TO PAVEMENT GRADE DURING INITIAL CONSTRUCTION.

13. ALL CONCRETE EDGES MUST BE ROUNDED TO A 1/4 INCH RADIUS, EXCEPT WHERE SHOWN OTHERWISE ON DRAWINGS. ALL ASPHALT SHALL BE 1/4 INCH ABOVE CONCRETE EDGES, MANHOLES, AND VALVES.

14. ALL PHASES OF WORK SHALL BE INSPECTED AND APPROVED BY THE CITY OF SPOKANE.

15. ALL TRAFFIC CONTROL, IF REQUIRED, SHALL CONFORM TO THE APPLICABLE REGULATIONS SET FORTH IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

16. ALL THE OPERATIONS SHALL CONFORM TO THE APPLICABLE REGULATIONS SET FORTH BY ICC AND OSHA.

STORM WATER NOTES:

1. DRAINAGE PONDS SHALL BE CONSTRUCTED PER THE REQUIREMENTS OF THESE DRAWINGS INCLUDING GRADING, SOD OR SEED AS NOTED, AND CATCH BASIN INSTALLATION. NO BARK, GRAVEL OR CINDERS ARE ALLOWED IN PONDS.

2. CONTRACTOR SHALL CONTACT GEOTECHNICAL ENGINEER OF RECORD DURING SWALE AND DRYWELL CONSTRUCTION TO VERIFY SOIL CONDITIONS MEET SPOKANE REGIONAL STORM WATER MANUAL REQUIREMENTS.

3. ALL DRAINAGE PONDS WITHIN THE SCOPE OF THIS PROJECT SHALL BE COMPLETED DURING THE CONSTRUCTION OF THE PARKING AREAS. THE CONTRACTOR SHALL PERFORM THE POND GRADE WORK AND INSTALL THE IRRIGATION SYSTEM AND SOD OR HYDROSEED FOLLOWING THE ROADWAY/PARKING AREA PAVING WORK.

4. ALL DRAINAGE PONDS SHALL BE IRRIGATED BY AN AUTOMATIC IRRIGATION SYSTEM INSTALLED BY OR UNDER THE DIRECTION OF THE LANDSCAPE CONTRACTOR. THE IRRIGATION IS TO COMPLY WITH ALL LOCAL CODES AND ORDINANCES (90 DAY GUARANTEE). AN APPROVED BACKFLOW DEVICE SHALL BE INSTALLED TO PREVENT WATER FROM GOING BACK INTO THE WATER SUPPLY. SEE IRRIGATION PLAN.

5. THE FLOOR OF THE GRASSED PERCOLATION AREA (GPA) POND INCLUDES THE LEVEL PORTION OF THE FLOOR OF THE POND, AND THE SIDESLOPES OF THE POND OVERFLOW ELEVATION OR TOP OF DRYWELL. THE SOIL LOCATED IN THE FLOOR OF THE CONTAINMENT POND SHALL BE A MEDIUM TO WELL-DRAINING MATERIAL, WITH A MINIMUM INFILTRATION RATE OF 0.5 INCHES PER HOUR.

6. SLEEVING: PROVIDE SLEEVING AS REQUIRED UNDER SIDEWALKS, PATHS, CURBING, PAVING, ETC. AS NEEDED FOR IRRIGATION ACCESS. ALL SLEEVING SHALL BE 4" PVC WITH AT LEAST 12" OF COVER (1) FOOT BELOW FINISHED GRADE. THE OWNER/GENERAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING SLEEVING BEFORE CURBING, SIDEWALKS, PAVING, ETC. IS INSTALLED. PATCH ASPHALT AS NEEDED. SEE IRRIGATION PLAN.

7. ADJUSTMENT: AFTER INSTALLATION, ADJUST VALVES, HEADS, EMITTERS ETC. TO PROVIDE UNIFORM COVERAGE AND TO MINIMIZE OVERSPRAY ON WALLS, FENCES, WALKS, DRIVES, ETC.

8. POND BOTTOM ELEVATIONS SHOWN ON THESE PLANS ARE FINISHED GRADE. CONTRACTOR SHALL ROUGH GRADE ALL PONDS TO 0.2' BELOW ELEVATIONS SHOWN TO ALLOW FOR FINAL PLACEMENT OF SOD, OR ESTABLISHMENT OF PLANTINGS.

9. RIM ELEVATIONS OF DRAINAGE STRUCTURES SHALL BE INSTALLED SO THAT RIMS MAY BE ADJUSTED ±0.5 FEET TO MATCH FINISHED GRADE.

10. STORM SEWER PIPE SHALL BE PVC ASTM D 3034, SDR 35, OR ASTM F 789 WITH PUSH-ON JOINTS AND RUBBER GASKETS CONFORMING TO ASTM D 3212 AND ASTM F 477 UNLESS OTHERWISE SPECIFIED IN THESE PLANS. PROVIDE TRENCHING AND BEDDING PER CITY OF SPOKANE STANDARDS.

11. STORM WATER FACILITIES, INCLUDING DRYWELLS, CB'S, AND PIPES, MUST BE CONSTRUCTED UNDER THE SUPERVISION OF THE WASTEWATER MANAGEMENT DIVISION. STORM WATER TREATMENT FACILITIES (BIO-INFILTRATION SWALES AND BIO-RETENTION AREAS) SHALL BE INSPECTED PRIOR TO PLACEMENT OF TOPSOIL, PLANTINGS, OR GRASS. THE CONTRACTOR SHALL CONTACT THE WASTEWATER MAINTENANCE DIVISION OFFICE AT (509) 625-7905 OR (509) 625-7912 IN ORDER TO ARRANGE A MUTUALLY AGREEABLE INSPECTION SCHEDULE.

12. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO PROTECT THE INFILTRATION CAPACITY OF STORM WATER FACILITIES (E.G., LINE THE FACILITY WITH FILTER FABRIC, OVER-EXCAVATE UPON COMPLETION OF THE INFRASTRUCTURE, ETC.).

SEWER NOTES:

1. ALL SEWER CONSTRUCTION PROCEDURES AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF SPOKANE CONSTRUCTION SPECIFICATIONS.

2. ALL SIDE SEWER LINES SHALL BE 6", OR AS INDICATED ON THE PLANS.

3. ALL SEWER MAINS AND SERVICE LINES SHALL BE LOCATED TO MEET STATE SEPARATION REQUIREMENTS.

4. ANY SIDE SEWER THAT DOES NOT MAINTAIN A MINIMUM OF 18" COVER AT WATER MAIN CROSSINGS, OR WHERE THE SIDE SEWER MUST CROSS ABOVE THE WATER, SHALL BE SLEEVED WITH A CONTINUOUS 20' SECTION OF C900 PVC WATER PIPE CENTERED ON THE CROSSING.

5. SANITARY SEWER PIPE SHALL BE PVC ASTM D 3034, SDR 35, OR ASTM F 789 WITH PUSH-ON JOINTS AND RUBBER GASKETS CONFORMING TO ASTM D 3212 AND ASTM F 477. PROVIDE TRENCHING AND BEDDING PER CITY OF SPOKANE STANDARDS.

6. PRECAST MANHOLES SHALL MEET THE REQUIREMENTS OF ASTM C 478. MANHOLES SHALL BE TYPE 1-48" UNLESS OTHERWISE SPECIFIED ON THE PLANS. JOINTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C 443 AND SHALL BE GROUTED FROM THE INSIDE. LIFT HOLES SHALL BE GROUTED FROM THE INSIDE AND OUTSIDE.

7. SIDE SEWER SERVICES SHALL BE PVC, ASTM D 3034 SDR 35 WITH FLEXIBLE GASKETED JOINTS. SIDE SEWER CONNECTIONS SHALL BE MADE BY A TAP ON AN EXISTING MAIN OR WYE BRANCH FROM A NEW MAIN CONNECTED ABOVE THE SPRINGLINE OF THE PIPE.

8. ALL SEWER MAINS SHALL BE FIELD STAKED FOR GRADES AND ALIGNMENT BY A LICENSED ENGINEERING OR SURVEYING FIRM QUALIFIED TO PERFORM SUCH WORK.

9. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD CONSTRUCTION SPECIFICATIONS. ALL WATER AND SEWER MAINS AND LINES SHALL MEET STATE SEPARATION REQUIREMENTS.

10. ALL SEWER PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE FINAL GROUND SURFACE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING MARKED SANITARY SEWER, THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL.

11. UTILITY SEPARATIONS, INCLUDING WATER AND SEWER OR STORM CROSSINGS, SHALL BE IN ACCORDANCE WITH CITY OF SPOKANE STANDARD PLANS W-110, W-111, AND W-112 OR W-113.

12. PIPE BEDDING SHALL BE IN ACCORDANCE WITH DETAIL 6/C9.1 AND THE GEOTECHNICAL REPORT.

13. ALL SEWER WORK MUST BE DONE UNDER THE SUPERVISION AND INSPECTION OF THE WASTEWATER MANAGEMENT DIVISION. THE CONTRACTOR MUST CONTACT WASTEWATER MANAGEMENT MAINTENANCE DIVISION OFFICE IN ORDER TO ARRANGE A MUTUALLY AGREEABLE INSPECTION SCHEDULE. ALL FACILITIES MUST BE UNCOVERED AT THE TIME OF INSPECTION.

14. ALL SIDE SEWER CONNECTIONS SHALL BE INSTALLED PER CITY OF SPOKANE REQUIREMENTS.

WATER NOTES:

1. WATER LINES 4" AND LARGER SHALL BE DUCTILE IRON, CLASS 350 (AWWA C151 APPROVED) WITH RESTRAINED JOINTS AND CEMENT MORTAR LINING PER AWWA C104. FITTINGS SHALL BE AWWA C110 OR C153 DUCTILE IRON WITH MECHANICAL JOINTS.

2. WATERLINES SHALL BE INSTALLED WITH BOTTOM OF PIPE ELEVATIONS 5.5' BELOW FINISHED GRADE UNLESS OTHERWISE NOTED. PROVIDE TRENCHING AND BEDDING PER STANDARD SPECIFICATIONS. PIPE DEPTH SHALL BE MAINTAINED THROUGH SWALE SYSTEMS.

3. GATE VALVES 3" AND LARGER, SHALL BE RESILIENT SEATED, NON-RISING STEM O-RING SEALS. VALVE ENDS SHALL BE MECHANICAL JOINT OR ANSI FLANGES. VALVES SHALL CONFORM TO AWWA C509. PROVIDE CAST IRON TWO PIECE SLIDING COVERS FOR ALL VALVES. GATE VALVES SHALL BE RIGHT-TURN OPEN PER CITY OF SPOKANE STANDARD SPECIFICATIONS.

4. HYDRANTS SHALL CONFORM TO AWWA STANDARD C502-94 AND THE CITY OF SPOKANE SUPPLEMENTAL SPECIFICATIONS. ALL HYDRANTS SHALL BE BAGGED UNTIL SYSTEM IS APPROVED.

5. ALL PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE FINAL GROUND SURFACE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING MARKED WATER, THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL.

6. ALL WATER MAINS SHALL BE STAKED FOR GRADES AND ALIGNMENT BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK.

7. WHERE CONNECTIONS REQUIRE "FIELD VERIFICATION," CONNECTION POINTS SHALL BE EXPOSED BY THE CONTRACTOR AND FITTINGS VERIFIED 48 HOURS PRIOR TO DISTRIBUTION OF SHUT-DOWN NOTICES.

8. AT ANY CONNECTION TO AN EXISTING LINE WHERE A NEW VALVE IS NOT INSTALLED, THE EXISTING VALVE MUST BE PRESSURE TESTED PRIOR TO CONNECTION. IF AN EXISTING VALVE FAILS TO PASS THE TEST, THE CONTRACTOR SHALL MAKE THE NECESSARY PROVISIONS TO TEST THE NEW LINE PRIOR TO CONNECTION TO THE EXISTING SYSTEM OR INSTALL A NEW VALVE.

9. WHEN FIRE FLOW WILL BE INTERRUPTED, THE CITY OF SPOKANE FIRE DEPARTMENT SHALL BE GIVEN 24 HOURS NOTICE OF TIME AND LOCATIONS AFFECTED.

10. AFTER THE WATER LINES ARE CONSTRUCTED, TESTED, AND APPROVED, THE OWNER MAY APPLY FOR A WATER METER.

11. DEFLECTIONS AT PIPE JOINTS SHALL NOT EXCEED 75% OF MAXIMUM ALLOWED DEFLECTION, PER MANUFACTURER'S RECOMMENDATIONS.

12. THE CITY OF SPOKANE WATER DEPARTMENT WILL MAKE CONNECTIONS AND DISCONNECTIONS TO EXISTING WATER MAINS. CONTRACTOR SHALL PROVIDE ALL MATERIALS FOR CONNECTION, PAY ALL FEES, FURNISH ALL MATERIALS, AND INSTALL WATER LINES FROM CONNECTION POINT THROUGH DOUBLE CHECK VALVE ASSEMBLY (INCLUDING THE VAULT). CONTRACTOR SHALL FURNISH ALL MATERIALS, EXCAVATION, AND BACKFILL. SEE CITY OF SPOKANE STANDARD SPECIFICATIONS.

13. PIPE RESTRAINMENT SHALL BE INSTALLED AT ALL BENDS (VERTICAL AND HORIZONTAL), TEES, CROSSES, PLUGS, AND VALVES. THE RESTRAINMENT SHALL BE IN THE FORM OF ACCEPTABLE MANUFACTURED MECHANICAL RESTRAINT JOINTS, IN ACCORDANCE WITH CITY OF SPOKANE DESIGN STANDARDS, TABLE 8-A.

14. LOCATION OF EXISTING WATER MAINS AND SERVICES SHOWN ARE APPROXIMATE AND ARE BASED ON INFORMATION PROVIDED BY THE CITY OF SPOKANE. CONTRACTOR SHALL VERIFY ALL LOCATIONS PRIOR TO CONSTRUCTION.

15. NEW WATER LINES 2" AND LARGER SHALL BE PRESSURE TESTED AT NO LESS THAN 175 PSI (FIRE LINES NO LESS THAN 200 PSI) FOR A MINIMUM OF THREE (3) HOURS IN ACCORDANCE WITH CITY OF SPOKANE STANDARD CONSTRUCTION SPECIFICATIONS.

16. WATER SERVICES SHALL BE INSTALLED ABOVE THE BOTTOM OF FOOTING ELEVATIONS.

17. ALL UNDERGROUND FIRE LINES, OR FIRE SUPPRESSION SYSTEMS THAT ARE SEPARATED OR PROTECTED FROM THE POTABLE WATER SYSTEM, REQUIRE A STATE LEVEL III OR "U" LICENSED CONTRACTOR FOR INSTALLATION.

UTILITY NOTES:

1. CONTRACTOR SHALL COORDINATE WITH AVISTA UTILITIES FOR ALL NATURAL GAS AND/OR POWER SERVICE WORK ON THE PROJECT SITE.

2. CONTRACTOR SHALL COORDINATE WITH CENTURYLINK, COMCAST, LEVEL 3, AND ZAYO COMMUNICATIONS FOR ALL TELEPHONE SERVICE WORK ON THE PROJECT SITE.

3. RIM ELEVATIONS OF UTILITY STRUCTURES SHALL BE INSTALLED SO THAT RIM MAY BE ADJUSTED ±0.5 FEET TO MATCH FINISHED GRADES.

CONTRACTOR NOTE

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CIVIL / STRUCTURAL

BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
4	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GENERAL NOTES

C-001

REFERENCE NOTES:

1. NO EXCAVATION EXCEPT FOR MINOR CLEARING AND GRUBBING SHALL TAKE PLACE WITHIN WSDOT BRIDGE PIER FOOTING RIGHT-OF-WAY
2. REMOVE EXISTING SIGN AND RETURN TO PROPERTY OWNER
3. REMOVE EXISTING GATE AND RETURN TO PROPERTY OWNER
4. RETAIN AND PROTECT EXISTING SANITARY SEWER
5. RETAIN AND PROTECT EXISTING STORM DRAIN
6. RETAIN AND PROTECT EXISTING DRY UTILITIES
7. RETAIN AND PROTECT EXISTING MONITORING WELLS
8. REMOVE EXISTING POWER POLE. COORDINATE WITH AVISTA UTILITIES.
9. RETAIN AND PROTECT EXISTING TRAIL.
10. DEMOLISH AND REMOVE EXISTING TRAIL.
11. REMOVE EXISTING BOLLARDS AND RETURN TO PROPERTY OWNER.
12. RETAIN AND PROTECT EXISTING FIRE HYDRANT.
13. RETAIN AND PROTECT EXISTING IRRIGATION BOXES.
14. EXISTING SIGN TO BE RELOCATED.
15. DEMOLISH AND REMOVE EXISTING ROCK RETAINING WALL.
16. RETAIN AND PROTECT EXISTING SIDEWALK.
17. RETAIN AND PROTECT EXISTING SWALE.
18. DEMOLISH AND REMOVE EXISTING SWALE.
19. RETAIN AND PROTECT EXISTING DRIVEWAY.
20. DEMOLISH AND REMOVE EXISTING DRIVEWAY.

120' BRIDGE AIRSPACE EASEMENT

28+00

JAMES KEEFE BRIDGE

STA: 26+97.01
OFFSET: 0.00 L

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

26+00

24+00

22+00

E. MARTIN LUTHER KING JR. WAY

RIM=1884.35'
60"I.E.(FLOW)=1863.45'

RIM=1884.54'
NO FLOW;
FULL OF WATER

RIM=1885.89'

RIM(N)=1883.59'
RIM(S)=1883.80'
60"I.E.(FLOW)=1862.60'

BOTTOM OF BEAM ELEVATION=1913.61'

TOP OF SIGN ELEVATION=1954.25'

BEAM

GATE

HAMILTON STREET OVERHEAD BRIDGE

ERIE STREET (VACATED)

RIM=1884.06'

RIM=1884.07'

RIM=1884.17'

RIM=1883.

RIM=1885.77'

ERIE AVENUE

ON-SITE TBM:
SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE
ELEVATION = 1886.14' (NAVD88)

RIM=1894.22'

RIM=1893.56'

RIM=1891.43'

RIM=1891.30'

RIM=1891.42'

RIM=1887.82'

RIM=1886.75'

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

CONTRACTOR NOTE

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GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

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3/1/2021

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CIVIL / STRUCTURAL

BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

EXISTING SITE CONDITIONS & DEMOLITION PLAN

C-100

REFERENCE NOTES:

(1) PROVIDE NEW CONSTRUCTION ENTRANCE AND CONCRETE WASHOUT AREA PER DETAIL 1/C-500.

(2) PROVIDE TEMPORARY FILTER FABRIC FENCE PER DETAIL 2/C-500.

(3) PLACE STEEL PLATES ON TOP OF DRAINAGE STRUCTURES AND BURY UNTIL TIME OF FINAL GRADING AND/OR PAVING, WHEN FRAMES AND GRATES CAN BE INSTALLED AND SET TO FINISHED GRADE.

(4) PROVIDE NEW STRAW WATTLES PER DETAIL 5/C-500.

ENGINEER'S NOTES:

1. EROSION CONTROL MEASURES SHOWN ON THE PLAN ARE MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL INSTALL ADDITIONAL MEASURES, AS NEEDED, TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE OR FROM COMPROMISING THE PROPOSED/EXISTING STORM WATER FACILITIES.

2. SEE SHEET C-001 FOR ADDITIONAL ESC NOTES.

3. CONTRACTOR SHALL CONSTRUCT EROSION CONTROL FACILITIES BEFORE GRADING COMMENCES.

4. CONTRACTOR IS RESPONSIBLE FOR DESIGNATING A LOCATION WHERE CONCRETE TRUCKS OR EQUIPMENT CAN BE WASHED OUT. THIS AREA SHALL NOT BE LOCATED NEAR OR DRAINING INTO A STORM DRAINAGE AREA, TREATMENT AREA, DRAINAGE STRUCTURE OR OTHER STORM WATER FACILITIES EXISTING OR OTHERWISE.

CONTAMINATED SOILS EXPOSURE:

FOR AREAS WHERE EXCAVATIONS WILL EXPOSE CONTAMINATED SOILS, THE CONTRACTOR SHALL TAKE MULTIPLE PRECAUTIONS TO ENSURE THAT RAINWATER DOES NOT COMINGLE WITH THE CONTAMINATION, AND CONTAMINATION IS NOT SPREAD TO OTHER AREAS OF THE SITE. THESE PRECAUTIONS INCLUDE BUT ARE NOT LIMITED TO:

1. PERFORM EXCAVATIONS DURING DRY WEATHER PERIODS ONLY.

2. COVER OPEN UTILITY TRENCHES AT THE END OF EVERY WORKDAY.

3. LINE LARGER EXCAVATIONS WITH AN IMPERMEABLE LINER AT THE END OF EVERY WORKDAY.

4. PLACE CONTAMINATED SPOILS IN DESIGNATED STOCKPILE AREAS ON TOP OF AN IMPERMEABLE LINER, AND COVER WITH AN IMPERMEABLE LINER. PLACE STOCKPILE UNDER BRIDGE IF POSSIBLE TO MINIMIZE CHANGE OF RAINFALL REACHING STOCKPILE.

5. IF RAINFALL BEGINS WHILE EXCAVATION IS IN PROGRESS, STOP WORK IMMEDIATELY AND COVER OR LINE THE OPEN EXCAVATION.

6. PLACE PERMANENT CONCRETE AS SOON AS POSSIBLE IN FOOTING EXCAVATIONS TO MINIMIZE EXPOSURE TIME OF CONTAMINATION.

7. COLLECT SPOILS FROM AUGERED PILE CONSTRUCTION, PLACE IN DESIGNATED STOCKPILE LOCATIONS.

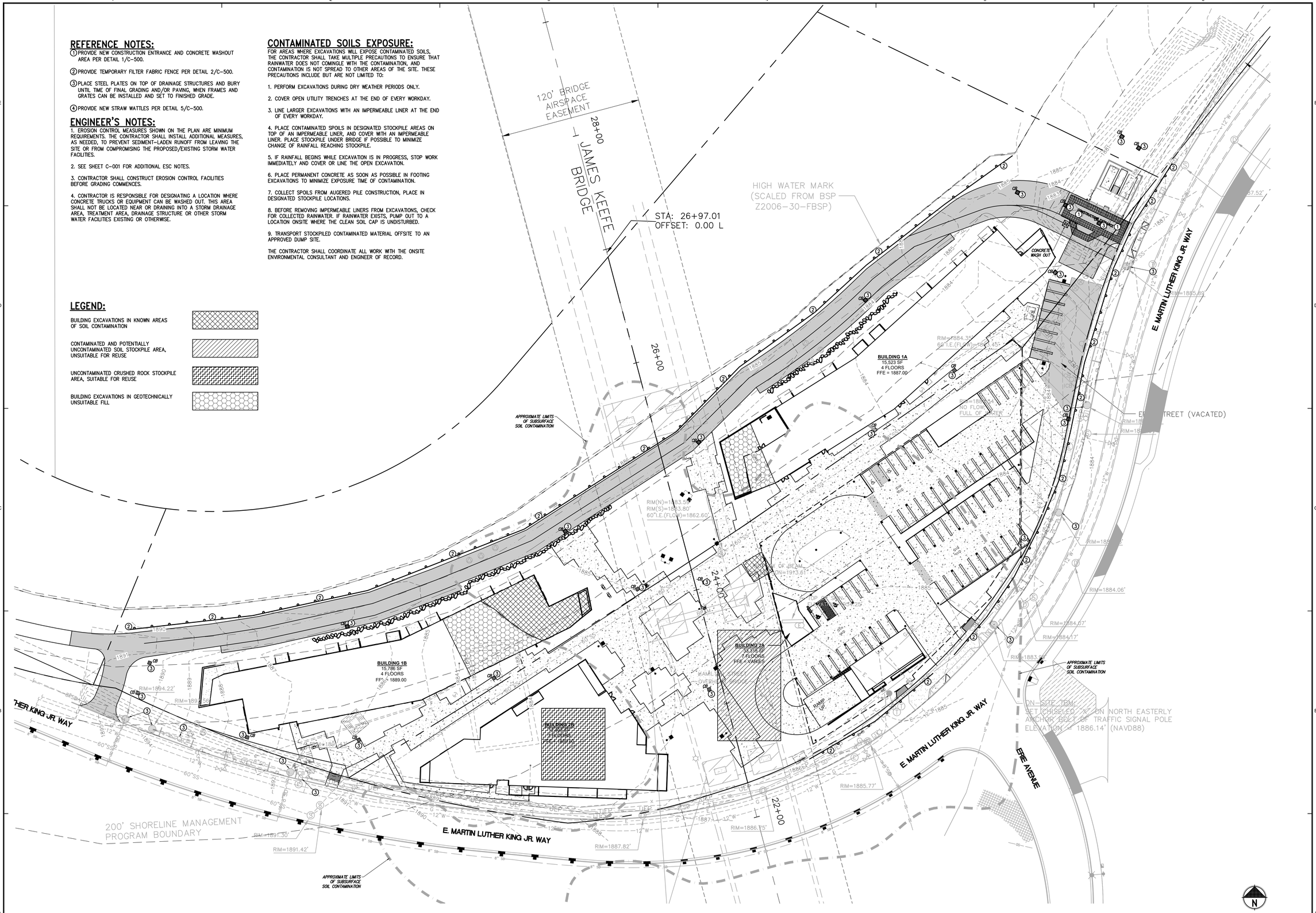
8. BEFORE REMOVING IMPERMEABLE LINERS FROM EXCAVATIONS, CHECK FOR COLLECTED RAINWATER. IF RAINWATER EXISTS, PUMP OUT TO A LOCATION ONSITE WHERE THE CLEAN SOIL CAP IS UNDISTURBED.

9. TRANSPORT STOCKPILED CONTAMINATED MATERIAL OFFSITE TO AN APPROVED DUMP SITE.

THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE ONSITE ENVIRONMENTAL CONSULTANT AND ENGINEER OF RECORD.

LEGEND:

- BUILDING EXCAVATIONS IN KNOWN AREAS OF SOIL CONTAMINATION
- CONTAMINATED AND POTENTIALLY UNCONTAMINATED SOIL STOCKPILE AREA, UNSUITABLE FOR REUSE
- UNCONTAMINATED CRUSHED ROCK STOCKPILE AREA, SUITABLE FOR REUSE
- BUILDING EXCAVATIONS IN GEOTECHNICALLY UNSUITABLE FILL



N

GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

CONTRACTOR NOTE

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BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
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PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

EROSION CONTROL PLAN

C-110

REFERENCE NOTES:

(1) PROVIDE ADA PAVEMENT MARKINGS AND SIGNAGE PER CITY OF S SPOKANE STANDARD PLANS G-54 AND G-80A. SEE DETAIL 1/C-501.

SITE DATA:

SITE ADDRESSES: 111, 115, 119, 225, 229 N ERIE STREET
PARCEL NOS. 35174.0601-0608

PRIMARY CONTACT: RUSTIN HALL - ALSC ARCHITECTS
203 N WASHINGTON, SUITE 400
SPOKANE, WA 99201
(509) 838-8568
rhall@alscarchitects.com

PROPERTY OWNER: SAGAMORE SPOKANE QOZP, LLC
1 EAST CAMELBACK ROAD, SUITE 200
PHOENIX, AZ 85012
(602) 549-4021
rhayes@bridgestonecap.com

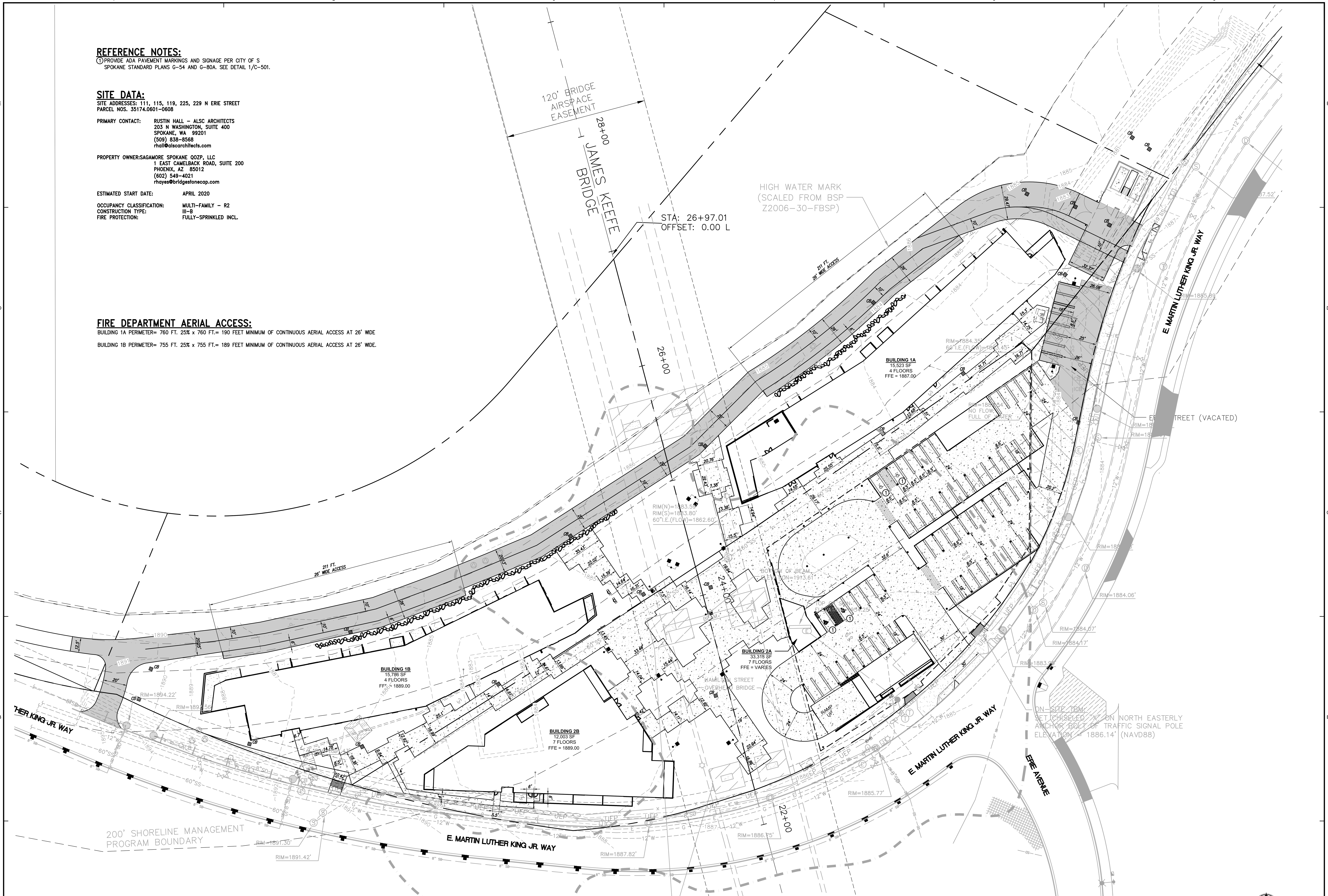
ESTIMATED START DATE: APRIL 2020

OCCUPANCY CLASSIFICATION: MULTI-FAMILY - R2
CONSTRUCTION TYPE: III-B
FIRE PROTECTION: FULLY-SPRINKLED INCL.

FIRE DEPARTMENT AERIAL ACCESS:

BUILDING 1A PERIMETER= 760 FT. 25% x 760 FT.= 190 FEET MINIMUM OF CONTINUOUS AERIAL ACCESS AT 26' WIDE

BUILDING 1B PERIMETER= 755 FT. 25% x 755 FT.= 189 FEET MINIMUM OF CONTINUOUS AERIAL ACCESS AT 26' WIDE.



GRAPHIC SCALE

(IN FEET)
1 inch = 30 ft.

CONTRACTOR NOTE

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DATE	2/5/21

CIVIL SITE PLAN

C-120

REFERENCE NOTES:

1. PROVIDE NEW STANDARD DUTY ASPHALT PAVEMENT (3" AC ON 6" BASE). SEE DETAIL 5/C-500.
2. PROVIDE NEW CONCRETE CURB PER CITY OF SPOKANE STANDARD PLAN F-106.
3. PROVIDE NEW HEAVY DUTY ASPHALT PAVEMENT (4" AC ON 8" BASE). SEE DETAIL 5/C-500.
4. PROVIDE NEW CONCRETE CURB AND GUTTER PER CITY OF SPOKANE STANDARD PLAN F-106.
5. PROVIDE ADA RAMP PER CITY OF SPOKANE STANDARD PLAN F-102D.
6. PROVIDE CONCRETE SIDEWALK PER DETAIL 4/C-500.
7. PROVIDE CONCRETE TRASH ENCLOSURE PAD PER DETAIL 6/C-500. SEE ARCHITECTURAL PLANS.
8. PROVIDE NEW CONCRETE DRIVEWAY PER CITY OF SPOKANE STANDARD PLAN F-103. SEE DETAIL 2/C-501.
9. PROVIDE NEW CONCRETE SLAB. SEE STRUCTURAL PLANS.
10. PROVIDE 18" WIDE CONCRETE PASS-THROUGH TO FACILITATE DRAINAGE.
11. PROVIDE NEW ROCK RETAINING WALL PER ELEVATIONS SHOWN. SEE LANDSCAPE PLANS.

120' BRIDGE AIRSPACE EASEMENT

JAMES KEEFE BRIDGE

28+00

26+00

24+00

22+00

STA: 26+97.01
OFFSET: 0.00 L

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

BUILDING 1A
15,523 SF
4 FLOORS
FFE = 1887.00

BUILDING 1B
15,786 SF
4 FLOORS
FFE = 1889.00

BUILDING 2A
33,318 SF
7 FLOORS
FFE = VARIES

BUILDING 2B
12,003 SF
7 FLOORS
FFE = 1889.00

E. MARTIN LUTHER KING JR WAY

ERIE STREET (VACATED)

ERIE AVENUE

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

ON-SITE TRM:
SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE
ELEVATION = 1886.14' (NAVD88)

GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

CONTRACTOR NOTE

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509.838.8568
6500 Mineral Drive, Suite 101
Coure d' Alene, Idaho 83815
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MATTHEW R. LEWIS — STATE OF WASHINGTON — 41809 — REGISTERED PROFESSIONAL ENGINEER

3/1/2021

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SPOKANE, WASHINGTON 99201
PHONE: (509) 455-4448 • FAX: (509) 455-7492
WEBSITE: www.dci-engineers.com
CIVIL / STRUCTURAL

BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GRADING PLAN

C-130

REFERENCE NOTES:

1. PROVIDE INFILTRATION SWALE PER SPOKANE REGIONAL STORM WATER MANUAL REQUIREMENTS AND CITY OF SPOKANE STANDARD PLAN B-102F.
2. PROVIDE NEW 44'x44'x3' DEEP UNDERGROUND INFILTRATION GALLERY PER DETAIL 4/C-501.
3. PROVIDE 8" SDR35 PVC STORM DRAIN PIPE.
4. PROVIDE TYPE 1 CATCH BASIN PER CITY OF SPOKANE STANDARD PLAN B-101c. SEE DETAIL 3/C-501.
5. PROVIDE 6" SDR35 PVC STORM DRAIN PIPE.
6. PROVIDE RIP-RAP PAD FOR ENERGY DISSIPATION PER DETAIL 11/C5.0.
7. PROVIDE NEW CLEANOUT TO GRADE.
8. CONNECT TO BUILDING ROOF DRAIN. SEE PLUMBING PLANS.
9. PROPOSED FLOOR DRAIN. SEE PLUMBING PLAN.
10. PROVIDE NEW 15" SDR35 PVC PERFORATED PIPE
11. PROVIDE NEW 30'x115'x2' DEEP UNDERGROUND INFILTRATION GALLERY PER DETAIL 5/C-501.
12. PROVIDE NEW 12" SDR35 PVC STORM DRAIN PIPE.
13. PROVIDE NEW 15" SDR35 PVC STORM DRAIN PIPE.
14. PROVIDE NEW 12" SDR35 PVC PERFORATED PIPE.
15. PROVIDE NEW 8" DUCTILE IRON STORM DRAIN PIPE.

120' BRIDGE AIRSPACE EASEMENT

JAMES KEEFE BRIDGE

28+00

STA: 26+97.01
OFFSET: 0.00 L

26+00

24+00

22+00

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

110 LF 15" PERFORATED PIPE S= 0.00%

SWALE "A" BOTTOM ELEV.= 1881.00

RIM= 1881.50
I.E.= 1878.50
15 LF 15" PERFORATED PIPE S= 0.00%
RIM= 1881.50
15" I.E.= 1878.50
I.E.= 1881.00

75'± LF 15" SD LINE S= 0.50%
RIM= 1886.00
15" I.E.(N)= 1878.68
12" I.E.(W)= 1878.98
12" I.E.(S)= 1878.98

45'± LF 12" SD LINE S= 0.50%

RIM= 1885.00
12" I.E.(E)= 1879.10
12" I.E.(W)= 1879.20

160'± LF 12" SD LINE S= 0.50%

RIM= 1884.00
12" I.E.(E)= 1880.00
8" I.E.(W)= 1880.10

55'± LF 12" SD LINE
RIM= 1886.50
12" I.E.(E)= 1881.15
12" I.E.(W)= 1881.25

E. MARTIN LUTHER KING JR. WAY

60'± LF 8" SD LINE S= 0.50%
RIM= 1886.00
8" I.E.(E)= 1884.30
8" I.E.(S)= 1884.40

163'± LF 8" SD LINE S= 0.50%
RIM=1885.69

180'± LF 8" SD LINE S= 0.50%

125'± LF 12" SD LINE

RIM= 1886.50
12" I.E.(E)= 1881.98
8" I.E.(W)= 1882.08

RIM=1884.50
8" I.E.(N)= 1882.20

RIM= 1886.00
8" I.E.(E)= 1881.00
8" I.E.(W)= 1881.10

BUILDING 1A
15,523 SF
4 FLOORS
FFE = 1887.00

85'± LF 8" SD LINE

RIM= 1886.50
8" I.E.(E)= 1882.50
8" I.E.(W)= 1882.50

RIM=1884.50
NO FLOW
FULL OF WATER

60'± LF 8" SD LINE S= 0.50%

ERIE STREET (VACATED)

RIM=1885.77'

135'± LF 8" SD LINE S= 0.50%
RIM= 1885.00
8" I.E.(E)= 1881.78
8" I.E.(W)= 1881.88

RIM(N)=1883.55'
RIM(S)=1883.80'
60"I.E.(FLOW)=1862.60'

60'± LF 8" SD LINE S= 0.50%

RIM= 1886.10
8" I.E.(W)= 1884.30
8" I.E.(S)= 1884.40

BOTTOM OF BEAM ELEVATION=1913.61'

RAMP UP

RIM=1884.06'
RIM=1884.07'
RIM=1884.17'
RIM=1883.8

190'± LF 8" SD LINE S= 0.50%
RIM= 1887.00
8" I.E.(E)= 1882.63

44 LF 12" PERFORATED PIPE S= 0.00%
RIM= 1888.00
12" I.E.= 1881.35

RIM= 1888.50
8" I.E.(W)= 1886.13
8" I.E.(E)= 1886.23

BUILDING 1B
15,786 SF
4 FLOORS
FFE = 1889.00

145'± LF 8" SD LINE S= 0.50%

RIM= 1886.10
8" I.E.(W)= 1883.95
8" I.E.(E)= 1884.05

95'± LF 8" SD LINE S= 0.50%

BUILDING 2A
33,319 SF
7 FLOORS
FFE = VARIES

RAMP DOWN STREET OVERHEAD BRIDGE

RIM= 1888.40
12" I.E.(W)= 1883.15
8" I.E.(E)= 1883.25

125'± LF 12" SD LINE S= 0.50%

RIM= 1888.50
12" I.E.(W)= 1881.85
12" I.E.(E)= 1881.95
90'± LF 12" SD LINE S= 0.50%

BUILDING 2B
12,003 SF
7 FLOORS
FFE = 1889.00

RIM= 1886.60
8" I.E.(N)= 1884.95

RIM= 1888.50
12" I.E.(W)= 1882.40
12" I.E.(E)= 1882.50

ON-SITE ITEM:
SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE
ELEVATION = 1886.14' (NAVD88)

100'± LF 12" SD LINE S= 0.50%
RIM= 1888.00
12" I.E.= 1881.35

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

RIM=1891.35'
RIM=1891.42'
RIM=1887.82'
RIM=1886.75'

E. MARTIN LUTHER KING JR. WAY

ERIE AVENUE

N

GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

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BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
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STORM WATER PLAN

C-140

REFERENCE NOTES:

(1) PROVIDE 3" HDPE CTS SDR9 200 PSI DOMESTIC WATER SERVICE WITH 12 GAUGE TRACER WIRE AND PRESSURE REDUCING VALVE. COORDINATE WITH CITY BUILDING DEPARTMENT AT TIME OF BUILDING CONSTRUCTION.

(2) PROVIDE 8" DUCTILE IRON WATER MAIN WITH 5.5' MINIMUM DEPTH TO INVERT.

(3) TIE INTO EXISTING 8" WATER MAIN. CONTRACTOR SHALL FIELD LOCATE EXISTING TAP BY POTHOLE TO SELECT FINAL POSITION FOR METER VAULT.

(4) CAP 8" WATER MAIN.

(5) PROVIDE 8'x14' WATER METER VAULT PER DETAIL 8/C-500. WILBERT PRECAST #1923 OR EQUAL, WITH 42"x42" HALLIDAY ALUMINUM HATCH.

(6) PROVIDE 6" DUCTILE IRON FIRE SERVICE. COORDINATE BACK FLOW PREVENTION WITH CITY BUILDING DEPARTMENT AT TIME OF BUILDING CONSTRUCTION.

(7) PROVIDE SANITARY SEWER MANHOLE PER CITY OF SPOKANE STANDARD PLAN Z-101.

(8) TIE INTO EXISTING SANITARY SEWER MANHOLE WITH DROP PER DETAIL 7/C-500.

(9) PROVIDE 6" SDR35 PVC SANITARY SEWER MAIN.

(10) PROVIDE POST INDICATOR VALVE PER DETAIL 10/C-500.

(11) PROVIDE 5'x8' 1000 GALLON OIL-WATER SEPARATOR, WILBERT PRECAST #16270WTBS OR APPROVED EQUAL. SEE DETAIL 1/C-501.

(12) PROVIDE NEW FIRE HYDRANT PER CITY OF SPOKANE STANDARD PLAN Y-101.

(13) ABANDON EXISTING IRRIGATION LINE.

(14) PROVIDE 6" SDR35 PVC SEWER SERVICE WITH 3.5' MINIMUM COVER. SLOPE= 2.0% MINIMUM.

(15) PROVIDE SANITARY SEWER CLEANOUT.

(16) PROVIDE 8" 45° BEND.

(17) PROVIDE NEW NATURAL GAS SERVICE. COORDINATE WITH AVISTA UTILITIES.

(18) IRRIGATION SYSTEM POINT OF CONNECTION.

(19) PROVIDE 8" GATE VALVE.

(20) PROVIDE 8" x 6" TEE.

(21) PROVIDE 6" DUCTILE IRON WATER MAIN WITH 5.5' MINIMUM DEPTH TO INVERT.

(22) PROVIDE 6" 45° BEND.

(23) PROPOSED SITE LIGHTING. SEE ELECTRICAL PLANS

(24) PROPOSED ELECTRICAL TRANSFORMERS. SEE ELECTRICAL PLANS.

(25) PROVIDE BUILDING MOUNTED FIRE DEPARTMENT CONNECTION.

(26) EXISTING FIRE HYDRANT.

(27) RELOCATE FIRE HYDRANT INTO RIGHT-OF-WAY.

(28) PROVIDE NEW UNDERGROUND ELECTRICAL SERVICE. SEE ELECTRICAL PLANS. COORDINATE WITH AVISTA UTILITIES.

(29) TIE INTO EXISTING SEWER STUB. CONTRACTOR SHALL FIELD VERIFY SIZE, DEPTH, AND SLOPE OF SANITARY SEWER STUB BEFORE STARTING CONSTRUCTION. (A)

REFERENCE NOTES:

(30) CONSTRUCT PROTECTUS METER SIGNAL 3' ABOVE GROUND NEXT TO BOLLARD, AT LOCATION SHOWN. ALL CONDUIT BENDS SHALL BE SWEEPS, NOT ELBOWS. PROVIDE AND ATTACH A 16" LONG TREATED 2X6 TO FACE OF BOLLARD JUST BELOW ITS TOP (BOARD LENGTH PARALLEL TO GROUND, FACING NEAREST STREET) TO MOUNT THE METER TRANSMITTERS. BOLLARD PER DETAIL 7/C-501.

(31) PROVIDE 6" GATE VALVE.

(32) PROVIDE 8" SDR35 PVC SANITARY SEWER LINE. LENGTH AND SLOPE PER PLAN.

(33) PROVIDE 2" HDPE WATER SERVICE STUB FOR FUTURE WATER FEATURE (A)

ENGINEER'S NOTES:

1. WATER SERVICES SHALL MEET CURRENT BACKFLOW STANDARDS PER WAC 246-290-490 AND FOLLOW CITY OF SPOKANE WATER DEPARTMENT RULES AND REGULATIONS FOR WATER SERVICE INSTALLATIONS.

2. ON-PROPERTY SITE WATER LINES SHALL BE INSPECTED BY CITY WATER PRIOR TO BACKFILL.

3. ALL WATER-SEWER CROSSINGS SHALL CONFORM TO CITY OF SPOKANE STANDARD PLAN A-5.

4. NO JOINTS IN WATER LINES ALLOWED WITHIN 5' OF FOUNDATION; COORDINATE LOCATION FOR END OF SERVICE STUB AND PIV DURING MANDATORY PRE-CONSTRUCTION MEETING WITH WATER DEPT (REQUIRED MIN. TWO WEEKS BEFORE CONSTRUCTION START).

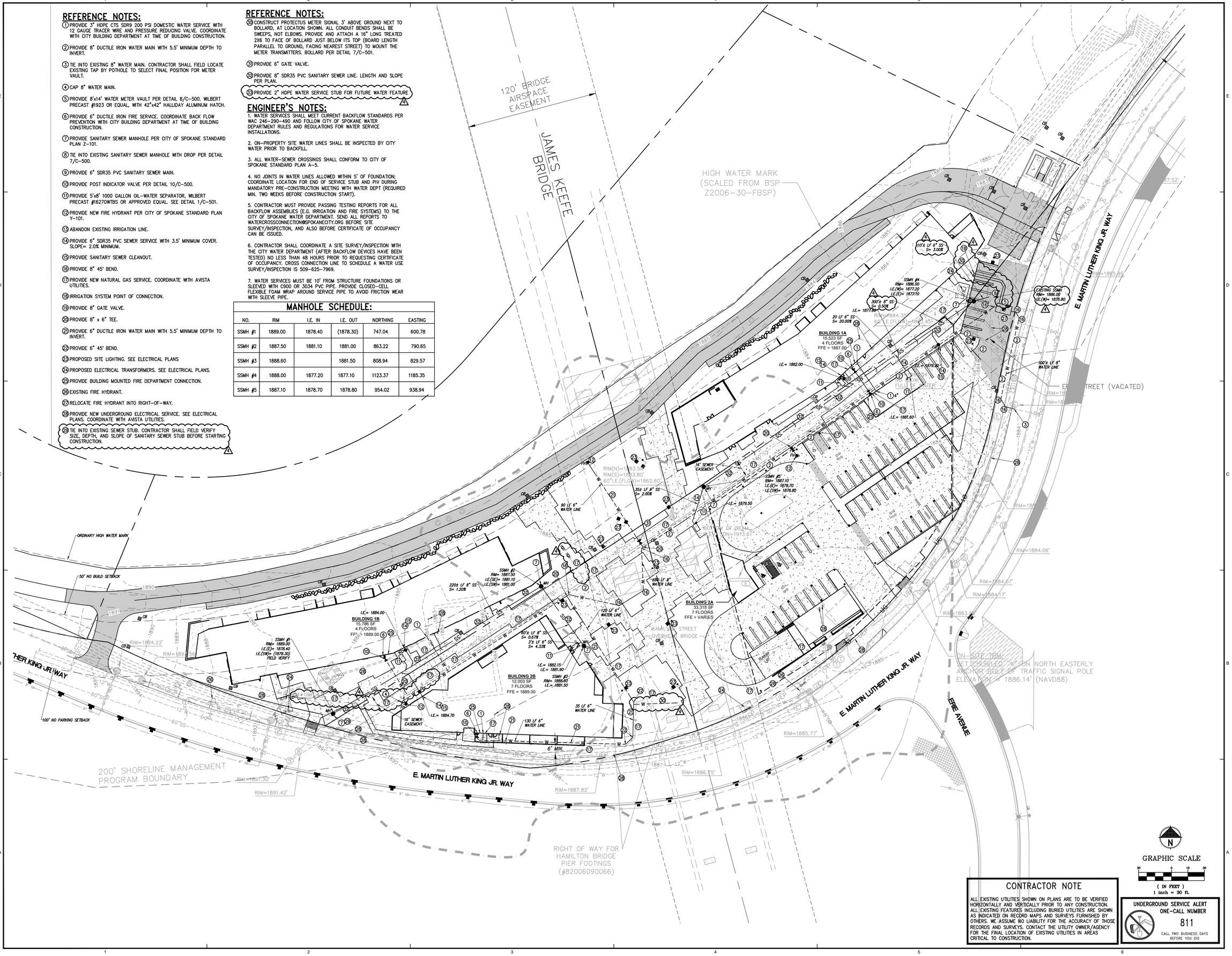
5. CONTRACTOR MUST PROVIDE PASSING TESTING REPORTS FOR ALL BACKFLOW ASSEMBLIES (E.G. IRRIGATION AND FIRE SYSTEMS) TO THE CITY OF SPOKANE WATER DEPARTMENT. SEND ALL REPORTS TO WATERCROSSCONNECTION@SPOKANECITY.ORG BEFORE SITE SURVEY/INSPECTION, AND ALSO BEFORE CERTIFICATE OF OCCUPANCY CAN BE ISSUED.

6. CONTRACTOR SHALL COORDINATE A SITE SURVEY/INSPECTION WITH THE CITY WATER DEPARTMENT (AFTER BACKFLOW DEVICES HAVE BEEN TESTED) NO LESS THAN 48 HOURS PRIOR TO REQUESTING CERTIFICATE OF OCCUPANCY. CROSS CONNECTION LINE TO SCHEDULE A WATER USE SURVEY/INSPECTION IS 509-625-7969.

7. WATER SERVICES MUST BE 10' FROM STRUCTURE FOUNDATIONS OR SLEEVED WITH C900 OR 3034 PVC PIPE. PROVIDE CLOSED-CELL FLEXIBLE FOAM WRAP AROUND SERVICE PIPE TO AVOID FRICTION WEAR WITH SLEEVE PIPE.

MANHOLE SCHEDULE:

NO.	RIM	I.E. IN	I.E. OUT	NORTHING	EASTING
SSMH #1	1889.00	1878.40	(1878.30)	747.04	600.78
SSMH #2	1887.50	1881.10	1881.00	863.22	790.65
SSMH #3	1888.60		1881.50	808.94	829.57
SSMH #4	1888.00	1877.20	1877.10	1123.37	1185.35
SSMH #5	1887.10	1878.70	1878.80	954.02	938.94



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GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

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BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
A	3/1/21	BID SET

PROJ. NO.	2018-050
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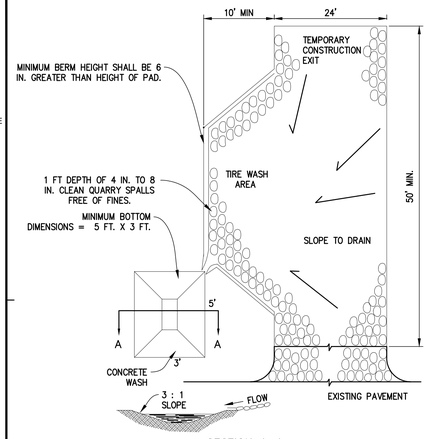
DATE	2/5/21

UTILITY PLAN

C-150



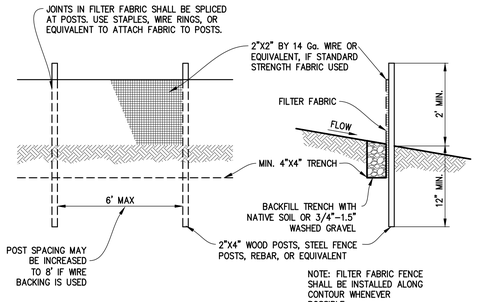
SECTION A–A

NOTES:

1. TIRE WASH AREA MUST BE INSTALLED ADJACENT TO AND DOWN GRADIENT FROM TEMPORARY CONSTRUCTION EXIT AND AS CLOSE TO EXISTING PAVEMENT AS POSSIBLE.
2. MORE TRUCK TRAFFIC MAY REQUIRE A LARGER AREA.

CONSTRUCTION ENTRANCE 1

SCALE : NTS



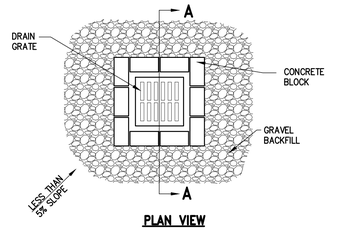
NOTE: FILTER FABRIC FENCE SHALL BE INSTALLED ALONG CONTOUR WHENEVER POSSIBLE.

MAINTENANCE STANDARDS:

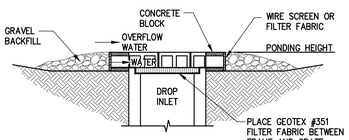
1. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.
2. IF CONCENTRATED FLOWS ARE EVIDENT UPHILL OF THE FENCE, THEY MUST BE INTERCEPTED AND CONVEYED TO A SEDIMENT TRAP OR POND.
3. IT IS IMPORTANT TO CHECK THE UPHILL SIDE OF THE FENCE FOR SIGN OF THE FENCE CLOGGING AND ACTING AS A BARRIER TO FLOW AND THEN CAUSING CHANNELIZATION OF FLOWS PARALLEL TO THE FENCE. IF THIS OCCURS, REPLACE THE FENCE AND/OR REMOVE THE TRAPPED SEDIMENT.
4. SEDIMENT MUST BE REMOVED WHEN THE SEDIMENT IS 6" HIGH.
5. IF THE FILTER FABRIC HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN, IT SHALL BE REPLACED.

FILTER FABRIC FENCE DETAIL 2

SCALE : NTS



PLAN VIEW



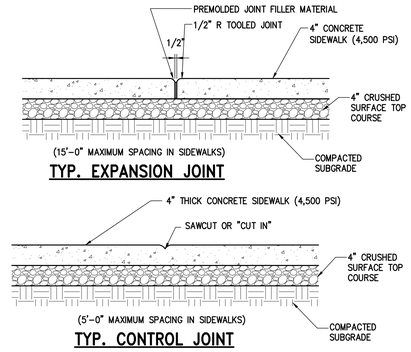
SECTION A–A

NOTES:

1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. EXCAVATE A BASIN OF SUFFICIENT SIZE ADJACENT TO THE DROP INLET.
3. THE TOP OF THE STRUCTURE (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BYPASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

INLET PROTECTION DETAIL 3

SCALE : NTS



TYP. EXPANSION JOINT

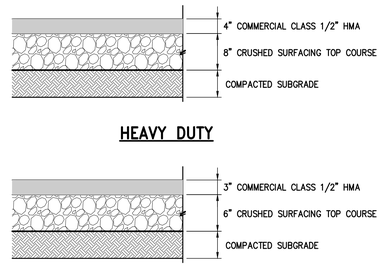
TYP. CONTROL JOINT

NOTES:

1. SUBGRADE AND 4" CRUSHED GRAVEL MUST BE PROPERLY COMPACTED TO PREVENT FUTURE DIFFERENTIAL SETTLING OF SIDEWALK.
2. SEE ARCHITECTURAL SITE PLANS FOR JOINT TYPES AND LOCATIONS IN CONCRETE SIDEWALK AREAS.

CONCRETE SIDEWALK DETAIL 4

SCALE : NTS

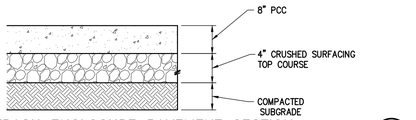


HEAVY DUTY

STANDARD DUTY

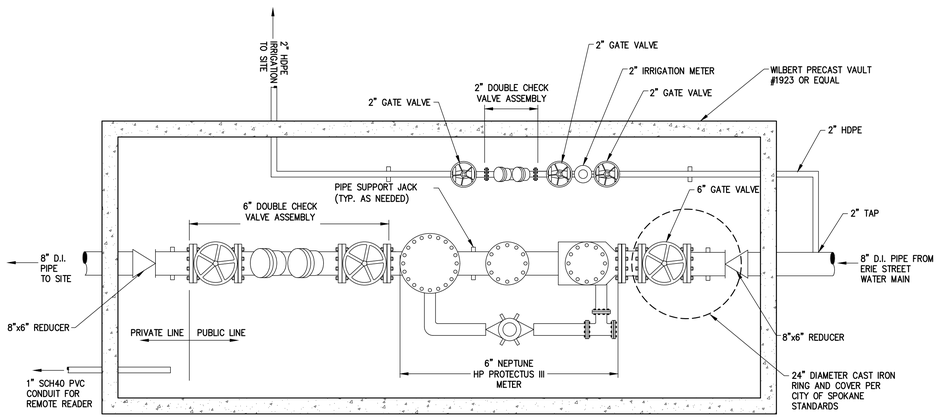
ASPHALT PAVEMENT SECTIONS 5

SCALE : NTS



TRASH ENCLOSURE PAVEMENT SECTION 6

SCALE : NTS



NOTES:

1. CONTRACTOR SHALL INSTALL VAULT, BACKFILL, AND COMPACT PER PROJECT SPECIFICATIONS. CITY OF SPOKANE SHALL INSTALL ALL PIPING AND APPURTENANCES.
2. ALL PIPES THROUGH WALLS AND TOP SHALL BE GROUTED AND SEALED. ALL PIPING 3" AND LARGER SHALL BE DUCTILE IRON CLASS 50.

WATER VAULT DETAIL 8

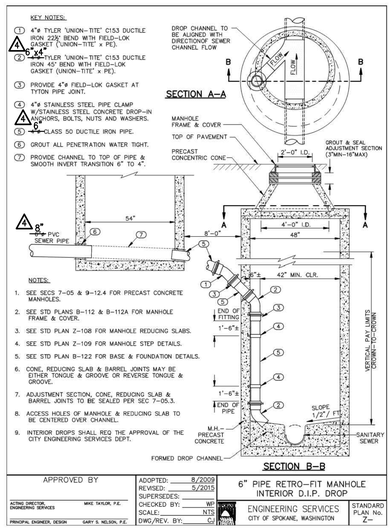
SCALE : NTS

NOTE:

1. P.I.V. MUST HAVE A TAMPER SWITCH WITH 1" SCH40 PVC CONDUIT TO FIRE ALARM PANEL. SEE ELECTRICAL PLANS.

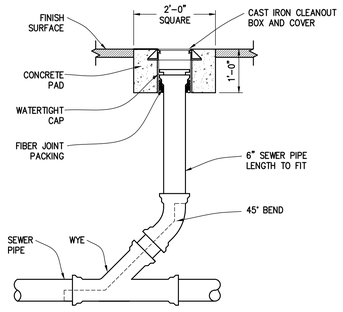
POST INDICATOR VALVE (P.I.V.) 10

SCALE : NTS



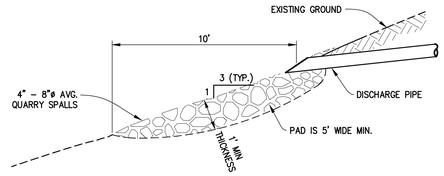
DROP MANHOLE 7

SCALE : NTS



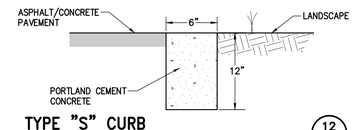
TYPICAL CLEANOUT 9

SCALE : NTS



RIP–RAP PAD 11

SCALE : NTS



TYPE "S" CURB 12

SCALE : NTS

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203 North Washington, Suite 9400
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208.676.8292
alscarchitects.com

MATTHEW R. GRAY — STATE OF WASHINGTON — 41809 — REGISTERED PROFESSIONAL ENGINEER

3/1/2021

DCI ENGINEERS
707 W. 2ND AVENUE
SPOKANE, WASHINGTON 99201
PHONE: (509) 455-4448 • FAX: (509) 455-7492
WEBSITE: www.dci-engineers.com
CIVIL / STRUCTURAL

BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

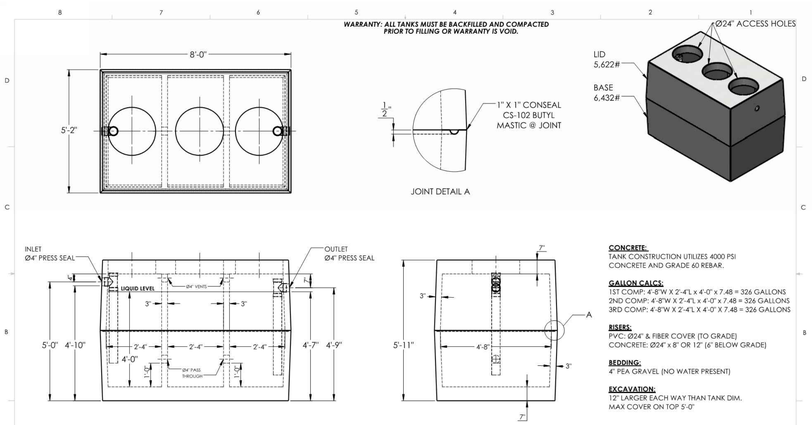
BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

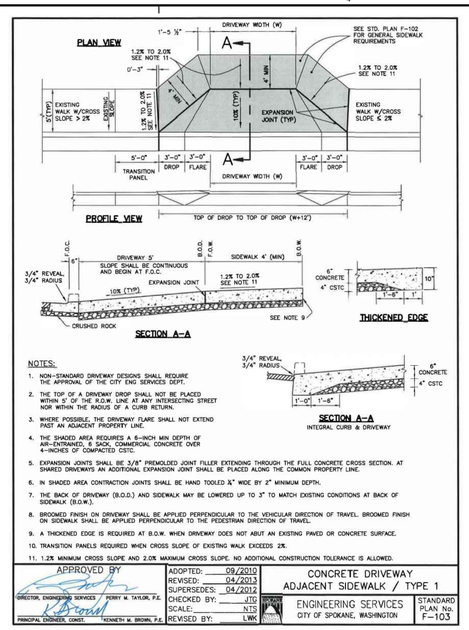
DETAILS

C-500



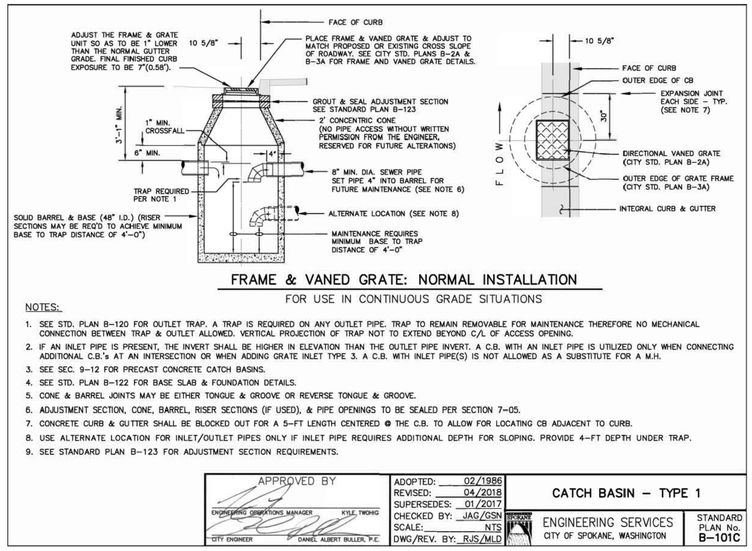
OIL/WATER SEPARATOR

SCALE : NTS (1)



CONCRETE DRIVEWAY

SCALE : NTS (2)

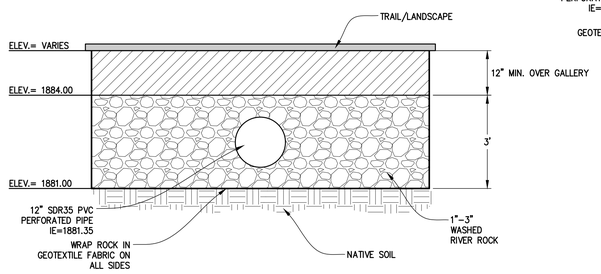


FRAME & VANED GRATE: NORMAL INSTALLATION

FOR USE IN CONTINUOUS GRADE SITUATIONS

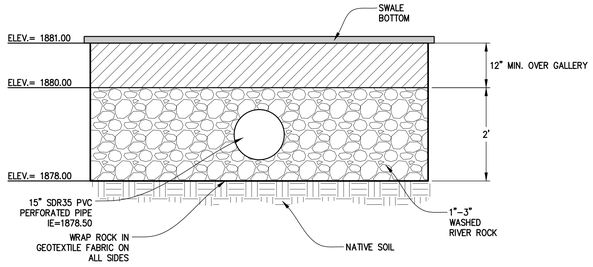
CATCH BASIN TYPE "1"

SCALE : NTS (3)



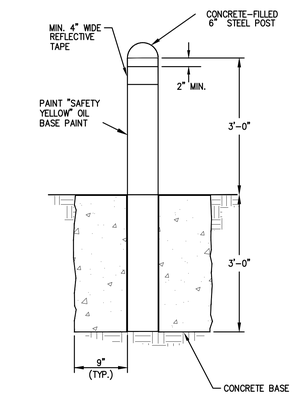
GRAVEL INFILTRATION GALLERY SECTION B

SCALE : NTS (4)



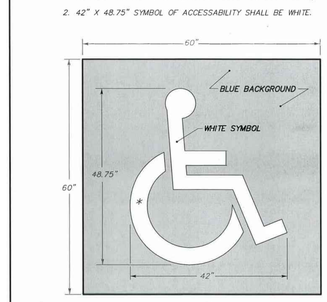
GRAVEL INFILTRATION GALLERY SECTION A

SCALE : NTS (5)



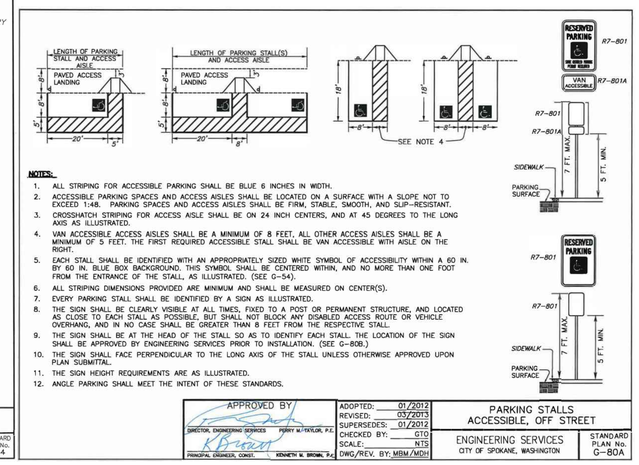
BOLLARD DETAIL

SCALE : NTS (7)



ADA SIGNAGE AND STRIPING

SCALE : NTS (6)



CONTRACTOR NOTE

ALL EXISTING UTILITIES SHOWN ON PLANS ARE TO BE VERIFIED HORIZONTALLY AND VERTICALLY PRIOR TO ANY CONSTRUCTION. ALL EXISTING FEATURES INCLUDING BURIED UTILITIES ARE SHOWN AS INDICATED ON RECORD MAPS AND SURVEYS FURNISHED BY OTHERS. WE ASSUME NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS AND SURVEYS. CONTACT THE UTILITY OWNER/AGENCY FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO CONSTRUCTION.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

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3/11/2021

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CIVIL / STRUCTURAL

BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

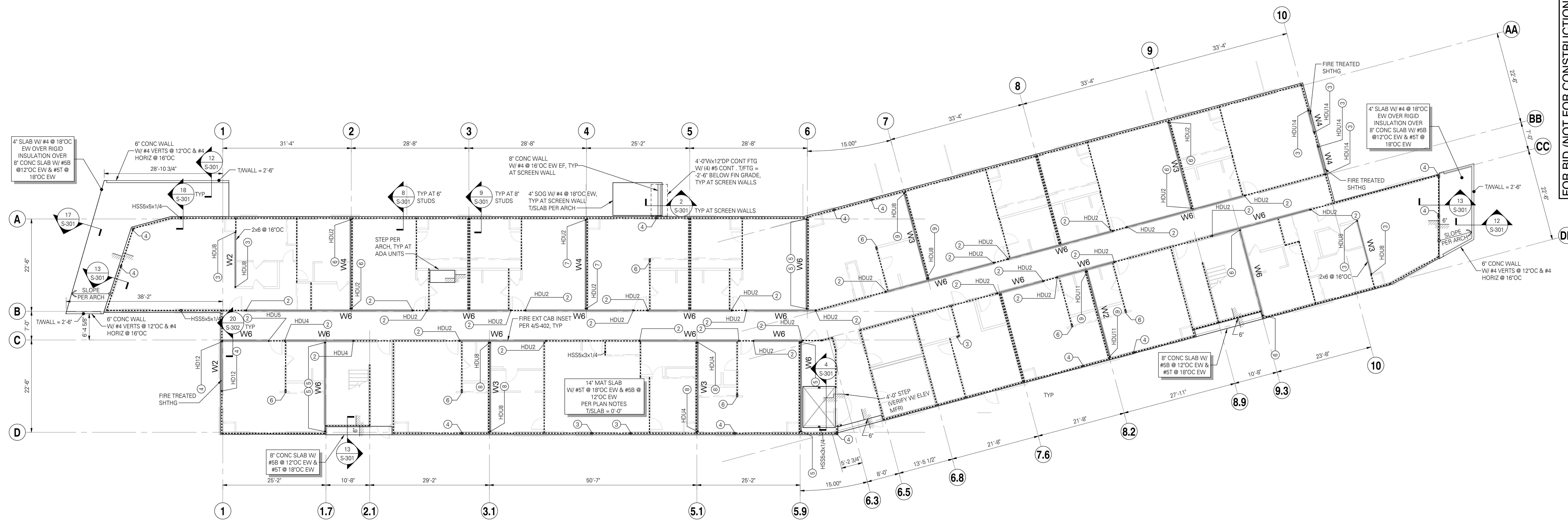
BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

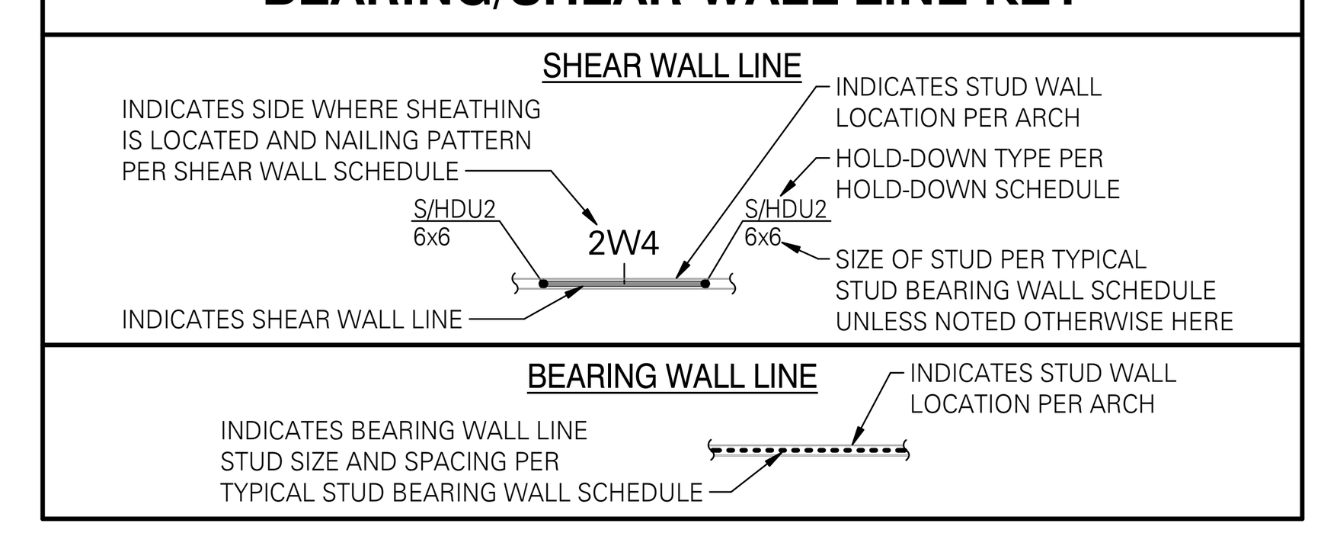
PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

DETAILS

C-501



BEARING/SHEAR WALL LINE KEY



STUD WALL FRAMING SCHEDULE

FLOOR LEVEL	BEARING WALLS, UNO			
	EXTERIOR	CORRIDOR	INTERIOR	PARTY WALL
R-1	2x6 @ 16"OC (MIN)	2x6 @ 16"OC	(2) LVL1 3/4x3 1/2 @ 16"OC	2x4 @ 16"OC
R-2	2x6 @ 16"OC (MIN)	2x6 @ 16"OC	LVL1 3/4x3 1/2 @ 16"OC	2x4 @ 16"OC
R-3	2x6 @ 16"OC (MIN)	2x6 @ 16"OC	2x4 @ 12"OC	2x4 @ 16"OC
R-4	2x6 @ 16"OC (MIN)	2x6 @ 16"OC	2x4 @ 16"OC	2x4 @ 16"OC

NOTE: EXTERIOR STUDS AND PLATES TO BE FIRE TREATED LUMBER.

STUD AND SHEAR WALL PLAN NOTES:

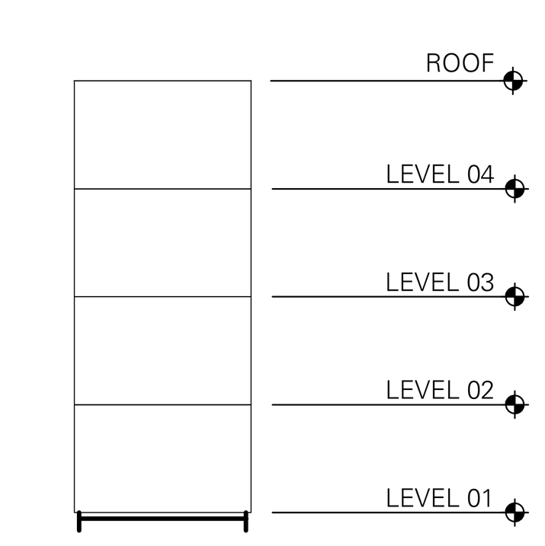
1. STRUCTURAL GENERAL NOTES, DESIGN CRITERIA, ABBREVIATIONS AND LEGEND PER S-001, S-002 AND S-003.
2. LUMBER GRADE PER STRUCTURAL GENERAL NOTES.
3. PARTY WALLS PER PLAN, PROVIDE 1" SPACE BETWEEN WALLS.
4. BALLOON FRAME ALL WALLS GREATER THAN ONE LEVEL 10'-0" WITH (2) 2x @ 16"OC.
5. ALL INTERIOR NON-BEARING, NON-STRUCTURAL WALL STUD REQUIREMENTS PER STRUCTURAL GENERAL NOTES.
6. HEADERS SHOWN ON FRAMING PLAN SHALL BE SUPPORTED BY (1) TRIMMER AND (1) KING STUD MINIMUM, UNO. WHERE MORE THAN (1) TRIMMER IS REQUIRED, THE NUMBER OF TRIMMER STUDS SHALL BE NOTED THUS: ■-(2) . TRIMMERS TO BE CONTINUOUS TO THE FOUNDATION. POST-TENSIONED SLAB. BLOCK SOLID AT FLOOR FRAMING.
7. BEAMS SHOWN ON FRAMING PLAN SHALL BE SUPPORTED BY (2) BUNDLED STUDS MINIMUM, UNO. WHERE MORE THAN (2) BUNDLED STUDS ARE REQUIRED, THE NUMBER OF BUNDLED STUDS SHALL BE NOTED THUS: ■-(3) . BUNDLED STUDS TO BE CONTINUOUS TO THE FOUNDATION. [POST-TENSIONED SLAB.] BLOCK SOLID AT FLOOR FRAMING.
8. SHEAR WALL AND NAILING REQUIREMENTS PER SHEAR WALL SCHEDULE 19/S-401.
9. ALL EXTERIOR WALLS REQUIRING WOOD SHEATHING PER THE ARCHITECT SHALL BE SHEAR WALL TYPE W6 UNO.
10. AT STAGGERED STUD WALLS, BUNDLED STUDS, TRIMMER STUDS, KING STUDS AND SHEAR WALL COMPRESSION STUDS ARE TO MATCH THE WIDTH OF THE WALL PLATES.
11. HD (2) 2x (-) INDICATES HOLD-DOWN TYPE PER HOLD-DOWN SCHEDULE 9/S-302. CIRCLED NUMBER INDICATES NUMBER OF TRIM STUDS REQUIRED AND BOTTOM NUMBER INDICATES NUMBER OF FULL HEIGHT (KING) STUDS REQUIRED IN ADDITION TO BUNDLED OR TRIM STUDS OR POSTS SHOWN ON PLAN.
12. TYPICAL HOLD-DOWN ELEVATION PER 4/S-302.
13. ANCHOR BOLTS TO BE 5/8" DIA x 7" MINIMUM EMBEDMENT PER 2/S-401. PROVIDE HOT-DIPPED GALVANIZED ANCHOR BOLTS AT PRESSURE-TREATED SILL PLATES. HOT-DIPPED GALVANIZED ANCHOR BOLTS ARE NOT REQUIRED AT SODIUM BORATE PRESSURE TREATED PLATES PER STRUCTURAL GENERAL NOTES.
14. ALL WOOD FRAMING AND SHEATHING AT EXTERIOR WALLS TO BE FIRE RETARDANT TREATED (FRT) WOOD. ALL CONNECTORS (NAILS, SCREWS, HANGERS, AND ETC) TO BE HOT-DIPPED GALVANIZED AS REQUIRED BY TREATMENT MANUFACTURER.
15. ELEVATOR STEEL AND CONNECTIONS ARE PROVIDED FOR BUDGET PURPOSES ONLY AND ARE PRELIMINARY. THE PROPOSED STRUCTURAL MEMBERS AND THEIR CONNECTIONS SHALL BE CONFIRMED ONCE FINAL ELEVATOR REACTIONS ARE PROVIDED TO THE STRUCTURAL ENGINEER OF RECORD.
16. TYPICAL DETAILS PER:

14/S-302	TYPICAL HOLD-DOWN OR STRAP CONNECTION AT FLOOR FRAMING
18/S-302	TYPICAL SHEAR WALL ELEVATION
4/S-401	TYPICAL HOLES AND NOTCHES IN WOOD STUDS
5/S-401	TYPICAL TOP PLATE SPLICE DETAIL
17/S-401	TYPICAL STUD WALL OPENING (HEADER) DETAIL
3/S-402	TYPICAL INTERIOR STAIRWELL ELEVATION
7/S-402	NON-STRUCTURAL PARTITION WALL CONNECTION [I-JOIST]

FOUNDATION PLAN NOTES:

1. STRUCTURAL GENERAL NOTES, DESIGN CRITERIA, ABBREVIATIONS AND LEGEND PER S-001, S-002 AND S-003.
2. VERIFY ALL DIMENSIONS AND ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS.
3. CONTRACTOR SHALL LOCATE AND VERIFY THE FOLLOWING WITH OTHERS PRIOR TO POURING CONCRETE: ALL DOOR OPENINGS IN FOUNDATION WALLS; DRAINS AND SLOPES; BLOCKOUTS FOR [POOLS, SPAS, FREEZERS, COOLERS, PLUMBING, SPRINKLERS AND HVAC]. ALL DUCTS, CHASES AND PIPES PER MECHANICAL, PLUMBING, ELECTRICAL AND SPRINKLER DRAWINGS. STAIR DETAILS AND GUARDRAILS PER ARCHITECTURAL DRAWINGS.
4. TOP OF SLAB (T/SLAB) ELEVATION ASSUMED 0'-0". FOR ACTUAL T/SLAB ELEVATION REFER TO CIVIL AND ARCHITECTURAL DRAWINGS. PROVIDE 6 MIL VAPOR BARRIER BELOW SLAB AT INTERIOR SPACES. PROVIDE FREE-DRAINING GRANULAR FILL PER GEOTECH REPORT.
5. ALL SLABS TO BEAR ON COMPETENT NATIVE SOIL AND/OR STRUCTURAL FILL. SUBGRADE PREPARATION, STRUCTURAL FILL, FOOTING DRAINS, VAPOR BARRIER AND OTHER REQUIREMENTS PER GEOTECH REPORT AS NOTED IN THE STRUCTURAL GENERAL NOTES.
6. CJ INDICATES CONTROL JOINT PER PLAN.
7. MOISTURE PROOF ALL CONCRETE STEM AND BASEMENT WALLS PER ARCHITECT.
8. STEEL STAIRS SHALL BE BIDDER-DESIGNED, UNO. APPLICABLE DESIGN REQUIREMENTS PER STRUCTURAL GENERAL NOTES.
9. ELEVATOR STEEL AND CONNECTIONS ARE PROVIDED FOR BUDGET PURPOSES ONLY AND ARE PRELIMINARY. THE PROPOSED STRUCTURAL MEMBERS AND THEIR CONNECTIONS SHALL BE CONFIRMED ONCE FINAL ELEVATOR REACTIONS ARE PROVIDED TO THE STRUCTURAL ENGINEER OF RECORD.
10. TYPICAL DETAILS PER:

10/S-301	TYPICAL LAP SPLICE SCHEDULE
14/S-301	TYPICAL DEPRESSED SLAB DETAIL
15/S-301	STANDARD HOOKS AND BAR BENDS
4/S-302	TYPICAL HOLD-DOWN AT THICKENED SLAB FOOTING



NOTE:
DARKENED LINES DESIGNATE AREA OF WORK.

LEVEL 01 FOUNDATION PLAN

SCALE: 3/32 = 1'-0"

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Coeur d'Alene, Idaho 83815
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DCI ENGINEERS
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Spokane, Washington 99201
P: (509) 455-4448 www.dci-engineers.com
CIVIL / STRUCTURAL

FOR BID (NOT FOR CONSTRUCTION)

BUILDING 1B

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
1	7/24/20	PERMIT RESPONSE

PROJ. NO. 18041-0341

PROJECT MANAGER KEA

DATE 03/01/2021

LEVEL 01 FOUNDATION PLAN

S-101

RIVERBEND APARTMENTS
PHASE 2
SAGAMORE SPOKANE LLC
SPOKANE, WASHINGTON

ABBREVIATIONS

ACP	ASPHALT CONCRETE PAVEMENT	FT (')	FOOT (FEET)
ADD'L	ADDITIONAL	FTG	FOOTING
AD	AREA DRAIN	G	GAS MAIN
ADJ	ADJACENT	GB	GRADE BREAK
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	GM	GAS METER
		GRD	GRADE
APPROX.	APPROXIMATE(LY)	GV	GATE VALVE
ARCH	ARCHITECT(URAL)	HB	HOSE BIB
ASSY	ASSEMBLY	HDPE	HIGH DENSITY POLYETHYLENE
BLDG	BUILDING	HORIZ(H)	HORIZONTAL
BM	BENCHMARK	HT	HEIGHT
BNDRY	BOUNDARY	HYD	HYDRANT
BOW	BOTTOM OF WALL (AT FINISHED GRADE)	ID	INSIDE DIAMETER
		I.E.	INVERT ELEVATION
BVC	BEGINNING OF VERTICAL CURVE	IN (")	INCH(ES)
CTV	CABLE TV	INV	INVERT
C&G	CURB AND GUTTER	IRR	IRRIGATION WATER
CB	CATCH BASIN	LB	POUND(S)
CC	CURB CUT	LCPE	LINED CORRUGATED POLYETHYLENE PIPE
CD	CONCRETE DRIVE		
CF	CUBIC FEET (FOOT)	LF	LINEAR FEET
CI	CAST IRON	MAT'L	MATERIAL
CJ	CONSTRUCTION JOINT	MAX	MAXIMUM
CL	CLASS	MFR	MANUFACTURER
CL	CENTER LINE	MH	MANHOLE
CMP	CORRUGATED METAL PIPE	MJ	MECHANICAL JOINT
		MIN.	MINIMUM
CONC.	CONCRETE	MISC.	MISCELLANEOUS
CONST.	CONSTRUCTION	N	NORTH(ING)
CPEP	CORRUGATED POLYETHYLENE PIPE	NO (#)	NUMBER
		OC	ON CENTER
CTR	CENTER(ED)	O/W	OIL WATER
CY	CUBIC YARD	P	POWER
DCVA	DOUBLE CHECK VALVE ASSEMBLY	PC	POINT OF CURVATURE
		PIV	POST INDICATOR VALVE
DDCV	DOUBLE DETECTOR CHECK VALVE	PP	POWER POLE
		PL	PROPERTY LINE
DEPT.	DEPARTMENT	PSF	POUNDS PER SQUARE FOOT
DET	DETAIL	PSI	POUNDS PER SQUARE INCH
D.I.	DUCTILE IRON	PT	POINT OF TANGENCY
DIA (ø)	DIAMETER	PVC	POLYVINYL CHLORIDE
DIM	DIMENSION	PVI	POINT OF VERTICAL INFLECTION
DS	DOWN SPOUT	QTY.	QUANTITY
DWG	DRAWING	RAD (R)	RADIUS
E	EAST(ING)	RCP	REINFORCED CONCRETE PIPE
EC	ELECTRICAL CONDUIT	RD	ROAD
ECC	EXTRUDED CONCRETE CURB	REF	REFERENCE
EL.=	ELEVATION	REQD.	REQUIRED
EOP	EDGE OF PAVEMENT	RET	RETAINING
EQUIV.	EQUIVALENT	ROW	RIGHT OF WAY
EVC	END OF VERTICAL CURVE	SD	STORM DRAIN
EXIST.	EXISTING	S.F.	SQUARE FEET
FD	FLOOR DRAIN	SHT	SHEET
FDC	FIRE DEPARTMENT CONNECTION	SIM	SIMILAR
		SPEC	SPECIFICATION(S)
FDN	FOUNDATION	SQ	SQUARE
FFE	FINISH FLOOR ELEVATION	SS	SANITARY SEWER
FH	FIRE HYDRANT	STA	STATION
FL	FLANGED	STD	STANDARD
FLR	FLOOR	TOE	TOE OF WALL, OR SLOPE
FOC	FACE OF CURB	T	TELEPHONE WIRE
F.S.	FINISHED SURFACE	TBM	TEMPORARY BENCH MARK
		T.C.	TOP OF CURB
		TG OR RIM	TOP OF GRATE
		TEMP.	TEMPORARY
		TOP	TOP OF SLOPE
		TOW	TOP OF WALL
		TV	TELEVISION WIRE
		TYP.	TYPICAL
		VC	VERTICAL CURVE
		VERT (V)	VERTICAL
		WM	WATER METER
		W/	WITH
		WT	WEIGHT
		WWF	WELDED WIRE FABRIC
		YD	YARD DRAIN

LEGEND

STORM PIPE — SD
NEW & EXISTING CATCH BASINS — CB / C.B.
NEW & EXISTING DRYWELLS — DW / DW
STORM MANHOLE — SDMH / SDMH
SANITARY SEWER PIPE — SS
SANITARY SEWER MANHOLE — SSMH / SSMH
WATER MAINS — W
FIRE HYDRANTS (NEW AND EXISTING) AND FDC — FH / FH
WATER METERS
WATER VALVES
FITTINGS WITH THRUST BLOCKS — TEE, 90°, 45°, 22.5°, 11.25°
SURFACE WTR AND PIPE DIRECTION FLOW — OR
EXISTING CONTOUR LABELS — (457)
PROPOSED CONTOUR LABELS — 457
EXISTING SURFACE ELEVATIONS — (XXX.XX) F.S. / (XXX.XX T.C.) (XXX.XX F.S.)
FINISHED SURFACE ELEVATIONS — XXX.XX F.S. / XXX.XX T.C. XXX.XX F.S.
NEW EASEMENT
NEW DITCH
TRAFFIC ARROWS
TOP OF WALL/BOTTOM OF WALL — TOW XXX.XX / XXX.XX BOW
SLOPE INDICATORS — 3:1, 2:1
RIP RAP
FILTER FABRIC FENCING
FOOTING DRAINS
DOWNSPOUTS — DS
CLEANOUTS (C.O.) SS, AND RWL (NEW AND EXISTING) — CO
INTERCEPTOR AND BIO-SWALES
CEMENT CONCRETE
COORDINATES, & LEADERS — N 10000.00 E 5000.00
STUBBED & PLUGGED LINE
CONCRETE CURB
CONCRETE CURB & GUTTER
NEW ASPHALT/CONCRETE PAVEMENT
CURB INLET/UNDER SIDEWALK INLET
DRAINAGE SWALE
RETAINING WALL
STRAW BALE
ROCK CHECK DAM

GENERAL CONSTRUCTION NOTES:

1. UNLESS SPECIFICALLY EXCEPTED IN THE PLANS OR CONTRACT DOCUMENTS, ALL CONSTRUCTION METHODS AND MATERIALS SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND STANDARD PLANS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION PROMULGATED BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND THE WASHINGTON CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION (LATEST EDITION) AND THE CITY OF SPOKANE STANDARDS AND SPECIFICATIONS.

2. THE PLANS ARE SCHEMATIC AND ARE NOT INTENDED TO DEPICT ALL DETAILS OF THE WORK REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE TO FAMILIARIZE HIMSELF WITH ACTUAL SITE CONDITIONS, REQUIREMENTS AND FACTORS AFFECTING THE WORK. WHERE LACK OF DETAIL OR CONFLICT EXISTS BETWEEN THESE AND OTHER PLANS, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING. IF THE CONTRACTOR DISCOVERS ANY DISCREPANCIES BETWEEN THE PLANS AND EXISTING CONDITIONS ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER AND CITY OF SPOKANE ENGINEERING AND DEVELOPER SERVICES DEPARTMENT.

3. THIS PLAN MAY NOT SHOW ALL EXISTING UTILITIES. EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. PRIOR TO CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES. CALL THE UNDERGROUND UTILITY LOCATION SERVICE AT 811 BEFORE YOU DIG. ANY CONFLICTING UTILITIES SHALL BE RELOCATED PRIOR TO CONSTRUCTION. IN THE CASE WHERE RELOCATION IS REQUIRED, THE APPLICABLE UTILITY COMPANY SHALL BE NOTIFIED AND ANY COST REQUIRED FOR RELOCATION OR ADJUSTMENTS SHALL BE AGREED UPON.

4. THE ENGINEER HAS ATTEMPTED TO SHOW ALL EXISTING UNDERGROUND UTILITIES AND STRUCTURES. APPEARANCE ON THESE PLANS, HOWEVER, DOES NOT GUARANTEE THE ACCURACY AND COMPLETENESS OF THE LOCATION OR EXISTENCE OF THESE UTILITIES AND/OR SUBSTRUCTURES. THE CONTRACTOR IS REQUIRED TO TAKE ALL REQUIRED PRECAUTIONARY MEANS TO LOCATE AND PROTECT ALL EXISTING UTILITIES AND SUBSTRUCTURES WHETHER SHOWN OR NOT, PRIOR TO EXCAVATION IN ANY AREA. THE CONTRACTOR SHALL MEET AT THE JOB SITE WITH REPRESENTATIVES OF THE UTILITY DISTRICTS, COMPANIES, AND OTHER OWNERS THAT MAY HAVE EXISTING FACILITIES AT THE SITE, TO DISCUSS THEIR PROTECTION.

5. THE CONTRACTOR IS REQUIRED TO HAVE A COMPLETE SET OF APPROVED PLANS ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS. THE CONTRACTOR SHALL HAVE A RESPONSIBLE PARTY, WHO HAS THE AUTHORITY TO REPRESENT AND ACT FOR THE CONTRACTOR, AT THE JOB SITE DURING ALL WORKING HOURS.

6. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS AND APPROVALS FROM CITY OF SPOKANE AND OTHER JURISDICTIONS PRIOR TO THE START OF CONSTRUCTION. ABSENCE OF THE PERMIT MAY RESULT IN IMMEDIATE SHUT DOWN OF WORK AND POSSIBLE REMOVAL OF THE ITEMS CONSTRUCTED WITHOUT A PERMIT.

7. THE CONTRACTOR SHALL PROVIDE THE DESIGN ENGINEERS WITH RECORD DRAWINGS PRIOR TO FINAL APPROVAL. ALL DEVIATIONS FROM THE ORIGINAL PLANS MADE DURING THE COURSE OF THE CONSTRUCTION INCLUDING LOCATION, INVERTS, AND DEPTHS OF UTILITIES SHALL BE CLEARLY MARKED ON THE RECORD DRAWINGS. THE ENGINEER SHALL PROVIDE THE CITY ENGINEER WITH "RECORD DRAWINGS" AS REQUIRED.

8. THE EXISTING SITE CONDITIONS SHOWN ARE FOR INFORMATIONAL PURPOSES ONLY. NO CERTIFICATIONS ARE EXPRESSED OR IMPLIED. THE TOPOGRAPHIC SURVEY WAS PROVIDED BY DURYEA AND ASSOCIATES.

9. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT TO CONSTRUCT AND INSTALL TO PROPER WORKING ORDER, THE DESIGN SHOWN, AS DETAILED OR CALLED OUT IN THESE PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR BEING FAMILIAR WITH THE PROVISIONS AND REQUIREMENTS CONTAINED IN THE STANDARD SPECIFICATIONS.

10. IF CONSTRUCTION IS TO TAKE PLACE IN PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE GOVERNING MUNICIPALITY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLAN(S) IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS REQUIRED. PRIOR TO DISRUPTION OF ANY TRAFFIC, A TRAFFIC PLAN SHALL BE PREPARED AND SUBMITTED TO THE CITY OF SPOKANE FOR APPROVAL. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.

11. A PRE-CONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF SPOKANE CONSTRUCTION INSPECTOR PRIOR TO THE START OF CONSTRUCTION.

12. ANY CHANGES TO THE DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE DESIGN ENGINEER AND THE CITY OF SPOKANE.

13. ALL TESTING SHALL BE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATIONS (LATEST EDITION) AND GEOTECHNICAL REPORT BY ASPECT CONSULTING, LLC. DATED OCTOBER 25, 2019.

14. EXCAVATION AND EMBANKMENT SHALL BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF SECTION 2-03 OF THE WSDOT STANDARD SPECIFICATIONS. ALL COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 2-03.3(14)C, METHOD C FOR BUILDING PADS, METHOD B FOR OTHER AREAS, AND THE GEOTECHNICAL REPORTS.

15. ALL FINISHED GRADING ELEVATIONS SHALL MATCH EXISTING ELEVATIONS AT THE SITE'S BOUNDARY, EXCEPT AS SHOWN OTHERWISE ON THE GRADING PLAN. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING.

16. THE CONTRACTOR SHALL REMOVE ALL WASTE MATERIAL.

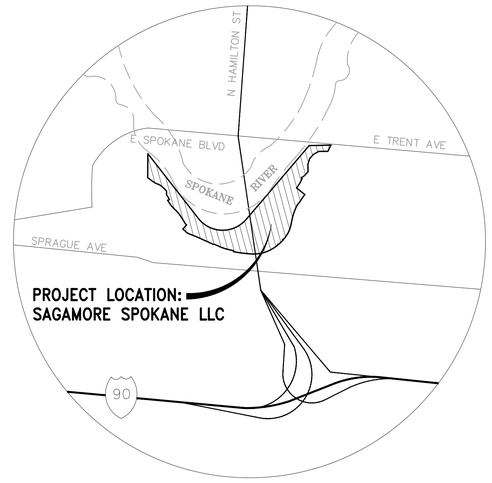
17. GRADING: ALL GRADING SHALL BE LIMITED TO THE AREAS IDENTIFIED ON THE GRADING PLAN AND SHALL NOT INFRINGE ON ADJACENT OWNERSHIPS, EXCEPT AS SHOWN OTHERWISE ON THE PLANS.

18. THE CONTRACTOR SHALL PROTECT ALL CATCH BASINS, DRYWELLS, AND OTHER STORM WATER STRUCTURES FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC OVER THE METAL FRAME DURING CONSTRUCTION AND KEEPING IT IN PLACE UNTIL THE SITE HAS BEEN PAVED AND CLEANED.

19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING DIRT, MUD, AND OTHER CONSTRUCTION DEBRIS THAT MAY ACCUMULATE ON PAVED STREETS ADJACENT TO THE SITE AS A RESULT OF CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MATERIALS THAT SPILL ONTO LOCAL STREETS DURING THE TRANSPORTATION OF EQUIPMENT, MATERIALS, ETC. SHOULD A SPILL OCCUR, THE CONTRACTOR SHALL REMOVE THE MATERIAL BY THE END OF THE WORK DAY. NO MATERIAL SHALL BE ALLOWED TO SET, DRY, OR BE WASHED INTO ADJACENT STORM WATER FACILITIES. CLEANING SHALL BE ON AN "AS NEEDED" BASIS USING WATER UNDER PRESSURE. SWEEPING AND WATER SHALL BE USED WHEN WATER PRESSURE ALONE WILL NOT WASH THE CONSTRUCTION DEBRIS FROM THE STREET. THE CONTRACTOR MUST PROTECT ALL EXISTING STORM WATER FACILITIES FROM DIRT/DEBRIS.

20. ANY BROKEN, HEAVED, OR SUNKEN SIDEWALK AND/OR CURB ALONG THE PROJECT PROPERTY FRONTAGE MUST BE REPLACED TO CITY STANDARDS, WHETHER EXISTING OR CAUSED DURING CONSTRUCTION. (SMC 12.01.010)

21. CONSTRUCTION OPERATIONS, INCLUDING EQUIPMENT WARM UP AND OPERATION, ARE RESTRICTED TO THE TIME LIMITS OUTLINED IN THE CITY NOISE ORDINANCE.



VICINITY MAP

NOT TO SCALE

SE 1/4 SEC. 17, T. 25 N., R. 43 E., W.M.

PROJECT TEAM:

OWNER:
SAGAMORE SPOKANE LLC
1 E CAMELBACK RD STE 200
PHOENIX, AZ 85012
PHONE: (212) 446-6980

ARCHITECT:
ALSC ARCHITECTS
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SPOKANE, WA 99201
CONTACT: RUSTIN HALL
PHONE: (509) 838-8568

CIVIL ENGINEER:
DCI ENGINEERS
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SPOKANE, WA 99201
CONTACT: MATT GIBB, P.E.
PHONE: (509) 227-5721

UTILITY PURVEYORS:

SEWER:
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909 E. SPRAGUE AVE.
SPOKANE, WA 99202
PHONE: (509) 625-7900

WATER:
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914 E. NORTH FOOTHILLS DRIVE
SPOKANE, WA 99207
PHONE: (509) 625-7800

POWER/GAS:
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1411 E. MISSION AVE.
SPOKANE, WA 99252
POWER CONTACT: NICK HARMON
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SHEET INDEX

CONTRACTOR NOTE

ALL EXISTING UTILITIES SHOWN ON PLANS ARE TO BE VERIFIED HORIZONTALLY AND VERTICALLY PRIOR TO ANY CONSTRUCTION. ALL EXISTING FEATURES INCLUDING BURIED UTILITIES ARE SHOWN AS INDICATED ON RECORD MAPS AND SURVEYS FURNISHED BY OTHERS. WE ASSUME NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS AND SURVEYS. CONTACT THE UTILITY OWNER/AGENCY FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO CONSTRUCTION.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

ALSC ARCHITECTS
203 North Washington, Suite 9400
Spokane, WA 99201
509.838.8568
6500 Mineral Drive, Suite 101
Coure d' Alene, Idaho 83815
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MATTHEW R. GIBB — STATE OF WASHINGTON — 41809 — REGISTERED PROFESSIONAL ENGINEER

3/11/2021

DCI ENGINEERS
707 W. 2ND AVENUE
SPOKANE, WASHINGTON 99201
PHONE: (509) 455-4448 • FAX: (509) 455-7492
WEBSITE: www.dci-engineers.com
CIVIL / STRUCTURAL

BUILDING 1B

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GENERAL CIVIL INFORMATION

C-000

SPOKANE REGIONAL STORM WATER MANUAL APPENDIX 9A- ESC STANDARD PLAN NOTES:

THE FOLLOWING ESC STANDARD PLAN NOTES ORIGINATE FROM SECTION 9.4.3. THESE NOTES ARE AN OVERALL SET; USE ONLY WHAT APPLIES TO THE GIVEN PROJECT.

1. THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE FOLLOWED IN ORDER TO BEST MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION CONTROL PROBLEMS:

(A) CLEAR AND GRUB SUFFICIENTLY FOR INSTALLATION OF TEMPORARY ESC BMPS;
(B) INSTALL TEMPORARY ESC BMPS, CONSTRUCTING SEDIMENT TRAPPING BMPS AS ONE OF THE FIRST STEPS PRIOR TO GRADING;
(C) CLEAR, GRUB AND ROUGH GRADE FOR ROADS, TEMPORARY ACCESS POINTS AND UTILITY LOCATIONS;
(D) STABILIZE ROADWAY APPROACHES AND TEMPORARY ACCESS POINTS WITH THE APPROPRIATE CONSTRUCTION ENTRY BMP;
(E) CLEAR, GRUB AND GRADE INDIVIDUAL LOTS OR GROUPS OF LOTS;
(F) TEMPORARILY STABILIZE, THROUGH RE-VEGETATION OR OTHER APPROPRIATE BMPS, LOTS OR GROUPS OF LOTS IN SITUATIONS WHERE SUBSTANTIAL CUT OR FILL SLOPES ARE A RESULT OF THE SITE GRADING;
(G) CONSTRUCT ROADS, BUILDINGS, PERMANENT STORM WATER FACILITIES (I.E. INLETS, PONDS, UIC FACILITIES, ETC.);
(H) PROTECT ALL PERMANENT STORM WATER FACILITIES UTILIZING THE APPROPRIATE BMPS;
(I) INSTALL PERMANENT ESC CONTROLS, WHEN APPLICABLE; AND,
(J) REMOVE TEMPORARY ESC CONTROLS WHEN:

2. PERMANENT ESC CONTROLS, WHEN APPLICABLE, HAVE BEEN COMPLETELY INSTALLED;

3. ALL LAND-DISTURBING ACTIVITIES THAT HAVE THE POTENTIAL TO CAUSE EROSION OR SEDIMENTATION PROBLEMS HAVE CEASED; AND,

4. VEGETATION HAD BEEN ESTABLISHED IN THE AREAS NOTED AS REQUIRING VEGETATION ON THE ACCEPTED ESC PLAN ON FILE WITH THE LOCAL JURISDICTION.

5. INSPECT ALL ROADWAYS, AT THE END OF EACH DAY, ADJACENT TO THE CONSTRUCTION ACCESS ROUTE. IF IT IS EVIDENT THAT SEDIMENT HAS BEEN TRACKED OFF SITE AND/OR BEYOND THE ROADWAY APPROACH, CLEANING IS REQUIRED.

6. IF SEDIMENT REMOVAL IS NECESSARY PRIOR TO STREET WASHING, IT SHALL BE REMOVED BY SHOVELING OR PICKUP SWEEPING AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.

7. IF STREET WASHING IS REQUIRED TO CLEAN SEDIMENT TRACKED OFF SITE, ONCE SEDIMENT HAS BEEN REMOVED, STREET WASH WASTEWATER SHALL BE CONTROLLED BY PUMPING BACK ON-SITE OR OTHERWISE PREVENTED FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.

8. RESTORE CONSTRUCTION ACCESS ROUTE EQUAL TO OR BETTER THAN THE PRE-CONSTRUCTION CONDITION.

9. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICAL.

10. INSPECT SEDIMENT CONTROL BMPS WEEKLY AT A MINIMUM, DAILY DURING A STORM EVENT, AND AFTER ANY DISCHARGE FROM THE SITE (STORM WATER OR NON-STORMWATER). THE INSPECTION FREQUENCY MAY BE REDUCED TO ONCE A MONTH IF THE SITE IS STABILIZED AND INACTIVE.

11. CONTROL FUGITIVE DUST FROM CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE STATE AND/OR LOCAL AIR QUALITY CONTROL AUTHORITIES WITH JURISDICTION OVER THE PROJECT AREA.

12. STABILIZE EXPOSED UNWORKED SOILS (INCLUDING STOCKPILES), WHETHER AT FINAL GRADE OR NOT, WITHIN 10 DAYS DURING THE REGIONAL DRY SEASON (JULY 1 THROUGH SEPTEMBER 30) AND WITHIN 5 DAYS DURING THE REGIONAL WET SEASON (OCTOBER 1 THROUGH JUNE 30). SOILS MUST BE STABILIZED AT THE END OF A SHIFT BEFORE A HOLIDAY WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. THIS TIME LIMIT MAY ONLY BE ADJUSTED BY A LOCAL JURISDICTION WITH A "QUALIFIED LOCAL PROGRAM," IF IT CAN BE DEMONSTRATED THAT THE RECENT PRECIPITATION JUSTIFIES A DIFFERENT STANDARD AND MEETS THE REQUIREMENTS SET FOURTH IN THE CONSTRUCTION STORM WATER GENERAL PERMIT.

13. PROTECT INLETS, DRYWELLS, CATCH BASINS AND OTHER STORM WATER MANAGEMENT FACILITIES FROM SEDIMENT, WHETHER OR NOT FACILITIES ARE OPERABLE.

14. KEEP ROADS ADJACENT TO INLETS CLEAN.

15. INSPECT INLETS WEEKLY AT A MINIMUM AND DAILY DURING STORM EVENTS.

16. CONSTRUCT STORM WATER CONTROL FACILITIES (DETENTION/RETENTION STORAGE POND OR SWALES) BEFORE GRADING BEGINS. THESE FACILITIES SHALL BE OPERATIONAL BEFORE THE CONSTRUCTION OF IMPERVIOUS SITE IMPROVEMENTS.

17. STOCKPILE MATERIALS (SUCH AS TOPSOIL) ON SITE, KEEPING OFF OF ROADWAY AND SIDEWALKS.

18. COVER, CONTAIN AND PROTECT ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCT, AND NON-INERT WASTES PRESENT ON SITE FROM VANDALISM (SEE CHAPTER 173-304 WAC FOR THE DEFINITION OF INERT WASTE), USE SECONDARY CONTAINMENT FOR ON-SITE FUELING TANKS.

19. CONDUCT MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM REPAIRS, SOLVENT AND DE-GREASING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES THAT MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORM WATER RUNOFF USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CLEAN ALL CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. IF RAINING OVER EQUIPMENT OR VEHICLE, PERFORM EMERGENCY REPAIRS ON SITE USING TEMPORARY PLASTIC BENEATH THE VEHICLE.

20. CONDUCT APPLICATION OF AGRICULTURAL CHEMICALS, INCLUDING FERTILIZERS AND PESTICIDES, IN SUCH A MANNER, AND AT APPLICATION RATES, THAT INHIBITS THE LOSS OF CHEMICALS INTO STORM WATER RUNOFF FACILITIES. AMEND MANUFACTURER'S RECOMMENDED APPLICATION RATES AND PROCEDURES TO MEET THIS REQUIREMENT, IF NECESSARY.

21. INSPECT ON A REGULAR BASIS (AT A MINIMUM WEEKLY, AND DAILY DURING/AFTER A RUNOFF PRODUCING STORM EVENT) AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL BMPS TO ENSURE SUCCESSFUL PERFORMANCE OF THE BMPS. NOTE THAT INLET PROTECTION DEVICES SHALL BE CLEANED OR REMOVED AND REPLACE BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE.

22. REMOVE TEMPORARY ESC BMPS WITHIN 30 DAYS AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED. PERMANENTLY STABILIZE AREAS THAT ARE DISTURBED DURING THE REMOVAL PROCESS.

EROSION CONTROL NOTES:

1. AN EROSION/SEDIMENTATION CONTROL (ESC) PLAN IS REQUIRED FOR THIS PROJECT. IMPLEMENTATION OF THIS ESC PLAN, AND CONSTRUCTION, MAINTENANCE, AND UPGRADING OF THE ESC FACILITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND ACCEPTED BY THE CITY OF SPOKANE, OR UNTIL VEGETATION IS ESTABLISHED THROUGHOUT THE SITE, AND ACCEPTED BY THE CITY OF SPOKANE, WHICHEVER IS LATER.

2. APPROVAL OF THE ESC PLAN DOES NOT CONSTITUTE APPROVAL OF ANY OF THE PROPOSED ROAD, STORM WATER, GRADING, OR UTILITY DESIGN ELEMENTS SHOWN ON THE ESC PLAN.

3. THE EROSION/SEDIMENTATION CONTROL MEASURES SHOWN ARE THE MINIMUM REQUIREMENTS OF THE ANTICIPATED SITE CONDITIONS. THE CONTRACTOR SHALL INSPECT AND MAINTAIN THESE ESC MEASURES DAILY, AND SHALL MAINTAIN AND UPGRADE THESE MEASURES AS NECESSARY TO PREVENT SEDIMENT-LADEN WATER FROM EITHER FLOWING OFF-SITE, OR INTO NEW/EXISTING STORM WATER FACILITIES, SUCH AS DRYWELLS, CULVERTS, OR GRAVEL GALLERIES.

4. CONTRACTOR IS RESPONSIBLE FOR INSTALLING A ROCK CONSTRUCTION ENTRANCE AT ANY AND ALL LOCATIONS USED BY VEHICLES TO ENTER OR EXIT THE PROJECT SITE TO PREVENT SEDIMENTS FROM BEING TRACKED OFF THE SITE BY CONSTRUCTION TRAFFIC. .

5. ANY DISTURBED AREAS, EXCEPT FOR POND BOTTOMS AND SLOPES, THAT WILL BE LEFT BARE FOR MORE THAN 7 DAYS AND ARE NOT INTENDED TO BE REWORKED WITHIN 30-45 DAYS, SHALL BE SEEDED WITH A FAST STARTING NATIVE DRYLAND GRASS SUCH AS ANNUAL RYE, OR APPROVED EQUAL, AT A RATE OF 60 LBS./ACRE.

6. GRADED POND AREAS, THAT WILL BE LEFT BARE FOR MORE THAN 7 DAYS, SHALL HAVE A MULCH APPLIED AT A RATE OF TWO THOUSAND (2,000) POUNDS PER ACRE. MULCH SHALL BE A VIRGIN WOOD CELLULOSE FIBER SPECIALLY PROCESSED AS A HYDROSEEDING MULCH AND CONTAIN NO GROWTH OR GERMINATION INHIBITING FACTORS. IF POND CONSTRUCTION HAS BEEN COMPLETED, INCLUDING DRAINAGE STRUCTURES, AND HAVE RECEIVED FINAL INSPECTION APPROVAL, THEY SHALL BE SODDED.

7. DUST CONTROL: AN APPROVED METHOD OF DUST CONTROL, MEETING THE REQUIREMENTS OF LOCAL REGULATIONS, SHALL BE UTILIZED DURING CONSTRUCTION OF THIS PROJECT. THIS MAY REQUIRE THE USE OF WATER SPRAYS, TARPS, SPRINKLERS, OR SUSPENSION OF ACTIVITY DURING CERTAIN WEATHER CONDITIONS.

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MATERIALS THAT SPILL ONTO LOCAL STREETS DURING THE TRANSPORTATION OF EQUIPMENT. SHOULD A SPILL OCCUR, THE CONTRACTOR SHALL REMOVE THE MATERIAL BY THE END OF THE WORK DAY. NO MATERIAL SHALL BE ALLOWED TO SET, DRY, OR BE WASHED INTO ADJACENT STORM WATER FACILITIES.

9. GEOTEXTILE FABRIC IS TO BE PLACED ON THE RIMS OF DRYWELLS, CATCH BASINS, AND INLETS UNTIL SUCH TIME AS THE VEGETATION ON THE SITE IS ESTABLISHED AND THE THREAT OF SEDIMENT DEPOSITION INTO THE DRAINAGE SYSTEM IS MITIGATED.

10. THE CONTRACTOR SHALL PROTECT ALL CATCH BASINS, DRYWELLS, AND OTHER STORM WATER STRUCTURES FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC OVER THE METAL FRAME DURING CONSTRUCTION AND KEEPING IT IN PLACE UNTIL THE SITE/STREET HAS BEEN PAVED AND CLEANED.

11. ALL PONDS/SWALES SHALL BE SODDED AND IRRIGATED.

12. CONTRACTOR SHALL INSTALL FILTER FABRIC FENCE AS NEEDED ON-SITE TO PREVENT SEDIMENTS FROM LEAVING THE SITE.

13. CONTRACTOR IS RESPONSIBLE FOR DESIGNING A LOCATION WHERE CONCRETE TRUCKS AND EQUIPMENT CAN BE WASHED OUT. WASHOUT AREA SHALL NOT BE LOCATED NEAR OR DRAIN INTO A STORM DRAINAGE AREA, TREATMENT AREA, OR FACILITY.

EROSION CONTROL MAINTENANCE NOTES:

1. SEDIMENT BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL PRODUCING RUNOFF AND AT LEAST DAILY DURING PROLONGED RAINFALL OF 24 CONTINUOUS HOURS OR 48 HOURS IN ANY ONE WEEK.

2. NECESSARY REPAIRS TO BARRIERS OR REPLACEMENT OF BARRIERS SHALL BE ACCOMPLISHED PROMPTLY.

3. SEDIMENT MUST BE REMOVED WHEN IT REACHES A HEIGHT OF 6 INCHES UP THE BASE OF THE FILTER FABRIC BARRIER, THE DEPTH OF THE CUTOFF DITCH, OR THE SEDIMENT POND. ALL EROSION CONTROL SHALL BE CHECKED AFTER ANY RAIN STORM.

4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE ESC STRUCTURE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED, AND HYDRO/HAND SEEDED OR SODDED.

5. ALL TEMPORARY AND PERMANENT ESC PRACTICES SHALL BE MAINTAINED AND PREPARED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.

6. ALL TEMPORARY ESC MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON-SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL WITHOUT PERMISSION OF THE ENGINEER OR INSPECTOR THAT RESULTS IN CONTAMINATION OF THE DRYWELLS SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO REMEDY. REMEDY MAY ENTAIL DRYWELL CLEANING OR REMOVAL AND RECONSTRUCTION.

GRADING NOTES:

1. EXCAVATION AND EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL REPORTS FOR THIS PROJECT AND ALL APPLICABLE REQUIREMENTS OF THE THE CITY OF SPOKANE STANDARD SPECIFICATIONS AND THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION). ALL COMPACTION OF SUBGRADES, ROCK, AND ASPHALT SHALL BE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD SPECIFICATIONS AND THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION) AND THE GEOTECH REPORT.

2. ALL FINISHED GRADING ELEVATIONS SHALL MATCH EXISTING ELEVATIONS AT THE SITE'S BOUNDARY, EXCEPT AS SHOWN OTHERWISE ON THE GRADING PLAN. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING.

3. EARTHWORK QUANTITIES HAVE NOT BEEN CALCULATED TO DETERMINE ESTIMATED VOLUMES OF EXCAVATION AND EMBANKMENT ON THIS PROJECT. CONTRACTOR IS RESPONSIBLE FOR CALCULATING THEIR OWN EARTHWORK QUANTITIES.

4. GRADING: ALL GRADING SHALL BE LIMITED TO THE AREAS IDENTIFIED IN THE GRADING PLAN AND SHALL NOT INFRINGE ON ADJACENT OWNERSHIPS.

5. CUT SLOPES IN SOLID ROCK SHALL NOT EXCEED 0.5H:1V (HORIZONTAL:VERTICAL), AND SOIL CUT SLOPES SHALL NOT EXCEED 2H:1V, EXCEPT AS SHOWN OTHERWISE ON THE PLANS. TEMPORARY SOIL CUT SLOPES SHALL NOT EXCEED 2H:1V.

6. FILL SLOPES ACROSS THE PROPERTY SHOULD BE DESIGNED FOR A MAXIMUM SLOPE OF 2H:1V, EXCEPT AS SHOWN OTHERWISE ON THE PLANS.

7. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL REPORTS BY ASPECT CONSULTING, LLC. (OCTOBER 25, 2019), FOR EXISTING SOIL CONDITIONS AND EARTHWORK RECOMMENDATIONS.

PAVING NOTES:

1. ALL CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD DRAWINGS AND SPECIFICATIONS, WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION), AND THE GEOTECHNICAL REPORTS BY ASPECT CONSULTING, LLC. (OCTOBER 25, 2019).

2. CONTRACTOR SHALL CONTACT ALL APPROPRIATE UTILITY COMPANIES AND THE CITY OF SPOKANE TO OBTAIN NECESSARY LOCATES 48 HOURS BEFORE CONSTRUCTION BEGINS.

3. NO VARIANCE FROM THE SPECIFICATIONS AND NOTES SHALL BE ACCEPTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE CITY OF SPOKANE.

4. CONCRETE, AGGREGATE BASE, AND ASPHALT MIX DESIGN SHALL BE SUBMITTED BY THE SUPPLIER AND APPROVED IN WRITING BY THE ENGINEER OF RECORD PRIOR TO ANY ROAD OR PARKING LOT CONSTRUCTION. MATERIALS SHALL BE IN CONFORMANCE WITH THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT.

5. REMOVAL OF EXISTING PAVEMENT MARKINGS SHALL BE ACCOMPLISHED BY A METHOD THAT DOES NOT MATERIALLY DAMAGE THE SURFACE OR TEXTURE OF THE PAVEMENT OR SURFACING. THE PAVEMENT MARKINGS SHALL BE REMOVED TO THE EXTENT THAT THEY WILL NOT BE VISIBLE UNDER DAY OR NIGHT CONDITIONS.

6. ALL EXISTING PAVEMENT SHALL BE REMOVED IN THE SECTIONS REQUIRING REMOVAL AND REPLACEMENT. THE EXISTING BASE COURSE MATERIALS IN THESE SECTIONS SHALL BE COMPACTED TO A MINIMUM OF 95% OF MODIFIED PROCTOR DRY DENSITY AT OPTIMUM MOISTURE CONTENT. ALL COMPACTION SHALL BE DONE IN ACCORDANCE WITH ASTM D-1557. THE NEW PAVEMENT SHALL BE REPLACED TO A DEPTH OF THE PAVEMENT DETAIL SHOWN ON THESE PLANS.

7. ASPHALT/CONCRETE PAVING SHALL CONFORM TO WSDOT STANDARD SPECIFICATIONS (LATEST EDITION) DIVISION 9, HMA CLASS 1/2". ASPHALT PAVED AREAS SHALL BE ASPHALT/CONCRETE PAVEMENT PLACED OVER A FREE-DRAINING, COMPACT, GRANULAR BASE MATERIAL.

8. ALL AREAS TO BE PAVED SHALL BE CLEARED OF ALL GRASS, ROOTS, TRASH, METAL AND ORGANIC MATERIALS DOWN TO FULL DEPTH BELOW THE PAVING MAT. THE EXPOSED SURFACE SHOULD THEN BE PROOF ROLLED TO 90% OF MAXIMUM COMPACTION AS DETERMINED BY ASTM D-1557 USING A MECHANICAL VIBRATORY COMPACTOR. ANY BACK FILL MATERIAL SHOULD BE SIMILARLY COMPACTED.

9. BEFORE PLACING THE BASE MATERIAL, THE SURFACE OF THE SUBGRADE SHALL BE COMPACTED AS SPECIFIED IN THE GEOTECHNICAL REPORT.

10. BITUMINOUS TACK COAT SHALL BE APPLIED BETWEEN ASPHALT PAVING LIFTS AND SHALL BE USED PRIOR TO OVERLAY, (CSS-1H), 50:50 DILUTION, 0.05 GAL/SY TO 0.15 GAL/SY OR AS DIRECTED BY THE ENGINEER. ALL EDGES ABUTTING NEW PAVEMENT SHALL BE TACKED.

11. ALL PAVEMENT SHALL BE COMPACTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. TESTS SHALL BE CONDUCTED AT 100 FOOT INTERVALS OR 1 PER 3000 SQUARE FEET FOR EACH LIFT OR AS DIRECTED BY THE ENGINEER. ALL TEST REPORTS SHALL BE SUBMITTED TO THE CITY OF SPOKANE PRIOR TO PROOF ROLLS. SINGLE-AXLE 5-TON TRUCK PROOF ROLLS MONITORED BY THE CITY OF SPOKANE PRIOR TO PLACEMENT OF ROAD/PARKING LOT BASE AND ASPHALT ARE REQUIRED. CONCRETE AND ASPHALT TESTING SHALL BE AS DIRECTED BY THE CITY OF SPOKANE'S INSPECTOR.

12. ALL VALVE AND MANHOLE COVERS SHALL BE ADJUSTED TO PAVEMENT GRADE DURING INITIAL CONSTRUCTION.

13. ALL CONCRETE EDGES MUST BE ROUNDED TO A 1/4 INCH RADIUS, EXCEPT WHERE SHOWN OTHERWISE ON DRAWINGS. ALL ASPHALT SHALL BE 1/4 INCH ABOVE CONCRETE EDGES, MANHOLES, AND VALVES.

14. ALL PHASES OF WORK SHALL BE INSPECTED AND APPROVED BY THE CITY OF SPOKANE.

15. ALL TRAFFIC CONTROL, IF REQUIRED, SHALL CONFORM TO THE APPLICABLE REGULATIONS SET FORTH IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

16. ALL THE OPERATIONS SHALL CONFORM TO THE APPLICABLE REGULATIONS SET FORTH BY ICC AND OSHA.

STORM WATER NOTES:

1. DRAINAGE PONDS SHALL BE CONSTRUCTED PER THE REQUIREMENTS OF THESE DRAWINGS INCLUDING GRADING, SOD OR SEED AS NOTED, AND CATCH BASIN INSTALLATION. NO BARK, GRAVEL OR CINDERS ARE ALLOWED IN PONDS.

2. CONTRACTOR SHALL CONTACT GEOTECHNICAL ENGINEER OF RECORD DURING SWALE AND DRYWELL CONSTRUCTION TO VERIFY SOIL CONDITIONS MEET SPOKANE REGIONAL STORM WATER MANUAL REQUIREMENTS.

3. ALL DRAINAGE PONDS WITHIN THE SCOPE OF THIS PROJECT SHALL BE COMPLETED DURING THE CONSTRUCTION OF THE PARKING AREAS. THE CONTRACTOR SHALL PERFORM THE POND GRADE WORK AND INSTALL THE IRRIGATION SYSTEM AND SOD OR HYDROSEED FOLLOWING THE ROADWAY/PARKING AREA PAVING WORK.

4. ALL DRAINAGE PONDS SHALL BE IRRIGATED BY AN AUTOMATIC IRRIGATION SYSTEM INSTALLED BY OR UNDER THE DIRECTION OF THE LANDSCAPE CONTRACTOR. THE IRRIGATION IS TO COMPLY WITH ALL LOCAL CODES AND ORDINANCES (90 DAY GUARANTEE). AN APPROVED BACKFLOW DEVICE SHALL BE INSTALLED TO PREVENT WATER FROM GOING BACK INTO THE WATER SUPPLY. SEE IRRIGATION PLAN.

5. THE FLOOR OF THE GRASSED PERCOLATION AREA (GPA) POND INCLUDES THE LEVEL PORTION OF THE FLOOR OF THE POND, AND THE SIDESLOPES OF THE POND OVERFLOW ELEVATION OR TOP OF DRYWELL. THE SOIL LOCATED IN THE FLOOR OF THE CONTAINMENT POND SHALL BE A MEDIUM TO WELL-DRAINING MATERIAL, WITH A MINIMUM INFILTRATION RATE OF 0.5 INCHES PER HOUR.

6. SLEEVING: PROVIDE SLEEVING AS REQUIRED UNDER SIDEWALKS, PATHS, CURBING, PAVING, ETC. AS NEEDED FOR IRRIGATION ACCESS. ALL SLEEVING SHALL BE 4" PVC WITH AT LEAST 12" OF COVER (1) FOOT BELOW FINISHED GRADE. THE OWNER/GENERAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING SLEEVING BEFORE CURBING, SIDEWALKS, PAVING, ETC. IS INSTALLED. PATCH ASPHALT AS NEEDED. SEE IRRIGATION PLAN.

7. ADJUSTMENT: AFTER INSTALLATION, ADJUST VALVES, HEADS, EMITTERS ETC. TO PROVIDE UNIFORM COVERAGE AND TO MINIMIZE OVERSPRAY ON WALLS, FENCES, WALKS, DRIVES, ETC.

8. POND BOTTOM ELEVATIONS SHOWN ON THESE PLANS ARE FINISHED GRADE. CONTRACTOR SHALL ROUGH GRADE ALL PONDS TO 0.2' BELOW ELEVATIONS SHOWN TO ALLOW FOR FINAL PLACEMENT OF SOD, OR ESTABLISHMENT OF PLANTINGS.

9. RIM ELEVATIONS OF DRAINAGE STRUCTURES SHALL BE INSTALLED SO THAT RIMS MAY BE ADJUSTED ±0.5 FEET TO MATCH FINISHED GRADE.

10. STORM SEWER PIPE SHALL BE PVC ASTM D 3034, SDR 35, OR ASTM F 789 WITH PUSH-ON JOINTS AND RUBBER GASKETS CONFORMING TO ASTM D 3212 AND ASTM F 477 UNLESS OTHERWISE SPECIFIED IN THESE PLANS. PROVIDE TRENCHING AND BEDDING PER CITY OF SPOKANE STANDARDS.

11. STORM WATER FACILITIES, INCLUDING DRYWELLS, CB'S, AND PIPES, MUST BE CONSTRUCTED UNDER THE SUPERVISION OF THE WASTEWATER MANAGEMENT DIVISION. STORM WATER TREATMENT FACILITIES (BIO-INFILTRATION SWALES AND BIO-RETENTION AREAS) SHALL BE INSPECTED PRIOR TO PLACEMENT OF TOPSOIL, PLANTINGS, OR GRASS. THE CONTRACTOR SHALL CONTACT THE WASTEWATER MAINTENANCE DIVISION OFFICE AT (509) 625-7905 OR (509) 625-7912 IN ORDER TO ARRANGE A MUTUALLY AGREEABLE INSPECTION SCHEDULE.

12. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO PROTECT THE INFILTRATION CAPACITY OF STORM WATER FACILITIES (E.G., LINE THE FACILITY WITH FILTER FABRIC, OVER-EXCAVATE UPON COMPLETION OF THE INFRASTRUCTURE, ETC.).

SEWER NOTES:

1. ALL SEWER CONSTRUCTION PROCEDURES AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF SPOKANE CONSTRUCTION SPECIFICATIONS.

2. ALL SIDE SEWER LINES SHALL BE 6", OR AS INDICATED ON THE PLANS.

3. ALL SEWER MAINS AND SERVICE LINES SHALL BE LOCATED TO MEET STATE SEPARATION REQUIREMENTS.

4. ANY SIDE SEWER THAT DOES NOT MAINTAIN A MINIMUM OF 18" COVER AT WATER MAIN CROSSINGS, OR WHERE THE SIDE SEWER MUST CROSS ABOVE THE WATER, SHALL BE SLEEVED WITH A CONTINUOUS 20' SECTION OF C900 PVC WATER PIPE CENTERED ON THE CROSSING.

5. SANITARY SEWER PIPE SHALL BE PVC ASTM D 3034, SDR 35, OR ASTM F 789 WITH PUSH-ON JOINTS AND RUBBER GASKETS CONFORMING TO ASTM D 3212 AND ASTM F 477. PROVIDE TRENCHING AND BEDDING PER CITY OF SPOKANE STANDARDS.

6. PRECAST MANHOLES SHALL MEET THE REQUIREMENTS OF ASTM C 478. MANHOLES SHALL BE TYPE 1-48" UNLESS OTHERWISE SPECIFIED ON THE PLANS. JOINTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C 443 AND SHALL BE GROUTED FROM THE INSIDE. LIFT HOLES SHALL BE GROUTED FROM THE INSIDE AND OUTSIDE.

7. SIDE SEWER SERVICES SHALL BE PVC, ASTM D 3034 SDR 35 WITH FLEXIBLE GASKETED JOINTS. SIDE SEWER CONNECTIONS SHALL BE MADE BY A TAP ON AN EXISTING MAIN OR WYE BRANCH FROM A NEW MAIN CONNECTED ABOVE THE SPRINGLINE OF THE PIPE.

8. ALL SEWER MAINS SHALL BE FIELD STAKED FOR GRADES AND ALIGNMENT BY A LICENSED ENGINEERING OR SURVEYING FIRM QUALIFIED TO PERFORM SUCH WORK.

9. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD CONSTRUCTION SPECIFICATIONS. ALL WATER AND SEWER MAINS AND LINES SHALL MEET STATE SEPARATION REQUIREMENTS.

10. ALL SEWER PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE FINAL GROUND SURFACE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING MARKED SANITARY SEWER, THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL.

11. UTILITY SEPARATIONS, INCLUDING WATER AND SEWER OR STORM CROSSINGS, SHALL BE IN ACCORDANCE WITH CITY OF SPOKANE STANDARD PLANS W-110, W-111, AND W-112 OR W-113.

12. PIPE BEDDING SHALL BE IN ACCORDANCE WITH DETAIL 6/C9.1 AND THE GEOTECHNICAL REPORT.

13. ALL SEWER WORK MUST BE DONE UNDER THE SUPERVISION AND INSPECTION OF THE WASTEWATER MANAGEMENT DIVISION. THE CONTRACTOR MUST CONTACT WASTEWATER MANAGEMENT MAINTENANCE DIVISION OFFICE IN ORDER TO ARRANGE A MUTUALLY AGREEABLE INSPECTION SCHEDULE. ALL FACILITIES MUST BE UNCOVERED AT THE TIME OF INSPECTION.

14. ALL SIDE SEWER CONNECTIONS SHALL BE INSTALLED PER CITY OF SPOKANE REQUIREMENTS.

WATER NOTES:

1. WATER LINES 4" AND LARGER SHALL BE DUCTILE IRON, CLASS 350 (AWWA C151 APPROVED) WITH RESTRAINED JOINTS AND CEMENT MORTAR LINING PER AWWA C104. FITTINGS SHALL BE AWWA C110 OR C153 DUCTILE IRON WITH MECHANICAL JOINTS.

2. WATERLINES SHALL BE INSTALLED WITH BOTTOM OF PIPE ELEVATIONS 5.5' BELOW FINISHED GRADE UNLESS OTHERWISE NOTED. PROVIDE TRENCHING AND BEDDING PER STANDARD SPECIFICATIONS. PIPE DEPTH SHALL BE MAINTAINED THROUGH SWALE SYSTEMS.

3. GATE VALVES 3" AND LARGER, SHALL BE RESILIENT SEATED, NON-RISING STEM O-RING SEALS. VALVE ENDS SHALL BE MECHANICAL JOINT OR ANSI FLANGES. VALVES SHALL CONFORM TO AWWA C509. PROVIDE CAST IRON TWO PIECE SLIDING COVERS FOR ALL VALVES. GATE VALVES SHALL BE RIGHT-TURN OPEN PER CITY OF SPOKANE STANDARD SPECIFICATIONS.

4. HYDRANTS SHALL CONFORM TO AWWA STANDARD C502-94 AND THE CITY OF SPOKANE SUPPLEMENTAL SPECIFICATIONS. ALL HYDRANTS SHALL BE BAGGED UNTIL SYSTEM IS APPROVED.

5. ALL PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE FINAL GROUND SURFACE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING MARKED WATER, THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL.

6. ALL WATER MAINS SHALL BE STAKED FOR GRADES AND ALIGNMENT BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK.

7. WHERE CONNECTIONS REQUIRE "FIELD VERIFICATION," CONNECTION POINTS SHALL BE EXPOSED BY THE CONTRACTOR AND FITTINGS VERIFIED 48 HOURS PRIOR TO DISTRIBUTION OF SHUT-DOWN NOTICES.

8. AT ANY CONNECTION TO AN EXISTING LINE WHERE A NEW VALVE IS NOT INSTALLED, THE EXISTING VALVE MUST BE PRESSURE TESTED PRIOR TO CONNECTION. IF AN EXISTING VALVE FAILS TO PASS THE TEST, THE CONTRACTOR SHALL MAKE THE NECESSARY PROVISIONS TO TEST THE NEW LINE PRIOR TO CONNECTION TO THE EXISTING SYSTEM OR INSTALL A NEW VALVE.

9. WHEN FIRE FLOW WILL BE INTERRUPTED, THE CITY OF SPOKANE FIRE DEPARTMENT SHALL BE GIVEN 24 HOURS NOTICE OF TIME AND LOCATIONS AFFECTED.

10. AFTER THE WATER LINES ARE CONSTRUCTED, TESTED, AND APPROVED, THE OWNER MAY APPLY FOR A WATER METER.

11. DEFLECTIONS AT PIPE JOINTS SHALL NOT EXCEED 75% OF MAXIMUM ALLOWED DEFLECTION, PER MANUFACTURER'S RECOMMENDATIONS.

12. THE CITY OF SPOKANE WATER DEPARTMENT WILL MAKE CONNECTIONS AND DISCONNECTIONS TO EXISTING WATER MAINS. CONTRACTOR SHALL PROVIDE ALL MATERIALS FOR CONNECTION, PAY ALL FEES, FURNISH ALL MATERIALS, AND INSTALL WATER LINES FROM CONNECTION POINT THROUGH DOUBLE CHECK VALVE ASSEMBLY (INCLUDING THE VAULT). CONTRACTOR SHALL FURNISH ALL MATERIALS, EXCAVATION, AND BACKFILL. SEE CITY OF SPOKANE STANDARD SPECIFICATIONS.

13. PIPE RESTRAINMENT SHALL BE INSTALLED AT ALL BENDS (VERTICAL AND HORIZONTAL), TEES, CROSSES, PLUGS, AND VALVES. THE RESTRAINMENT SHALL BE IN THE FORM OF ACCEPTABLE MANUFACTURED MECHANICAL RESTRAINT JOINTS, IN ACCORDANCE WITH CITY OF SPOKANE DESIGN STANDARDS, TABLE 8-A.

14. LOCATION OF EXISTING WATER MAINS AND SERVICES SHOWN ARE APPROXIMATE AND ARE BASED ON INFORMATION PROVIDED BY THE CITY OF SPOKANE. CONTRACTOR SHALL VERIFY ALL LOCATIONS PRIOR TO CONSTRUCTION.

15. NEW WATER LINES 2" AND LARGER SHALL BE PRESSURE TESTED AT NO LESS THAN 175 PSI (FIRE LINES NO LESS THAN 200 PSI) FOR A MINIMUM OF THREE (3) HOURS IN ACCORDANCE WITH CITY OF SPOKANE STANDARD CONSTRUCTION SPECIFICATIONS.

16. WATER SERVICES SHALL BE INSTALLED ABOVE THE BOTTOM OF FOOTING ELEVATIONS.

17. ALL UNDERGROUND FIRE LINES, OR FIRE SUPPRESSION SYSTEMS THAT ARE SEPARATED OR PROTECTED FROM THE POTABLE WATER SYSTEM, REQUIRE A STATE LEVEL III OR "U" LICENSED CONTRACTOR FOR INSTALLATION.

UTILITY NOTES:

1. CONTRACTOR SHALL COORDINATE WITH AVISTA UTILITIES FOR ALL NATURAL GAS AND/OR POWER SERVICE WORK ON THE PROJECT SITE.

2. CONTRACTOR SHALL COORDINATE WITH CENTURYLINK, COMCAST, LEVEL 3, AND ZAYO COMMUNICATIONS FOR ALL TELEPHONE SERVICE WORK ON THE PROJECT SITE.

3. RIM ELEVATIONS OF UTILITY STRUCTURES SHALL BE INSTALLED SO THAT RIM MAY BE ADJUSTED ±0.5 FEET TO MATCH FINISHED GRADES.

CONTRACTOR NOTE

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CIVIL / STRUCTURAL

BUILDING 1B

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
4	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GENERAL NOTES

C-001

REFERENCE NOTES:

1. NO EXCAVATION EXCEPT FOR MINOR CLEARING AND GRUBBING SHALL TAKE PLACE WITHIN WSDOT BRIDGE PIER FOOTING RIGHT-OF-WAY
2. REMOVE EXISTING SIGN AND RETURN TO PROPERTY OWNER
3. REMOVE EXISTING GATE AND RETURN TO PROPERTY OWNER
4. RETAIN AND PROTECT EXISTING SANITARY SEWER
5. RETAIN AND PROTECT EXISTING STORM DRAIN
6. RETAIN AND PROTECT EXISTING DRY UTILITIES
7. RETAIN AND PROTECT EXISTING MONITORING WELLS
8. REMOVE EXISTING POWER POLE. COORDINATE WITH AVISTA UTILITIES.
9. RETAIN AND PROTECT EXISTING TRAIL.
10. DEMOLISH AND REMOVE EXISTING TRAIL.
11. REMOVE EXISTING BOLLARDS AND RETURN TO PROPERTY OWNER.
12. RETAIN AND PROTECT EXISTING FIRE HYDRANT.
13. RETAIN AND PROTECT EXISTING IRRIGATION BOXES.
14. EXISTING SIGN TO BE RELOCATED.
15. DEMOLISH AND REMOVE EXISTING ROCK RETAINING WALL.
16. RETAIN AND PROTECT EXISTING SIDEWALK.
17. RETAIN AND PROTECT EXISTING SWALE.
18. DEMOLISH AND REMOVE EXISTING SWALE.
19. RETAIN AND PROTECT EXISTING DRIVEWAY.
20. DEMOLISH AND REMOVE EXISTING DRIVEWAY.

120' BRIDGE AIRSPACE EASEMENT

28+00

JAMES KEEFE BRIDGE

STA: 26+97.01
OFFSET: 0.00 L

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

26+00

24+00

22+00

E. MARTIN LUTHER KING JR. WAY

RIM=1884.35'
60"I.E.(FLOW)=1863.45'

RIM=1884.54'
NO FLOW;
FULL OF WATER

RIM=1885.89

RIM(N)=1883.59'
RIM(S)=1883.80'
60"I.E.(FLOW)=1862.60'

BOTTOM OF BEAM ELEVATION=1913.61'

TOP OF SIGN ELEVATION=1954.25'

BEAM

GATE

HAMILTON STREET OVERHEAD BRIDGE

ERIE STREET (VACATED)

RIM=1884.06'

RIM=1884.07'

RIM=1884.17'

RIM=1883.

RIM=1885.77'

RIM=1886.75'

RIM=1887.82'

ERIE AVENUE

ON-SITE TBM:
SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE
ELEVATION = 1886.14' (NAVD88)

RIM=1894.22'

RIM=1893.56'

RIM=1891.43'

RIM=1891.30'

RIM=1891.42'

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

CONTRACTOR NOTE

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SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

PROJ. NO.	2018-050
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CHECKED	MRG
DATE	2/5/21

EXISTING SITE CONDITIONS & DEMOLITION PLAN

C-100

REFERENCE NOTES:

1. PROVIDE NEW CONSTRUCTION ENTRANCE AND CONCRETE WASHOUT AREA PER DETAIL 1/C-500.
2. PROVIDE TEMPORARY FILTER FABRIC FENCE PER DETAIL 2/C-500.
3. PLACE STEEL PLATES ON TOP OF DRAINAGE STRUCTURES AND BURY UNTIL TIME OF FINAL GRADING AND/OR PAVING, WHEN FRAMES AND GRATES CAN BE INSTALLED AND SET TO FINISHED GRADE.
4. PROVIDE NEW STRAW WATTLES PER DETAIL 5/C-500.

ENGINEER'S NOTES:

1. EROSION CONTROL MEASURES SHOWN ON THE PLAN ARE MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL INSTALL ADDITIONAL MEASURES, AS NEEDED, TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE OR FROM COMPROMISING THE PROPOSED/EXISTING STORM WATER FACILITIES.
2. SEE SHEET C-001 FOR ADDITIONAL ESC NOTES.
3. CONTRACTOR SHALL CONSTRUCT EROSION CONTROL FACILITIES BEFORE GRADING COMMENCES.
4. CONTRACTOR IS RESPONSIBLE FOR DESIGNATING A LOCATION WHERE CONCRETE TRUCKS OR EQUIPMENT CAN BE WASHED OUT. THIS AREA SHALL NOT BE LOCATED NEAR OR DRAINING INTO A STORM DRAINAGE AREA, TREATMENT AREA, DRAINAGE STRUCTURE OR OTHER STORM WATER FACILITIES EXISTING OR OTHERWISE.

CONTAMINATED SOILS EXPOSURE:

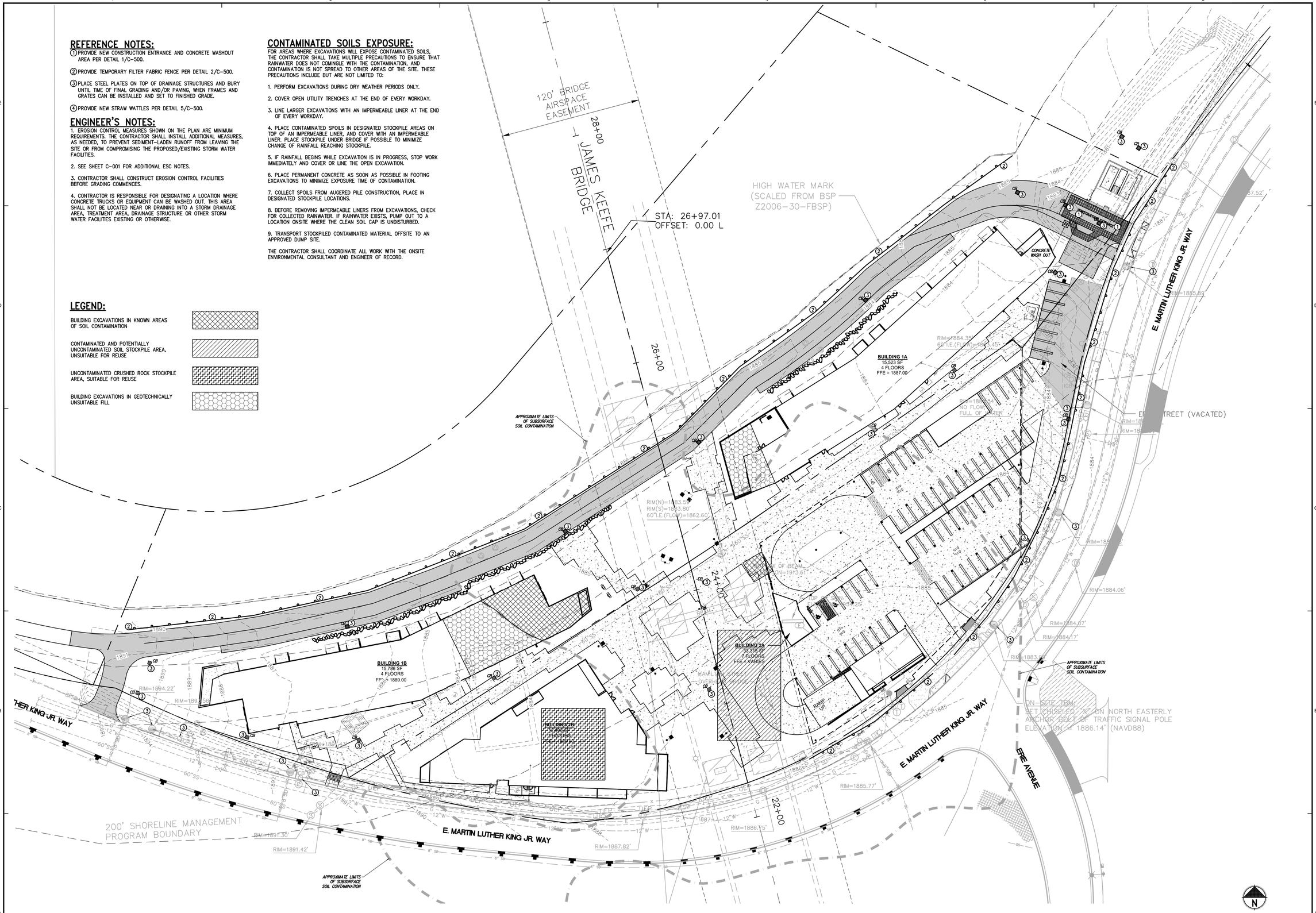
FOR AREAS WHERE EXCAVATIONS WILL EXPOSE CONTAMINATED SOILS, THE CONTRACTOR SHALL TAKE MULTIPLE PRECAUTIONS TO ENSURE THAT RAINWATER DOES NOT COMINGLE WITH THE CONTAMINATION, AND CONTAMINATION IS NOT SPREAD TO OTHER AREAS OF THE SITE. THESE PRECAUTIONS INCLUDE BUT ARE NOT LIMITED TO:

1. PERFORM EXCAVATIONS DURING DRY WEATHER PERIODS ONLY.
2. COVER OPEN UTILITY TRENCHES AT THE END OF EVERY WORKDAY.
3. LINE LARGER EXCAVATIONS WITH AN IMPERMEABLE LINER AT THE END OF EVERY WORKDAY.
4. PLACE CONTAMINATED SPOILS IN DESIGNATED STOCKPILE AREAS ON TOP OF AN IMPERMEABLE LINER, AND COVER WITH AN IMPERMEABLE LINER. PLACE STOCKPILE UNDER BRIDGE IF POSSIBLE TO MINIMIZE CHANGE OF RAINFALL REACHING STOCKPILE.
5. IF RAINFALL BEGINS WHILE EXCAVATION IS IN PROGRESS, STOP WORK IMMEDIATELY AND COVER OR LINE THE OPEN EXCAVATION.
6. PLACE PERMANENT CONCRETE AS SOON AS POSSIBLE IN FOOTING EXCAVATIONS TO MINIMIZE EXPOSURE TIME OF CONTAMINATION.
7. COLLECT SPOILS FROM AUGERED PILE CONSTRUCTION, PLACE IN DESIGNATED STOCKPILE LOCATIONS.
8. BEFORE REMOVING IMPERMEABLE LINERS FROM EXCAVATIONS, CHECK FOR COLLECTED RAINWATER. IF RAINWATER EXISTS, PUMP OUT TO A LOCATION ONSITE WHERE THE CLEAN SOIL CAP IS UNDISTURBED.
9. TRANSPORT STOCKPILED CONTAMINATED MATERIAL OFFSITE TO AN APPROVED DUMP SITE.

THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE ONSITE ENVIRONMENTAL CONSULTANT AND ENGINEER OF RECORD.

LEGEND:

- BUILDING EXCAVATIONS IN KNOWN AREAS OF SOIL CONTAMINATION
- CONTAMINATED AND POTENTIALLY UNCONTAMINATED SOIL STOCKPILE AREA, UNSUITABLE FOR REUSE
- UNCONTAMINATED CRUSHED ROCK STOCKPILE AREA, SUITABLE FOR REUSE
- BUILDING EXCAVATIONS IN GEOTECHNICALLY UNSUITABLE FILL



CONTRACTOR NOTE

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GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

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SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
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PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

EROSION CONTROL PLAN

C-110

REFERENCE NOTES:

(1) PROVIDE ADA PAVEMENT MARKINGS AND SIGNAGE PER CITY OF S SPOKANE STANDARD PLANS G-54 AND G-80A. SEE DETAIL 1/C-501.

SITE DATA:

SITE ADDRESSES: 111, 115, 119, 225, 229 N ERIE STREET
PARCEL NOS. 35174.0601-0608

PRIMARY CONTACT: RUSTIN HALL - ALSC ARCHITECTS
203 N WASHINGTON, SUITE 400
SPOKANE, WA 99201
(509) 838-8568
rhall@alscarchitects.com

PROPERTY OWNER:SAGAMORE SPOKANE QOZP, LLC
1 EAST CAMELBACK ROAD, SUITE 200
PHOENIX, AZ 85012
(602) 549-4021
rhayes@bridgestonecap.com

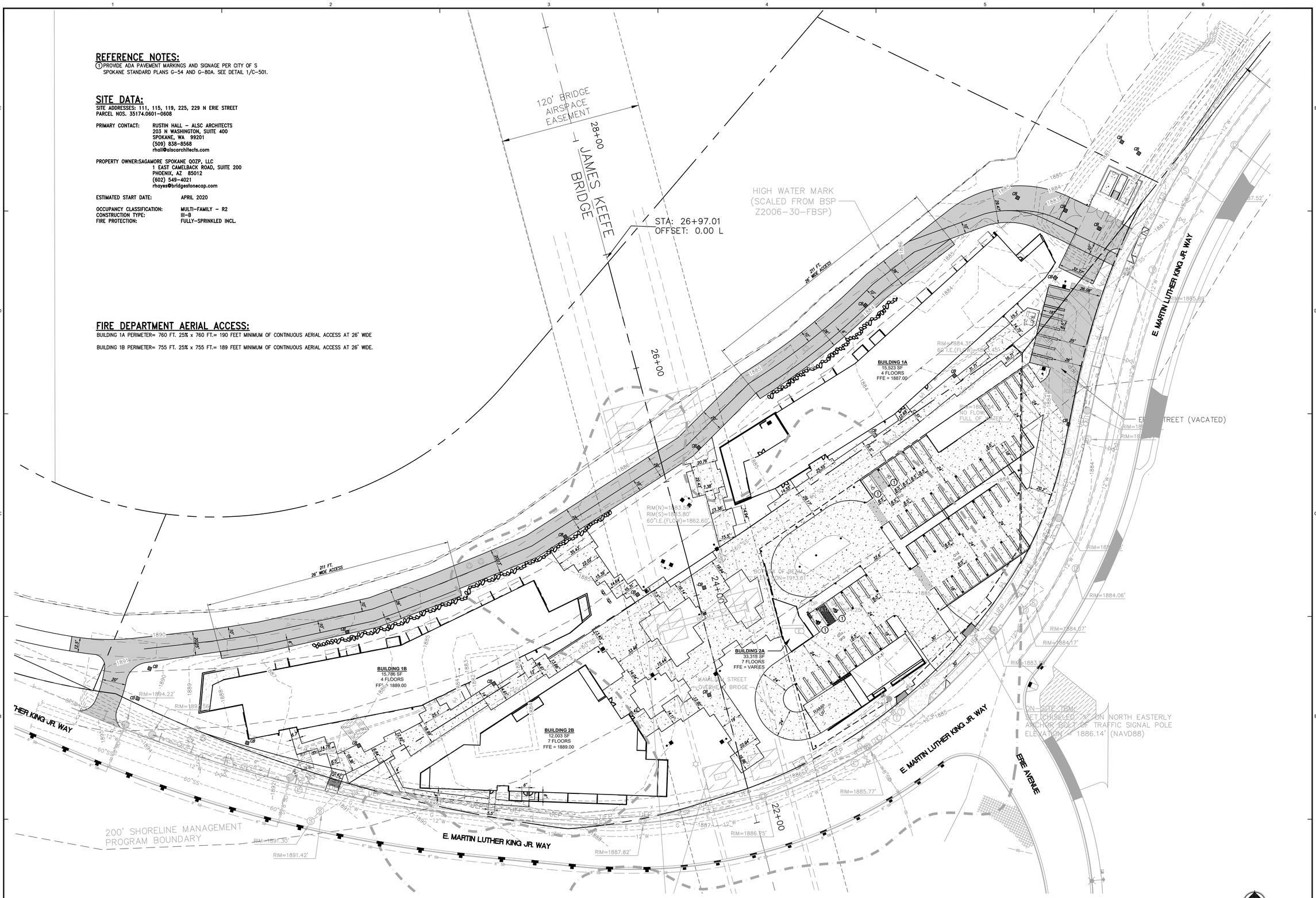
ESTIMATED START DATE: APRIL 2020

OCCUPANCY CLASSIFICATION: MULTI-FAMILY - R2
CONSTRUCTION TYPE: III-B
FIRE PROTECTION: FULLY-SPRINKLED INCL.

FIRE DEPARTMENT AERIAL ACCESS:

BUILDING 1A PERIMETER= 760 FT. 25% x 760 FT.= 190 FEET MINIMUM OF CONTINUOUS AERIAL ACCESS AT 26' WIDE

BUILDING 1B PERIMETER= 755 FT. 25% x 755 FT.= 189 FEET MINIMUM OF CONTINUOUS AERIAL ACCESS AT 26' WIDE.



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GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

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DATE	2/5/21

CIVIL SITE PLAN

C-120

REFERENCE NOTES:

1. PROVIDE NEW STANDARD DUTY ASPHALT PAVEMENT (3" AC ON 6" BASE). SEE DETAIL 5/C-500.
2. PROVIDE NEW CONCRETE CURB PER CITY OF SPOKANE STANDARD PLAN F-106.
3. PROVIDE NEW HEAVY DUTY ASPHALT PAVEMENT (4" AC ON 8" BASE). SEE DETAIL 5/C-500.
4. PROVIDE NEW CONCRETE CURB AND GUTTER PER CITY OF SPOKANE STANDARD PLAN F-106.
5. PROVIDE ADA RAMP PER CITY OF SPOKANE STANDARD PLAN F-102D.
6. PROVIDE CONCRETE SIDEWALK PER DETAIL 4/C-500.
7. PROVIDE CONCRETE TRASH ENCLOSURE PAD PER DETAIL 6/C-500. SEE ARCHITECTURAL PLANS.
8. PROVIDE NEW CONCRETE DRIVEWAY PER CITY OF SPOKANE STANDARD PLAN F-103. SEE DETAIL 2/C-501.
9. PROVIDE NEW CONCRETE SLAB. SEE STRUCTURAL PLANS.
10. PROVIDE 18" WIDE CONCRETE PASS-THROUGH TO FACILITATE DRAINAGE.
11. PROVIDE NEW ROCK RETAINING WALL PER ELEVATIONS SHOWN. SEE LANDSCAPE PLANS.

120' BRIDGE AIRSPACE EASEMENT

JAMES KEEFE BRIDGE

28+00

26+00

24+00

22+00

STA: 26+97.01
OFFSET: 0.00 L

HIGH WATER MARK
(SCALED FROM BSP
Z2006-30-FBSP)

BUILDING 1A
15,523 SF
4 FLOORS
FFE = 1887.00

BUILDING 1B
15,786 SF
4 FLOORS
FFE = 1889.00

BUILDING 2A
33,318 SF
7 FLOORS
FFE = VARIES

BUILDING 2B
12,003 SF
7 FLOORS
FFE = 1889.00

E. MARTIN LUTHER KING JR WAY

ERIE STREET (VACATED)

ERIE AVENUE

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

ON-SITE TBM:
SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE
ELEVATION = 1886.14' (NAVD88)

GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

CONTRACTOR NOTE

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PHONE: (509) 455-4448 • FAX: (509) 455-7492
WEBSITE: www.dci-engineers.com
CIVIL / STRUCTURAL

BUILDING 1B

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GRADING PLAN

C-130

REFERENCE NOTES:

1. PROVIDE INFILTRATION SWALE PER SPOKANE REGIONAL STORM WATER MANUAL REQUIREMENTS AND CITY OF SPOKANE STANDARD PLAN B-102F.
2. PROVIDE NEW 44'x44'x3' DEEP UNDERGROUND INFILTRATION GALLERY PER DETAIL 4/C-501.
3. PROVIDE 8" SDR35 PVC STORM DRAIN PIPE.
4. PROVIDE TYPE 1 CATCH BASIN PER CITY OF SPOKANE STANDARD PLAN B-101c. SEE DETAIL 3/C-501.
5. PROVIDE 6" SDR35 PVC STORM DRAIN PIPE.
6. PROVIDE RIP-RAP PAD FOR ENERGY DISSIPATION PER DETAIL 11/C5.0.
7. PROVIDE NEW CLEANOUT TO GRADE.
8. CONNECT TO BUILDING ROOF DRAIN. SEE PLUMBING PLANS.
9. PROPOSED FLOOR DRAIN. SEE PLUMBING PLAN.
10. PROVIDE NEW 15" SDR35 PVC PERFORATED PIPE
11. PROVIDE NEW 30'x115'x2' DEEP UNDERGROUND INFILTRATION GALLERY PER DETAIL 5/C-501.
12. PROVIDE NEW 12" SDR35 PVC STORM DRAIN PIPE.
13. PROVIDE NEW 15" SDR35 PVC STORM DRAIN PIPE.
14. PROVIDE NEW 12" SDR35 PVC PERFORATED PIPE.
15. PROVIDE NEW 8" DUCTILE IRON STORM DRAIN PIPE.

120' BRIDGE AIRSPACE EASEMENT

JAMES KEEFE BRIDGE

28+00

STA: 26+97.01
OFFSET: 0.00 L

26+00

24+00

22+00

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

110 LF 15" PERFORATED PIPE S= 0.00%

SWALE "A" BOTTOM ELEV.= 1881.00

RIM= 1881.50 I.E.= 1878.50

15 LF 15" PERFORATED PIPE S= 0.00%

RIM= 1881.50 15" I.E.= 1878.50

I.E.= 1881.00

75'± LF 15" SD LINE S= 0.50%

RIM= 1886.00 15" I.E.(N)= 1878.88 12" I.E.(W)= 1878.98 12" I.E.(S)= 1878.98

45'± LF 12" SD LINE S= 0.50%

RIM= 1885.00 12" I.E.(E)= 1879.10 12" I.E.(W)= 1879.20

160'± LF 12" SD LINE S= 0.50%

RIM= 1884.00 12" I.E.(E)= 1880.00 8" I.E.(W)= 1880.10

55'± LF 12" SD LINE RIM= 1886.50 12" I.E.(E)= 1881.15 12" I.E.(W)= 1881.25

125'± LF 12" SD LINE

RIM= 1886.50 12" I.E.(E)= 1881.98 8" I.E.(W)= 1882.08

180'± LF 8" SD LINE S= 0.50%

RIM= 1886.00 8" I.E.(E)= 1881.00 8" I.E.(W)= 1881.10

85'± LF 8" SD LINE

RIM= 1886.50 8" I.E.(E)= 1882.50 8" I.E.(W)= 1882.50

60'± LF 8" SD LINE S= 0.50%

135'± LF 8" SD LINE S= 0.50%

RIM= 1885.00 8" I.E.(E)= 1881.78 8" I.E.(W)= 1881.88

190'± LF 8" SD LINE S= 0.50%

RIM= 1887.00 8" I.E.(E)= 1882.83

60'± LF 8" SD LINE S= 0.50%

RIM= 1886.10 8" I.E.(W)= 1884.30 8" I.E.(S)= 1884.40

95'± LF 8" SD LINE S= 0.50%

RIM= 1886.10 8" I.E.(W)= 1883.95 8" I.E.(E)= 1884.05

145'± LF 8" SD LINE S= 0.50%

RIM= 1888.40 12" I.E.(W)= 1883.15 8" I.E.(E)= 1883.25

RIM= 1888.50 8" I.E.(W)= 1886.13 8" I.E.(E)= 1886.23

44 LF 12" PERFORATED PIPE S= 0.00%

RIM= 1888.00 12" I.E.= 1881.35

RIM= 1888.50 12" I.E.(W)= 1881.85 12" I.E.(E)= 1881.95

90'± LF 12" SD LINE S= 0.50%

125'± LF 12" SD LINE S= 0.50%

100'± LF 12" SD LINE S= 0.50%

RIM= 1888.00 12" I.E.= 1881.35

RIM= 1888.50 12" I.E.(W)= 1882.40 12" I.E.(E)= 1882.50

RIM= 1886.60 8" I.E.(N)= 1884.95

163'± LF 8" SD LINE S= 0.50%

RIM= 1886.00 8" I.E.(N)= 1881.30 8" I.E.(S)= 1881.40

RIM=1885.69

40'± LF 8" SD LINE S= 0.50%

RIM= 1884.50 8" I.E.(N)= 1882.20

BUILDING 1A
15,523 SF
4 FLOORS
FFE = 1887.00

BUILDING 1B
15,786 SF
4 FLOORS
FFE = 1889.00

BUILDING 2A
33,319 SF
7 FLOORS
FFE = VARIES

BUILDING 2B
12,003 SF
7 FLOORS
FFE = 1889.00

RIM(N)=1883.55'
RIM(S)=1883.80'
60"I.E.(FLOW)=1862.60'

RIM=1884.06'

RIM=1884.07'

RIM=1884.17'

RIM=1883.82'

RIM=1885.77'

RIM=1886.75'

RIM=1887.82'

RIM=1891.42'

RIM=1891.35'

RIM=1889.

BOTTOM OF BEAM ELEVATION=1913.61'

RAMP UP STREET OVERHEAD BRIDGE

RAMP UP

ON-SITE ITEM: SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE ELEVATION = 1886.14' (NAVD88)

E. MARTIN LUTHER KING JR. WAY

ERIE AVENUE

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

CONTRACTOR NOTE

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GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

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MATTHEW R. LEWIS — STATE OF WASHINGTON — 41809 — REGISTERED PROFESSIONAL ENGINEER

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STORM WATER PLAN

C-140

REFERENCE NOTES:

(1) PROVIDE 3" HDPE CTS SDR9 200 PSI DOMESTIC WATER SERVICE WITH 12 GAUGE TRACER WIRE AND PRESSURE REDUCING VALVE. COORDINATE WITH CITY BUILDING DEPARTMENT AT TIME OF BUILDING CONSTRUCTION.

(2) PROVIDE 8" DUCTILE IRON WATER MAIN WITH 5.5' MINIMUM DEPTH TO INVERT.

(3) TIE INTO EXISTING 8" WATER MAIN. CONTRACTOR SHALL FIELD LOCATE EXISTING TAP BY POTHOLE TO SELECT FINAL POSITION FOR METER VAULT.

(4) CAP 8" WATER MAIN.

(5) PROVIDE 8'x14' WATER METER VAULT PER DETAIL 8/C-500. WILBERT PRECAST #1923 OR EQUAL, WITH 42"x42" HALLIDAY ALUMINUM HATCH.

(6) PROVIDE 6" DUCTILE IRON FIRE SERVICE. COORDINATE BACK FLOW PREVENTION WITH CITY BUILDING DEPARTMENT AT TIME OF BUILDING CONSTRUCTION.

(7) PROVIDE SANITARY SEWER MANHOLE PER CITY OF SPOKANE STANDARD PLAN Z-101.

(8) TIE INTO EXISTING SANITARY SEWER MANHOLE WITH DROP PER DETAIL 7/C-500.

(9) PROVIDE 6" SDR35 PVC SANITARY SEWER MAIN.

(10) PROVIDE POST INDICATOR VALVE PER DETAIL 10/C-500.

(11) PROVIDE 5'x8' 1000 GALLON OIL-WATER SEPARATOR, WILBERT PRECAST #16270WTBS OR APPROVED EQUAL. SEE DETAIL 1/C-501.

(12) PROVIDE NEW FIRE HYDRANT PER CITY OF SPOKANE STANDARD PLAN Y-101.

(13) ABANDON EXISTING IRRIGATION LINE.

(14) PROVIDE 6" SDR35 PVC SEWER SERVICE WITH 3.5' MINIMUM COVER. SLOPE= 2.0% MINIMUM.

(15) PROVIDE SANITARY SEWER CLEANOUT.

(16) PROVIDE 8" 45° BEND.

(17) PROVIDE NEW NATURAL GAS SERVICE. COORDINATE WITH AVISTA UTILITIES.

(18) IRRIGATION SYSTEM POINT OF CONNECTION.

(19) PROVIDE 8" GATE VALVE.

(20) PROVIDE 8" x 6" TEE.

(21) PROVIDE 6" DUCTILE IRON WATER MAIN WITH 5.5' MINIMUM DEPTH TO INVERT.

(22) PROVIDE 6" 45° BEND.

(23) PROPOSED SITE LIGHTING. SEE ELECTRICAL PLANS

(24) PROPOSED ELECTRICAL TRANSFORMERS. SEE ELECTRICAL PLANS.

(25) PROVIDE BUILDING MOUNTED FIRE DEPARTMENT CONNECTION.

(26) EXISTING FIRE HYDRANT.

(27) RELOCATE FIRE HYDRANT INTO RIGHT-OF-WAY.

(28) PROVIDE NEW UNDERGROUND ELECTRICAL SERVICE. SEE ELECTRICAL PLANS. COORDINATE WITH AVISTA UTILITIES.

(29) TIE INTO EXISTING SEWER STUB. CONTRACTOR SHALL FIELD VERIFY SIZE, DEPTH, AND SLOPE OF SANITARY SEWER STUB BEFORE STARTING CONSTRUCTION. (A)

REFERENCE NOTES:

(30) CONSTRUCT PROTECTUS METER SIGNAL 3' ABOVE GROUND NEXT TO BOLLARD, AT LOCATION SHOWN. ALL CONDUIT BENDS SHALL BE SWEEPS, NOT ELBOWS. PROVIDE AND ATTACH A 16" LONG TREATED 2X6 TO FACE OF BOLLARD JUST BELOW ITS TOP (BOARD LENGTH PARALLEL TO GROUND, FACING NEAREST STREET) TO MOUNT THE METER TRANSMITTERS. BOLLARD PER DETAIL 7/C-501.

(31) PROVIDE 6" GATE VALVE.

(32) PROVIDE 8" SDR35 PVC SANITARY SEWER LINE. LENGTH AND SLOPE PER PLAN.

(33) PROVIDE 2" HDPE WATER SERVICE STUB FOR FUTURE WATER FEATURE (A)

ENGINEER'S NOTES:

1. WATER SERVICES SHALL MEET CURRENT BACKFLOW STANDARDS PER WAC 246-290-490 AND FOLLOW CITY OF SPOKANE WATER DEPARTMENT RULES AND REGULATIONS FOR WATER SERVICE INSTALLATIONS.

2. ON-PROPERTY SITE WATER LINES SHALL BE INSPECTED BY CITY WATER PRIOR TO BACKFILL.

3. ALL WATER-SEWER CROSSINGS SHALL CONFORM TO CITY OF SPOKANE STANDARD PLAN A-5.

4. NO JOINTS IN WATER LINES ALLOWED WITHIN 5' OF FOUNDATION; COORDINATE LOCATION FOR END OF SERVICE STUB AND PIV DURING MANDATORY PRE-CONSTRUCTION MEETING WITH WATER DEPT (REQUIRED MIN. TWO WEEKS BEFORE CONSTRUCTION START).

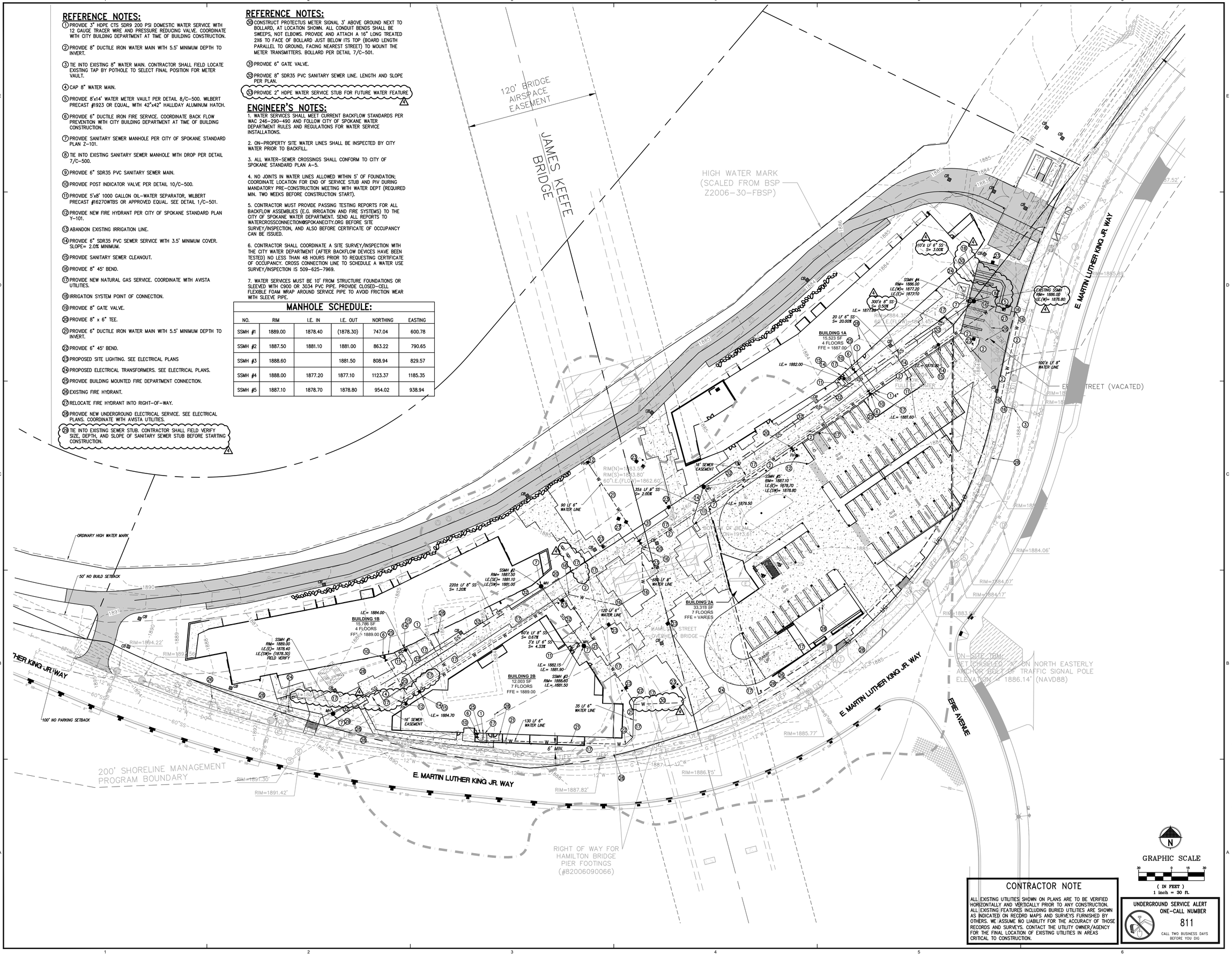
5. CONTRACTOR MUST PROVIDE PASSING TESTING REPORTS FOR ALL BACKFLOW ASSEMBLIES (E.G. IRRIGATION AND FIRE SYSTEMS) TO THE CITY OF SPOKANE WATER DEPARTMENT. SEND ALL REPORTS TO WATERCROSSCONNECTION@SPOKANECITY.ORG BEFORE SITE SURVEY/INSPECTION, AND ALSO BEFORE CERTIFICATE OF OCCUPANCY CAN BE ISSUED.

6. CONTRACTOR SHALL COORDINATE A SITE SURVEY/INSPECTION WITH THE CITY WATER DEPARTMENT (AFTER BACKFLOW DEVICES HAVE BEEN TESTED) NO LESS THAN 48 HOURS PRIOR TO REQUESTING CERTIFICATE OF OCCUPANCY. CROSS CONNECTION LINE TO SCHEDULE A WATER USE SURVEY/INSPECTION IS 509-625-7969.

7. WATER SERVICES MUST BE 10' FROM STRUCTURE FOUNDATIONS OR SLEEVED WITH C900 OR 3034 PVC PIPE. PROVIDE CLOSED-CELL FLEXIBLE FOAM WRAP AROUND SERVICE PIPE TO AVOID FRICTION WEAR WITH SLEEVE PIPE.

MANHOLE SCHEDULE:

NO.	RIM	I.E. IN	I.E. OUT	NORTHING	EASTING
SSMH #1	1889.00	1878.40	(1878.30)	747.04	600.78
SSMH #2	1887.50	1881.10	1881.00	863.22	790.65
SSMH #3	1888.60		1881.50	808.94	829.57
SSMH #4	1888.00	1877.20	1877.10	1123.37	1185.35
SSMH #5	1887.10	1878.70	1878.80	954.02	938.94



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UTILITY PLAN

GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

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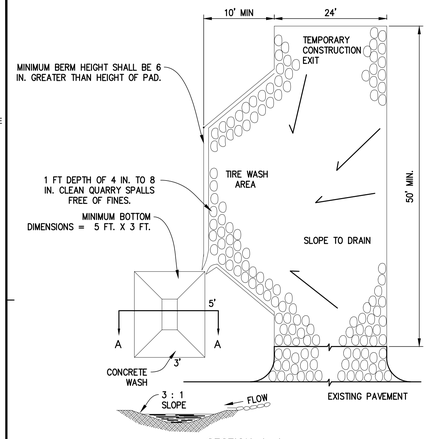
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

C-150



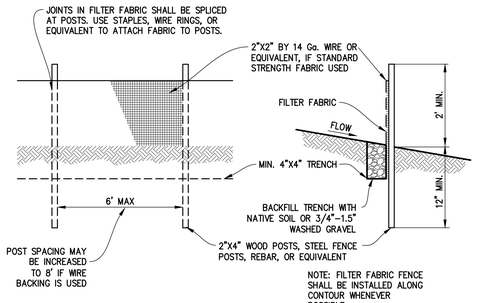
SECTION A–A

NOTES:

1. TIRE WASH AREA MUST BE INSTALLED ADJACENT TO AND DOWN GRADIENT FROM TEMPORARY CONSTRUCTION EXIT AND AS CLOSE TO EXISTING PAVEMENT AS POSSIBLE.
2. MORE TRUCK TRAFFIC MAY REQUIRE A LARGER AREA.

CONSTRUCTION ENTRANCE 1

SCALE : NTS



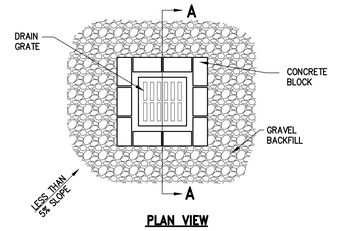
NOTE: FILTER FABRIC FENCE SHALL BE INSTALLED ALONG CONTOUR WHENEVER POSSIBLE.

MAINTENANCE STANDARDS:

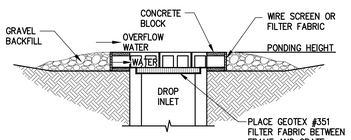
1. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.
2. IF CONCENTRATED FLOWS ARE EVIDENT UPHILL OF THE FENCE, THEY MUST BE INTERCEPTED AND CONVEYED TO A SEDIMENT TRAP OR POND.
3. IT IS IMPORTANT TO CHECK THE UPHILL SIDE OF THE FENCE FOR SIGN OF THE FENCE CLOGGING AND ACTING AS A BARRIER TO FLOW AND THEN CAUSING CHANNELIZATION OF FLOWS PARALLEL TO THE FENCE. IF THIS OCCURS, REPLACE THE FENCE AND/OR REMOVE THE TRAPPED SEDIMENT.
4. SEDIMENT MUST BE REMOVED WHEN THE SEDIMENT IS 6" HIGH.
5. IF THE FILTER FABRIC HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN, IT SHALL BE REPLACED.

FILTER FABRIC FENCE DETAIL 2

SCALE : NTS



PLAN VIEW



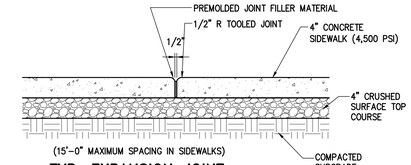
SECTION A–A

NOTES:

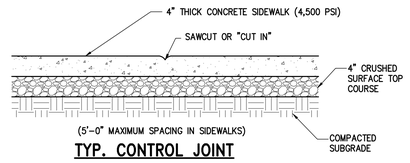
1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. EXCAVATE A BASIN OF SUFFICIENT SIZE ADJACENT TO THE DROP INLET.
3. THE TOP OF THE STRUCTURE (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BYPASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

INLET PROTECTION DETAIL 3

SCALE : NTS



TYP. EXPANSION JOINT



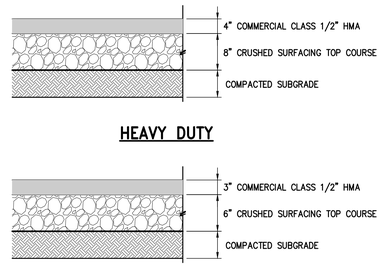
TYP. CONTROL JOINT

NOTES:

1. SUBGRADE AND 4" CRUSHED GRAVEL MUST BE PROPERLY COMPACTED TO PREVENT FUTURE DIFFERENTIAL SETTLING OF SIDEWALK.
2. SEE ARCHITECTURAL SITE PLANS FOR JOINT TYPES AND LOCATIONS IN CONCRETE SIDEWALK AREAS.

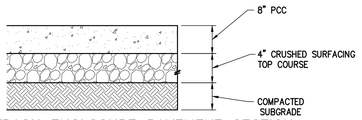
CONCRETE SIDEWALK DETAIL 4

SCALE : NTS



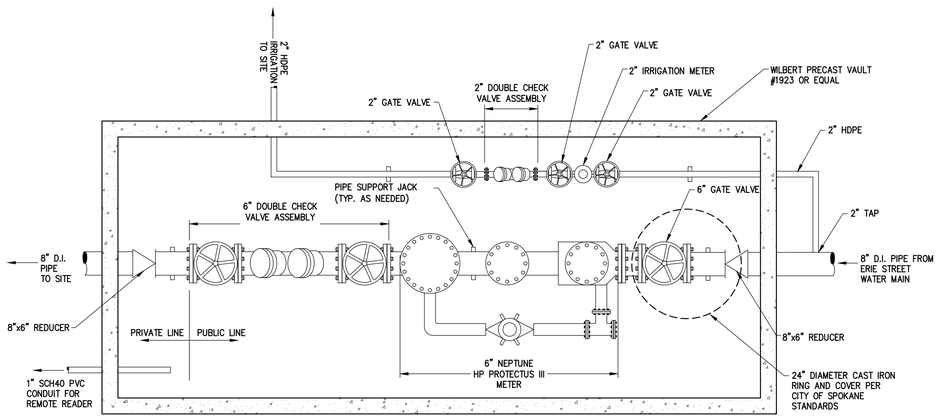
ASPHALT PAVEMENT SECTIONS 5

SCALE : NTS



TRASH ENCLOSURE PAVEMENT SECTION 6

SCALE : NTS

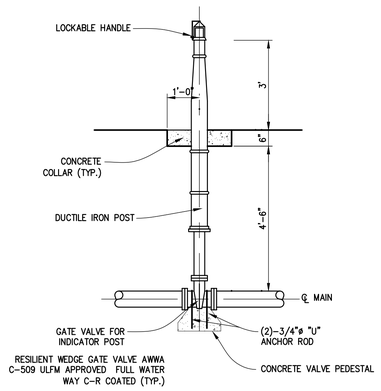


NOTES:

1. CONTRACTOR SHALL INSTALL VAULT, BACKFILL, AND COMPACT PER PROJECT SPECIFICATIONS. CITY OF SPOKANE SHALL INSTALL ALL PIPING AND APPURTENANCES.
2. ALL PIPES THROUGH WALLS AND TOP SHALL BE GROUTED AND SEALED. ALL PIPING 3" AND LARGER SHALL BE DUCTILE IRON CLASS 50.

WATER VAULT DETAIL 8

SCALE : NTS

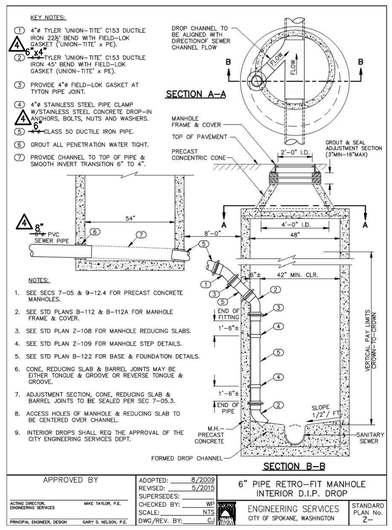


NOTE:

1. P.I.V. MUST HAVE A TAMPER SWITCH WITH 1" SCH40 PVC CONDUIT TO FIRE ALARM PANEL. SEE ELECTRICAL PLANS.

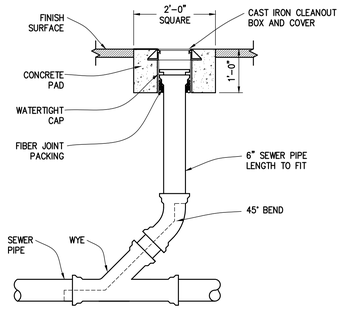
POST INDICATOR VALVE (P.I.V.) 10

SCALE : NTS



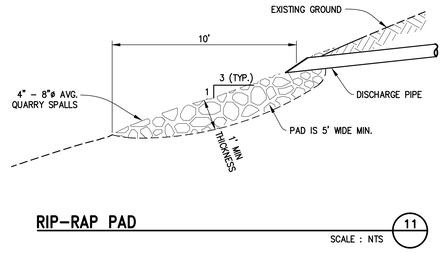
DROP MANHOLE 7

SCALE : NTS



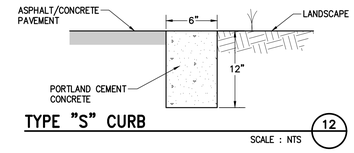
TYPICAL CLEANOUT 9

SCALE : NTS



RIP–RAP PAD 11

SCALE : NTS



TYPE "S" CURB 12

SCALE : NTS

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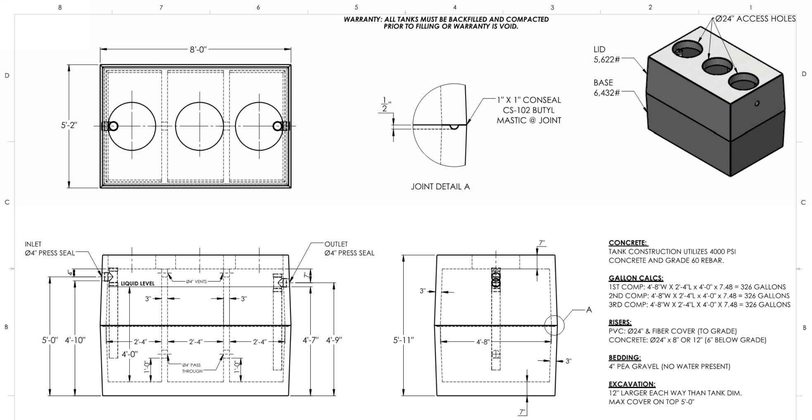
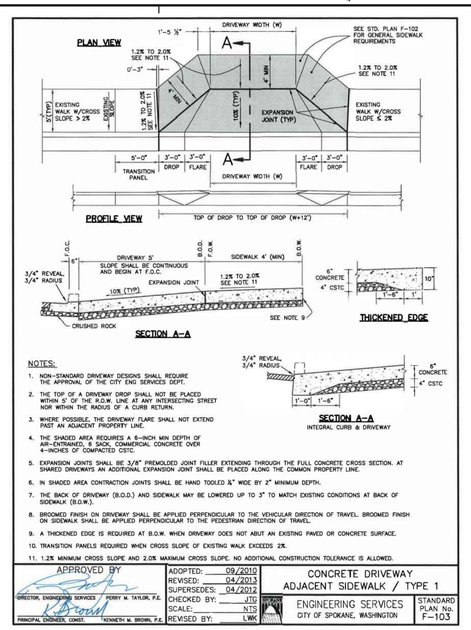
DETAILS

C-500



OIL/WATER SEPARATOR

SCALE : NTS (1)



CONCRETE DRIVEWAY

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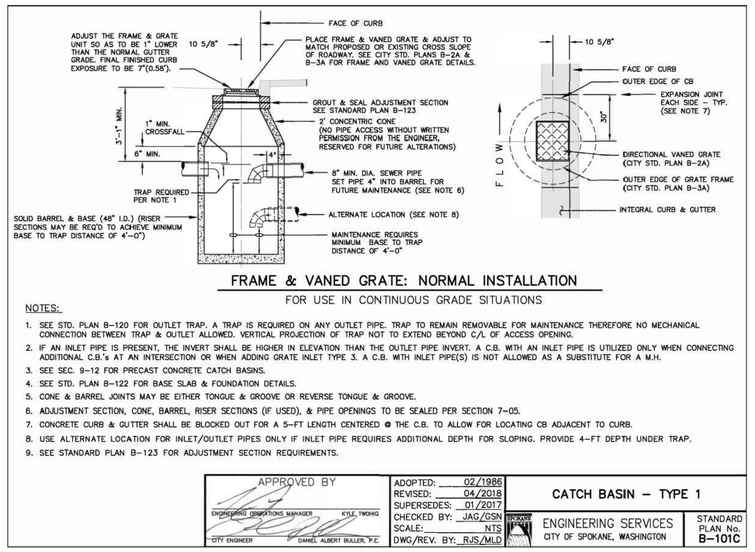
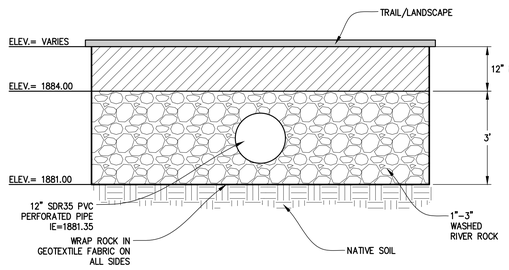


FRAME & VANED GRATE: NORMAL INSTALLATION

FOR USE IN CONTINUOUS GRADE SITUATIONS

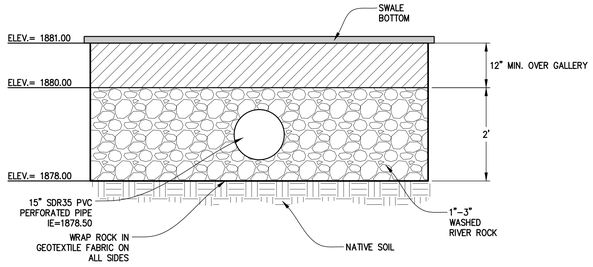
CATCH BASIN TYPE "1"

SCALE : NTS (3)



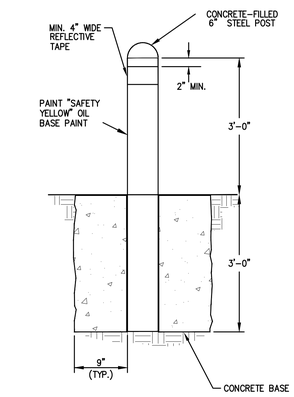
GRAVEL INFILTRATION GALLERY SECTION B

SCALE : NTS (4)



GRAVEL INFILTRATION GALLERY SECTION A

SCALE : NTS (5)

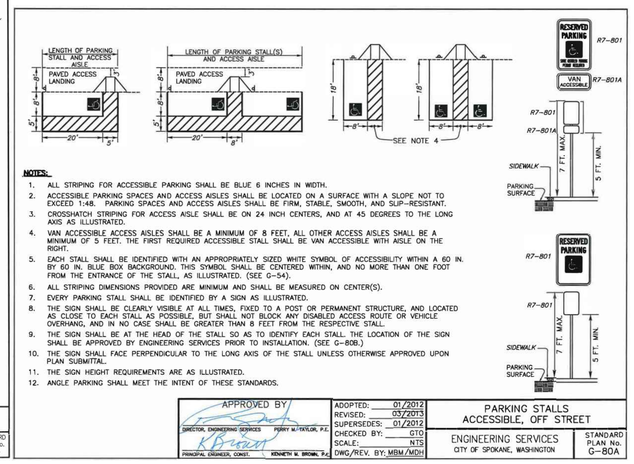


BOLLARD DETAIL

SCALE : NTS (7)

ADA SIGNAGE AND STRIPING

SCALE : NTS (6)



CONTRACTOR NOTE

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MATTHEW R. GILLIS — STATE OF WASHINGTON — 41809 — REGISTERED PROFESSIONAL ENGINEER
3/11/2021

DCI ENGINEERS
707 W. 2ND AVENUE
SPOKANE, WASHINGTON 99201
PHONE: (509) 456-4446 • FAX: (509) 455-7492
WEBSITE: www.dci-engineers.com
CIVIL / STRUCTURAL

BUILDING 1B

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

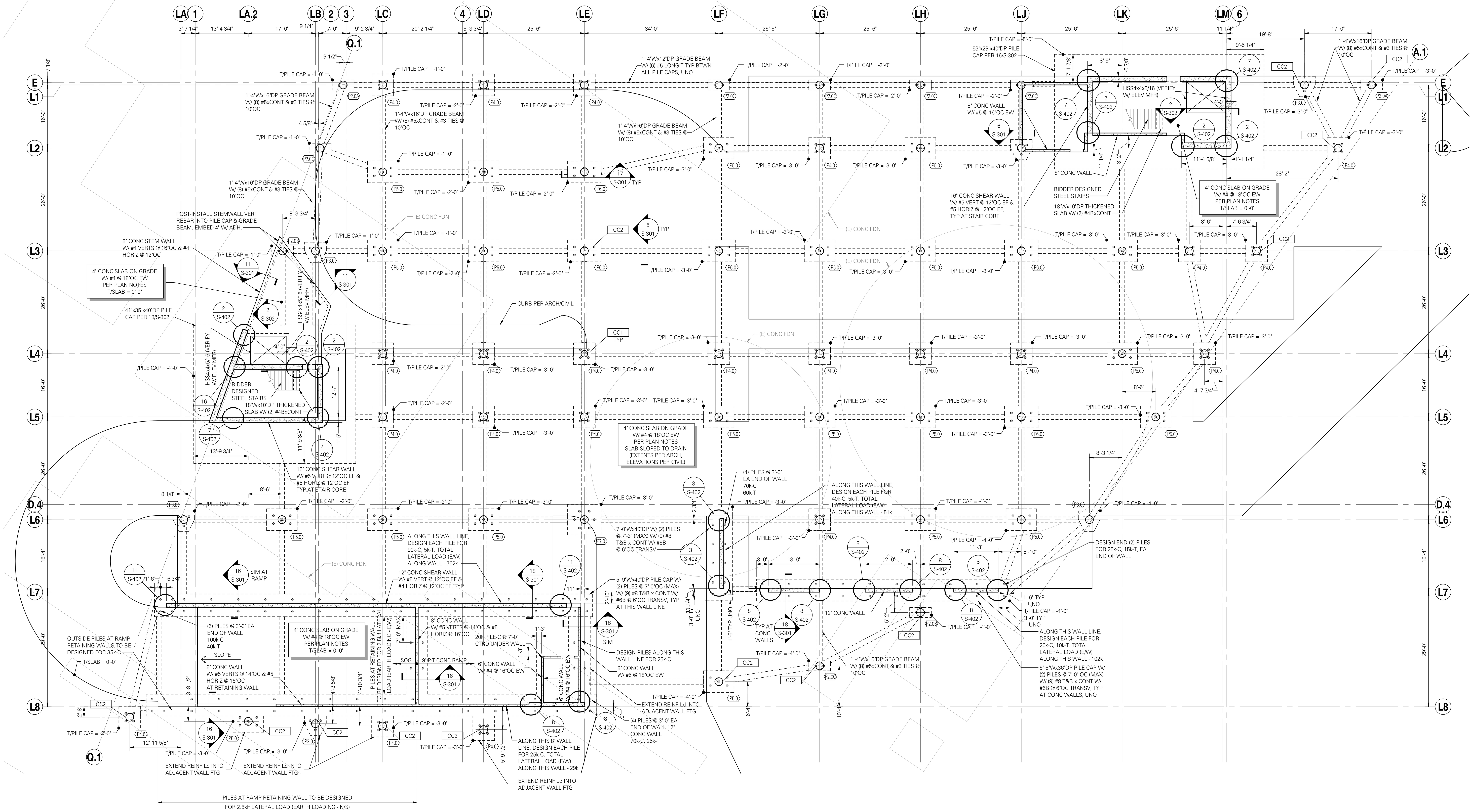
BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

DETAILS

C-501



FOUNDATION PLAN NOTES:

1. STRUCTURAL GENERAL NOTES, DESIGN CRITERIA, ABBREVIATIONS AND LEGEND PER S-001, S-002 AND S-003.
2. VERIFY ALL DIMENSIONS AND ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS.
3. CONTRACTOR SHALL LOCATE AND VERIFY THE FOLLOWING WITH OTHERS PRIOR TO POURING CONCRETE: ALL DOOR OPENINGS IN FOUNDATION WALLS; DRAINS AND SLOPES; BLOCKOUTS FOR [POOLS, SPAS, FREEZERS, COOLERS, PLUMBING, SPRINKLERS AND HVAC]. ALL DUCTS, CHASES AND PIPES PER MECHANICAL, PLUMBING, ELECTRICAL AND SPRINKLER DRAWINGS. STAIR DETAILS AND GUARDRAILS PER ARCHITECTURAL DRAWINGS.
4. TOP OF SLAB (T/SLAB) ELEVATION ASSUMED 0'-0". FOR ACTUAL T/SLAB ELEVATION REFER TO CIVIL AND ARCHITECTURAL DRAWINGS. PROVIDE 6 MIL VAPOR BARRIER BELOW SLAB AT INTERIOR SPACES. PROVIDE FREE-DRAINING GRANULAR FILL PER GEOTECH REPORT.
5. ALL SLABS TO BEAR ON COMPETENT NATIVE SOIL AND/OR STRUCTURAL FILL. SUBGRADE PREPARATION, STRUCTURAL FILL, FOOTING DRAINS, VAPOR BARRIER AND OTHER REQUIREMENTS PER GEOTECH REPORT AS NOTED IN THE STRUCTURAL GENERAL NOTES.
6. CJ INDICATES CONTROL JOINT PER PLAN.
7. MOISTURE PROOF ALL CONCRETE STEMWALLS PER ARCHITECT.
8. STEEL STAIRS SHALL BE BIDDER-DESIGNED, UNO. APPLICABLE DESIGN REQUIREMENTS PER STRUCTURAL GENERAL NOTES.
9. ELEVATOR STEEL AND CONNECTIONS ARE PROVIDED FOR BUDGET PURPOSES ONLY AND ARE PRELIMINARY. THE PROPOSED STRUCTURAL MEMBERS AND THEIR CONNECTIONS SHALL BE CONFIRMED ONCE FINAL ELEVATOR REACTIONS ARE PROVIDED TO THE STRUCTURAL ENGINEER OF RECORD.
10. TYPICAL DETAILS PER:

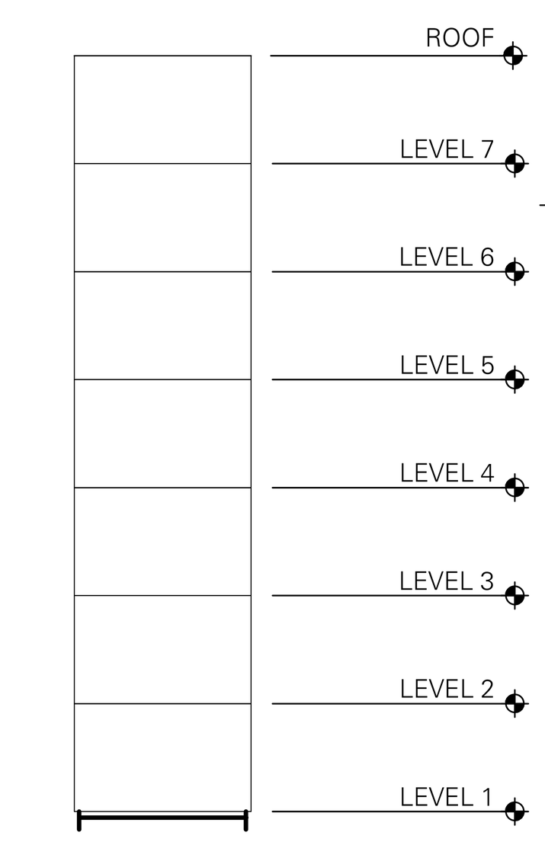
    10/S-301 TYPICAL LAP SPLICE SCHEDULE
    14/S-301 TYPICAL DEPRESSED SLAB DETAIL
    15/S-301 STANDARD HOOKS AND BAR BENDS
    4/S-302 TYPICAL HOLD-DOWN AT THICKENED SLAB FOOTING

PILE CAP SCHEDULE

TYPE	NUMBER OF PILES	SIZE			REFERENCE DETAIL	ASD PILE LOAD
		WIDTH	LENGTH	DEPTH		
P2.0A	2	2'-6"	5'-6"	2'-6"	1/S-302	40k - C
P2.0B	2	2'-6"	5'-6"	2'-6"	1/S-302	60k - C
P2.0C	2	2'-6"	5'-6"	2'-6"	1/S-302	100k - C
P3.0	3	5'-2"	5'-6"	3'-0"	2/S-302	100k - C
P4.0	4	5'-6"	5'-6"	2'-6"	3/S-302	100k - C
P5.0	5	5'-6"	7'-9"	3'-0"	6/S-302	100k - C
P6.0	6	5'-6"	8'-6"	3'-3"	7/S-302	100k - C
P7.0	7	7'-9"	8'-6"	3'-0"	8/S-302	100k - C

NOTE:

1. PILE LOADS SHOWN IN SCHEDULE ARE ASD LOADING.
2. PILE LOCATIONS SHOWN ON PLAN ARE FOR VISUAL REFERENCE ONLY. PILE DESIGNER IS RESPONSIBLE FOR FINAL LOCATIONS.
3. REFERENCE GEOTECH REPORT FOR PILE TYPE AND DRIVEN LENGTH.



NOTE:
DARKENED LINES DESIGNATE AREA OF WORK.

LEVEL 01 FOUNDATION PLAN

SCALE: 3/32" = 1'-0"

ALSC ARCHITECTS
203 North Washington, Suite 400
Spokane, WA 99201
509.838.8568

6500 Mineral Drive, Suite 101
Coeur d'Alene, Idaho 83815
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CIVIL / STRUCTURAL

FOR BID (NOT FOR CONSTRUCTION)

BUILDING 2A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
ADD 4	05/22/2020	PRICING SET ADD 4
	06/29/2020	SECOND PRICING SET
	02/05/2021	FOUNDATION SET

PROJ. NO. 18041-0341

PROJECT MANAGER KEA

DATE 03/01/2021

LEVEL 01 FOUNDATION PLAN

S-101

RIVERBEND APARTMENTS
PHASE 2
SAGAMORE SPOKANE LLC
SPOKANE, WASHINGTON

ABBREVIATIONS

ACP	ASPHALT CONCRETE PAVEMENT	FT (')	FOOT (FEET)
ADD'L	ADDITIONAL	FTG	FOOTING
AD	AREA DRAIN	G	GAS MAIN
ADJ	ADJACENT	GB	GRADE BREAK
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	GM	GAS METER
		GRD	GRADE
APPROX.	APPROXIMATE(LY)	GV	GATE VALVE
ARCH	ARCHITECT(URAL)	HB	HOSE BIB
ASSY	ASSEMBLY	HDPE	HIGH DENSITY POLYETHYLENE
BLDG	BUILDING	HORIZ(H)	HORIZONTAL
BM	BENCHMARK	HT	HEIGHT
BNDRY	BOUNDARY	HYD	HYDRANT
BOW	BOTTOM OF WALL (AT FINISHED GRADE)	ID	INSIDE DIAMETER
		I.E.	INVERT ELEVATION
BVC	BEGINNING OF VERTICAL CURVE	IN (")	INCH(ES)
CTV	CABLE TV	INV	INVERT
C&G	CURB AND GUTTER	IRR	IRRIGATION WATER
CB	CATCH BASIN	LB	POUND(S)
CC	CURB CUT	LCPE	LINED CORRUGATED POLYETHYLENE PIPE
CD	CONCRETE DRIVE		
CF	CUBIC FEET (FOOT)	LF	LINEAR FEET
CI	CAST IRON	MAT'L	MATERIAL
CJ	CONSTRUCTION JOINT	MAX	MAXIMUM
CL	CLASS	MFR	MANUFACTURER
CL	CENTER LINE	MH	MANHOLE
CMP	CORRUGATED METAL PIPE	MJ	MECHANICAL JOINT
CONC.	CONCRETE	MIN.	MINIMUM
CONST.	CONSTRUCTION	MISC.	MISCELLANEOUS
CPEP	CORRUGATED POLYETHYLENE PIPE	N	NORTH(ING)
CTR	CENTER(ED)	NO (#)	NUMBER
CY	CUBIC YARD	OC	ON CENTER
DCVA	DOUBLE CHECK VALVE ASSEMBLY	O/W	OIL WATER
DDCV	DOUBLE DETECTOR CHECK VALVE	P	POWER
DEPT.	DEPARTMENT	PC	POINT OF CURVATURE
DET	DETAIL	PIV	POST INDICATOR VALVE
D.I.	DUCTILE IRON	PP	POWER POLE
DIA (ø)	DIAMETER	PL	PROPERTY LINE
DIM	DIMENSION	PSF	POUNDS PER SQUARE FOOT
DS	DOWN SPOUT	PSI	POUNDS PER SQUARE INCH
DWG	DRAWING	PT	POINT OF TANGENCY
E	EAST(ING)	PVC	POLYVINYL CHLORIDE
EC	ELECTRICAL CONDUIT	PVI	POINT OF VERTICAL INFLECTION
ECC	EXTRUDED CONCRETE CURB	QTY.	QUANTITY
EL.=	ELEVATION	RAD (R)	RADIUS
EOP	EDGE OF PAVEMENT	RCP	REINFORCED CONCRETE PIPE
EQUIV.	EQUIVALENT	RD	ROAD
EVC	END OF VERTICAL CURVE	REF	REFERENCE
EXIST.	EXISTING	REQD.	REQUIRED
FD	FLOOR DRAIN	RET	RETAINING
FDC	FIRE DEPARTMENT CONNECTION	ROW	RIGHT OF WAY
FDN	FOUNDATION	SD	STORM DRAIN
FFE	FINISH FLOOR ELEVATION	S.F.	SQUARE FEET
FH	FIRE HYDRANT	SHT	SHEET
FL	FLANGED	SIM	SIMILAR
FLR	FLOOR	SPEC	SPECIFICATION(S)
FOC	FACE OF CURB	SQ	SQUARE
F.S.	FINISHED SURFACE	SS	SANITARY SEWER
		STA	STATION
		STD	STANDARD
		TOE	TOE OF WALL, OR SLOPE
		T	TELEPHONE WIRE
		TBM	TEMPORARY BENCH MARK
		T.C.	TOP OF CURB
		TG OR RIM	TOP OF GRATE
		TEMP.	TEMPORARY
		TOP	TOP OF SLOPE
		TOW	TOP OF WALL
		TV	TELEVISION WIRE
		TYP.	TYPICAL
		VC	VERTICAL CURVE
		VERT (V)	VERTICAL
		WM	WATER METER
		W/	WITH
		WT	WEIGHT
		WWF	WELDED WIRE FABRIC
		YD	YARD DRAIN

LEGEND

STORM PIPE — SD
NEW & EXISTING CATCH BASINS — CB / C.B.
NEW & EXISTING DRYWELLS — DW / DW
STORM MANHOLE — SDMH / SDMH
SANITARY SEWER PIPE — SS
SANITARY SEWER MANHOLE — SSMH / SSMH
WATER MAINS — W
FIRE HYDRANTS (NEW AND EXISTING) AND FDC — FH / FH
WATER METERS
WATER VALVES
FITTINGS WITH THRUST BLOCKS — TEE, 90°, 45°, 22.5°, 11.25°
SURFACE WTR AND PIPE DIRECTION FLOW — OR
EXISTING CONTOUR LABELS — (457)
PROPOSED CONTOUR LABELS — 457
EXISTING SURFACE ELEVATIONS — (XXX.XX) F.S. / (XXX.XX T.C.) (XXX.XX F.S.)
FINISHED SURFACE ELEVATIONS — XXX.XX F.S. / XXX.XX T.C. XXX.XX F.S.
NEW EASEMENT
NEW DITCH
TRAFFIC ARROWS
TOP OF WALL/BOTTOM OF WALL — TOW XXX.XX / XXX.XX BOW
SLOPE INDICATORS — 3:1, 2:1
RIP RAP
FILTER FABRIC FENCING
FOOTING DRAINS
DOWNSPOUTS — DS
CLEANOUTS (C.O.) SS, AND RWL (NEW AND EXISTING) — CO / CO
INTERCEPTOR AND BIO-SWALES
CEMENT CONCRETE
COORDINATES, & LEADERS — N 10000.00 E 5000.00
STUBBED & PLUGGED LINE
CONCRETE CURB
CONCRETE CURB & GUTTER
NEW ASPHALT/CONCRETE PAVEMENT
CURB INLET/UNDER SIDEWALK INLET
DRAINAGE SWALE
RETAINING WALL
STRAW BALE
ROCK CHECK DAM

GENERAL CONSTRUCTION NOTES:

1. UNLESS SPECIFICALLY EXCEPTED IN THE PLANS OR CONTRACT DOCUMENTS, ALL CONSTRUCTION METHODS AND MATERIALS SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND STANDARD PLANS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION PROMULGATED BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND THE WASHINGTON CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION (LATEST EDITION) AND THE CITY OF SPOKANE STANDARDS AND SPECIFICATIONS.

2. THE PLANS ARE SCHEMATIC AND ARE NOT INTENDED TO DEPICT ALL DETAILS OF THE WORK REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE TO FAMILIARIZE HIMSELF WITH ACTUAL SITE CONDITIONS, REQUIREMENTS AND FACTORS AFFECTING THE WORK. WHERE LACK OF DETAIL OR CONFLICT EXISTS BETWEEN THESE AND OTHER PLANS, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING. IF THE CONTRACTOR DISCOVERS ANY DISCREPANCIES BETWEEN THE PLANS AND EXISTING CONDITIONS ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER AND CITY OF SPOKANE ENGINEERING AND DEVELOPER SERVICES DEPARTMENT.

3. THIS PLAN MAY NOT SHOW ALL EXISTING UTILITIES. EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. PRIOR TO CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES. CALL THE UNDERGROUND UTILITY LOCATION SERVICE AT 811 BEFORE YOU DIG. ANY CONFLICTING UTILITIES SHALL BE RELOCATED PRIOR TO CONSTRUCTION. IN THE CASE WHERE RELOCATION IS REQUIRED, THE APPLICABLE UTILITY COMPANY SHALL BE NOTIFIED AND ANY COST REQUIRED FOR RELOCATION OR ADJUSTMENTS SHALL BE AGREED UPON.

4. THE ENGINEER HAS ATTEMPTED TO SHOW ALL EXISTING UNDERGROUND UTILITIES AND STRUCTURES. APPEARANCE ON THESE PLANS, HOWEVER, DOES NOT GUARANTEE THE ACCURACY AND COMPLETENESS OF THE LOCATION OR EXISTENCE OF THESE UTILITIES AND/OR SUBSTRUCTURES. THE CONTRACTOR IS REQUIRED TO TAKE ALL REQUIRED PRECAUTIONARY MEANS TO LOCATE AND PROTECT ALL EXISTING UTILITIES AND SUBSTRUCTURES WHETHER SHOWN OR NOT, PRIOR TO EXCAVATION IN ANY AREA. THE CONTRACTOR SHALL MEET AT THE JOB SITE WITH REPRESENTATIVES OF THE UTILITY DISTRICTS, COMPANIES, AND OTHER OWNERS THAT MAY HAVE EXISTING FACILITIES AT THE SITE, TO DISCUSS THEIR PROTECTION.

5. THE CONTRACTOR IS REQUIRED TO HAVE A COMPLETE SET OF APPROVED PLANS ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS. THE CONTRACTOR SHALL HAVE A RESPONSIBLE PARTY, WHO HAS THE AUTHORITY TO REPRESENT AND ACT FOR THE CONTRACTOR, AT THE JOB SITE DURING ALL WORKING HOURS.

6. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS AND APPROVALS FROM CITY OF SPOKANE AND OTHER JURISDICTIONS PRIOR TO THE START OF CONSTRUCTION. ABSENCE OF THE PERMIT MAY RESULT IN IMMEDIATE SHUT DOWN OF WORK AND POSSIBLE REMOVAL OF THE ITEMS CONSTRUCTED WITHOUT A PERMIT.

7. THE CONTRACTOR SHALL PROVIDE THE DESIGN ENGINEERS WITH RECORD DRAWINGS PRIOR TO FINAL APPROVAL. ALL DEVIATIONS FROM THE ORIGINAL PLANS MADE DURING THE COURSE OF THE CONSTRUCTION INCLUDING LOCATION, INVERTS, AND DEPTHS OF UTILITIES SHALL BE CLEARLY MARKED ON THE RECORD DRAWINGS. THE ENGINEER SHALL PROVIDE THE CITY ENGINEER WITH "RECORD DRAWINGS" AS REQUIRED.

8. THE EXISTING SITE CONDITIONS SHOWN ARE FOR INFORMATIONAL PURPOSES ONLY. NO CERTIFICATIONS ARE EXPRESSED OR IMPLIED. THE TOPOGRAPHIC SURVEY WAS PROVIDED BY DURYEA AND ASSOCIATES.

9. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT TO CONSTRUCT AND INSTALL TO PROPER WORKING ORDER, THE DESIGN SHOWN, AS DETAILED OR CALLED OUT IN THESE PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR BEING FAMILIAR WITH THE PROVISIONS AND REQUIREMENTS CONTAINED IN THE STANDARD SPECIFICATIONS.

10. IF CONSTRUCTION IS TO TAKE PLACE IN PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE GOVERNING MUNICIPALITY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLAN(S) IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS REQUIRED. PRIOR TO DISRUPTION OF ANY TRAFFIC, A TRAFFIC PLAN SHALL BE PREPARED AND SUBMITTED TO THE CITY OF SPOKANE FOR APPROVAL. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.

11. A PRE-CONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF SPOKANE CONSTRUCTION INSPECTOR PRIOR TO THE START OF CONSTRUCTION.

12. ANY CHANGES TO THE DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE DESIGN ENGINEER AND THE CITY OF SPOKANE.

13. ALL TESTING SHALL BE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATIONS (LATEST EDITION) AND GEOTECHNICAL REPORT BY ASPECT CONSULTING, LLC. DATED OCTOBER 25, 2019.

14. EXCAVATION AND EMBANKMENT SHALL BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF SECTION 2-03 OF THE WSDOT STANDARD SPECIFICATIONS. ALL COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 2-03.3(14)C, METHOD C FOR BUILDING PADS, METHOD B FOR OTHER AREAS, AND THE GEOTECHNICAL REPORTS.

15. ALL FINISHED GRADING ELEVATIONS SHALL MATCH EXISTING ELEVATIONS AT THE SITE'S BOUNDARY, EXCEPT AS SHOWN OTHERWISE ON THE GRADING PLAN. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING.

16. THE CONTRACTOR SHALL REMOVE ALL WASTE MATERIAL.

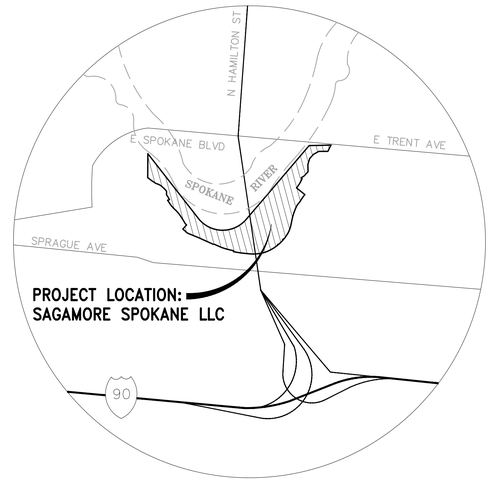
17. GRADING: ALL GRADING SHALL BE LIMITED TO THE AREAS IDENTIFIED ON THE GRADING PLAN AND SHALL NOT INFRINGE ON ADJACENT OWNERSHIPS, EXCEPT AS SHOWN OTHERWISE ON THE PLANS.

18. THE CONTRACTOR SHALL PROTECT ALL CATCH BASINS, DRYWELLS, AND OTHER STORM WATER STRUCTURES FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC OVER THE METAL FRAME DURING CONSTRUCTION AND KEEPING IT IN PLACE UNTIL THE SITE HAS BEEN PAVED AND CLEANED.

19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING DIRT, MUD, AND OTHER CONSTRUCTION DEBRIS THAT MAY ACCUMULATE ON PAVED STREETS ADJACENT TO THE SITE AS A RESULT OF CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MATERIALS THAT SPILL ONTO LOCAL STREETS DURING THE TRANSPORTATION OF EQUIPMENT, MATERIALS, ETC. SHOULD A SPILL OCCUR, THE CONTRACTOR SHALL REMOVE THE MATERIAL BY THE END OF THE WORK DAY. NO MATERIAL SHALL BE ALLOWED TO SET, DRY, OR BE WASHED INTO ADJACENT STORM WATER FACILITIES. CLEANING SHALL BE ON AN "AS NEEDED" BASIS USING WATER UNDER PRESSURE. SWEEPING AND WATER SHALL BE USED WHEN WATER PRESSURE ALONE WILL NOT WASH THE CONSTRUCTION DEBRIS FROM THE STREET. THE CONTRACTOR MUST PROTECT ALL EXISTING STORM WATER FACILITIES FROM DIRT/DEBRIS.

20. ANY BROKEN, HEAVED, OR SUNKEN SIDEWALK AND/OR CURB ALONG THE PROJECT PROPERTY FRONTAGE MUST BE REPLACED TO CITY STANDARDS, WHETHER EXISTING OR CAUSED DURING CONSTRUCTION. (SMC 12.01.010)

21. CONSTRUCTION OPERATIONS, INCLUDING EQUIPMENT WARM UP AND OPERATION, ARE RESTRICTED TO THE TIME LIMITS OUTLINED IN THE CITY NOISE ORDINANCE.



VICINITY MAP

NOT TO SCALE

N

PROJECT TEAM:

OWNER:
SAGAMORE SPOKANE LLC
1 E CAMELBACK RD STE 200
PHOENIX, AZ 85012
PHONE: (212) 446-6980

ARCHITECT:
ALSC ARCHITECTS
203 N WASHINGTON ST #400
SPOKANE, WA 99201
CONTACT: RUSTIN HALL
PHONE: (509) 838-8568

CIVIL ENGINEER:
DCI ENGINEERS
707 W. 2ND AVENUE
SPOKANE, WA 99201
CONTACT: MATT GIBB, P.E.
PHONE: (509) 227-5721

UTILITY PURVEYORS:

SEWER:
CITY OF SPOKANE
909 E. SPRAGUE AVE.
SPOKANE, WA 99202
PHONE: (509) 625-7900

WATER:
CITY OF SPOKANE
914 E. NORTH FOOTHILLS DRIVE
SPOKANE, WA 99207
PHONE: (509) 625-7800

POWER/GAS:
AVISTA UTILITIES
1411 E. MISSION AVE.
SPOKANE, WA 99252
POWER CONTACT: NICK HARMON
PHONE: (509) 495-4889
GAS CONTACT: CHRISTIAN WRIGHT
PHONE: (509) 495-2910

CABLE/PHONE:
COMCAST - BRIAN RICHARDSON
EMAIL: bryan_richardson@cable.comcast.com
PHONE: (509) 755-4717
CENTURYLINK - ROB GOEDE
EMAIL: robert.goede@centurylink.com
PHONE: (509) 623-0319

SHEET INDEX

CONTRACTOR NOTE

ALL EXISTING UTILITIES SHOWN ON PLANS ARE TO BE VERIFIED HORIZONTALLY AND VERTICALLY PRIOR TO ANY CONSTRUCTION. ALL EXISTING FEATURES INCLUDING BURIED UTILITIES ARE SHOWN AS INDICATED ON RECORD MAPS AND SURVEYS FURNISHED BY OTHERS. WE ASSUME NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS AND SURVEYS. CONTACT THE UTILITY OWNER/AGENCY FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO CONSTRUCTION.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

SE 1/4 SEC. 17, T. 25 N., R. 43 E., W.M.

ALSC ARCHITECTS
203 North Washington, Suite 9400
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MATTHEW R. GIBB — STATE OF WASHINGTON — 41809 — REGISTERED PROFESSIONAL ENGINEER

3/11/2021

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WEBSITE: www.dci-engineers.com
CIVIL / STRUCTURAL

BUILDING 2A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GENERAL CIVIL INFORMATION

C-000

SPOKANE REGIONAL STORM WATER MANUAL APPENDIX 9A- ESC STANDARD PLAN NOTES:

THE FOLLOWING ESC STANDARD PLAN NOTES ORIGINATE FROM SECTION 9.4.3. THESE NOTES ARE AN OVERALL SET; USE ONLY WHAT APPLIES TO THE GIVEN PROJECT.

1. THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE FOLLOWED IN ORDER TO BEST MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION CONTROL PROBLEMS:

(A) CLEAR AND GRUB SUFFICIENTLY FOR INSTALLATION OF TEMPORARY ESC BMPS;
(B) INSTALL TEMPORARY ESC BMPS, CONSTRUCTING SEDIMENT TRAPPING BMPS AS ONE OF THE FIRST STEPS PRIOR TO GRADING;
(C) CLEAR, GRUB AND ROUGH GRADE FOR ROADS, TEMPORARY ACCESS POINTS AND UTILITY LOCATIONS;
(D) STABILIZE ROADWAY APPROACHES AND TEMPORARY ACCESS POINTS WITH THE APPROPRIATE CONSTRUCTION ENTRY BMP;
(E) CLEAR, GRUB AND GRADE INDIVIDUAL LOTS OR GROUPS OF LOTS;
(F) TEMPORARILY STABILIZE, THROUGH RE-VEGETATION OR OTHER APPROPRIATE BMPS, LOTS OR GROUPS OF LOTS IN SITUATIONS WHERE SUBSTANTIAL CUT OR FILL SLOPES ARE A RESULT OF THE SITE GRADING;
(G) CONSTRUCT ROADS, BUILDINGS, PERMANENT STORM WATER FACILITIES (I.E. INLETS, PONDS, UIC FACILITIES, ETC.);
(H) PROTECT ALL PERMANENT STORM WATER FACILITIES UTILIZING THE APPROPRIATE BMPS;
(I) INSTALL PERMANENT ESC CONTROLS, WHEN APPLICABLE; AND,
(J) REMOVE TEMPORARY ESC CONTROLS WHEN:

2. PERMANENT ESC CONTROLS, WHEN APPLICABLE, HAVE BEEN COMPLETELY INSTALLED;

3. ALL LAND-DISTURBING ACTIVITIES THAT HAVE THE POTENTIAL TO CAUSE EROSION OR SEDIMENTATION PROBLEMS HAVE CEASED; AND,

4. VEGETATION HAD BEEN ESTABLISHED IN THE AREAS NOTED AS REQUIRING VEGETATION ON THE ACCEPTED ESC PLAN ON FILE WITH THE LOCAL JURISDICTION.

5. INSPECT ALL ROADWAYS, AT THE END OF EACH DAY, ADJACENT TO THE CONSTRUCTION ACCESS ROUTE. IF IT IS EVIDENT THAT SEDIMENT HAS BEEN TRACKED OFF SITE AND/OR BEYOND THE ROADWAY APPROACH, CLEANING IS REQUIRED.

6. IF SEDIMENT REMOVAL IS NECESSARY PRIOR TO STREET WASHING, IT SHALL BE REMOVED BY SHOVELING OR PICKUP SWEEPING AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.

7. IF STREET WASHING IS REQUIRED TO CLEAN SEDIMENT TRACKED OFF SITE, ONCE SEDIMENT HAS BEEN REMOVED, STREET WASH WASTEWATER SHALL BE CONTROLLED BY PUMPING BACK ON-SITE OR OTHERWISE PREVENTED FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.

8. RESTORE CONSTRUCTION ACCESS ROUTE EQUAL TO OR BETTER THAN THE PRE-CONSTRUCTION CONDITION.

9. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICAL.

10. INSPECT SEDIMENT CONTROL BMPS WEEKLY AT A MINIMUM, DAILY DURING A STORM EVENT, AND AFTER ANY DISCHARGE FROM THE SITE (STORM WATER OR NON-STORMWATER). THE INSPECTION FREQUENCY MAY BE REDUCED TO ONCE A MONTH IF THE SITE IS STABILIZED AND INACTIVE.

11. CONTROL FUGITIVE DUST FROM CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE STATE AND/OR LOCAL AIR QUALITY CONTROL AUTHORITIES WITH JURISDICTION OVER THE PROJECT AREA.

12. STABILIZE EXPOSED UNWORKED SOILS (INCLUDING STOCKPILES), WHETHER AT FINAL GRADE OR NOT, WITHIN 10 DAYS DURING THE REGIONAL DRY SEASON (JULY 1 THROUGH SEPTEMBER 30) AND WITHIN 5 DAYS DURING THE REGIONAL WET SEASON (OCTOBER 1 THROUGH JUNE 30). SOILS MUST BE STABILIZED AT THE END OF A SHIFT BEFORE A HOLIDAY WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. THIS TIME LIMIT MAY ONLY BE ADJUSTED BY A LOCAL JURISDICTION WITH A "QUALIFIED LOCAL PROGRAM," IF IT CAN BE DEMONSTRATED THAT THE RECENT PRECIPITATION JUSTIFIES A DIFFERENT STANDARD AND MEETS THE REQUIREMENTS SET FOURTH IN THE CONSTRUCTION STORM WATER GENERAL PERMIT.

13. PROTECT INLETS, DRYWELLS, CATCH BASINS AND OTHER STORM WATER MANAGEMENT FACILITIES FROM SEDIMENT, WHETHER OR NOT FACILITIES ARE OPERABLE.

14. KEEP ROADS ADJACENT TO INLETS CLEAN.

15. INSPECT INLETS WEEKLY AT A MINIMUM AND DAILY DURING STORM EVENTS.

16. CONSTRUCT STORM WATER CONTROL FACILITIES (DETENTION/RETENTION STORAGE POND OR SWALES) BEFORE GRADING BEGINS. THESE FACILITIES SHALL BE OPERATIONAL BEFORE THE CONSTRUCTION OF IMPERVIOUS SITE IMPROVEMENTS.

17. STOCKPILE MATERIALS (SUCH AS TOPSOIL) ON SITE, KEEPING OFF OF ROADWAY AND SIDEWALKS.

18. COVER, CONTAIN AND PROTECT ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCT, AND NON-INERT WASTES PRESENT ON SITE FROM VANDALISM (SEE CHAPTER 173-304 WAC FOR THE DEFINITION OF INERT WASTE), USE SECONDARY CONTAINMENT FOR ON-SITE FUELING TANKS.

19. CONDUCT MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM REPAIRS, SOLVENT AND DE-GREASING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES THAT MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORM WATER RUNOFF USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CLEAN ALL CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. IF RAINING OVER EQUIPMENT OR VEHICLE, PERFORM EMERGENCY REPAIRS ON SITE USING TEMPORARY PLASTIC BENEATH THE VEHICLE.

20. CONDUCT APPLICATION OF AGRICULTURAL CHEMICALS, INCLUDING FERTILIZERS AND PESTICIDES, IN SUCH A MANNER, AND AT APPLICATION RATES, THAT INHIBITS THE LOSS OF CHEMICALS INTO STORM WATER RUNOFF FACILITIES. AMEND MANUFACTURER'S RECOMMENDED APPLICATION RATES AND PROCEDURES TO MEET THIS REQUIREMENT, IF NECESSARY.

21. INSPECT ON A REGULAR BASIS (AT A MINIMUM WEEKLY, AND DAILY DURING/AFTER A RUNOFF PRODUCING STORM EVENT) AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL BMPS TO ENSURE SUCCESSFUL PERFORMANCE OF THE BMPS. NOTE THAT INLET PROTECTION DEVICES SHALL BE CLEANED OR REMOVED AND REPLACE BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE.

22. REMOVE TEMPORARY ESC BMPS WITHIN 30 DAYS AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED. PERMANENTLY STABILIZE AREAS THAT ARE DISTURBED DURING THE REMOVAL PROCESS.

EROSION CONTROL NOTES:

1. AN EROSION/SEDIMENTATION CONTROL (ESC) PLAN IS REQUIRED FOR THIS PROJECT. IMPLEMENTATION OF THIS ESC PLAN, AND CONSTRUCTION, MAINTENANCE, AND UPGRADING OF THE ESC FACILITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND ACCEPTED BY THE CITY OF SPOKANE, OR UNTIL VEGETATION IS ESTABLISHED THROUGHOUT THE SITE, AND ACCEPTED BY THE CITY OF SPOKANE, WHICHEVER IS LATER.

2. APPROVAL OF THE ESC PLAN DOES NOT CONSTITUTE APPROVAL OF ANY OF THE PROPOSED ROAD, STORM WATER, GRADING, OR UTILITY DESIGN ELEMENTS SHOWN ON THE ESC PLAN.

3. THE EROSION/SEDIMENTATION CONTROL MEASURES SHOWN ARE THE MINIMUM REQUIREMENTS OF THE ANTICIPATED SITE CONDITIONS. THE CONTRACTOR SHALL INSPECT AND MAINTAIN THESE ESC MEASURES DAILY, AND SHALL MAINTAIN AND UPGRADE THESE MEASURES AS NECESSARY TO PREVENT SEDIMENT-LADEN WATER FROM EITHER FLOWING OFF-SITE, OR INTO NEW/EXISTING STORM WATER FACILITIES, SUCH AS DRYWELLS, CULVERTS, OR GRAVEL GALLERIES.

4. CONTRACTOR IS RESPONSIBLE FOR INSTALLING A ROCK CONSTRUCTION ENTRANCE AT ANY AND ALL LOCATIONS USED BY VEHICLES TO ENTER OR EXIT THE PROJECT SITE TO PREVENT SEDIMENTS FROM BEING TRACKED OFF THE SITE BY CONSTRUCTION TRAFFIC. .

5. ANY DISTURBED AREAS, EXCEPT FOR POND BOTTOMS AND SLOPES, THAT WILL BE LEFT BARE FOR MORE THAN 7 DAYS AND ARE NOT INTENDED TO BE REWORKED WITHIN 30-45 DAYS, SHALL BE SEEDED WITH A FAST STARTING NATIVE DRYLAND GRASS SUCH AS ANNUAL RYE, OR APPROVED EQUAL, AT A RATE OF 60 LBS./ACRE.

6. GRADED POND AREAS, THAT WILL BE LEFT BARE FOR MORE THAN 7 DAYS, SHALL HAVE A MULCH APPLIED AT A RATE OF TWO THOUSAND (2,000) POUNDS PER ACRE. MULCH SHALL BE A VIRGIN WOOD CELLULOSE FIBER SPECIALLY PROCESSED AS A HYDROSEEDING MULCH AND CONTAIN NO GROWTH OR GERMINATION INHIBITING FACTORS. IF POND CONSTRUCTION HAS BEEN COMPLETED, INCLUDING DRAINAGE STRUCTURES, AND HAVE RECEIVED FINAL INSPECTION APPROVAL, THEY SHALL BE SODDED.

7. DUST CONTROL: AN APPROVED METHOD OF DUST CONTROL, MEETING THE REQUIREMENTS OF LOCAL REGULATIONS, SHALL BE UTILIZED DURING CONSTRUCTION OF THIS PROJECT. THIS MAY REQUIRE THE USE OF WATER SPRAYS, TARPS, SPRINKLERS, OR SUSPENSION OF ACTIVITY DURING CERTAIN WEATHER CONDITIONS.

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MATERIALS THAT SPILL ONTO LOCAL STREETS DURING THE TRANSPORTATION OF EQUIPMENT. SHOULD A SPILL OCCUR, THE CONTRACTOR SHALL REMOVE THE MATERIAL BY THE END OF THE WORK DAY. NO MATERIAL SHALL BE ALLOWED TO SET, DRY, OR BE WASHED INTO ADJACENT STORM WATER FACILITIES.

9. GEOTEXTILE FABRIC IS TO BE PLACED ON THE RIMS OF DRYWELLS, CATCH BASINS, AND INLETS UNTIL SUCH TIME AS THE VEGETATION ON THE SITE IS ESTABLISHED AND THE THREAT OF SEDIMENT DEPOSITION INTO THE DRAINAGE SYSTEM IS MITIGATED.

10. THE CONTRACTOR SHALL PROTECT ALL CATCH BASINS, DRYWELLS, AND OTHER STORM WATER STRUCTURES FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC OVER THE METAL FRAME DURING CONSTRUCTION AND KEEPING IT IN PLACE UNTIL THE SITE/STREET HAS BEEN PAVED AND CLEANED.

11. ALL PONDS/SWALES SHALL BE SODDED AND IRRIGATED.

12. CONTRACTOR SHALL INSTALL FILTER FABRIC FENCE AS NEEDED ON-SITE TO PREVENT SEDIMENTS FROM LEAVING THE SITE.

13. CONTRACTOR IS RESPONSIBLE FOR DESIGNING A LOCATION WHERE CONCRETE TRUCKS AND EQUIPMENT CAN BE WASHED OUT. WASHOUT AREA SHALL NOT BE LOCATED NEAR OR DRAIN INTO A STORM DRAINAGE AREA, TREATMENT AREA, OR FACILITY.

EROSION CONTROL MAINTENANCE NOTES:

1. SEDIMENT BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL PRODUCING RUNOFF AND AT LEAST DAILY DURING PROLONGED RAINFALL OF 24 CONTINUOUS HOURS OR 48 HOURS IN ANY ONE WEEK.

2. NECESSARY REPAIRS TO BARRIERS OR REPLACEMENT OF BARRIERS SHALL BE ACCOMPLISHED PROMPTLY.

3. SEDIMENT MUST BE REMOVED WHEN IT REACHES A HEIGHT OF 6 INCHES UP THE BASE OF THE FILTER FABRIC BARRIER, THE DEPTH OF THE CUTOFF DITCH, OR THE SEDIMENT POND. ALL EROSION CONTROL SHALL BE CHECKED AFTER ANY RAIN STORM.

4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE ESC STRUCTURE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED, AND HYDRO/HAND SEEDED OR SODDED.

5. ALL TEMPORARY AND PERMANENT ESC PRACTICES SHALL BE MAINTAINED AND PREPARED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.

6. ALL TEMPORARY ESC MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON-SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL WITHOUT PERMISSION OF THE ENGINEER OR INSPECTOR THAT RESULTS IN CONTAMINATION OF THE DRYWELLS SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO REMEDY. REMEDY MAY ENTAIL DRYWELL CLEANING OR REMOVAL AND RECONSTRUCTION.

GRADING NOTES:

1. EXCAVATION AND EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL REPORTS FOR THIS PROJECT AND ALL APPLICABLE REQUIREMENTS OF THE THE CITY OF SPOKANE STANDARD SPECIFICATIONS AND THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION). ALL COMPACTION OF SUBGRADES, ROCK, AND ASPHALT SHALL BE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD SPECIFICATIONS AND THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION) AND THE GEOTECH REPORT.

2. ALL FINISHED GRADING ELEVATIONS SHALL MATCH EXISTING ELEVATIONS AT THE SITE'S BOUNDARY, EXCEPT AS SHOWN OTHERWISE ON THE GRADING PLAN. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING.

3. EARTHWORK QUANTITIES HAVE NOT BEEN CALCULATED TO DETERMINE ESTIMATED VOLUMES OF EXCAVATION AND EMBANKMENT ON THIS PROJECT. CONTRACTOR IS RESPONSIBLE FOR CALCULATING THEIR OWN EARTHWORK QUANTITIES.

4. GRADING: ALL GRADING SHALL BE LIMITED TO THE AREAS IDENTIFIED IN THE GRADING PLAN AND SHALL NOT INFRINGE ON ADJACENT OWNERSHIPS.

5. CUT SLOPES IN SOLID ROCK SHALL NOT EXCEED 0.5H:1V (HORIZONTAL:VERTICAL), AND SOIL CUT SLOPES SHALL NOT EXCEED 2H:1V, EXCEPT AS SHOWN OTHERWISE ON THE PLANS. TEMPORARY SOIL CUT SLOPES SHALL NOT EXCEED 2H:1V.

6. FILL SLOPES ACROSS THE PROPERTY SHOULD BE DESIGNED FOR A MAXIMUM SLOPE OF 2H:1V, EXCEPT AS SHOWN OTHERWISE ON THE PLANS.

7. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL REPORTS BY ASPECT CONSULTING, LLC. (OCTOBER 25, 2019), FOR EXISTING SOIL CONDITIONS AND EARTHWORK RECOMMENDATIONS.

PAVING NOTES:

1. ALL CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD DRAWINGS AND SPECIFICATIONS, WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION), AND THE GEOTECHNICAL REPORTS BY ASPECT CONSULTING, LLC. (OCTOBER 25, 2019).

2. CONTRACTOR SHALL CONTACT ALL APPROPRIATE UTILITY COMPANIES AND THE CITY OF SPOKANE TO OBTAIN NECESSARY LOCATES 48 HOURS BEFORE CONSTRUCTION BEGINS.

3. NO VARIANCE FROM THE SPECIFICATIONS AND NOTES SHALL BE ACCEPTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE CITY OF SPOKANE.

4. CONCRETE, AGGREGATE BASE, AND ASPHALT MIX DESIGN SHALL BE SUBMITTED BY THE SUPPLIER AND APPROVED IN WRITING BY THE ENGINEER OF RECORD PRIOR TO ANY ROAD OR PARKING LOT CONSTRUCTION. MATERIALS SHALL BE IN CONFORMANCE WITH THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT.

5. REMOVAL OF EXISTING PAVEMENT MARKINGS SHALL BE ACCOMPLISHED BY A METHOD THAT DOES NOT MATERIALLY DAMAGE THE SURFACE OR TEXTURE OF THE PAVEMENT OR SURFACING. THE PAVEMENT MARKINGS SHALL BE REMOVED TO THE EXTENT THAT THEY WILL NOT BE VISIBLE UNDER DAY OR NIGHT CONDITIONS.

6. ALL EXISTING PAVEMENT SHALL BE REMOVED IN THE SECTIONS REQUIRING REMOVAL AND REPLACEMENT. THE EXISTING BASE COURSE MATERIALS IN THESE SECTIONS SHALL BE COMPACTED TO A MINIMUM OF 95% OF MODIFIED PROCTOR DRY DENSITY AT OPTIMUM MOISTURE CONTENT. ALL COMPACTION SHALL BE DONE IN ACCORDANCE WITH ASTM D-1557. THE NEW PAVEMENT SHALL BE REPLACED TO A DEPTH OF THE PAVEMENT DETAIL SHOWN ON THESE PLANS.

7. ASPHALT/CONCRETE PAVING SHALL CONFORM TO WSDOT STANDARD SPECIFICATIONS (LATEST EDITION) DIVISION 9, HMA CLASS 1/2". ASPHALT PAVED AREAS SHALL BE ASPHALT/CONCRETE PAVEMENT PLACED OVER A FREE-DRAINING, COMPACT, GRANULAR BASE MATERIAL.

8. ALL AREAS TO BE PAVED SHALL BE CLEARED OF ALL GRASS, ROOTS, TRASH, METAL AND ORGANIC MATERIALS DOWN TO FULL DEPTH BELOW THE PAVING MAT. THE EXPOSED SURFACE SHOULD THEN BE PROOF ROLLED TO 90% OF MAXIMUM COMPACTION AS DETERMINED BY ASTM D-1557 USING A MECHANICAL VIBRATORY COMPACTOR. ANY BACK FILL MATERIAL SHOULD BE SIMILARLY COMPACTED.

9. BEFORE PLACING THE BASE MATERIAL, THE SURFACE OF THE SUBGRADE SHALL BE COMPACTED AS SPECIFIED IN THE GEOTECHNICAL REPORT.

10. BITUMINOUS TACK COAT SHALL BE APPLIED BETWEEN ASPHALT PAVING LIFTS AND SHALL BE USED PRIOR TO OVERLAY, (CSS-1H), 50:50 DILUTION, 0.05 GAL/SY TO 0.15 GAL/SY OR AS DIRECTED BY THE ENGINEER. ALL EDGES ABUTTING NEW PAVEMENT SHALL BE TACKED.

11. ALL PAVEMENT SHALL BE COMPACTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. TESTS SHALL BE CONDUCTED AT 100 FOOT INTERVALS OR 1 PER 3000 SQUARE FEET FOR EACH LIFT OR AS DIRECTED BY THE ENGINEER. ALL TEST REPORTS SHALL BE SUBMITTED TO THE CITY OF SPOKANE PRIOR TO PROOF ROLLS. SINGLE-AXLE 5-TON TRUCK PROOF ROLLS MONITORED BY THE CITY OF SPOKANE PRIOR TO PLACEMENT OF ROAD/PARKING LOT BASE AND ASPHALT ARE REQUIRED. CONCRETE AND ASPHALT TESTING SHALL BE AS DIRECTED BY THE CITY OF SPOKANE'S INSPECTOR.

12. ALL VALVE AND MANHOLE COVERS SHALL BE ADJUSTED TO PAVEMENT GRADE DURING INITIAL CONSTRUCTION.

13. ALL CONCRETE EDGES MUST BE ROUNDED TO A 1/4 INCH RADIUS, EXCEPT WHERE SHOWN OTHERWISE ON DRAWINGS. ALL ASPHALT SHALL BE 1/4 INCH ABOVE CONCRETE EDGES, MANHOLES, AND VALVES.

14. ALL PHASES OF WORK SHALL BE INSPECTED AND APPROVED BY THE CITY OF SPOKANE.

15. ALL TRAFFIC CONTROL, IF REQUIRED, SHALL CONFORM TO THE APPLICABLE REGULATIONS SET FORTH IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

16. ALL THE OPERATIONS SHALL CONFORM TO THE APPLICABLE REGULATIONS SET FORTH BY ICC AND OSHA.

STORM WATER NOTES:

1. DRAINAGE PONDS SHALL BE CONSTRUCTED PER THE REQUIREMENTS OF THESE DRAWINGS INCLUDING GRADING, SOD OR SEED AS NOTED, AND CATCH BASIN INSTALLATION. NO BARK, GRAVEL OR CINDERS ARE ALLOWED IN PONDS.

2. CONTRACTOR SHALL CONTACT GEOTECHNICAL ENGINEER OF RECORD DURING SWALE AND DRYWELL CONSTRUCTION TO VERIFY SOIL CONDITIONS MEET SPOKANE REGIONAL STORM WATER MANUAL REQUIREMENTS.

3. ALL DRAINAGE PONDS WITHIN THE SCOPE OF THIS PROJECT SHALL BE COMPLETED DURING THE CONSTRUCTION OF THE PARKING AREAS. THE CONTRACTOR SHALL PERFORM THE POND GRADE WORK AND INSTALL THE IRRIGATION SYSTEM AND SOD OR HYDROSEED FOLLOWING THE ROADWAY/PARKING AREA PAVING WORK.

4. ALL DRAINAGE PONDS SHALL BE IRRIGATED BY AN AUTOMATIC IRRIGATION SYSTEM INSTALLED BY OR UNDER THE DIRECTION OF THE LANDSCAPE CONTRACTOR. THE IRRIGATION IS TO COMPLY WITH ALL LOCAL CODES AND ORDINANCES (90 DAY GUARANTEE). AN APPROVED BACKFLOW DEVICE SHALL BE INSTALLED TO PREVENT WATER FROM GOING BACK INTO THE WATER SUPPLY. SEE IRRIGATION PLAN.

5. THE FLOOR OF THE GRASSED PERCOLATION AREA (GPA) POND INCLUDES THE LEVEL PORTION OF THE FLOOR OF THE POND, AND THE SIDESLOPES OF THE POND OVERFLOW ELEVATION OR TOP OF DRYWELL. THE SOIL LOCATED IN THE FLOOR OF THE CONTAINMENT POND SHALL BE A MEDIUM TO WELL-DRAINING MATERIAL, WITH A MINIMUM INFILTRATION RATE OF 0.5 INCHES PER HOUR.

6. SLEEVING: PROVIDE SLEEVING AS REQUIRED UNDER SIDEWALKS, PATHS, CURBING, PAVING, ETC. AS NEEDED FOR IRRIGATION ACCESS. ALL SLEEVING SHALL BE 4" PVC WITH AT LEAST 12" OF COVER (1) FOOT BELOW FINISHED GRADE. THE OWNER/GENERAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING SLEEVING BEFORE CURBING, SIDEWALKS, PAVING, ETC. IS INSTALLED. PATCH ASPHALT AS NEEDED. SEE IRRIGATION PLAN.

7. ADJUSTMENT: AFTER INSTALLATION, ADJUST VALVES, HEADS, EMITTERS ETC. TO PROVIDE UNIFORM COVERAGE AND TO MINIMIZE OVERSPRAY ON WALLS, FENCES, WALKS, DRIVES, ETC.

8. POND BOTTOM ELEVATIONS SHOWN ON THESE PLANS ARE FINISHED GRADE. CONTRACTOR SHALL ROUGH GRADE ALL PONDS TO 0.2' BELOW ELEVATIONS SHOWN TO ALLOW FOR FINAL PLACEMENT OF SOD, OR ESTABLISHMENT OF PLANTINGS.

9. RIM ELEVATIONS OF DRAINAGE STRUCTURES SHALL BE INSTALLED SO THAT RIMS MAY BE ADJUSTED ±0.5 FEET TO MATCH FINISHED GRADE.

10. STORM SEWER PIPE SHALL BE PVC ASTM D 3034, SDR 35, OR ASTM F 789 WITH PUSH-ON JOINTS AND RUBBER GASKETS CONFORMING TO ASTM D 3212 AND ASTM F 477 UNLESS OTHERWISE SPECIFIED IN THESE PLANS. PROVIDE TRENCHING AND BEDDING PER CITY OF SPOKANE STANDARDS.

11. STORM WATER FACILITIES, INCLUDING DRYWELLS, CB'S, AND PIPES, MUST BE CONSTRUCTED UNDER THE SUPERVISION OF THE WASTEWATER MANAGEMENT DIVISION. STORM WATER TREATMENT FACILITIES (BIO-INFILTRATION SWALES AND BIO-RETENTION AREAS) SHALL BE INSPECTED PRIOR TO PLACEMENT OF TOPSOIL, PLANTINGS, OR GRASS. THE CONTRACTOR SHALL CONTACT THE WASTEWATER MAINTENANCE DIVISION OFFICE AT (509) 625-7905 OR (509) 625-7912 IN ORDER TO ARRANGE A MUTUALLY AGREEABLE INSPECTION SCHEDULE.

12. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO PROTECT THE INFILTRATION CAPACITY OF STORM WATER FACILITIES (E.G., LINE THE FACILITY WITH FILTER FABRIC, OVER-EXCAVATE UPON COMPLETION OF THE INFRASTRUCTURE, ETC.).

SEWER NOTES:

1. ALL SEWER CONSTRUCTION PROCEDURES AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF SPOKANE CONSTRUCTION SPECIFICATIONS.

2. ALL SIDE SEWER LINES SHALL BE 6", OR AS INDICATED ON THE PLANS.

3. ALL SEWER MAINS AND SERVICE LINES SHALL BE LOCATED TO MEET STATE SEPARATION REQUIREMENTS.

4. ANY SIDE SEWER THAT DOES NOT MAINTAIN A MINIMUM OF 18" COVER AT WATER MAIN CROSSINGS, OR WHERE THE SIDE SEWER MUST CROSS ABOVE THE WATER, SHALL BE SLEEVED WITH A CONTINUOUS 20' SECTION OF C900 PVC WATER PIPE CENTERED ON THE CROSSING.

5. SANITARY SEWER PIPE SHALL BE PVC ASTM D 3034, SDR 35, OR ASTM F 789 WITH PUSH-ON JOINTS AND RUBBER GASKETS CONFORMING TO ASTM D 3212 AND ASTM F 477. PROVIDE TRENCHING AND BEDDING PER CITY OF SPOKANE STANDARDS.

6. PRECAST MANHOLES SHALL MEET THE REQUIREMENTS OF ASTM C 478. MANHOLES SHALL BE TYPE 1-48" UNLESS OTHERWISE SPECIFIED ON THE PLANS. JOINTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C 443 AND SHALL BE GROUTED FROM THE INSIDE. LIFT HOLES SHALL BE GROUTED FROM THE INSIDE AND OUTSIDE.

7. SIDE SEWER SERVICES SHALL BE PVC, ASTM D 3034 SDR 35 WITH FLEXIBLE GASKETED JOINTS. SIDE SEWER CONNECTIONS SHALL BE MADE BY A TAP ON AN EXISTING MAIN OR WYE BRANCH FROM A NEW MAIN CONNECTED ABOVE THE SPRINGLINE OF THE PIPE.

8. ALL SEWER MAINS SHALL BE FIELD STAKED FOR GRADES AND ALIGNMENT BY A LICENSED ENGINEERING OR SURVEYING FIRM QUALIFIED TO PERFORM SUCH WORK.

9. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD CONSTRUCTION SPECIFICATIONS. ALL WATER AND SEWER MAINS AND LINES SHALL MEET STATE SEPARATION REQUIREMENTS.

10. ALL SEWER PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE FINAL GROUND SURFACE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING MARKED SANITARY SEWER, THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL.

11. UTILITY SEPARATIONS, INCLUDING WATER AND SEWER OR STORM CROSSINGS, SHALL BE IN ACCORDANCE WITH CITY OF SPOKANE STANDARD PLANS W-110, W-111, AND W-112 OR W-113.

12. PIPE BEDDING SHALL BE IN ACCORDANCE WITH DETAIL 6/C9.1 AND THE GEOTECHNICAL REPORT.

13. ALL SEWER WORK MUST BE DONE UNDER THE SUPERVISION AND INSPECTION OF THE WASTEWATER MANAGEMENT DIVISION. THE CONTRACTOR MUST CONTACT WASTEWATER MANAGEMENT MAINTENANCE DIVISION OFFICE IN ORDER TO ARRANGE A MUTUALLY AGREEABLE INSPECTION SCHEDULE. ALL FACILITIES MUST BE UNCOVERED AT THE TIME OF INSPECTION.

14. ALL SIDE SEWER CONNECTIONS SHALL BE INSTALLED PER CITY OF SPOKANE REQUIREMENTS.

WATER NOTES:

1. WATER LINES 4" AND LARGER SHALL BE DUCTILE IRON, CLASS 350 (AWWA C151 APPROVED) WITH RESTRAINED JOINTS AND CEMENT MORTAR LINING PER AWWA C104. FITTINGS SHALL BE AWWA C110 OR C153 DUCTILE IRON WITH MECHANICAL JOINTS.

2. WATERLINES SHALL BE INSTALLED WITH BOTTOM OF PIPE ELEVATIONS 5.5' BELOW FINISHED GRADE UNLESS OTHERWISE NOTED. PROVIDE TRENCHING AND BEDDING PER STANDARD SPECIFICATIONS. PIPE DEPTH SHALL BE MAINTAINED THROUGH SWALE SYSTEMS.

3. GATE VALVES 3" AND LARGER, SHALL BE RESILIENT SEATED, NON-RISING STEM O-RING SEALS. VALVE ENDS SHALL BE MECHANICAL JOINT OR ANSI FLANGES. VALVES SHALL CONFORM TO AWWA C509. PROVIDE CAST IRON TWO PIECE SLIDING COVERS FOR ALL VALVES. GATE VALVES SHALL BE RIGHT-TURN OPEN PER CITY OF SPOKANE STANDARD SPECIFICATIONS.

4. HYDRANTS SHALL CONFORM TO AWWA STANDARD C502-94 AND THE CITY OF SPOKANE SUPPLEMENTAL SPECIFICATIONS. ALL HYDRANTS SHALL BE BAGGED UNTIL SYSTEM IS APPROVED.

5. ALL PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE FINAL GROUND SURFACE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING MARKED WATER, THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL.

6. ALL WATER MAINS SHALL BE STAKED FOR GRADES AND ALIGNMENT BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK.

7. WHERE CONNECTIONS REQUIRE "FIELD VERIFICATION," CONNECTION POINTS SHALL BE EXPOSED BY THE CONTRACTOR AND FITTINGS VERIFIED 48 HOURS PRIOR TO DISTRIBUTION OF SHUT-DOWN NOTICES.

8. AT ANY CONNECTION TO AN EXISTING LINE WHERE A NEW VALVE IS NOT INSTALLED, THE EXISTING VALVE MUST BE PRESSURE TESTED PRIOR TO CONNECTION. IF AN EXISTING VALVE FAILS TO PASS THE TEST, THE CONTRACTOR SHALL MAKE THE NECESSARY PROVISIONS TO TEST THE NEW LINE PRIOR TO CONNECTION TO THE EXISTING SYSTEM OR INSTALL A NEW VALVE.

9. WHEN FIRE FLOW WILL BE INTERRUPTED, THE CITY OF SPOKANE FIRE DEPARTMENT SHALL BE GIVEN 24 HOURS NOTICE OF TIME AND LOCATIONS AFFECTED.

10. AFTER THE WATER LINES ARE CONSTRUCTED, TESTED, AND APPROVED, THE OWNER MAY APPLY FOR A WATER METER.

11. DEFLECTIONS AT PIPE JOINTS SHALL NOT EXCEED 75% OF MAXIMUM ALLOWED DEFLECTION, PER MANUFACTURER'S RECOMMENDATIONS.

12. THE CITY OF SPOKANE WATER DEPARTMENT WILL MAKE CONNECTIONS AND DISCONNECTIONS TO EXISTING WATER MAINS. CONTRACTOR SHALL PROVIDE ALL MATERIALS FOR CONNECTION, PAY ALL FEES, FURNISH ALL MATERIALS, AND INSTALL WATER LINES FROM CONNECTION POINT THROUGH DOUBLE CHECK VALVE ASSEMBLY (INCLUDING THE VAULT). CONTRACTOR SHALL FURNISH ALL MATERIALS, EXCAVATION, AND BACKFILL. SEE CITY OF SPOKANE STANDARD SPECIFICATIONS.

13. PIPE RESTRAINMENT SHALL BE INSTALLED AT ALL BENDS (VERTICAL AND HORIZONTAL), TEES, CROSSES, PLUGS, AND VALVES. THE RESTRAINMENT SHALL BE IN THE FORM OF ACCEPTABLE MANUFACTURED MECHANICAL RESTRAINT JOINTS, IN ACCORDANCE WITH CITY OF SPOKANE DESIGN STANDARDS, TABLE 8-A.

14. LOCATION OF EXISTING WATER MAINS AND SERVICES SHOWN ARE APPROXIMATE AND ARE BASED ON INFORMATION PROVIDED BY THE CITY OF SPOKANE. CONTRACTOR SHALL VERIFY ALL LOCATIONS PRIOR TO CONSTRUCTION.

15. NEW WATER LINES 2" AND LARGER SHALL BE PRESSURE TESTED AT NO LESS THAN 175 PSI (FIRE LINES NO LESS THAN 200 PSI) FOR A MINIMUM OF THREE (3) HOURS IN ACCORDANCE WITH CITY OF SPOKANE STANDARD CONSTRUCTION SPECIFICATIONS.

16. WATER SERVICES SHALL BE INSTALLED ABOVE THE BOTTOM OF FOOTING ELEVATIONS.

17. ALL UNDERGROUND FIRE LINES, OR FIRE SUPPRESSION SYSTEMS THAT ARE SEPARATED OR PROTECTED FROM THE POTABLE WATER SYSTEM, REQUIRE A STATE LEVEL III OR "U" LICENSED CONTRACTOR FOR INSTALLATION.

UTILITY NOTES:

1. CONTRACTOR SHALL COORDINATE WITH AVISTA UTILITIES FOR ALL NATURAL GAS AND/OR POWER SERVICE WORK ON THE PROJECT SITE.

2. CONTRACTOR SHALL COORDINATE WITH CENTURYLINK, COMCAST, LEVEL 3, AND ZAYO COMMUNICATIONS FOR ALL TELEPHONE SERVICE WORK ON THE PROJECT SITE.

3. RIM ELEVATIONS OF UTILITY STRUCTURES SHALL BE INSTALLED SO THAT RIM MAY BE ADJUSTED ±0.5 FEET TO MATCH FINISHED GRADES.

CONTRACTOR NOTE

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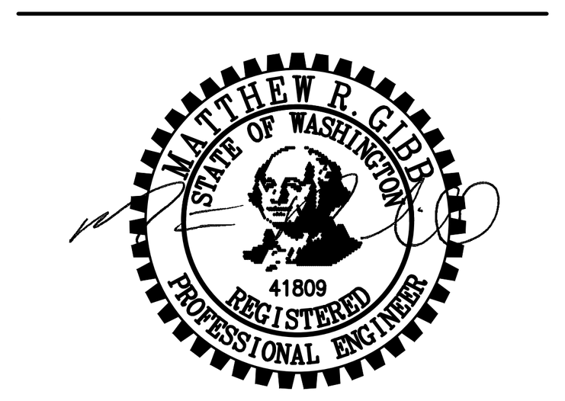

3/1/2021

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CIVIL / STRUCTURAL

BUILDING 2A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
4	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GENERAL NOTES

C-001

REFERENCE NOTES:

1. NO EXCAVATION EXCEPT FOR MINOR CLEARING AND GRUBBING SHALL TAKE PLACE WITHIN WSDOT BRIDGE PIER FOOTING RIGHT-OF-WAY
2. REMOVE EXISTING SIGN AND RETURN TO PROPERTY OWNER
3. REMOVE EXISTING GATE AND RETURN TO PROPERTY OWNER
4. RETAIN AND PROTECT EXISTING SANITARY SEWER
5. RETAIN AND PROTECT EXISTING STORM DRAIN
6. RETAIN AND PROTECT EXISTING DRY UTILITIES
7. RETAIN AND PROTECT EXISTING MONITORING WELLS
8. REMOVE EXISTING POWER POLE. COORDINATE WITH AVISTA UTILITIES.
9. RETAIN AND PROTECT EXISTING TRAIL.
10. DEMOLISH AND REMOVE EXISTING TRAIL.
11. REMOVE EXISTING BOLLARDS AND RETURN TO PROPERTY OWNER.
12. RETAIN AND PROTECT EXISTING FIRE HYDRANT.
13. RETAIN AND PROTECT EXISTING IRRIGATION BOXES.
14. EXISTING SIGN TO BE RELOCATED.
15. DEMOLISH AND REMOVE EXISTING ROCK RETAINING WALL.
16. RETAIN AND PROTECT EXISTING SIDEWALK.
17. RETAIN AND PROTECT EXISTING SWALE.
18. DEMOLISH AND REMOVE EXISTING SWALE.
19. RETAIN AND PROTECT EXISTING DRIVEWAY.
20. DEMOLISH AND REMOVE EXISTING DRIVEWAY.

120' BRIDGE AIRSPACE EASEMENT

28+00

JAMES KEEFE BRIDGE

STA: 26+97.01
OFFSET: 0.00 L

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

26+00

24+00

22+00

E. MARTIN LUTHER KING JR. WAY

RIM=1884.35'
60"I.E.(FLOW)=1863.45'

RIM=1884.54'
NO FLOW;
FULL OF WATER

RIM=1885.89

RIM(N)=1883.59'
RIM(S)=1883.80'
60"I.E.(FLOW)=1862.60'

BOTTOM OF BEAM ELEVATION=1913.61'

TOP OF SIGN ELEVATION=1954.25'

BEAM

GATE

HAMILTON STREET OVERHEAD BRIDGE

ERIE STREET (VACATED)

RIM=1884.06'

RIM=1884.07'

RIM=1884.17'

RIM=1883.

RIM=1885.77'

RIM=1886.75'

RIM=1887.82'

ERIE AVENUE

ON-SITE TBM:
SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE
ELEVATION = 1886.14' (NAVD88)

RIM=1894.22'

RIM=1893.56'

RIM=1891.43'

RIM=1891.30'

RIM=1891.42'

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

CONTRACTOR NOTE

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3/1/2021

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BUILDING 2A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

EXISTING SITE CONDITIONS & DEMOLITION PLAN

C-100

REFERENCE NOTES:

1. PROVIDE NEW CONSTRUCTION ENTRANCE AND CONCRETE WASHOUT AREA PER DETAIL 1/C-500.
2. PROVIDE TEMPORARY FILTER FABRIC FENCE PER DETAIL 2/C-500.
3. PLACE STEEL PLATES ON TOP OF DRAINAGE STRUCTURES AND BURY UNTIL TIME OF FINAL GRADING AND/OR PAVING, WHEN FRAMES AND GRATES CAN BE INSTALLED AND SET TO FINISHED GRADE.
4. PROVIDE NEW STRAW WATTLES PER DETAIL 5/C-500.

ENGINEER'S NOTES:

1. EROSION CONTROL MEASURES SHOWN ON THE PLAN ARE MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL INSTALL ADDITIONAL MEASURES, AS NEEDED, TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE OR FROM COMPROMISING THE PROPOSED/EXISTING STORM WATER FACILITIES.
2. SEE SHEET C-001 FOR ADDITIONAL ESC NOTES.
3. CONTRACTOR SHALL CONSTRUCT EROSION CONTROL FACILITIES BEFORE GRADING COMMENCES.
4. CONTRACTOR IS RESPONSIBLE FOR DESIGNATING A LOCATION WHERE CONCRETE TRUCKS OR EQUIPMENT CAN BE WASHED OUT. THIS AREA SHALL NOT BE LOCATED NEAR OR DRAINING INTO A STORM DRAINAGE AREA, TREATMENT AREA, DRAINAGE STRUCTURE OR OTHER STORM WATER FACILITIES EXISTING OR OTHERWISE.

CONTAMINATED SOILS EXPOSURE:

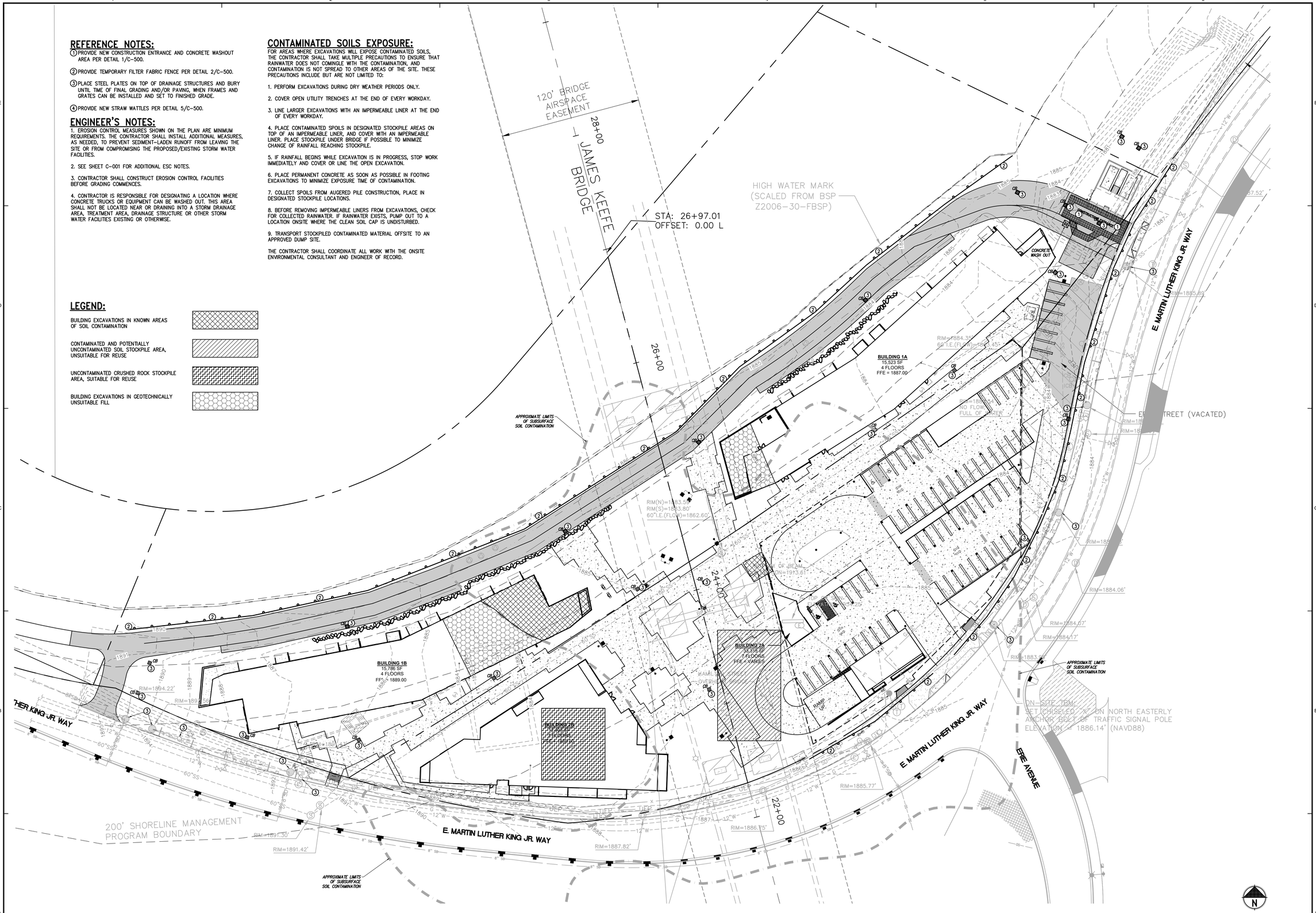
FOR AREAS WHERE EXCAVATIONS WILL EXPOSE CONTAMINATED SOILS, THE CONTRACTOR SHALL TAKE MULTIPLE PRECAUTIONS TO ENSURE THAT RAINWATER DOES NOT COMINGLE WITH THE CONTAMINATION, AND CONTAMINATION IS NOT SPREAD TO OTHER AREAS OF THE SITE. THESE PRECAUTIONS INCLUDE BUT ARE NOT LIMITED TO:

1. PERFORM EXCAVATIONS DURING DRY WEATHER PERIODS ONLY.
2. COVER OPEN UTILITY TRENCHES AT THE END OF EVERY WORKDAY.
3. LINE LARGER EXCAVATIONS WITH AN IMPERMEABLE LINER AT THE END OF EVERY WORKDAY.
4. PLACE CONTAMINATED SPOILS IN DESIGNATED STOCKPILE AREAS ON TOP OF AN IMPERMEABLE LINER, AND COVER WITH AN IMPERMEABLE LINER. PLACE STOCKPILE UNDER BRIDGE IF POSSIBLE TO MINIMIZE CHANGE OF RAINFALL REACHING STOCKPILE.
5. IF RAINFALL BEGINS WHILE EXCAVATION IS IN PROGRESS, STOP WORK IMMEDIATELY AND COVER OR LINE THE OPEN EXCAVATION.
6. PLACE PERMANENT CONCRETE AS SOON AS POSSIBLE IN FOOTING EXCAVATIONS TO MINIMIZE EXPOSURE TIME OF CONTAMINATION.
7. COLLECT SPOILS FROM AUGERED PILE CONSTRUCTION, PLACE IN DESIGNATED STOCKPILE LOCATIONS.
8. BEFORE REMOVING IMPERMEABLE LINERS FROM EXCAVATIONS, CHECK FOR COLLECTED RAINWATER. IF RAINWATER EXISTS, PUMP OUT TO A LOCATION ONSITE WHERE THE CLEAN SOIL CAP IS UNDISTURBED.
9. TRANSPORT STOCKPILED CONTAMINATED MATERIAL OFFSITE TO AN APPROVED DUMP SITE.

THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE ONSITE ENVIRONMENTAL CONSULTANT AND ENGINEER OF RECORD.

LEGEND:

- BUILDING EXCAVATIONS IN KNOWN AREAS OF SOIL CONTAMINATION
- CONTAMINATED AND POTENTIALLY UNCONTAMINATED SOIL STOCKPILE AREA, UNSUITABLE FOR REUSE
- UNCONTAMINATED CRUSHED ROCK STOCKPILE AREA, SUITABLE FOR REUSE
- BUILDING EXCAVATIONS IN GEOTECHNICALLY UNSUITABLE FILL



CONTRACTOR NOTE

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GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

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BUILDING 2A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

EROSION CONTROL PLAN

C-110

REFERENCE NOTES:

(1) PROVIDE ADA PAVEMENT MARKINGS AND SIGNAGE PER CITY OF S SPOKANE STANDARD PLANS G-54 AND G-80A. SEE DETAIL 1/C-501.

SITE DATA:

SITE ADDRESSES: 111, 115, 119, 225, 229 N ERIE STREET
PARCEL NOS. 35174.0601-0608

PRIMARY CONTACT: RUSTIN HALL - ALSC ARCHITECTS
203 N WASHINGTON, SUITE 400
SPOKANE, WA 99201
(509) 838-8568
rhall@alscarchitects.com

PROPERTY OWNER:SAGAMORE SPOKANE QOZP, LLC
1 EAST CAMELBACK ROAD, SUITE 200
PHOENIX, AZ 85012
(602) 549-4021
rhayes@bridgestonecap.com

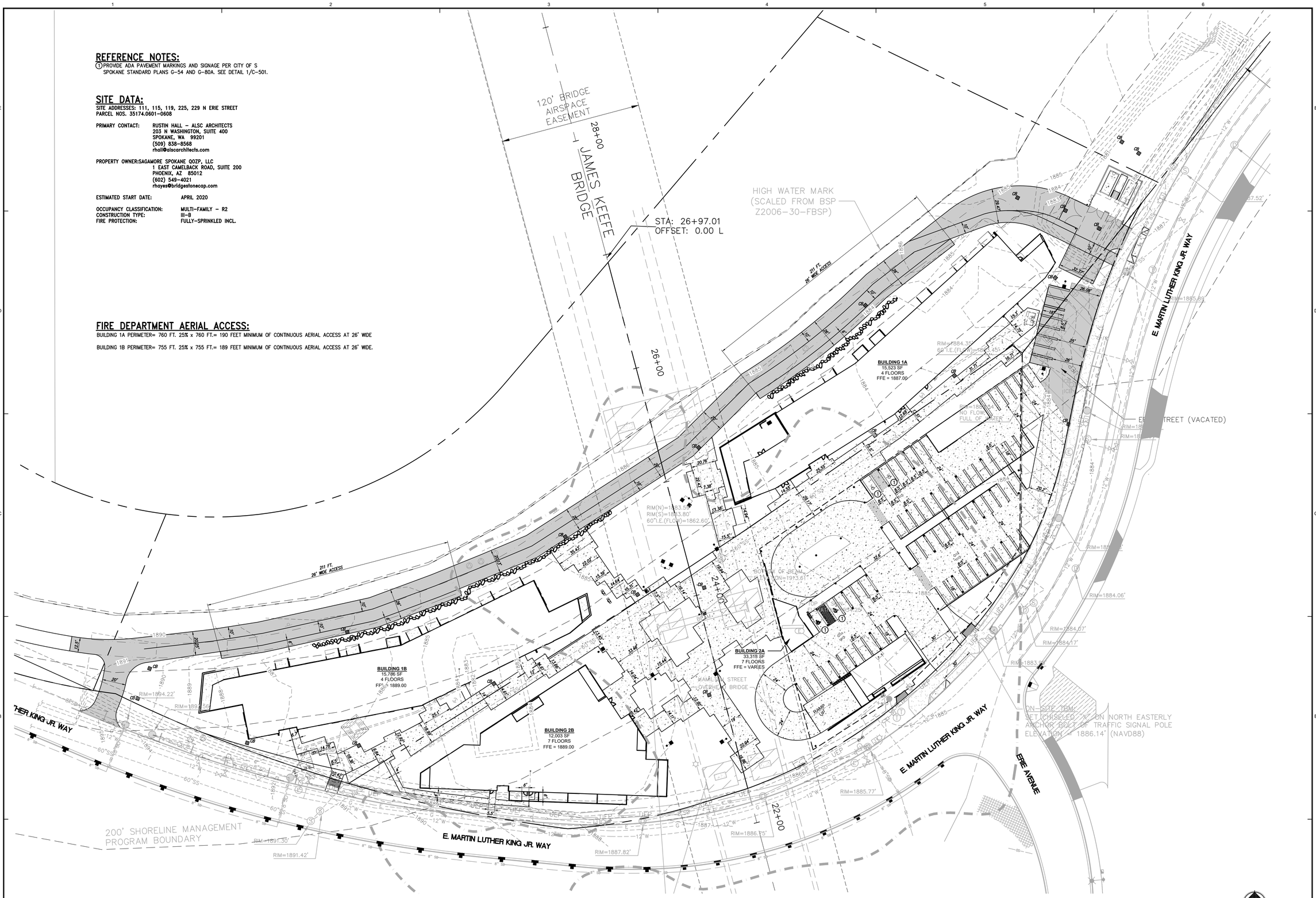
ESTIMATED START DATE: APRIL 2020

OCCUPANCY CLASSIFICATION: MULTI-FAMILY - R2
CONSTRUCTION TYPE: III-B
FIRE PROTECTION: FULLY-SPRINKLED INCL.

FIRE DEPARTMENT AERIAL ACCESS:

BUILDING 1A PERIMETER= 760 FT. 25% x 760 FT.= 190 FEET MINIMUM OF CONTINUOUS AERIAL ACCESS AT 26' WIDE

BUILDING 1B PERIMETER= 755 FT. 25% x 755 FT.= 189 FEET MINIMUM OF CONTINUOUS AERIAL ACCESS AT 26' WIDE.



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GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 inch = 30 ft.

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BUILDING 2A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

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PROJ. NO.	2018-050
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DATE	2/5/21

CIVIL SITE PLAN

C-120

REFERENCE NOTES:

1. PROVIDE NEW STANDARD DUTY ASPHALT PAVEMENT (3" AC ON 6" BASE). SEE DETAIL 5/C-500.
2. PROVIDE NEW CONCRETE CURB PER CITY OF SPOKANE STANDARD PLAN F-106.
3. PROVIDE NEW HEAVY DUTY ASPHALT PAVEMENT (4" AC ON 8" BASE). SEE DETAIL 5/C-500.
4. PROVIDE NEW CONCRETE CURB AND GUTTER PER CITY OF SPOKANE STANDARD PLAN F-106.
5. PROVIDE ADA RAMP PER CITY OF SPOKANE STANDARD PLAN F-102D.
6. PROVIDE CONCRETE SIDEWALK PER DETAIL 4/C-500.
7. PROVIDE CONCRETE TRASH ENCLOSURE PAD PER DETAIL 6/C-500. SEE ARCHITECTURAL PLANS.
8. PROVIDE NEW CONCRETE DRIVEWAY PER CITY OF SPOKANE STANDARD PLAN F-103. SEE DETAIL 2/C-501.
9. PROVIDE NEW CONCRETE SLAB. SEE STRUCTURAL PLANS.
10. PROVIDE 18" WIDE CONCRETE PASS-THROUGH TO FACILITATE DRAINAGE.
11. PROVIDE NEW ROCK RETAINING WALL PER ELEVATIONS SHOWN. SEE LANDSCAPE PLANS.

120' BRIDGE AIRSPACE EASEMENT

28+00

JAMES KEEFE BRIDGE

26+00

STA: 26+97.01
OFFSET: 0.00 L

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

BUILDING 1A
15,523 SF
4 FLOORS
FFE = 1887.00

BUILDING 1B
15,786 SF
4 FLOORS
FFE = 1889.00

BUILDING 2A
33,318 SF
7 FLOORS
FFE = VARIES

BUILDING 2B
12,003 SF
7 FLOORS
FFE = 1889.00

E. MARTIN LUTHER KING JR WAY

ERIE STREET (VACATED)

ERIE AVENUE

24+00

22+00

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

ON-SITE TRIM: SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE ELEVATION = 1886.14' (NAVD88)

GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

CONTRACTOR NOTE

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GRADING PLAN

C-130

REFERENCE NOTES:

1. PROVIDE INFILTRATION SWALE PER SPOKANE REGIONAL STORM WATER MANUAL REQUIREMENTS AND CITY OF SPOKANE STANDARD PLAN B-102F.
2. PROVIDE NEW 44'x44'x3' DEEP UNDERGROUND INFILTRATION GALLERY PER DETAIL 4/C-501.
3. PROVIDE 8" SDR35 PVC STORM DRAIN PIPE.
4. PROVIDE TYPE 1 CATCH BASIN PER CITY OF SPOKANE STANDARD PLAN B-101c. SEE DETAIL 3/C-501.
5. PROVIDE 6" SDR35 PVC STORM DRAIN PIPE.
6. PROVIDE RIP-RAP PAD FOR ENERGY DISSIPATION PER DETAIL 11/C5.0.
7. PROVIDE NEW CLEANOUT TO GRADE.
8. CONNECT TO BUILDING ROOF DRAIN. SEE PLUMBING PLANS.
9. PROPOSED FLOOR DRAIN. SEE PLUMBING PLAN.
10. PROVIDE NEW 15" SDR35 PVC PERFORATED PIPE
11. PROVIDE NEW 30'x115'x2' DEEP UNDERGROUND INFILTRATION GALLERY PER DETAIL 5/C-501.
12. PROVIDE NEW 12" SDR35 PVC STORM DRAIN PIPE.
13. PROVIDE NEW 15" SDR35 PVC STORM DRAIN PIPE.
14. PROVIDE NEW 12" SDR35 PVC PERFORATED PIPE.
15. PROVIDE NEW 8" DUCTILE IRON STORM DRAIN PIPE.

120' BRIDGE AIRSPACE EASEMENT

JAMES KEEFE BRIDGE

28+00

26+00

24+00

22+00

STA: 26+97.01
OFFSET: 0.00 L

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

110 LF 15" PERFORATED PIPE S= 0.00%

SWALE "A" BOTTOM ELEV.= 1881.00

RIM= 1881.50 I.E.= 1878.50

15 LF 15" PERFORATED PIPE S= 0.00%

RIM= 1881.50 15" I.E.= 1878.50

I.E.= 1881.00

75'± LF 15" SD LINE S= 0.50%

RIM= 1886.00 15" I.E.(N)= 1878.88 12" I.E.(W)= 1878.98 12" I.E.(S)= 1878.98

45'± LF 12" SD LINE S= 0.50%

RIM= 1885.00 12" I.E.(E)= 1879.10 12" I.E.(W)= 1879.20

160'± LF 12" SD LINE S= 0.50%

RIM= 1884.00 12" I.E.(E)= 1880.00 8" I.E.(W)= 1880.10

55'± LF 12" SD LINE RIM= 1886.50 12" I.E.(E)= 1881.15 12" I.E.(W)= 1881.25

E. MARTIN LUTHER KING JR. WAY

60'± LF 8" SD LINE S= 0.50% RIM= 1886.00 8" I.E.(N)= 1881.30 8" I.E.(S)= 1881.40

163'± LF 8" SD LINE S= 0.50%

RIM=1885.69

180'± LF 8" SD LINE S= 0.50%

125'± LF 12" SD LINE

RIM= 1886.50 12" I.E.(E)= 1881.98 8" I.E.(W)= 1882.08

RIM=1884.50 NO FLOW FULL OF WATER

RIM= 1886.00 8" I.E.(E)= 1881.00 8" I.E.(W)= 1881.10

BUILDING 1A
15,523 SF
4 FLOORS
FFE = 1887.00

85'± LF 8" SD LINE

RIM= 1886.50 8" I.E.(E)= 1882.50 8" I.E.(W)= 1882.50

60'± LF 8" SD LINE S= 0.50%

ERIE STREET (VACATED)

RIM=1884.50 8" I.E.(N)= 1882.20

135'± LF 8" SD LINE S= 0.50% RIM= 1885.00 8" I.E.(E)= 1881.78 8" I.E.(W)= 1881.88

RIM(N)=1883.55' RIM(S)=1883.80' 60"I.E.(FLOW)=1862.60'

60'± LF 8" SD LINE S= 0.50%

RIM= 1886.10 8" I.E.(W)= 1884.30 8" I.E.(S)= 1884.40

BOTTOM OF BEAM ELEVATION=1913.61'

190'± LF 8" SD LINE S= 0.50% RIM= 1887.00 8" I.E.(E)= 1882.83

44 LF 12" PERFORATED PIPE S= 0.00% RIM= 1888.00 12" I.E.= 1881.35

RIM= 1888.50 8" I.E.(W)= 1886.13 8" I.E.(E)= 1886.23

BUILDING 1B
15,786 SF
4 FLOORS
FFF = 1889.00

145'± LF 8" SD LINE S= 0.50%

RIM= 1886.10 8" I.E.(W)= 1883.95 8" I.E.(E)= 1884.05

95'± LF 8" SD LINE S= 0.50%

BUILDING 2A
33,319 SF
7 FLOORS
FFE = VARIES

RAMP UP STREET OVERHEAD BRIDGE

RAMP UP

RIM= 1888.50 12" I.E.(W)= 1881.85 12" I.E.(E)= 1881.95

90'± LF 12" SD LINE S= 0.50%

125'± LF 12" SD LINE S= 0.50%

RIM= 1888.40 12" I.E.(W)= 1883.15 8" I.E.(E)= 1883.25

BUILDING 2B
12,003 SF
7 FLOORS
FFE = 1889.00

RIM= 1886.60 8" I.E.(N)= 1884.95

RIM= 1888.50 12" I.E.(W)= 1882.40 12" I.E.(E)= 1882.50

ON-SITE ITEM: SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE ELEVATION = 1886.14' (NAVD88)

RIM=1884.06'

RIM=1884.07'

RIM=1884.17'

RIM=1883.83'

RIM=1885.77'

RIM=1886.75'

RIM=1887.82'

RIM=1891.42'

RIM=1891.35'

RIM=1888.00 12" I.E.= 1881.35

100'± LF 12" SD LINE S= 0.50%

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

E. MARTIN LUTHER KING JR. WAY

ERIE AVENUE

GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

CONTRACTOR NOTE

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CIVIL / STRUCTURAL

BUILDING 2A

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
A	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

STORM WATER PLAN

C-140

REFERENCE NOTES:

(1) PROVIDE 3" HDPE CTS SDR9 200 PSI DOMESTIC WATER SERVICE WITH 12 GAUGE TRACER WIRE AND PRESSURE REDUCING VALVE. COORDINATE WITH CITY BUILDING DEPARTMENT AT TIME OF BUILDING CONSTRUCTION.

(2) PROVIDE 8" DUCTILE IRON WATER MAIN WITH 5.5' MINIMUM DEPTH TO INVERT.

(3) TIE INTO EXISTING 8" WATER MAIN. CONTRACTOR SHALL FIELD LOCATE EXISTING TAP BY POTHOLE TO SELECT FINAL POSITION FOR METER VAULT.

(4) CAP 8" WATER MAIN.

(5) PROVIDE 8'x14' WATER METER VAULT PER DETAIL 8/C-500. WILBERT PRECAST #1923 OR EQUAL, WITH 42"x42" HALLIDAY ALUMINUM HATCH.

(6) PROVIDE 6" DUCTILE IRON FIRE SERVICE. COORDINATE BACK FLOW PREVENTION WITH CITY BUILDING DEPARTMENT AT TIME OF BUILDING CONSTRUCTION.

(7) PROVIDE SANITARY SEWER MANHOLE PER CITY OF SPOKANE STANDARD PLAN Z-101.

(8) TIE INTO EXISTING SANITARY SEWER MANHOLE WITH DROP PER DETAIL 7/C-500.

(9) PROVIDE 6" SDR35 PVC SANITARY SEWER MAIN.

(10) PROVIDE POST INDICATOR VALVE PER DETAIL 10/C-500.

(11) PROVIDE 5'x8' 1000 GALLON OIL-WATER SEPARATOR, WILBERT PRECAST #16270WTBS OR APPROVED EQUAL. SEE DETAIL 1/C-501.

(12) PROVIDE NEW FIRE HYDRANT PER CITY OF SPOKANE STANDARD PLAN Y-101.

(13) ABANDON EXISTING IRRIGATION LINE.

(14) PROVIDE 6" SDR35 PVC SEWER SERVICE WITH 3.5' MINIMUM COVER. SLOPE= 2.0% MINIMUM.

(15) PROVIDE SANITARY SEWER CLEANOUT.

(16) PROVIDE 8" 45° BEND.

(17) PROVIDE NEW NATURAL GAS SERVICE. COORDINATE WITH AVISTA UTILITIES.

(18) IRRIGATION SYSTEM POINT OF CONNECTION.

(19) PROVIDE 8" GATE VALVE.

(20) PROVIDE 8" x 6" TEE.

(21) PROVIDE 6" DUCTILE IRON WATER MAIN WITH 5.5' MINIMUM DEPTH TO INVERT.

(22) PROVIDE 6" 45° BEND.

(23) PROPOSED SITE LIGHTING. SEE ELECTRICAL PLANS

(24) PROPOSED ELECTRICAL TRANSFORMERS. SEE ELECTRICAL PLANS.

(25) PROVIDE BUILDING MOUNTED FIRE DEPARTMENT CONNECTION.

(26) EXISTING FIRE HYDRANT.

(27) RELOCATE FIRE HYDRANT INTO RIGHT-OF-WAY.

(28) PROVIDE NEW UNDERGROUND ELECTRICAL SERVICE. SEE ELECTRICAL PLANS. COORDINATE WITH AVISTA UTILITIES.

(29) TIE INTO EXISTING SEWER STUB. CONTRACTOR SHALL FIELD VERIFY SIZE, DEPTH, AND SLOPE OF SANITARY SEWER STUB BEFORE STARTING CONSTRUCTION. (A)

REFERENCE NOTES:

(30) CONSTRUCT PROTECTUS METER SIGNAL 3' ABOVE GROUND NEXT TO BOLLARD, AT LOCATION SHOWN. ALL CONDUIT BENDS SHALL BE SWEEPS, NOT ELBOWS. PROVIDE AND ATTACH A 16" LONG TREATED 2X6 TO FACE OF BOLLARD JUST BELOW ITS TOP (BOARD LENGTH PARALLEL TO GROUND, FACING NEAREST STREET) TO MOUNT THE METER TRANSMITTERS. BOLLARD PER DETAIL 7/C-501.

(31) PROVIDE 6" GATE VALVE.

(32) PROVIDE 8" SDR35 PVC SANITARY SEWER LINE. LENGTH AND SLOPE PER PLAN.

(33) PROVIDE 2" HDPE WATER SERVICE STUB FOR FUTURE WATER FEATURE (A)

ENGINEER'S NOTES:

1. WATER SERVICES SHALL MEET CURRENT BACKFLOW STANDARDS PER WAC 246-290-490 AND FOLLOW CITY OF SPOKANE WATER DEPARTMENT RULES AND REGULATIONS FOR WATER SERVICE INSTALLATIONS.

2. ON-PROPERTY SITE WATER LINES SHALL BE INSPECTED BY CITY WATER PRIOR TO BACKFILL.

3. ALL WATER-SEWER CROSSINGS SHALL CONFORM TO CITY OF SPOKANE STANDARD PLAN A-5.

4. NO JOINTS IN WATER LINES ALLOWED WITHIN 5' OF FOUNDATION; COORDINATE LOCATION FOR END OF SERVICE STUB AND PIV DURING MANDATORY PRE-CONSTRUCTION MEETING WITH WATER DEPT (REQUIRED MIN. TWO WEEKS BEFORE CONSTRUCTION START).

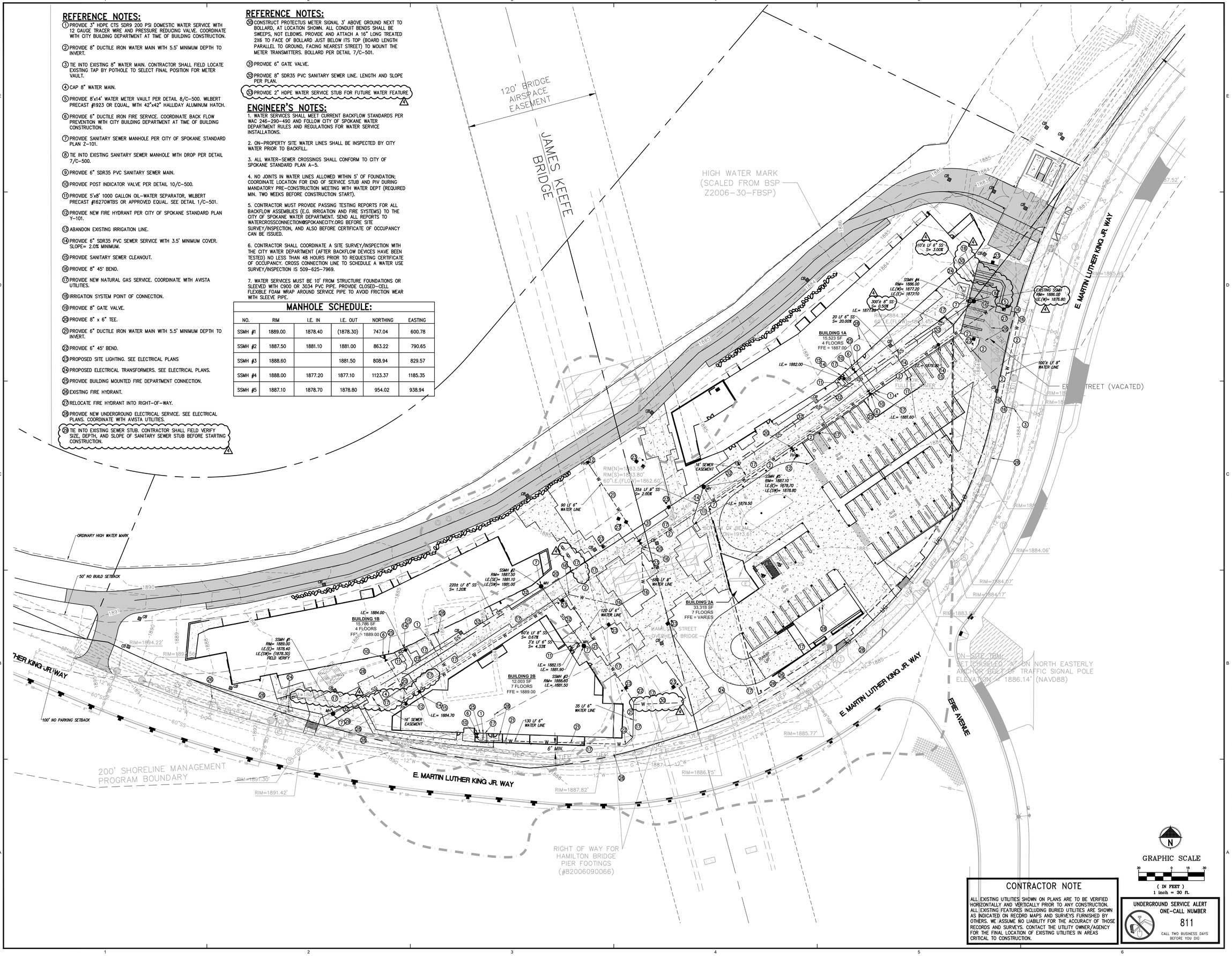
5. CONTRACTOR MUST PROVIDE PASSING TESTING REPORTS FOR ALL BACKFLOW ASSEMBLIES (E.G. IRRIGATION AND FIRE SYSTEMS) TO THE CITY OF SPOKANE WATER DEPARTMENT. SEND ALL REPORTS TO WATERCROSSCONNECTION@SPOKANECITY.ORG BEFORE SITE SURVEY/INSPECTION, AND ALSO BEFORE CERTIFICATE OF OCCUPANCY CAN BE ISSUED.

6. CONTRACTOR SHALL COORDINATE A SITE SURVEY/INSPECTION WITH THE CITY WATER DEPARTMENT (AFTER BACKFLOW DEVICES HAVE BEEN TESTED) NO LESS THAN 48 HOURS PRIOR TO REQUESTING CERTIFICATE OF OCCUPANCY. CROSS CONNECTION LINE TO SCHEDULE A WATER USE SURVEY/INSPECTION IS 509-625-7969.

7. WATER SERVICES MUST BE 10' FROM STRUCTURE FOUNDATIONS OR SLEEVED WITH C900 OR 3034 PVC PIPE. PROVIDE CLOSED-CELL FLEXIBLE FOAM WRAP AROUND SERVICE PIPE TO AVOID FRICTION WEAR WITH SLEEVE PIPE.

MANHOLE SCHEDULE:

NO.	RIM	I.E. IN	I.E. OUT	NORTHING	EASTING
SSMH #1	1889.00	1878.40	(1878.30)	747.04	600.78
SSMH #2	1887.50	1881.10	1881.00	863.22	790.65
SSMH #3	1888.60		1881.50	808.94	829.57
SSMH #4	1888.00	1877.20	1877.10	1123.37	1185.35
SSMH #5	1887.10	1878.70	1878.80	954.02	938.94



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(IN FEET)
1 inch = 30 ft.

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RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

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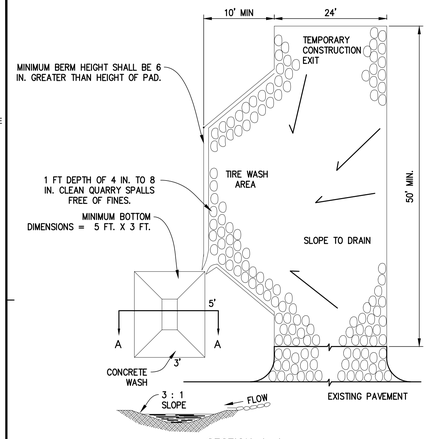
DATE	2/5/21

UTILITY PLAN

C-150



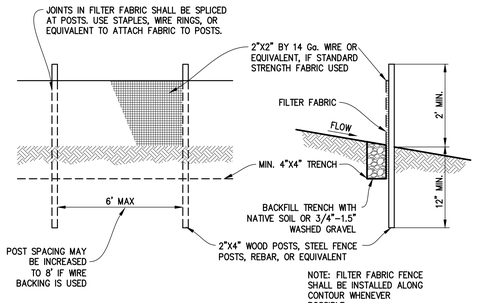
SECTION A–A

NOTES:

1. TIRE WASH AREA MUST BE INSTALLED ADJACENT TO AND DOWN GRADIENT FROM TEMPORARY CONSTRUCTION EXIT AND AS CLOSE TO EXISTING PAVEMENT AS POSSIBLE.
2. MORE TRUCK TRAFFIC MAY REQUIRE A LARGER AREA.

CONSTRUCTION ENTRANCE 1

SCALE : NTS



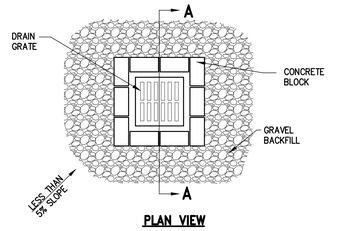
NOTE: FILTER FABRIC FENCE SHALL BE INSTALLED ALONG CONTOUR WHENEVER POSSIBLE.

MAINTENANCE STANDARDS:

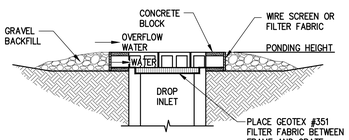
1. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.
2. IF CONCENTRATED FLOWS ARE EVIDENT UPHILL OF THE FENCE, THEY MUST BE INTERCEPTED AND CONVEYED TO A SEDIMENT TRAP OR POND.
3. IT IS IMPORTANT TO CHECK THE UPHILL SIDE OF THE FENCE FOR SIGN OF THE FENCE CLOGGING AND ACTING AS A BARRIER TO FLOW AND THEN CAUSING CHANNELIZATION OF FLOWS PARALLEL TO THE FENCE. IF THIS OCCURS, REPLACE THE FENCE AND/OR REMOVE THE TRAPPED SEDIMENT.
4. SEDIMENT MUST BE REMOVED WHEN THE SEDIMENT IS 6" HIGH.
5. IF THE FILTER FABRIC HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN, IT SHALL BE REPLACED.

FILTER FABRIC FENCE DETAIL 2

SCALE : NTS



PLAN VIEW



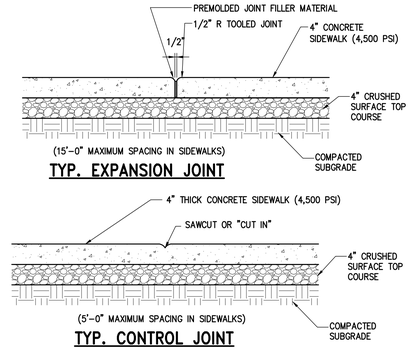
SECTION A–A

NOTES:

1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. EXCAVATE A BASIN OF SUFFICIENT SIZE ADJACENT TO THE DROP INLET.
3. THE TOP OF THE STRUCTURE (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BYPASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

INLET PROTECTION DETAIL 3

SCALE : NTS



TYP. EXPANSION JOINT

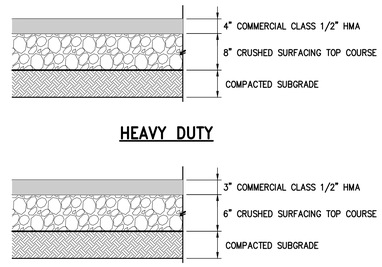
TYP. CONTROL JOINT

NOTES:

1. SUBGRADE AND 4" CRUSHED GRAVEL MUST BE PROPERLY COMPACTED TO PREVENT FUTURE DIFFERENTIAL SETTLING OF SIDEWALK.
2. SEE ARCHITECTURAL SITE PLANS FOR JOINT TYPES AND LOCATIONS IN CONCRETE SIDEWALK AREAS.

CONCRETE SIDEWALK DETAIL 4

SCALE : NTS

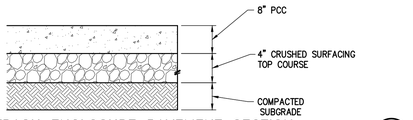


HEAVY DUTY

STANDARD DUTY

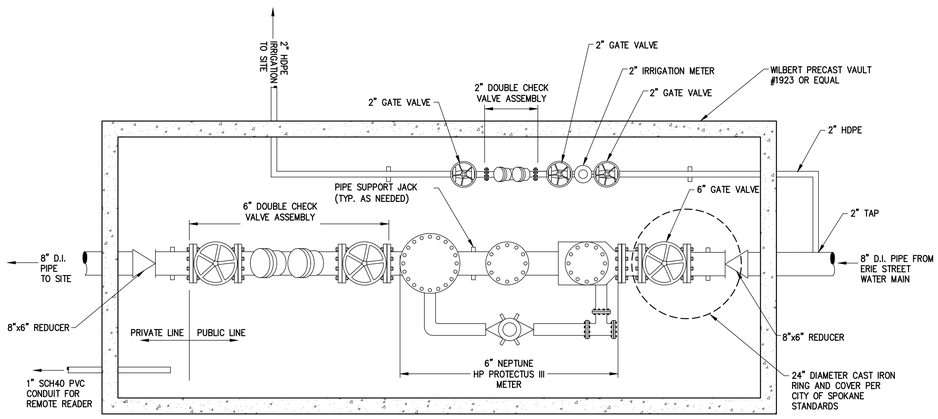
ASPHALT PAVEMENT SECTIONS 5

SCALE : NTS



TRASH ENCLOSURE PAVEMENT SECTION 6

SCALE : NTS

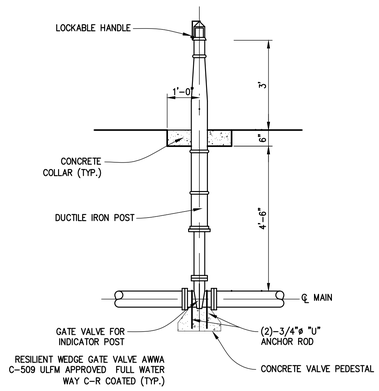


NOTES:

1. CONTRACTOR SHALL INSTALL VAULT, BACKFILL, AND COMPACT PER PROJECT SPECIFICATIONS. CITY OF SPOKANE SHALL INSTALL ALL PIPING AND APPURTENANCES.
2. ALL PIPES THROUGH WALLS AND TOP SHALL BE GROUTED AND SEALED. ALL PIPING 3" AND LARGER SHALL BE DUCTILE IRON CLASS 50.

WATER VAULT DETAIL 8

SCALE : NTS

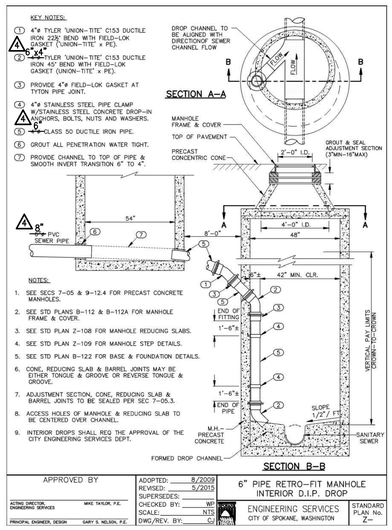


NOTE:

1. P.I.V. MUST HAVE A TAMPER SWITCH WITH 1" SCH40 PVC CONDUIT TO FIRE ALARM PANEL. SEE ELECTRICAL PLANS.

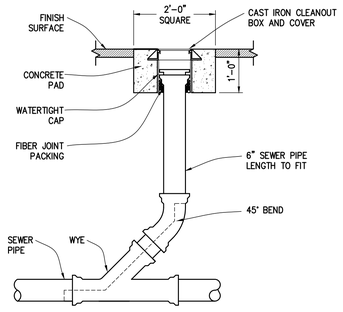
POST INDICATOR VALVE (P.I.V.) 10

SCALE : NTS



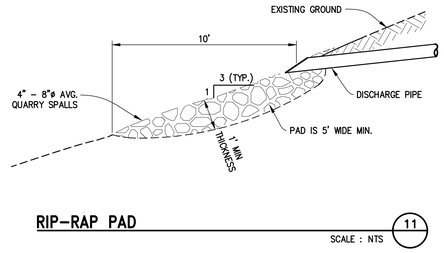
DROP MANHOLE 7

SCALE : NTS



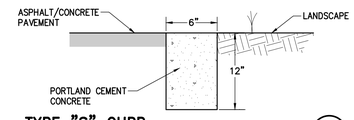
TYPICAL CLEANOUT 9

SCALE : NTS



RIP–RAP PAD 11

SCALE : NTS



TYPE "S" CURB 12

SCALE : NTS

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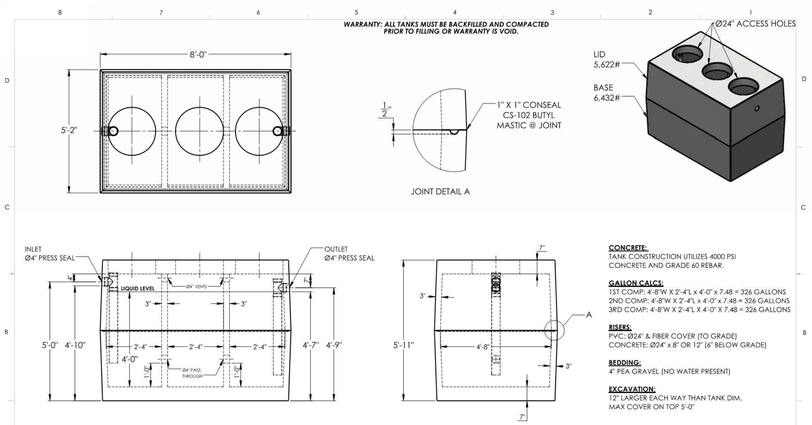
DATE	2/5/21

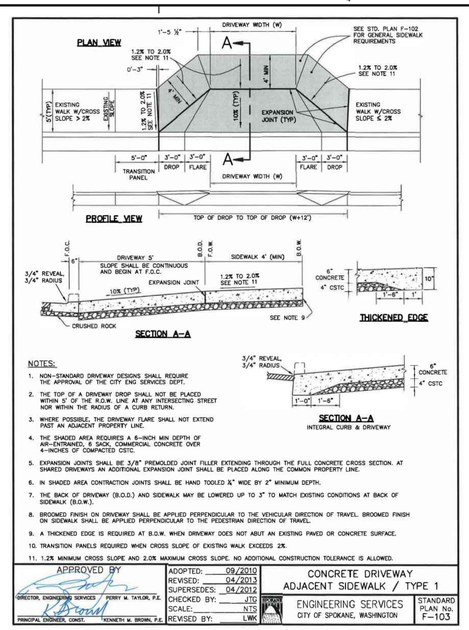
DETAILS

C-500



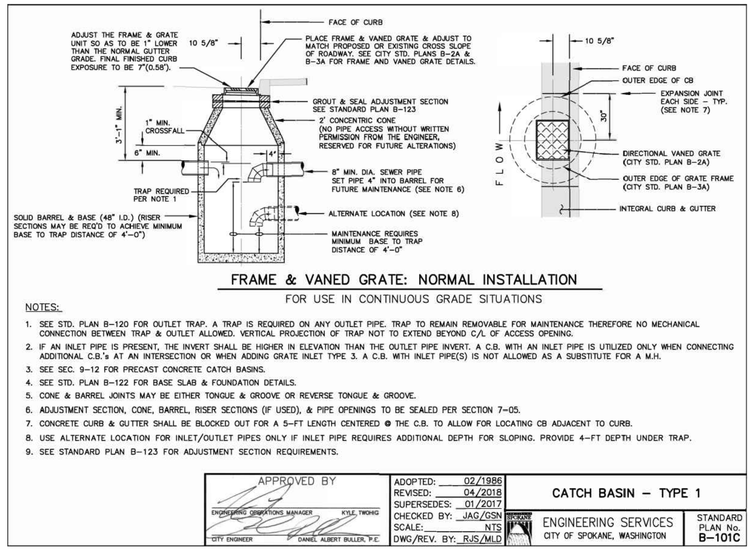
OIL/WATER SEPARATOR

SCALE : NTS (1)



CONCRETE DRIVEWAY

SCALE : NTS (2)

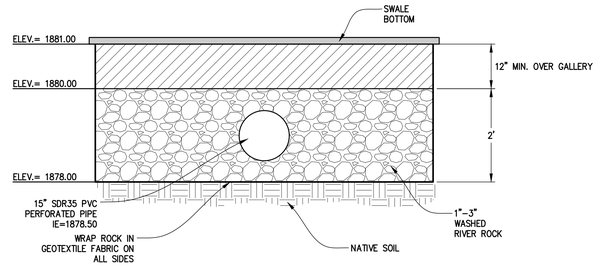


FRAME & VANED GRATE: NORMAL INSTALLATION

FOR USE IN CONTINUOUS GRADE SITUATIONS

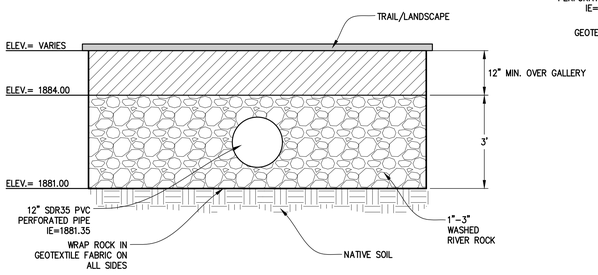
CATCH BASIN TYPE "1"

SCALE : NTS (3)



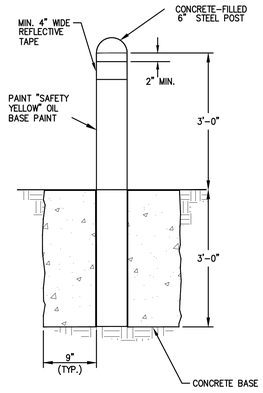
GRAVEL INFILTRATION GALLERY SECTION A

SCALE : NTS (5)



GRAVEL INFILTRATION GALLERY SECTION B

SCALE : NTS (4)

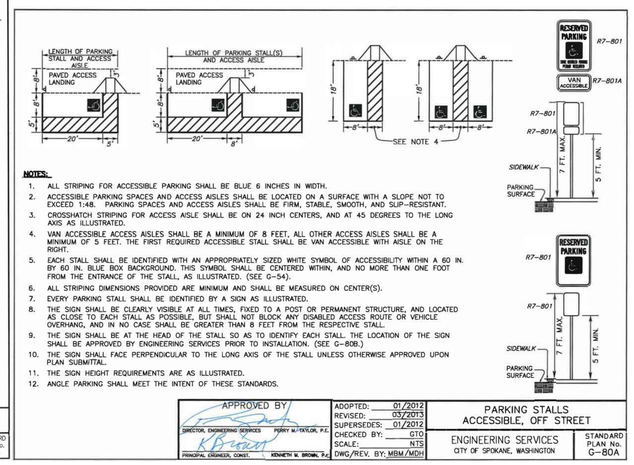


BOLLARD DETAIL

SCALE : NTS (7)

ADA SIGNAGE AND STRIPING

SCALE : NTS (6)



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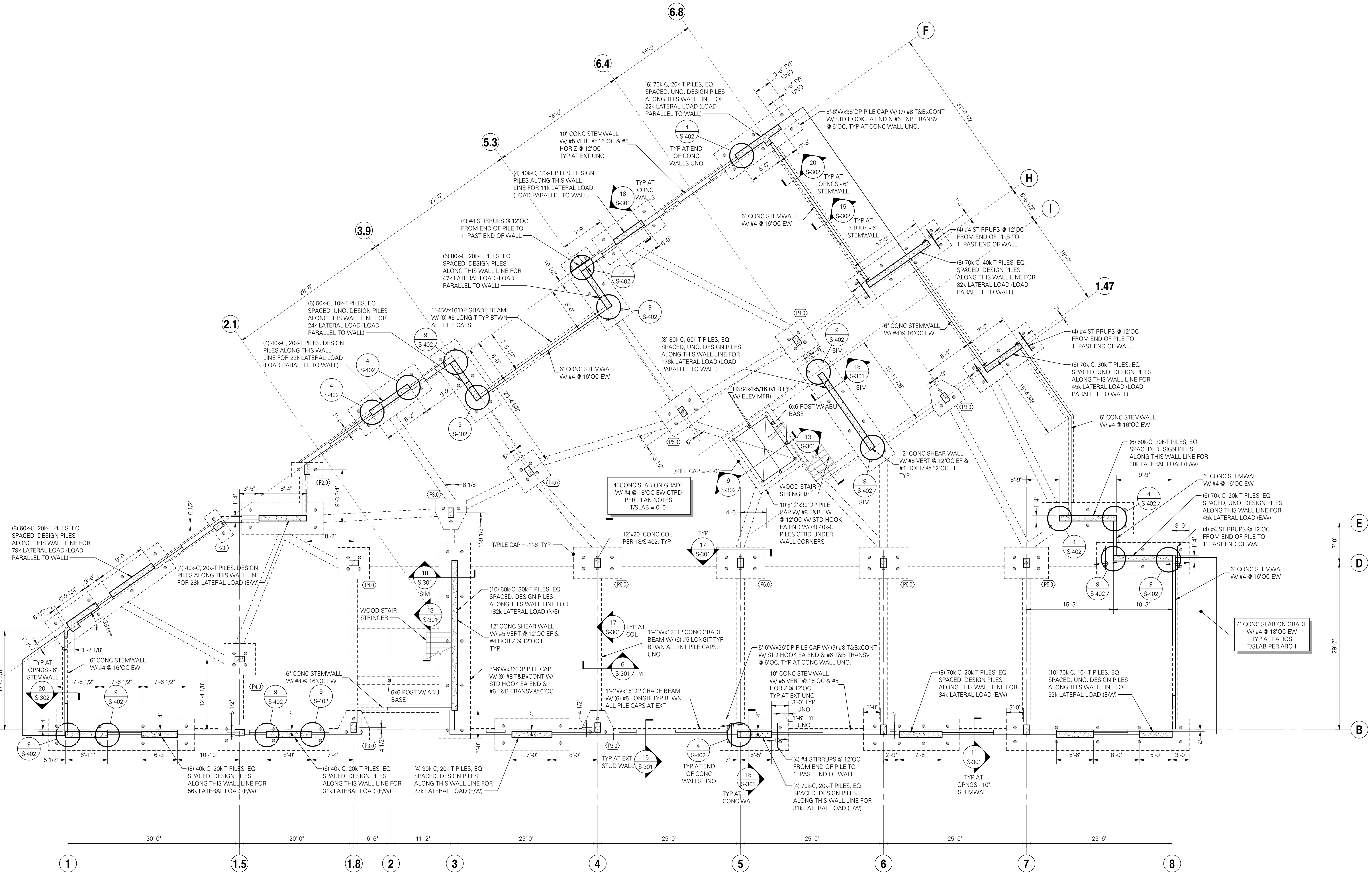
DETAILS

C-501



FOUNDATION PLAN NOTES:

1. STRUCTURAL GENERAL NOTES, DESIGN CRITERIA, ABBREVIATIONS AND LEGEND PER S-001, S-002 AND S-003.
2. VERIFY ALL DIMENSIONS AND ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS.
3. CONTRACTOR SHALL LOCATE AND VERIFY THE FOLLOWING WITH OTHERS PRIOR TO POURING CONCRETE: ALL DOOR OPENINGS IN FOUNDATION WALLS; DRAINS AND SLOPES; BLOCKOUTS FOR [POOLS, SPAS, FREEZERS, COOLERS, PLUMBING, SPRINKLERS AND HVAC]. ALL DUCTS, CHASES AND PIPES PER MECHANICAL, PLUMBING, ELECTRICAL AND SPRINKLER DRAWINGS. STAIR DETAILS AND GUARDRAILS PER ARCHITECTURAL DRAWINGS.
4. TOP OF SLAB (T/SLAB) ELEVATION ASSUMED 0'-0". FOR ACTUAL T/SLAB ELEVATION REFER TO CIVIL AND ARCHITECTURAL DRAWINGS. PROVIDE 6 MIL VAPOR BARRIER BELOW SLAB AT INTERIOR SPACES. PROVIDE FREE-DRAINING GRANULAR FILL PER GEOTECH REPORT.
5. ALL SLABS TO BEAR ON COMPETENT NATIVE SOIL AND/OR STRUCTURAL FILL. SUBGRADE PREPARATION, STRUCTURAL FILL, FOOTING DRAINS, VAPOR BARRIER AND OTHER REQUIREMENTS PER GEOTECH REPORT AS NOTED IN THE STRUCTURAL GENERAL NOTES.
6. CJ INDICATES CONTROL JOINT PER PLAN.
7. MOISTURE PROOF ALL CONCRETE STEM AND BASEMENT WALLS PER ARCHITECT.
8. STEEL STAIRS SHALL BE BIDDER-DESIGNED, UNO. APPLICABLE DESIGN REQUIREMENTS PER STRUCTURAL GENERAL NOTES.
9. ELEVATOR STEEL AND CONNECTIONS ARE PROVIDED FOR BUDGET PURPOSES ONLY AND ARE PRELIMINARY. THE PROPOSED STRUCTURAL MEMBERS AND THEIR CONNECTIONS SHALL BE CONFIRMED ONCE FINAL ELEVATOR REACTIONS ARE PROVIDED TO THE STRUCTURAL ENGINEER OF RECORD.
10. TYPICAL DETAILS PER:

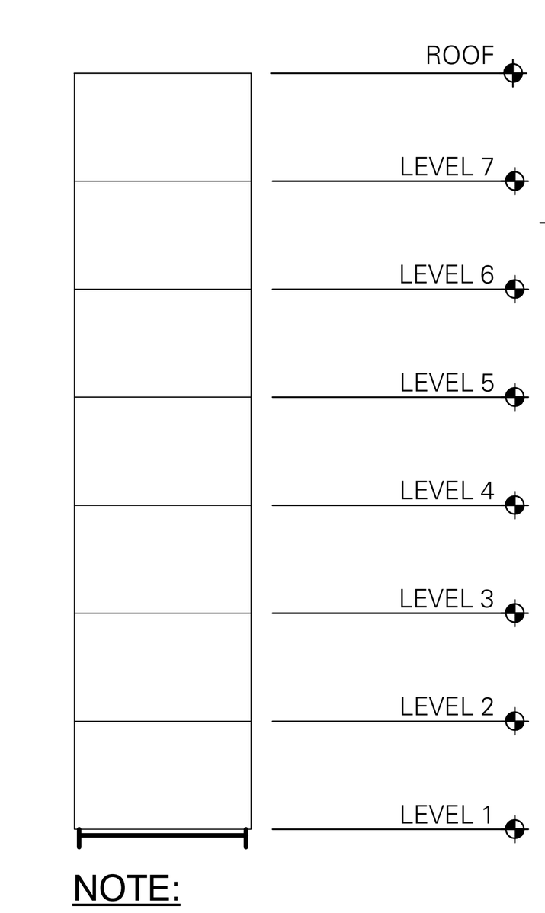
    10/S-301 TYPICAL LAP SPLICE SCHEDULE
    14/S-301 TYPICAL DEPRESSED SLAB DETAIL
    15/S-301 STANDARD HOOKS AND BAR BENDS
    4/S-302 TYPICAL HOLD-DOWN AT THICKENED SLAB FOOTING

PILE CAP SCHEDULE

TYPE	NUMBER OF PILES	SIZE			REFERENCE DETAIL	ASD PILE LOAD
		WIDTH	LENGTH	DEPTH		
P2.0	2	5'-6"	2'-6"	2'-11"	1/S-302	100k-C
P3.0	3	5'-2"	5'-6"	3'-0"	2/S-302	100k-C
P4.0	4	5'-6"	5'-6"	2'-8"	3/S-302	100k-C
P5.0	5	5'-6"	7'-9"	3'-0"	6/S-302	100k-C
P6.0	6	8'-6"	5'-6"	3'-8"	7/S-302	100k-C

NOTE:

1. PILE LOADS SHOWN IN SCHEDULE ARE ASD LOADING.
2. PILE LOCATIONS SHOWN ON PLAN ARE FOR VISUAL REFERENCE ONLY. PILE DESIGNER IS RESPONSIBLE FOR FINAL LOCATIONS.
3. REFERENCE GEOTECH REPORT FOR PILE TYPE AND DRIVEN LENGTH.



NOTE:
DARKENED LINES DESIGNATE AREA OF WORK.

FOUNDATION PLAN
SCALE: 1/8" = 1'-0"

FOR BID (NOT FOR CONSTRUCTION)
These drawings have been released at the request of the client for the purpose of bidding. These drawings are not intended for purposes of obtaining a permit or construction.

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CIVIL / STRUCTURAL

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STATE OF WASHINGTON
37983

BUILDING 2B

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
ADD 4	06/29/2020	PRICING SET ADD 4
	05/22/2020	SECOND PRICING SET
	02/05/2021	FOUNDATION SET

PROJ. NO. 18041-0341

PROJECT MANAGER KEA

DATE 03/01/2021

FOUNDATION PLAN

S-101

RIVERBEND APARTMENTS
PHASE 2
SAGAMORE SPOKANE LLC
SPOKANE, WASHINGTON

ABBREVIATIONS

ACP	ASPHALT CONCRETE PAVEMENT	FT (')	FOOT (FEET)
ADD'L	ADDITIONAL	FTG	FOOTING
AD	AREA DRAIN	G	GAS MAIN
ADJ	ADJACENT	GB	GRADE BREAK
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	GM	GAS METER
		GRD	GRADE
APPROX.	APPROXIMATE(LY)	GV	GATE VALVE
ARCH	ARCHITECT(URAL)	HB	HOSE BIB
ASSY	ASSEMBLY	HDPE	HIGH DENSITY POLYETHYLENE
BLDG	BUILDING	HORIZ(H)	HORIZONTAL
BM	BENCHMARK	HT	HEIGHT
BNDRY	BOUNDARY	HYD	HYDRANT
BOW	BOTTOM OF WALL (AT FINISHED GRADE)	ID	INSIDE DIAMETER
		I.E.	INVERT ELEVATION
BVC	BEGINNING OF VERTICAL CURVE	IN (")	INCH(ES)
CTV	CABLE TV	INV	INVERT
C&G	CURB AND GUTTER	IRR	IRRIGATION WATER
CB	CATCH BASIN	LB	POUND(S)
CC	CURB CUT	LCPE	LINED CORRUGATED POLYETHYLENE PIPE
CD	CONCRETE DRIVE		
CF	CUBIC FEET (FOOT)	LF	LINEAR FEET
CI	CAST IRON	MAT'L	MATERIAL
CJ	CONSTRUCTION JOINT	MAX	MAXIMUM
CL	CLASS	MFR	MANUFACTURER
CL	CENTER LINE	MH	MANHOLE
CMP	CORRUGATED METAL PIPE	MJ	MECHANICAL JOINT
CONC.	CONCRETE	MIN.	MINIMUM
CONST.	CONSTRUCTION	MISC.	MISCELLANEOUS
CPEP	CORRUGATED POLYETHYLENE PIPE	N	NORTH(ING)
CTR	CENTER(ED)	NO (#)	NUMBER
CY	CUBIC YARD	OC	ON CENTER
DCVA	DOUBLE CHECK VALVE ASSEMBLY	O/W	OIL WATER
DDCV	DOUBLE DETECTOR CHECK VALVE	P	POWER
DEPT.	DEPARTMENT	PC	POINT OF CURVATURE
DET	DETAIL	PIV	POST INDICATOR VALVE
D.I.	DUCTILE IRON	PP	POWER POLE
DIA (ø)	DIAMETER	PL	PROPERTY LINE
DIM	DIMENSION	PSF	POUNDS PER SQUARE FOOT
DS	DOWN SPOUT	PSI	POUNDS PER SQUARE INCH
DWG	DRAWING	PT	POINT OF TANGENCY
E	EAST(ING)	PVC	POLYVINYL CHLORIDE
EC	ELECTRICAL CONDUIT	PVI	POINT OF VERTICAL INFLECTION
ECC	EXTRUDED CONCRETE CURB	QTY.	QUANTITY
EL.=	ELEVATION	RAD (R)	RADIUS
EOP	EDGE OF PAVEMENT	RCP	REINFORCED CONCRETE PIPE
EQUIV.	EQUIVALENT	RD	ROAD
EVC	END OF VERTICAL CURVE	REF	REFERENCE
EXIST.	EXISTING	REQD.	REQUIRED
FD	FLOOR DRAIN	RET	RETAINING
FDC	FIRE DEPARTMENT CONNECTION	ROW	RIGHT OF WAY
FDN	FOUNDATION	SD	STORM DRAIN
FFE	FINISH FLOOR ELEVATION	S.F.	SQUARE FEET
FH	FIRE HYDRANT	SHT	SHEET
FL	FLANGED	SIM	SIMILAR
FLR	FLOOR	SPEC	SPECIFICATION(S)
FOC	FACE OF CURB	SQ	SQUARE
F.S.	FINISHED SURFACE	SS	SANITARY SEWER
		STA	STATION
		STD	STANDARD
		TOE	TOE OF WALL, OR SLOPE
		T	TELEPHONE WIRE
		TBM	TEMPORARY BENCH MARK
		T.C.	TOP OF CURB
		TG OR RIM	TOP OF GRATE
		TEMP.	TEMPORARY
		TOP	TOP OF SLOPE
		TOW	TOP OF WALL
		TV	TELEVISION WIRE
		TYP.	TYPICAL
		VC	VERTICAL CURVE
		VERT (V)	VERTICAL
		WM	WATER METER
		W/	WITH
		WT	WEIGHT
		WWF	WELDED WIRE FABRIC
		YD	YARD DRAIN

LEGEND

STORM PIPE — SD
NEW & EXISTING CATCH BASINS — CB / C.B.
NEW & EXISTING DRYWELLS — DW / DW
STORM MANHOLE — SDMH / SDMH
SANITARY SEWER PIPE — SS
SANITARY SEWER MANHOLE — SSMH / SSMH
WATER MAINS — W
FIRE HYDRANTS (NEW AND EXISTING) AND FDC — FH / FH
WATER METERS
WATER VALVES
FITTINGS WITH THRUST BLOCKS — TEE, 90°, 45°, 22.5°, 11.25°
SURFACE WTR AND PIPE DIRECTION FLOW — OR
EXISTING CONTOUR LABELS — (457)
PROPOSED CONTOUR LABELS — 457
EXISTING SURFACE ELEVATIONS — (XXX.XX) F.S. / (XXX.XX T.C.) (XXX.XX F.S.)
FINISHED SURFACE ELEVATIONS — XXX.XX F.S. / XXX.XX T.C. XXX.XX F.S.
NEW EASEMENT
NEW DITCH
TRAFFIC ARROWS
TOP OF WALL/BOTTOM OF WALL — TOW XXX.XX / XXX.XX BOW
SLOPE INDICATORS — 3:1, 2:1
RIP RAP
FILTER FABRIC FENCING
FOOTING DRAINS
DOWNSPOUTS — DS
CLEANOUTS (C.O.) SS, AND RWL (NEW AND EXISTING) — CO
INTERCEPTOR AND BIO-SWALES
CEMENT CONCRETE
COORDINATES, & LEADERS — N 10000.00 E 5000.00
STUBBED & PLUGGED LINE
CONCRETE CURB
CONCRETE CURB & GUTTER
NEW ASPHALT/CONCRETE PAVEMENT
CURB INLET/UNDER SIDEWALK INLET
DRAINAGE SWALE
RETAINING WALL
STRAW BALE
ROCK CHECK DAM

GENERAL CONSTRUCTION NOTES:

1. UNLESS SPECIFICALLY EXCEPTED IN THE PLANS OR CONTRACT DOCUMENTS, ALL CONSTRUCTION METHODS AND MATERIALS SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND STANDARD PLANS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION PROMULGATED BY THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION AND THE WASHINGTON CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION (LATEST EDITION) AND THE CITY OF SPOKANE STANDARDS AND SPECIFICATIONS.

2. THE PLANS ARE SCHEMATIC AND ARE NOT INTENDED TO DEPICT ALL DETAILS OF THE WORK REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE TO FAMILIARIZE HIMSELF WITH ACTUAL SITE CONDITIONS, REQUIREMENTS AND FACTORS AFFECTING THE WORK. WHERE LACK OF DETAIL OR CONFLICT EXISTS BETWEEN THESE AND OTHER PLANS, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING. IF THE CONTRACTOR DISCOVERS ANY DISCREPANCIES BETWEEN THE PLANS AND EXISTING CONDITIONS ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER AND CITY OF SPOKANE ENGINEERING AND DEVELOPER SERVICES DEPARTMENT.

3. THIS PLAN MAY NOT SHOW ALL EXISTING UTILITIES. EXISTING UTILITY LOCATIONS SHOWN ARE APPROXIMATE. PRIOR TO CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES. CALL THE UNDERGROUND UTILITY LOCATION SERVICE AT 811 BEFORE YOU DIG. ANY CONFLICTING UTILITIES SHALL BE RELOCATED PRIOR TO CONSTRUCTION. IN THE CASE WHERE RELOCATION IS REQUIRED, THE APPLICABLE UTILITY COMPANY SHALL BE NOTIFIED AND ANY COST REQUIRED FOR RELOCATION OR ADJUSTMENTS SHALL BE AGREED UPON.

4. THE ENGINEER HAS ATTEMPTED TO SHOW ALL EXISTING UNDERGROUND UTILITIES AND STRUCTURES. APPEARANCE ON THESE PLANS, HOWEVER, DOES NOT GUARANTEE THE ACCURACY AND COMPLETENESS OF THE LOCATION OR EXISTENCE OF THESE UTILITIES AND/OR SUBSTRUCTURES. THE CONTRACTOR IS REQUIRED TO TAKE ALL REQUIRED PRECAUTIONARY MEANS TO LOCATE AND PROTECT ALL EXISTING UTILITIES AND SUBSTRUCTURES WHETHER SHOWN OR NOT, PRIOR TO EXCAVATION IN ANY AREA. THE CONTRACTOR SHALL MEET AT THE JOB SITE WITH REPRESENTATIVES OF THE UTILITY DISTRICTS, COMPANIES, AND OTHER OWNERS THAT MAY HAVE EXISTING FACILITIES AT THE SITE, TO DISCUSS THEIR PROTECTION.

5. THE CONTRACTOR IS REQUIRED TO HAVE A COMPLETE SET OF APPROVED PLANS ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS. THE CONTRACTOR SHALL HAVE A RESPONSIBLE PARTY, WHO HAS THE AUTHORITY TO REPRESENT AND ACT FOR THE CONTRACTOR, AT THE JOB SITE DURING ALL WORKING HOURS.

6. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS AND APPROVALS FROM CITY OF SPOKANE AND OTHER JURISDICTIONS PRIOR TO THE START OF CONSTRUCTION. ABSENCE OF THE PERMIT MAY RESULT IN IMMEDIATE SHUT DOWN OF WORK AND POSSIBLE REMOVAL OF THE ITEMS CONSTRUCTED WITHOUT A PERMIT.

7. THE CONTRACTOR SHALL PROVIDE THE DESIGN ENGINEERS WITH RECORD DRAWINGS PRIOR TO FINAL APPROVAL. ALL DEVIATIONS FROM THE ORIGINAL PLANS MADE DURING THE COURSE OF THE CONSTRUCTION INCLUDING LOCATION, INVERTS, AND DEPTHS OF UTILITIES SHALL BE CLEARLY MARKED ON THE RECORD DRAWINGS. THE ENGINEER SHALL PROVIDE THE CITY ENGINEER WITH "RECORD DRAWINGS" AS REQUIRED.

8. THE EXISTING SITE CONDITIONS SHOWN ARE FOR INFORMATIONAL PURPOSES ONLY. NO CERTIFICATIONS ARE EXPRESSED OR IMPLIED. THE TOPOGRAPHIC SURVEY WAS PROVIDED BY DURYEA AND ASSOCIATES.

9. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT TO CONSTRUCT AND INSTALL TO PROPER WORKING ORDER, THE DESIGN SHOWN, AS DETAILED OR CALLED OUT IN THESE PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR BEING FAMILIAR WITH THE PROVISIONS AND REQUIREMENTS CONTAINED IN THE STANDARD SPECIFICATIONS.

10. IF CONSTRUCTION IS TO TAKE PLACE IN PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE GOVERNING MUNICIPALITY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLAN(S) IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS REQUIRED. PRIOR TO DISRUPTION OF ANY TRAFFIC, A TRAFFIC PLAN SHALL BE PREPARED AND SUBMITTED TO THE CITY OF SPOKANE FOR APPROVAL. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.

11. A PRE-CONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF SPOKANE CONSTRUCTION INSPECTOR PRIOR TO THE START OF CONSTRUCTION.

12. ANY CHANGES TO THE DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE DESIGN ENGINEER AND THE CITY OF SPOKANE.

13. ALL TESTING SHALL BE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATIONS (LATEST EDITION) AND GEOTECHNICAL REPORT BY ASPECT CONSULTING, LLC. DATED OCTOBER 25, 2019.

14. EXCAVATION AND EMBANKMENT SHALL BE IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF SECTION 2-03 OF THE WSDOT STANDARD SPECIFICATIONS. ALL COMPACTION SHALL BE IN ACCORDANCE WITH SECTION 2-03.3(14)C, METHOD C FOR BUILDING PADS, METHOD B FOR OTHER AREAS, AND THE GEOTECHNICAL REPORTS.

15. ALL FINISHED GRADING ELEVATIONS SHALL MATCH EXISTING ELEVATIONS AT THE SITE'S BOUNDARY, EXCEPT AS SHOWN OTHERWISE ON THE GRADING PLAN. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING.

16. THE CONTRACTOR SHALL REMOVE ALL WASTE MATERIAL.

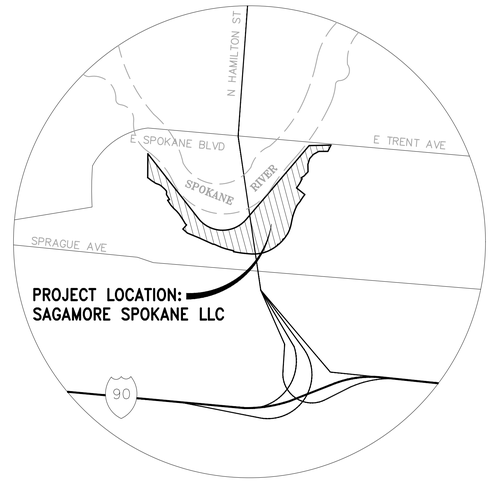
17. GRADING: ALL GRADING SHALL BE LIMITED TO THE AREAS IDENTIFIED ON THE GRADING PLAN AND SHALL NOT INFRINGE ON ADJACENT OWNERSHIPS, EXCEPT AS SHOWN OTHERWISE ON THE PLANS.

18. THE CONTRACTOR SHALL PROTECT ALL CATCH BASINS, DRYWELLS, AND OTHER STORM WATER STRUCTURES FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC OVER THE METAL FRAME DURING CONSTRUCTION AND KEEPING IT IN PLACE UNTIL THE SITE HAS BEEN PAVED AND CLEANED.

19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING DIRT, MUD, AND OTHER CONSTRUCTION DEBRIS THAT MAY ACCUMULATE ON PAVED STREETS ADJACENT TO THE SITE AS A RESULT OF CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MATERIALS THAT SPILL ONTO LOCAL STREETS DURING THE TRANSPORTATION OF EQUIPMENT, MATERIALS, ETC. SHOULD A SPILL OCCUR, THE CONTRACTOR SHALL REMOVE THE MATERIAL BY THE END OF THE WORK DAY. NO MATERIAL SHALL BE ALLOWED TO SET, DRY, OR BE WASHED INTO ADJACENT STORM WATER FACILITIES. CLEANING SHALL BE ON AN "AS NEEDED" BASIS USING WATER UNDER PRESSURE. SWEEPING AND WATER SHALL BE USED WHEN WATER PRESSURE ALONE WILL NOT WASH THE CONSTRUCTION DEBRIS FROM THE STREET. THE CONTRACTOR MUST PROTECT ALL EXISTING STORM WATER FACILITIES FROM DIRT/DEBRIS.

20. ANY BROKEN, HEAVED, OR SUNKEN SIDEWALK AND/OR CURB ALONG THE PROJECT PROPERTY FRONTAGE MUST BE REPLACED TO CITY STANDARDS, WHETHER EXISTING OR CAUSED DURING CONSTRUCTION. (SMC 12.01.010)

21. CONSTRUCTION OPERATIONS, INCLUDING EQUIPMENT WARM UP AND OPERATION, ARE RESTRICTED TO THE TIME LIMITS OUTLINED IN THE CITY NOISE ORDINANCE.



VICINITY MAP

NOT TO SCALE

SE 1/4 SEC. 17, T. 25 N., R. 43 E., W.M.

PROJECT TEAM:

OWNER:
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PHONE: (212) 446-6980

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PHONE: (509) 838-8568

CIVIL ENGINEER:
DCI ENGINEERS
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SPOKANE, WA 99201
CONTACT: MATT GIBB, P.E.
PHONE: (509) 227-5721

UTILITY PURVEYORS:

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909 E. SPRAGUE AVE.
SPOKANE, WA 99202
PHONE: (509) 625-7900

WATER:
CITY OF SPOKANE
914 E. NORTH FOOTHILLS DRIVE
SPOKANE, WA 99207
PHONE: (509) 625-7800

POWER/GAS:
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1411 E. MISSION AVE.
SPOKANE, WA 99252
POWER CONTACT: NICK HARMON
PHONE: (509) 495-4889
GAS CONTACT: CHRISTIAN WRIGHT
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PHONE: (509) 623-0319

SHEET INDEX

CONTRACTOR NOTE

ALL EXISTING UTILITIES SHOWN ON PLANS ARE TO BE VERIFIED HORIZONTALLY AND VERTICALLY PRIOR TO ANY CONSTRUCTION. ALL EXISTING FEATURES INCLUDING BURIED UTILITIES ARE SHOWN AS INDICATED ON RECORD MAPS AND SURVEYS FURNISHED BY OTHERS. WE ASSUME NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS AND SURVEYS. CONTACT THE UTILITY OWNER/AGENCY FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO CONSTRUCTION.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

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3/11/2021

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CIVIL / STRUCTURAL

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GENERAL CIVIL INFORMATION

C-000

SPOKANE REGIONAL STORM WATER MANUAL APPENDIX 9A- ESC STANDARD PLAN NOTES:

THE FOLLOWING ESC STANDARD PLAN NOTES ORIGINATE FROM SECTION 9.4.3. THESE NOTES ARE AN OVERALL SET; USE ONLY WHAT APPLIES TO THE GIVEN PROJECT.

1. THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE FOLLOWED IN ORDER TO BEST MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION CONTROL PROBLEMS:

(A) CLEAR AND GRUB SUFFICIENTLY FOR INSTALLATION OF TEMPORARY ESC BMPS;
(B) INSTALL TEMPORARY ESC BMPS, CONSTRUCTING SEDIMENT TRAPPING BMPS AS ONE OF THE FIRST STEPS PRIOR TO GRADING;
(C) CLEAR, GRUB AND ROUGH GRADE FOR ROADS, TEMPORARY ACCESS POINTS AND UTILITY LOCATIONS;
(D) STABILIZE ROADWAY APPROACHES AND TEMPORARY ACCESS POINTS WITH THE APPROPRIATE CONSTRUCTION ENTRY BMP;
(E) CLEAR, GRUB AND GRADE INDIVIDUAL LOTS OR GROUPS OF LOTS;
(F) TEMPORARILY STABILIZE, THROUGH RE-VEGETATION OR OTHER APPROPRIATE BMPS, LOTS OR GROUPS OF LOTS IN SITUATIONS WHERE SUBSTANTIAL CUT OR FILL SLOPES ARE A RESULT OF THE SITE GRADING;
(G) CONSTRUCT ROADS, BUILDINGS, PERMANENT STORM WATER FACILITIES (I.E. INLETS, PONDS, UIC FACILITIES, ETC.);
(H) PROTECT ALL PERMANENT STORM WATER FACILITIES UTILIZING THE APPROPRIATE BMPS;
(I) INSTALL PERMANENT ESC CONTROLS, WHEN APPLICABLE; AND,
(J) REMOVE TEMPORARY ESC CONTROLS WHEN:

2. PERMANENT ESC CONTROLS, WHEN APPLICABLE, HAVE BEEN COMPLETELY INSTALLED;

3. ALL LAND-DISTURBING ACTIVITIES THAT HAVE THE POTENTIAL TO CAUSE EROSION OR SEDIMENTATION PROBLEMS HAVE CEASED; AND,

4. VEGETATION HAD BEEN ESTABLISHED IN THE AREAS NOTED AS REQUIRING VEGETATION ON THE ACCEPTED ESC PLAN ON FILE WITH THE LOCAL JURISDICTION.

5. INSPECT ALL ROADWAYS, AT THE END OF EACH DAY, ADJACENT TO THE CONSTRUCTION ACCESS ROUTE. IF IT IS EVIDENT THAT SEDIMENT HAS BEEN TRACKED OFF SITE AND/OR BEYOND THE ROADWAY APPROACH, CLEANING IS REQUIRED.

6. IF SEDIMENT REMOVAL IS NECESSARY PRIOR TO STREET WASHING, IT SHALL BE REMOVED BY SHOVELING OR PICKUP SWEEPING AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.

7. IF STREET WASHING IS REQUIRED TO CLEAN SEDIMENT TRACKED OFF SITE, ONCE SEDIMENT HAS BEEN REMOVED, STREET WASH WASTEWATER SHALL BE CONTROLLED BY PUMPING BACK ON-SITE OR OTHERWISE PREVENTED FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.

8. RESTORE CONSTRUCTION ACCESS ROUTE EQUAL TO OR BETTER THAN THE PRE-CONSTRUCTION CONDITION.

9. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICAL.

10. INSPECT SEDIMENT CONTROL BMPS WEEKLY AT A MINIMUM, DAILY DURING A STORM EVENT, AND AFTER ANY DISCHARGE FROM THE SITE (STORM WATER OR NON-STORMWATER). THE INSPECTION FREQUENCY MAY BE REDUCED TO ONCE A MONTH IF THE SITE IS STABILIZED AND INACTIVE.

11. CONTROL FUGITIVE DUST FROM CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE STATE AND/OR LOCAL AIR QUALITY CONTROL AUTHORITIES WITH JURISDICTION OVER THE PROJECT AREA.

12. STABILIZE EXPOSED UNWORKED SOILS (INCLUDING STOCKPILES), WHETHER AT FINAL GRADE OR NOT, WITHIN 10 DAYS DURING THE REGIONAL DRY SEASON (JULY 1 THROUGH SEPTEMBER 30) AND WITHIN 5 DAYS DURING THE REGIONAL WET SEASON (OCTOBER 1 THROUGH JUNE 30). SOILS MUST BE STABILIZED AT THE END OF A SHIFT BEFORE A HOLIDAY WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. THIS TIME LIMIT MAY ONLY BE ADJUSTED BY A LOCAL JURISDICTION WITH A "QUALIFIED LOCAL PROGRAM," IF IT CAN BE DEMONSTRATED THAT THE RECENT PRECIPITATION JUSTIFIES A DIFFERENT STANDARD AND MEETS THE REQUIREMENTS SET FOURTH IN THE CONSTRUCTION STORM WATER GENERAL PERMIT.

13. PROTECT INLETS, DRYWELLS, CATCH BASINS AND OTHER STORM WATER MANAGEMENT FACILITIES FROM SEDIMENT, WHETHER OR NOT FACILITIES ARE OPERABLE.

14. KEEP ROADS ADJACENT TO INLETS CLEAN.

15. INSPECT INLETS WEEKLY AT A MINIMUM AND DAILY DURING STORM EVENTS.

16. CONSTRUCT STORM WATER CONTROL FACILITIES (DETENTION/RETENTION STORAGE POND OR SWALES) BEFORE GRADING BEGINS. THESE FACILITIES SHALL BE OPERATIONAL BEFORE THE CONSTRUCTION OF IMPERVIOUS SITE IMPROVEMENTS.

17. STOCKPILE MATERIALS (SUCH AS TOPSOIL) ON SITE, KEEPING OFF OF ROADWAY AND SIDEWALKS.

18. COVER, CONTAIN AND PROTECT ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCT, AND NON-INERT WASTES PRESENT ON SITE FROM VANDALISM (SEE CHAPTER 173-304 WAC FOR THE DEFINITION OF INERT WASTE), USE SECONDARY CONTAINMENT FOR ON-SITE FUELING TANKS.

19. CONDUCT MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEM REPAIRS, SOLVENT AND DE-GREASING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES THAT MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORM WATER RUNOFF USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. CLEAN ALL CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. IF RAINING OVER EQUIPMENT OR VEHICLE, PERFORM EMERGENCY REPAIRS ON SITE USING TEMPORARY PLASTIC BENEATH THE VEHICLE.

20. CONDUCT APPLICATION OF AGRICULTURAL CHEMICALS, INCLUDING FERTILIZERS AND PESTICIDES, IN SUCH A MANNER, AND AT APPLICATION RATES, THAT INHIBITS THE LOSS OF CHEMICALS INTO STORM WATER RUNOFF FACILITIES. AMEND MANUFACTURER'S RECOMMENDED APPLICATION RATES AND PROCEDURES TO MEET THIS REQUIREMENT, IF NECESSARY.

21. INSPECT ON A REGULAR BASIS (AT A MINIMUM WEEKLY, AND DAILY DURING/AFTER A RUNOFF PRODUCING STORM EVENT) AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL BMPS TO ENSURE SUCCESSFUL PERFORMANCE OF THE BMPS. NOTE THAT INLET PROTECTION DEVICES SHALL BE CLEANED OR REMOVED AND REPLACE BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE.

22. REMOVE TEMPORARY ESC BMPS WITHIN 30 DAYS AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED. PERMANENTLY STABILIZE AREAS THAT ARE DISTURBED DURING THE REMOVAL PROCESS.

EROSION CONTROL NOTES:

1. AN EROSION/SEDIMENTATION CONTROL (ESC) PLAN IS REQUIRED FOR THIS PROJECT. IMPLEMENTATION OF THIS ESC PLAN, AND CONSTRUCTION, MAINTENANCE, AND UPGRADING OF THE ESC FACILITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND ACCEPTED BY THE CITY OF SPOKANE, OR UNTIL VEGETATION IS ESTABLISHED THROUGHOUT THE SITE, AND ACCEPTED BY THE CITY OF SPOKANE, WHICHEVER IS LATER.

2. APPROVAL OF THE ESC PLAN DOES NOT CONSTITUTE APPROVAL OF ANY OF THE PROPOSED ROAD, STORM WATER, GRADING, OR UTILITY DESIGN ELEMENTS SHOWN ON THE ESC PLAN.

3. THE EROSION/SEDIMENTATION CONTROL MEASURES SHOWN ARE THE MINIMUM REQUIREMENTS OF THE ANTICIPATED SITE CONDITIONS. THE CONTRACTOR SHALL INSPECT AND MAINTAIN THESE ESC MEASURES DAILY, AND SHALL MAINTAIN AND UPGRADE THESE MEASURES AS NECESSARY TO PREVENT SEDIMENT-LADEN WATER FROM EITHER FLOWING OFF-SITE, OR INTO NEW/EXISTING STORM WATER FACILITIES, SUCH AS DRYWELLS, CULVERTS, OR GRAVEL GALLERIES.

4. CONTRACTOR IS RESPONSIBLE FOR INSTALLING A ROCK CONSTRUCTION ENTRANCE AT ANY AND ALL LOCATIONS USED BY VEHICLES TO ENTER OR EXIT THE PROJECT SITE TO PREVENT SEDIMENTS FROM BEING TRACKED OFF THE SITE BY CONSTRUCTION TRAFFIC. .

5. ANY DISTURBED AREAS, EXCEPT FOR POND BOTTOMS AND SLOPES, THAT WILL BE LEFT BARE FOR MORE THAN 7 DAYS AND ARE NOT INTENDED TO BE REWORKED WITHIN 30-45 DAYS, SHALL BE SEEDED WITH A FAST STARTING NATIVE DRYLAND GRASS SUCH AS ANNUAL RYE, OR APPROVED EQUAL, AT A RATE OF 60 LBS./ACRE.

6. GRADED POND AREAS, THAT WILL BE LEFT BARE FOR MORE THAN 7 DAYS, SHALL HAVE A MULCH APPLIED AT A RATE OF TWO THOUSAND (2,000) POUNDS PER ACRE. MULCH SHALL BE A VIRGIN WOOD CELLULOSE FIBER SPECIALLY PROCESSED AS A HYDROSEEDING MULCH AND CONTAIN NO GROWTH OR GERMINATION INHIBITING FACTORS. IF POND CONSTRUCTION HAS BEEN COMPLETED, INCLUDING DRAINAGE STRUCTURES, AND HAVE RECEIVED FINAL INSPECTION APPROVAL, THEY SHALL BE SODDED.

7. DUST CONTROL: AN APPROVED METHOD OF DUST CONTROL, MEETING THE REQUIREMENTS OF LOCAL REGULATIONS, SHALL BE UTILIZED DURING CONSTRUCTION OF THIS PROJECT. THIS MAY REQUIRE THE USE OF WATER SPRAYS, TARPS, SPRINKLERS, OR SUSPENSION OF ACTIVITY DURING CERTAIN WEATHER CONDITIONS.

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MATERIALS THAT SPILL ONTO LOCAL STREETS DURING THE TRANSPORTATION OF EQUIPMENT. SHOULD A SPILL OCCUR, THE CONTRACTOR SHALL REMOVE THE MATERIAL BY THE END OF THE WORK DAY. NO MATERIAL SHALL BE ALLOWED TO SET, DRY, OR BE WASHED INTO ADJACENT STORM WATER FACILITIES.

9. GEOTEXTILE FABRIC IS TO BE PLACED ON THE RIMS OF DRYWELLS, CATCH BASINS, AND INLETS UNTIL SUCH TIME AS THE VEGETATION ON THE SITE IS ESTABLISHED AND THE THREAT OF SEDIMENT DEPOSITION INTO THE DRAINAGE SYSTEM IS MITIGATED.

10. THE CONTRACTOR SHALL PROTECT ALL CATCH BASINS, DRYWELLS, AND OTHER STORM WATER STRUCTURES FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC OVER THE METAL FRAME DURING CONSTRUCTION AND KEEPING IT IN PLACE UNTIL THE SITE/STREET HAS BEEN PAVED AND CLEANED.

11. ALL PONDS/SWALES SHALL BE SODDED AND IRRIGATED.

12. CONTRACTOR SHALL INSTALL FILTER FABRIC FENCE AS NEEDED ON-SITE TO PREVENT SEDIMENTS FROM LEAVING THE SITE.

13. CONTRACTOR IS RESPONSIBLE FOR DESIGNING A LOCATION WHERE CONCRETE TRUCKS AND EQUIPMENT CAN BE WASHED OUT. WASHOUT AREA SHALL NOT BE LOCATED NEAR OR DRAIN INTO A STORM DRAINAGE AREA, TREATMENT AREA, OR FACILITY.

EROSION CONTROL MAINTENANCE NOTES:

1. SEDIMENT BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL PRODUCING RUNOFF AND AT LEAST DAILY DURING PROLONGED RAINFALL OF 24 CONTINUOUS HOURS OR 48 HOURS IN ANY ONE WEEK.

2. NECESSARY REPAIRS TO BARRIERS OR REPLACEMENT OF BARRIERS SHALL BE ACCOMPLISHED PROMPTLY.

3. SEDIMENT MUST BE REMOVED WHEN IT REACHES A HEIGHT OF 6 INCHES UP THE BASE OF THE FILTER FABRIC BARRIER, THE DEPTH OF THE CUTOFF DITCH, OR THE SEDIMENT POND. ALL EROSION CONTROL SHALL BE CHECKED AFTER ANY RAIN STORM.

4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE ESC STRUCTURE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED, AND HYDRO/HAND SEEDED OR SODDED.

5. ALL TEMPORARY AND PERMANENT ESC PRACTICES SHALL BE MAINTAINED AND PREPARED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.

6. ALL TEMPORARY ESC MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON-SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL WITHOUT PERMISSION OF THE ENGINEER OR INSPECTOR THAT RESULTS IN CONTAMINATION OF THE DRYWELLS SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO REMEDY. REMEDY MAY ENTAIL DRYWELL CLEANING OR REMOVAL AND RECONSTRUCTION.

GRADING NOTES:

1. EXCAVATION AND EMBANKMENT SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL REPORTS FOR THIS PROJECT AND ALL APPLICABLE REQUIREMENTS OF THE THE CITY OF SPOKANE STANDARD SPECIFICATIONS AND THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION). ALL COMPACTION OF SUBGRADES, ROCK, AND ASPHALT SHALL BE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD SPECIFICATIONS AND THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION) AND THE GEOTECH REPORT.

2. ALL FINISHED GRADING ELEVATIONS SHALL MATCH EXISTING ELEVATIONS AT THE SITE'S BOUNDARY, EXCEPT AS SHOWN OTHERWISE ON THE GRADING PLAN. WHERE CONFLICTS EXIST, THE CONTRACTOR SHALL NOTIFY THE OWNER TO RESOLVE THE ISSUE PRIOR TO PROCEEDING.

3. EARTHWORK QUANTITIES HAVE NOT BEEN CALCULATED TO DETERMINE ESTIMATED VOLUMES OF EXCAVATION AND EMBANKMENT ON THIS PROJECT. CONTRACTOR IS RESPONSIBLE FOR CALCULATING THEIR OWN EARTHWORK QUANTITIES.

4. GRADING: ALL GRADING SHALL BE LIMITED TO THE AREAS IDENTIFIED IN THE GRADING PLAN AND SHALL NOT INFRINGE ON ADJACENT OWNERSHIPS.

5. CUT SLOPES IN SOLID ROCK SHALL NOT EXCEED 0.5H:1V (HORIZONTAL:VERTICAL), AND SOIL CUT SLOPES SHALL NOT EXCEED 2H:1V, EXCEPT AS SHOWN OTHERWISE ON THE PLANS. TEMPORARY SOIL CUT SLOPES SHALL NOT EXCEED 2H:1V.

6. FILL SLOPES ACROSS THE PROPERTY SHOULD BE DESIGNED FOR A MAXIMUM SLOPE OF 2H:1V, EXCEPT AS SHOWN OTHERWISE ON THE PLANS.

7. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL REPORTS BY ASPECT CONSULTING, LLC. (OCTOBER 25, 2019), FOR EXISTING SOIL CONDITIONS AND EARTHWORK RECOMMENDATIONS.

PAVING NOTES:

1. ALL CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD DRAWINGS AND SPECIFICATIONS, WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (LATEST EDITION), AND THE GEOTECHNICAL REPORTS BY ASPECT CONSULTING, LLC. (OCTOBER 25, 2019).

2. CONTRACTOR SHALL CONTACT ALL APPROPRIATE UTILITY COMPANIES AND THE CITY OF SPOKANE TO OBTAIN NECESSARY LOCATES 48 HOURS BEFORE CONSTRUCTION BEGINS.

3. NO VARIANCE FROM THE SPECIFICATIONS AND NOTES SHALL BE ACCEPTED WITHOUT PRIOR WRITTEN APPROVAL FROM THE CITY OF SPOKANE.

4. CONCRETE, AGGREGATE BASE, AND ASPHALT MIX DESIGN SHALL BE SUBMITTED BY THE SUPPLIER AND APPROVED IN WRITING BY THE ENGINEER OF RECORD PRIOR TO ANY ROAD OR PARKING LOT CONSTRUCTION. MATERIALS SHALL BE IN CONFORMANCE WITH THE RECOMMENDATIONS IN THE GEOTECHNICAL REPORT.

5. REMOVAL OF EXISTING PAVEMENT MARKINGS SHALL BE ACCOMPLISHED BY A METHOD THAT DOES NOT MATERIALLY DAMAGE THE SURFACE OR TEXTURE OF THE PAVEMENT OR SURFACING. THE PAVEMENT MARKINGS SHALL BE REMOVED TO THE EXTENT THAT THEY WILL NOT BE VISIBLE UNDER DAY OR NIGHT CONDITIONS.

6. ALL EXISTING PAVEMENT SHALL BE REMOVED IN THE SECTIONS REQUIRING REMOVAL AND REPLACEMENT. THE EXISTING BASE COURSE MATERIALS IN THESE SECTIONS SHALL BE COMPACTED TO A MINIMUM OF 95% OF MODIFIED PROCTOR DRY DENSITY AT OPTIMUM MOISTURE CONTENT. ALL COMPACTION SHALL BE DONE IN ACCORDANCE WITH ASTM D-1557. THE NEW PAVEMENT SHALL BE REPLACED TO A DEPTH OF THE PAVEMENT DETAIL SHOWN ON THESE PLANS.

7. ASPHALT/CONCRETE PAVING SHALL CONFORM TO WSDOT STANDARD SPECIFICATIONS (LATEST EDITION) DIVISION 9, HMA CLASS 1/2". ASPHALT PAVED AREAS SHALL BE ASPHALT/CONCRETE PAVEMENT PLACED OVER A FREE-DRAINING, COMPACT, GRANULAR BASE MATERIAL.

8. ALL AREAS TO BE PAVED SHALL BE CLEARED OF ALL GRASS, ROOTS, TRASH, METAL AND ORGANIC MATERIALS DOWN TO FULL DEPTH BELOW THE PAVING MAT. THE EXPOSED SURFACE SHOULD THEN BE PROOF ROLLED TO 90% OF MAXIMUM COMPACTION AS DETERMINED BY ASTM D-1557 USING A MECHANICAL VIBRATORY COMPACTOR. ANY BACK FILL MATERIAL SHOULD BE SIMILARLY COMPACTED.

9. BEFORE PLACING THE BASE MATERIAL, THE SURFACE OF THE SUBGRADE SHALL BE COMPACTED AS SPECIFIED IN THE GEOTECHNICAL REPORT.

10. BITUMINOUS TACK COAT SHALL BE APPLIED BETWEEN ASPHALT PAVING LIFTS AND SHALL BE USED PRIOR TO OVERLAY, (CSS-1H), 50:50 DILUTION, 0.05 GAL/SY TO 0.15 GAL/SY OR AS DIRECTED BY THE ENGINEER. ALL EDGES ABUTTING NEW PAVEMENT SHALL BE TACKED.

11. ALL PAVEMENT SHALL BE COMPACTED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. TESTS SHALL BE CONDUCTED AT 100 FOOT INTERVALS OR 1 PER 3000 SQUARE FEET FOR EACH LIFT OR AS DIRECTED BY THE ENGINEER. ALL TEST REPORTS SHALL BE SUBMITTED TO THE CITY OF SPOKANE PRIOR TO PROOF ROLLS. SINGLE-AXLE 5-TON TRUCK PROOF ROLLS MONITORED BY THE CITY OF SPOKANE PRIOR TO PLACEMENT OF ROAD/PARKING LOT BASE AND ASPHALT ARE REQUIRED. CONCRETE AND ASPHALT TESTING SHALL BE AS DIRECTED BY THE CITY OF SPOKANE'S INSPECTOR.

12. ALL VALVE AND MANHOLE COVERS SHALL BE ADJUSTED TO PAVEMENT GRADE DURING INITIAL CONSTRUCTION.

13. ALL CONCRETE EDGES MUST BE ROUNDED TO A 1/4 INCH RADIUS, EXCEPT WHERE SHOWN OTHERWISE ON DRAWINGS. ALL ASPHALT SHALL BE 1/4 INCH ABOVE CONCRETE EDGES, MANHOLES, AND VALVES.

14. ALL PHASES OF WORK SHALL BE INSPECTED AND APPROVED BY THE CITY OF SPOKANE.

15. ALL TRAFFIC CONTROL, IF REQUIRED, SHALL CONFORM TO THE APPLICABLE REGULATIONS SET FORTH IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

16. ALL THE OPERATIONS SHALL CONFORM TO THE APPLICABLE REGULATIONS SET FORTH BY ICC AND OSHA.

STORM WATER NOTES:

1. DRAINAGE PONDS SHALL BE CONSTRUCTED PER THE REQUIREMENTS OF THESE DRAWINGS INCLUDING GRADING, SOD OR SEED AS NOTED, AND CATCH BASIN INSTALLATION. NO BARK, GRAVEL OR CINDERS ARE ALLOWED IN PONDS.

2. CONTRACTOR SHALL CONTACT GEOTECHNICAL ENGINEER OF RECORD DURING SWALE AND DRYWELL CONSTRUCTION TO VERIFY SOIL CONDITIONS MEET SPOKANE REGIONAL STORM WATER MANUAL REQUIREMENTS.

3. ALL DRAINAGE PONDS WITHIN THE SCOPE OF THIS PROJECT SHALL BE COMPLETED DURING THE CONSTRUCTION OF THE PARKING AREAS. THE CONTRACTOR SHALL PERFORM THE POND GRADE WORK AND INSTALL THE IRRIGATION SYSTEM AND SOD OR HYDROSEED FOLLOWING THE ROADWAY/PARKING AREA PAVING WORK.

4. ALL DRAINAGE PONDS SHALL BE IRRIGATED BY AN AUTOMATIC IRRIGATION SYSTEM INSTALLED BY OR UNDER THE DIRECTION OF THE LANDSCAPE CONTRACTOR. THE IRRIGATION IS TO COMPLY WITH ALL LOCAL CODES AND ORDINANCES (90 DAY GUARANTEE). AN APPROVED BACKFLOW DEVICE SHALL BE INSTALLED TO PREVENT WATER FROM GOING BACK INTO THE WATER SUPPLY. SEE IRRIGATION PLAN.

5. THE FLOOR OF THE GRASSED PERCOLATION AREA (GPA) POND INCLUDES THE LEVEL PORTION OF THE FLOOR OF THE POND, AND THE SIDESLOPES OF THE POND OVERFLOW ELEVATION OR TOP OF DRYWELL. THE SOIL LOCATED IN THE FLOOR OF THE CONTAINMENT POND SHALL BE A MEDIUM TO WELL-DRAINING MATERIAL, WITH A MINIMUM INFILTRATION RATE OF 0.5 INCHES PER HOUR.

6. SLEEVING: PROVIDE SLEEVING AS REQUIRED UNDER SIDEWALKS, PATHS, CURBING, PAVING, ETC. AS NEEDED FOR IRRIGATION ACCESS. ALL SLEEVING SHALL BE 4" PVC WITH AT LEAST 12" OF COVER (1) FOOT BELOW FINISHED GRADE. THE OWNER/GENERAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING SLEEVING BEFORE CURBING, SIDEWALKS, PAVING, ETC. IS INSTALLED. PATCH ASPHALT AS NEEDED. SEE IRRIGATION PLAN.

7. ADJUSTMENT: AFTER INSTALLATION, ADJUST VALVES, HEADS, EMITTERS ETC. TO PROVIDE UNIFORM COVERAGE AND TO MINIMIZE OVERSPRAY ON WALLS, FENCES, WALKS, DRIVES, ETC.

8. POND BOTTOM ELEVATIONS SHOWN ON THESE PLANS ARE FINISHED GRADE. CONTRACTOR SHALL ROUGH GRADE ALL PONDS TO 0.2' BELOW ELEVATIONS SHOWN TO ALLOW FOR FINAL PLACEMENT OF SOD, OR ESTABLISHMENT OF PLANTINGS.

9. RIM ELEVATIONS OF DRAINAGE STRUCTURES SHALL BE INSTALLED SO THAT RIMS MAY BE ADJUSTED ±0.5 FEET TO MATCH FINISHED GRADE.

10. STORM SEWER PIPE SHALL BE PVC ASTM D 3034, SDR 35, OR ASTM F 789 WITH PUSH-ON JOINTS AND RUBBER GASKETS CONFORMING TO ASTM D 3212 AND ASTM F 477 UNLESS OTHERWISE SPECIFIED IN THESE PLANS. PROVIDE TRENCHING AND BEDDING PER CITY OF SPOKANE STANDARDS.

11. STORM WATER FACILITIES, INCLUDING DRYWELLS, CB'S, AND PIPES, MUST BE CONSTRUCTED UNDER THE SUPERVISION OF THE WASTEWATER MANAGEMENT DIVISION. STORM WATER TREATMENT FACILITIES (BIO-INFILTRATION SWALES AND BIO-RETENTION AREAS) SHALL BE INSPECTED PRIOR TO PLACEMENT OF TOPSOIL, PLANTINGS, OR GRASS. THE CONTRACTOR SHALL CONTACT THE WASTEWATER MAINTENANCE DIVISION OFFICE AT (509) 625-7905 OR (509) 625-7912 IN ORDER TO ARRANGE A MUTUALLY AGREEABLE INSPECTION SCHEDULE.

12. THE CONTRACTOR SHALL TAKE PRECAUTIONS TO PROTECT THE INFILTRATION CAPACITY OF STORM WATER FACILITIES (E.G., LINE THE FACILITY WITH FILTER FABRIC, OVER-EXCAVATE UPON COMPLETION OF THE INFRASTRUCTURE, ETC.).

SEWER NOTES:

1. ALL SEWER CONSTRUCTION PROCEDURES AND MATERIALS SHALL BE IN ACCORDANCE WITH CITY OF SPOKANE CONSTRUCTION SPECIFICATIONS.

2. ALL SIDE SEWER LINES SHALL BE 6", OR AS INDICATED ON THE PLANS.

3. ALL SEWER MAINS AND SERVICE LINES SHALL BE LOCATED TO MEET STATE SEPARATION REQUIREMENTS.

4. ANY SIDE SEWER THAT DOES NOT MAINTAIN A MINIMUM OF 18" COVER AT WATER MAIN CROSSINGS, OR WHERE THE SIDE SEWER MUST CROSS ABOVE THE WATER, SHALL BE SLEEVED WITH A CONTINUOUS 20' SECTION OF C900 PVC WATER PIPE CENTERED ON THE CROSSING.

5. SANITARY SEWER PIPE SHALL BE PVC ASTM D 3034, SDR 35, OR ASTM F 789 WITH PUSH-ON JOINTS AND RUBBER GASKETS CONFORMING TO ASTM D 3212 AND ASTM F 477. PROVIDE TRENCHING AND BEDDING PER CITY OF SPOKANE STANDARDS.

6. PRECAST MANHOLES SHALL MEET THE REQUIREMENTS OF ASTM C 478. MANHOLES SHALL BE TYPE 1-48" UNLESS OTHERWISE SPECIFIED ON THE PLANS. JOINTS SHALL BE RUBBER GASKETED CONFORMING TO ASTM C 443 AND SHALL BE GROUTED FROM THE INSIDE. LIFT HOLES SHALL BE GROUTED FROM THE INSIDE AND OUTSIDE.

7. SIDE SEWER SERVICES SHALL BE PVC, ASTM D 3034 SDR 35 WITH FLEXIBLE GASKETED JOINTS. SIDE SEWER CONNECTIONS SHALL BE MADE BY A TAP ON AN EXISTING MAIN OR WYE BRANCH FROM A NEW MAIN CONNECTED ABOVE THE SPRINGLINE OF THE PIPE.

8. ALL SEWER MAINS SHALL BE FIELD STAKED FOR GRADES AND ALIGNMENT BY A LICENSED ENGINEERING OR SURVEYING FIRM QUALIFIED TO PERFORM SUCH WORK.

9. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF SPOKANE STANDARD CONSTRUCTION SPECIFICATIONS. ALL WATER AND SEWER MAINS AND LINES SHALL MEET STATE SEPARATION REQUIREMENTS.

10. ALL SEWER PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE FINAL GROUND SURFACE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING MARKED SANITARY SEWER, THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL.

11. UTILITY SEPARATIONS, INCLUDING WATER AND SEWER OR STORM CROSSINGS, SHALL BE IN ACCORDANCE WITH CITY OF SPOKANE STANDARD PLANS W-110, W-111, AND W-112 OR W-113.

12. PIPE BEDDING SHALL BE IN ACCORDANCE WITH DETAIL 6/C9.1 AND THE GEOTECHNICAL REPORT.

13. ALL SEWER WORK MUST BE DONE UNDER THE SUPERVISION AND INSPECTION OF THE WASTEWATER MANAGEMENT DIVISION. THE CONTRACTOR MUST CONTACT WASTEWATER MANAGEMENT MAINTENANCE DIVISION OFFICE IN ORDER TO ARRANGE A MUTUALLY AGREEABLE INSPECTION SCHEDULE. ALL FACILITIES MUST BE UNCOVERED AT THE TIME OF INSPECTION.

14. ALL SIDE SEWER CONNECTIONS SHALL BE INSTALLED PER CITY OF SPOKANE REQUIREMENTS.

WATER NOTES:

1. WATER LINES 4" AND LARGER SHALL BE DUCTILE IRON, CLASS 350 (AWWA C151 APPROVED) WITH RESTRAINED JOINTS AND CEMENT MORTAR LINING PER AWWA C104. FITTINGS SHALL BE AWWA C110 OR C153 DUCTILE IRON WITH MECHANICAL JOINTS.

2. WATERLINES SHALL BE INSTALLED WITH BOTTOM OF PIPE ELEVATIONS 5.5' BELOW FINISHED GRADE UNLESS OTHERWISE NOTED. PROVIDE TRENCHING AND BEDDING PER STANDARD SPECIFICATIONS. PIPE DEPTH SHALL BE MAINTAINED THROUGH SWALE SYSTEMS.

3. GATE VALVES 3" AND LARGER, SHALL BE RESILIENT SEATED, NON-RISING STEM O-RING SEALS. VALVE ENDS SHALL BE MECHANICAL JOINT OR ANSI FLANGES. VALVES SHALL CONFORM TO AWWA C509. PROVIDE CAST IRON TWO PIECE SLIDING COVERS FOR ALL VALVES. GATE VALVES SHALL BE RIGHT-TURN OPEN PER CITY OF SPOKANE STANDARD SPECIFICATIONS.

4. HYDRANTS SHALL CONFORM TO AWWA STANDARD C502-94 AND THE CITY OF SPOKANE SUPPLEMENTAL SPECIFICATIONS. ALL HYDRANTS SHALL BE BAGGED UNTIL SYSTEM IS APPROVED.

5. ALL PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12" TO 18" UNDER THE FINAL GROUND SURFACE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE, METAL CORE OR BACKING MARKED WATER, THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL.

6. ALL WATER MAINS SHALL BE STAKED FOR GRADES AND ALIGNMENT BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK.

7. WHERE CONNECTIONS REQUIRE "FIELD VERIFICATION," CONNECTION POINTS SHALL BE EXPOSED BY THE CONTRACTOR AND FITTINGS VERIFIED 48 HOURS PRIOR TO DISTRIBUTION OF SHUT-DOWN NOTICES.

8. AT ANY CONNECTION TO AN EXISTING LINE WHERE A NEW VALVE IS NOT INSTALLED, THE EXISTING VALVE MUST BE PRESSURE TESTED PRIOR TO CONNECTION. IF AN EXISTING VALVE FAILS TO PASS THE TEST, THE CONTRACTOR SHALL MAKE THE NECESSARY PROVISIONS TO TEST THE NEW LINE PRIOR TO CONNECTION TO THE EXISTING SYSTEM OR INSTALL A NEW VALVE.

9. WHEN FIRE FLOW WILL BE INTERRUPTED, THE CITY OF SPOKANE FIRE DEPARTMENT SHALL BE GIVEN 24 HOURS NOTICE OF TIME AND LOCATIONS AFFECTED.

10. AFTER THE WATER LINES ARE CONSTRUCTED, TESTED, AND APPROVED, THE OWNER MAY APPLY FOR A WATER METER.

11. DEFLECTIONS AT PIPE JOINTS SHALL NOT EXCEED 75% OF MAXIMUM ALLOWED DEFLECTION, PER MANUFACTURER'S RECOMMENDATIONS.

12. THE CITY OF SPOKANE WATER DEPARTMENT WILL MAKE CONNECTIONS AND DISCONNECTIONS TO EXISTING WATER MAINS. CONTRACTOR SHALL PROVIDE ALL MATERIALS FOR CONNECTION, PAY ALL FEES, FURNISH ALL MATERIALS, AND INSTALL WATER LINES FROM CONNECTION POINT THROUGH DOUBLE CHECK VALVE ASSEMBLY (INCLUDING THE VAULT). CONTRACTOR SHALL FURNISH ALL MATERIALS, EXCAVATION, AND BACKFILL. SEE CITY OF SPOKANE STANDARD SPECIFICATIONS.

13. PIPE RESTRAINMENT SHALL BE INSTALLED AT ALL BENDS (VERTICAL AND HORIZONTAL), TEES, CROSSES, PLUGS, AND VALVES. THE RESTRAINMENT SHALL BE IN THE FORM OF ACCEPTABLE MANUFACTURED MECHANICAL RESTRAINT JOINTS, IN ACCORDANCE WITH CITY OF SPOKANE DESIGN STANDARDS, TABLE 8-A.

14. LOCATION OF EXISTING WATER MAINS AND SERVICES SHOWN ARE APPROXIMATE AND ARE BASED ON INFORMATION PROVIDED BY THE CITY OF SPOKANE. CONTRACTOR SHALL VERIFY ALL LOCATIONS PRIOR TO CONSTRUCTION.

15. NEW WATER LINES 2" AND LARGER SHALL BE PRESSURE TESTED AT NO LESS THAN 175 PSI (FIRE LINES NO LESS THAN 200 PSI) FOR A MINIMUM OF THREE (3) HOURS IN ACCORDANCE WITH CITY OF SPOKANE STANDARD CONSTRUCTION SPECIFICATIONS.

16. WATER SERVICES SHALL BE INSTALLED ABOVE THE BOTTOM OF FOOTING ELEVATIONS.

17. ALL UNDERGROUND FIRE LINES, OR FIRE SUPPRESSION SYSTEMS THAT ARE SEPARATED OR PROTECTED FROM THE POTABLE WATER SYSTEM, REQUIRE A STATE LEVEL III OR "U" LICENSED CONTRACTOR FOR INSTALLATION.

UTILITY NOTES:

1. CONTRACTOR SHALL COORDINATE WITH AVISTA UTILITIES FOR ALL NATURAL GAS AND/OR POWER SERVICE WORK ON THE PROJECT SITE.

2. CONTRACTOR SHALL COORDINATE WITH CENTURYLINK, COMCAST, LEVEL 3, AND ZAYO COMMUNICATIONS FOR ALL TELEPHONE SERVICE WORK ON THE PROJECT SITE.

3. RIM ELEVATIONS OF UTILITY STRUCTURES SHALL BE INSTALLED SO THAT RIM MAY BE ADJUSTED ±0.5 FEET TO MATCH FINISHED GRADES.

CONTRACTOR NOTE

ALL EXISTING UTILITIES SHOWN ON PLANS ARE TO BE VERIFIED HORIZONTALLY AND VERTICALLY PRIOR TO ANY CONSTRUCTION. ALL EXISTING FEATURES INCLUDING BURIED UTILITIES ARE SHOWN AS INDICATED ON RECORD MAPS AND SURVEYS FURNISHED BY OTHERS. WE ASSUME NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS AND SURVEYS. CONTACT THE UTILITY OWNER/AGENCY FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO CONSTRUCTION.

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SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
4	3/1/21	BID SET

PROJ. NO.	2018-050
DRAWN	JFS
CHECKED	MRG
DATE	2/5/21

GENERAL NOTES

C-001

REFERENCE NOTES:

1. NO EXCAVATION EXCEPT FOR MINOR CLEARING AND GRUBBING SHALL TAKE PLACE WITHIN WSDOT BRIDGE PIER FOOTING RIGHT-OF-WAY
2. REMOVE EXISTING SIGN AND RETURN TO PROPERTY OWNER
3. REMOVE EXISTING GATE AND RETURN TO PROPERTY OWNER
4. RETAIN AND PROTECT EXISTING SANITARY SEWER
5. RETAIN AND PROTECT EXISTING STORM DRAIN
6. RETAIN AND PROTECT EXISTING DRY UTILITIES
7. RETAIN AND PROTECT EXISTING MONITORING WELLS
8. REMOVE EXISTING POWER POLE. COORDINATE WITH AVISTA UTILITIES.
9. RETAIN AND PROTECT EXISTING TRAIL.
10. DEMOLISH AND REMOVE EXISTING TRAIL.
11. REMOVE EXISTING BOLLARDS AND RETURN TO PROPERTY OWNER.
12. RETAIN AND PROTECT EXISTING FIRE HYDRANT.
13. RETAIN AND PROTECT EXISTING IRRIGATION BOXES.
14. EXISTING SIGN TO BE RELOCATED.
15. DEMOLISH AND REMOVE EXISTING ROCK RETAINING WALL.
16. RETAIN AND PROTECT EXISTING SIDEWALK.
17. RETAIN AND PROTECT EXISTING SWALE.
18. DEMOLISH AND REMOVE EXISTING SWALE.
19. RETAIN AND PROTECT EXISTING DRIVEWAY.
20. DEMOLISH AND REMOVE EXISTING DRIVEWAY.

120' BRIDGE AIRSPACE EASEMENT

28+00

JAMES KEEFE BRIDGE

STA: 26+97.01
OFFSET: 0.00 L

HIGH WATER MARK (SCALED FROM BSP Z2006-30-FBSP)

26+00

24+00

22+00

E. MARTIN LUTHER KING JR. WAY

RIM=1884.35'
60"I.E.(FLOW)=1863.45'

RIM=1884.54'
NO FLOW;
FULL OF WATER

RIM=1885.89'

RIM(N)=1883.59'
RIM(S)=1883.80'
60"I.E.(FLOW)=1862.60'

BOTTOM OF BEAM ELEVATION=1913.61'

TOP OF SIGN ELEVATION=1954.25'

BEAM

GATE

HAMILTON STREET OVERHEAD BRIDGE

RIM=1884.06'

RIM=1884.07'

RIM=1884.17'

RIM=1883.

RIM=1885.77'

RIM=1886.75'

RIM=1887.82'

RIM=1894.22'

RIM=1893.56'

RIM=1891.43'

RIM=1891.30'

RIM=1891.42'

200' SHORELINE MANAGEMENT PROGRAM BOUNDARY

ON-SITE TBM:
SET CHISELED "X" ON NORTH EASTERLY ANCHOR BOLT OF TRAFFIC SIGNAL POLE
ELEVATION = 1886.14' (NAVD88)

ERIE AVENUE

ERIE STREET (VACATED)

CONTRACTOR NOTE

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GRAPHIC SCALE

30 0 15 30

(IN FEET)
1 inch = 30 ft.

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SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
1	3/1/21	BID SET

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CHECKED	MRG
DATE	2/5/21

EXISTING SITE CONDITIONS & DEMOLITION PLAN

C-100

REFERENCE NOTES:

(1) PROVIDE NEW CONSTRUCTION ENTRANCE AND CONCRETE WASHOUT AREA PER DETAIL 1/C-500.

(2) PROVIDE TEMPORARY FILTER FABRIC FENCE PER DETAIL 2/C-500.

(3) PLACE STEEL PLATES ON TOP OF DRAINAGE STRUCTURES AND BURY UNTIL TIME OF FINAL GRADING AND/OR PAVING, WHEN FRAMES AND GRATES CAN BE INSTALLED AND SET TO FINISHED GRADE.

(4) PROVIDE NEW STRAW WATTLES PER DETAIL 5/C-500.

ENGINEER'S NOTES:

1. EROSION CONTROL MEASURES SHOWN ON THE PLAN ARE MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL INSTALL ADDITIONAL MEASURES, AS NEEDED, TO PREVENT SEDIMENT-LADEN RUNOFF FROM LEAVING THE SITE OR FROM COMPROMISING THE PROPOSED/EXISTING STORM WATER FACILITIES.

2. SEE SHEET C-001 FOR ADDITIONAL ESC NOTES.

3. CONTRACTOR SHALL CONSTRUCT EROSION CONTROL FACILITIES BEFORE GRADING COMMENCES.

4. CONTRACTOR IS RESPONSIBLE FOR DESIGNATING A LOCATION WHERE CONCRETE TRUCKS OR EQUIPMENT CAN BE WASHED OUT. THIS AREA SHALL NOT BE LOCATED NEAR OR DRAINING INTO A STORM DRAINAGE AREA, TREATMENT AREA, DRAINAGE STRUCTURE OR OTHER STORM WATER FACILITIES EXISTING OR OTHERWISE.

CONTAMINATED SOILS EXPOSURE:

FOR AREAS WHERE EXCAVATIONS WILL EXPOSE CONTAMINATED SOILS, THE CONTRACTOR SHALL TAKE MULTIPLE PRECAUTIONS TO ENSURE THAT RAINWATER DOES NOT COMINGLE WITH THE CONTAMINATION, AND CONTAMINATION IS NOT SPREAD TO OTHER AREAS OF THE SITE. THESE PRECAUTIONS INCLUDE BUT ARE NOT LIMITED TO:

1. PERFORM EXCAVATIONS DURING DRY WEATHER PERIODS ONLY.

2. COVER OPEN UTILITY TRENCHES AT THE END OF EVERY WORKDAY.

3. LINE LARGER EXCAVATIONS WITH AN IMPERMEABLE LINER AT THE END OF EVERY WORKDAY.

4. PLACE CONTAMINATED SPOILS IN DESIGNATED STOCKPILE AREAS ON TOP OF AN IMPERMEABLE LINER, AND COVER WITH AN IMPERMEABLE LINER. PLACE STOCKPILE UNDER BRIDGE IF POSSIBLE TO MINIMIZE CHANGE OF RAINFALL REACHING STOCKPILE.

5. IF RAINFALL BEGINS WHILE EXCAVATION IS IN PROGRESS, STOP WORK IMMEDIATELY AND COVER OR LINE THE OPEN EXCAVATION.

6. PLACE PERMANENT CONCRETE AS SOON AS POSSIBLE IN FOOTING EXCAVATIONS TO MINIMIZE EXPOSURE TIME OF CONTAMINATION.

7. COLLECT SPOILS FROM AUGERED PILE CONSTRUCTION, PLACE IN DESIGNATED STOCKPILE LOCATIONS.

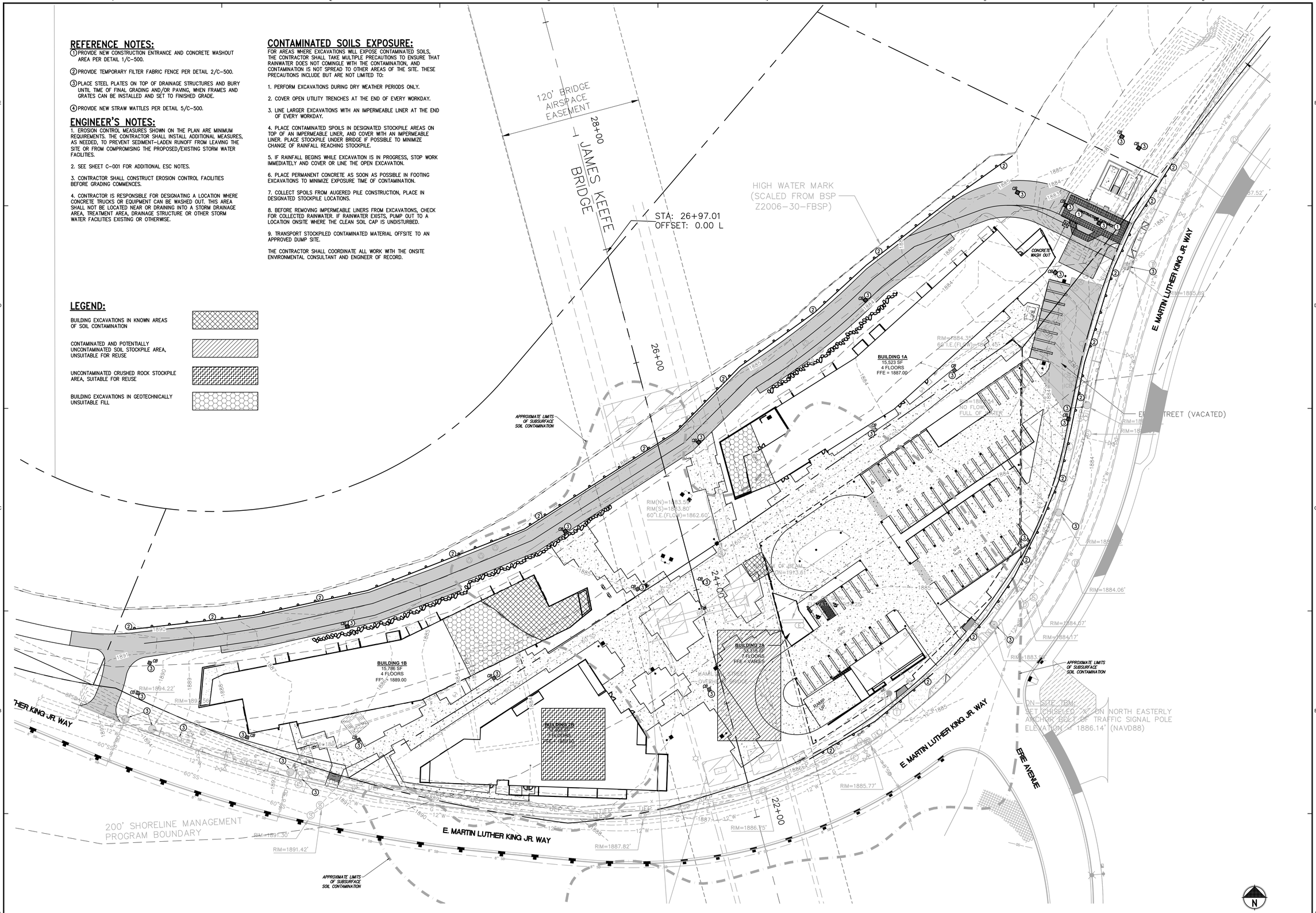
8. BEFORE REMOVING IMPERMEABLE LINERS FROM EXCAVATIONS, CHECK FOR COLLECTED RAINWATER. IF RAINWATER EXISTS, PUMP OUT TO A LOCATION ONSITE WHERE THE CLEAN SOIL CAP IS UNDISTURBED.

9. TRANSPORT STOCKPILED CONTAMINATED MATERIAL OFFSITE TO AN APPROVED DUMP SITE.

THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE ONSITE ENVIRONMENTAL CONSULTANT AND ENGINEER OF RECORD.

LEGEND:

- BUILDING EXCAVATIONS IN KNOWN AREAS OF SOIL CONTAMINATION
- CONTAMINATED AND POTENTIALLY UNCONTAMINATED SOIL STOCKPILE AREA, UNSUITABLE FOR REUSE
- UNCONTAMINATED CRUSHED ROCK STOCKPILE AREA, SUITABLE FOR REUSE
- BUILDING EXCAVATIONS IN GEOTECHNICALLY UNSUITABLE FILL



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SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

REV	DATE	DESCRIPTION
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EROSION CONTROL PLAN

C-110

REFERENCE NOTES:

(1) PROVIDE ADA PAVEMENT MARKINGS AND SIGNAGE PER CITY OF S SPOKANE STANDARD PLANS G-54 AND G-80A. SEE DETAIL 1/C-501.

SITE DATA:

SITE ADDRESSES: 111, 115, 119, 225, 229 N ERIE STREET
PARCEL NOS. 35174.0601-0608

PRIMARY CONTACT: RUSTIN HALL – ALSC ARCHITECTS
203 N WASHINGTON, SUITE 400
SPOKANE, WA 99201
(509) 838-8568
rhall@alscarchitects.com

PROPERTY OWNER:SAGAMORE SPOKANE QOZP, LLC
1 EAST CAMELBACK ROAD, SUITE 200
PHOENIX, AZ 85012
(602) 549-4021
rhayes@bridgestonecap.com

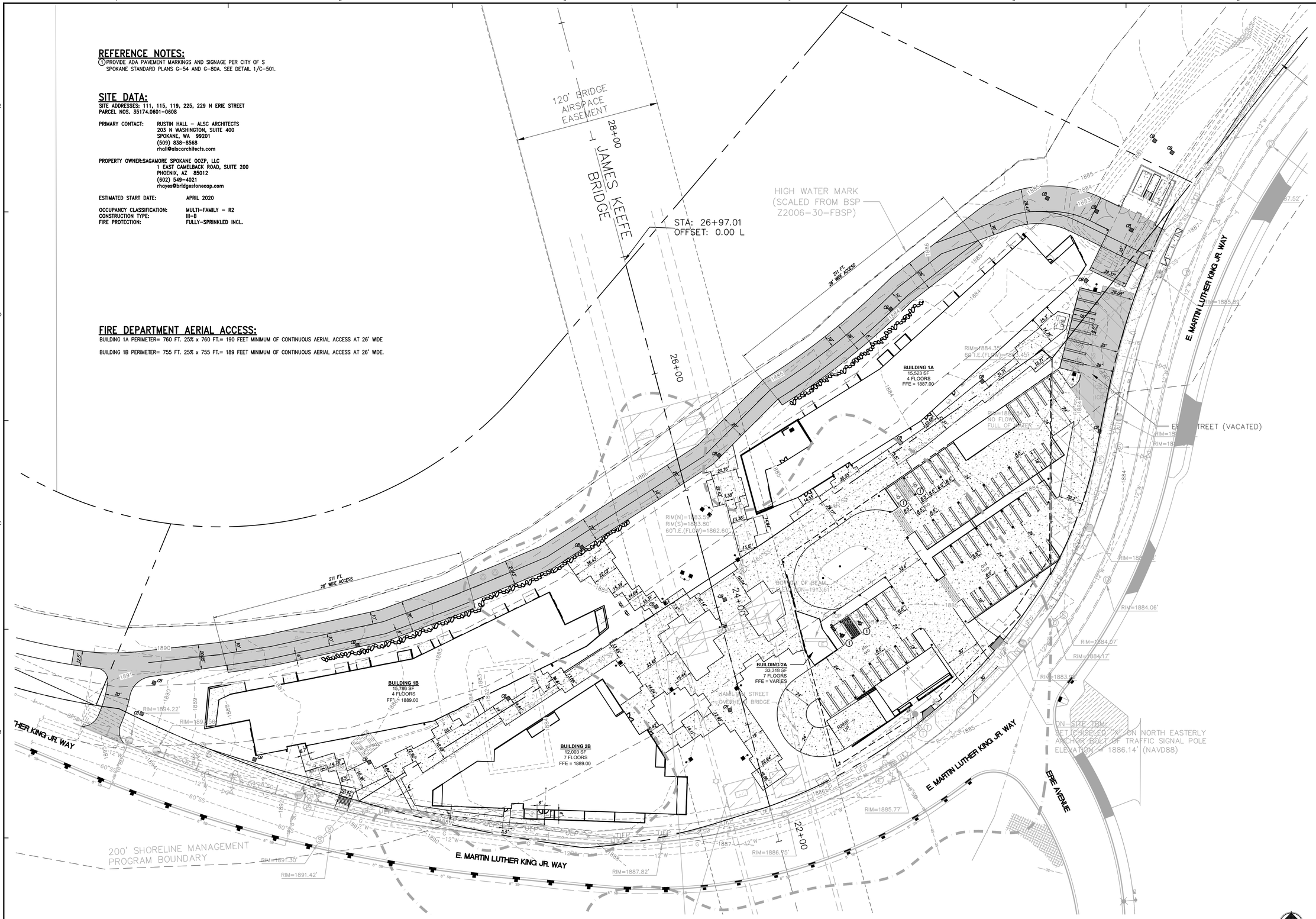
ESTIMATED START DATE: APRIL 2020

OCCUPANCY CLASSIFICATION: MULTI-FAMILY – R2
CONSTRUCTION TYPE: III-B
FIRE PROTECTION: FULLY-SPRINKLED INCL.

FIRE DEPARTMENT AERIAL ACCESS:

BUILDING 1A PERIMETER= 760 FT. 25% x 760 FT.= 190 FEET MINIMUM OF CONTINUOUS AERIAL ACCESS AT 26' WIDE

BUILDING 1B PERIMETER= 755 FT. 25% x 755 FT.= 189 FEET MINIMUM OF CONTINUOUS AERIAL ACCESS AT 26' WIDE.



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SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

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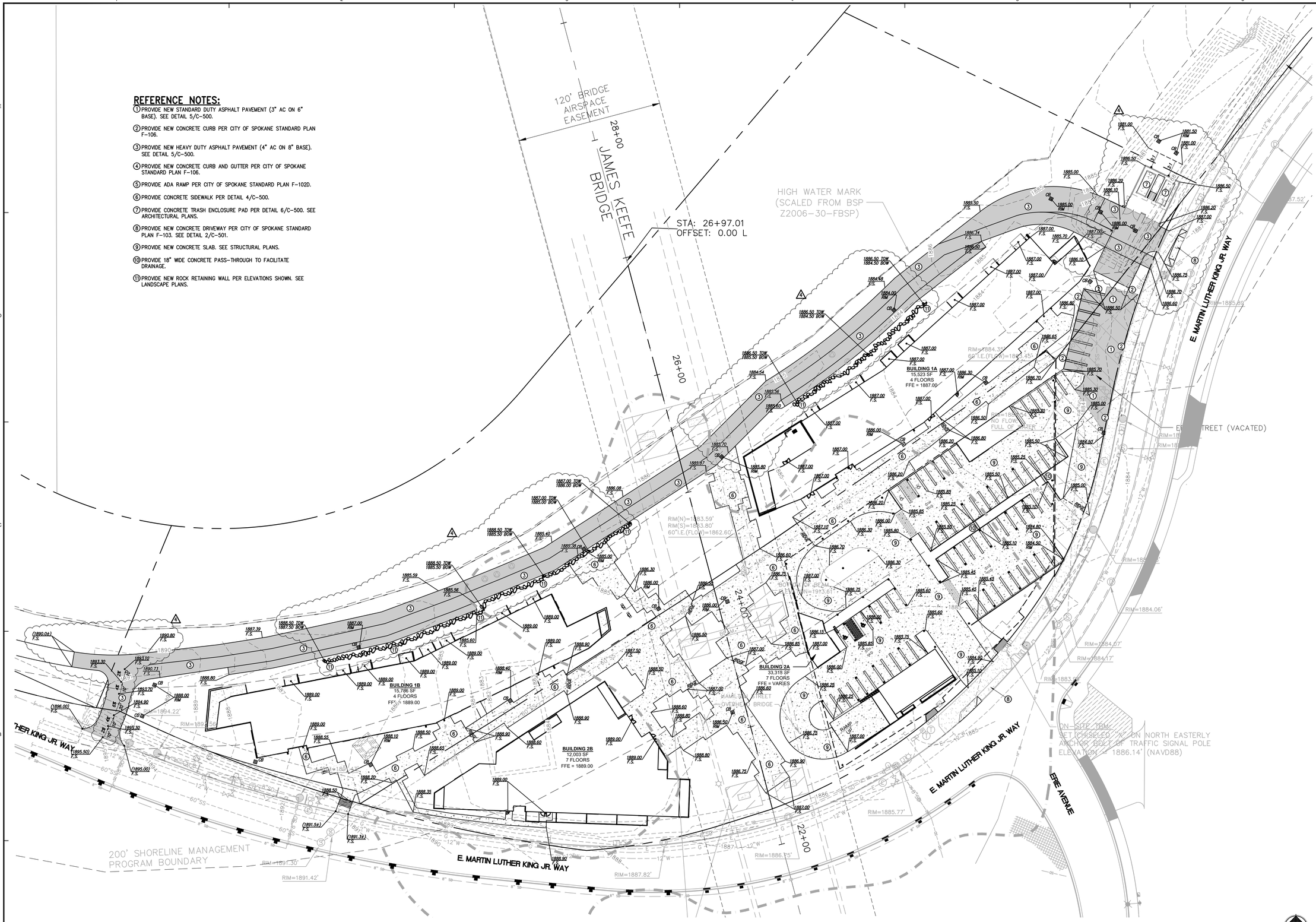
CIVIL SITE PLAN

C-120

REFERENCE NOTES:

1. PROVIDE NEW STANDARD DUTY ASPHALT PAVEMENT (3" AC ON 6" BASE). SEE DETAIL 5/C-500.
2. PROVIDE NEW CONCRETE CURB PER CITY OF SPOKANE STANDARD PLAN F-106.
3. PROVIDE NEW HEAVY DUTY ASPHALT PAVEMENT (4" AC ON 8" BASE). SEE DETAIL 5/C-500.
4. PROVIDE NEW CONCRETE CURB AND GUTTER PER CITY OF SPOKANE STANDARD PLAN F-106.
5. PROVIDE ADA RAMP PER CITY OF SPOKANE STANDARD PLAN F-102D.
6. PROVIDE CONCRETE SIDEWALK PER DETAIL 4/C-500.
7. PROVIDE CONCRETE TRASH ENCLOSURE PAD PER DETAIL 6/C-500. SEE ARCHITECTURAL PLANS.
8. PROVIDE NEW CONCRETE DRIVEWAY PER CITY OF SPOKANE STANDARD PLAN F-103. SEE DETAIL 2/C-501.
9. PROVIDE NEW CONCRETE SLAB. SEE STRUCTURAL PLANS.
10. PROVIDE 18" WIDE CONCRETE PASS-THROUGH TO FACILITATE DRAINAGE.
11. PROVIDE NEW ROCK RETAINING WALL PER ELEVATIONS SHOWN. SEE LANDSCAPE PLANS.



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SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

BID SET

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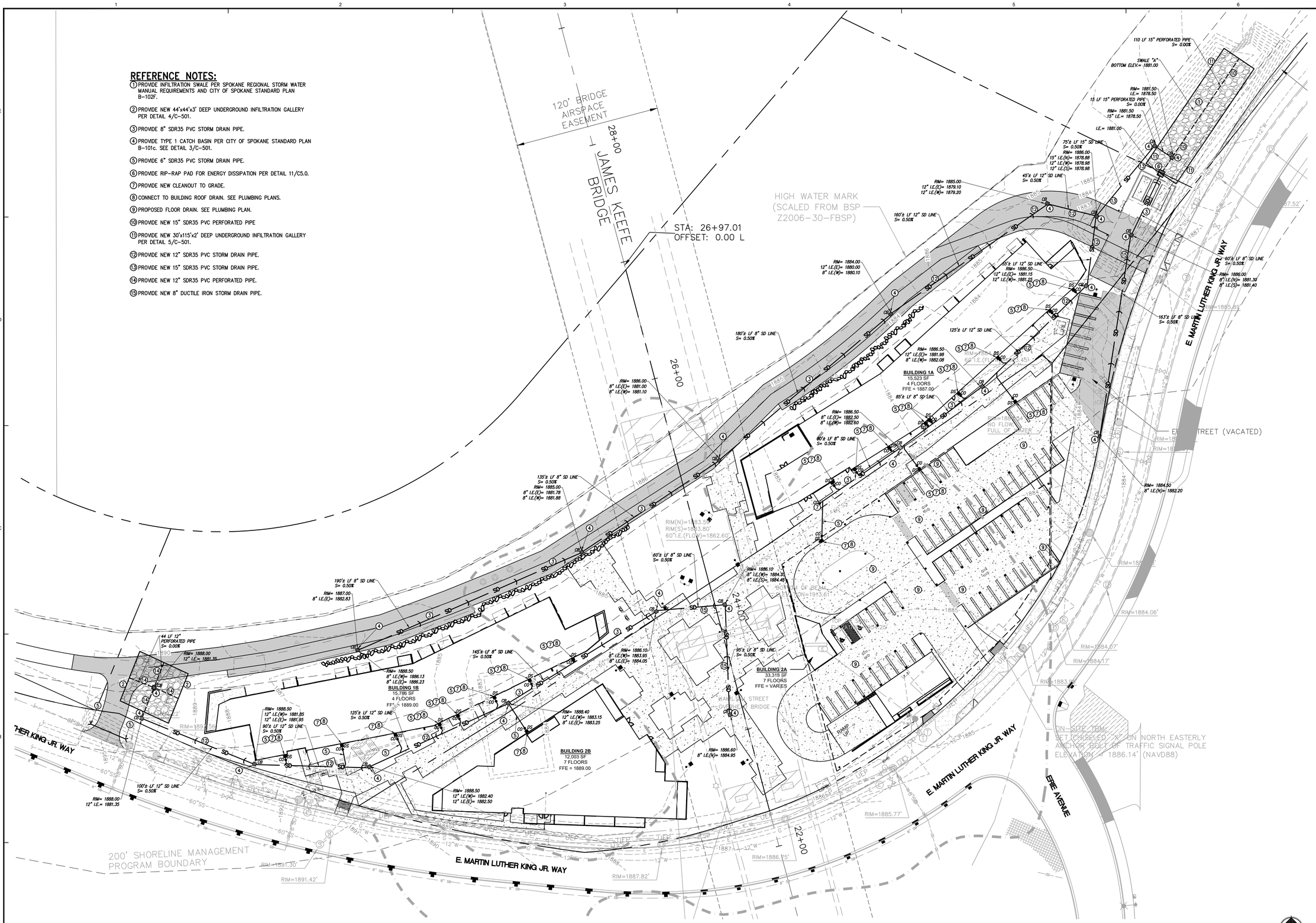
CHECKED	MRG
DATE	2/5/21

GRADING PLAN

C-130

REFERENCE NOTES:

1. PROVIDE INFILTRATION SWALE PER SPOKANE REGIONAL STORM WATER MANUAL REQUIREMENTS AND CITY OF SPOKANE STANDARD PLAN B-102F.
2. PROVIDE NEW 44'x44'x3' DEEP UNDERGROUND INFILTRATION GALLERY PER DETAIL 4/C-501.
3. PROVIDE 8" SDR35 PVC STORM DRAIN PIPE.
4. PROVIDE TYPE 1 CATCH BASIN PER CITY OF SPOKANE STANDARD PLAN B-101c. SEE DETAIL 3/C-501.
5. PROVIDE 6" SDR35 PVC STORM DRAIN PIPE.
6. PROVIDE RIP-RAP PAD FOR ENERGY DISSIPATION PER DETAIL 11/C5.0.
7. PROVIDE NEW CLEANOUT TO GRADE.
8. CONNECT TO BUILDING ROOF DRAIN. SEE PLUMBING PLANS.
9. PROPOSED FLOOR DRAIN. SEE PLUMBING PLAN.
10. PROVIDE NEW 15" SDR35 PVC PERFORATED PIPE
11. PROVIDE NEW 30'x115'x2' DEEP UNDERGROUND INFILTRATION GALLERY PER DETAIL 5/C-501.
12. PROVIDE NEW 12" SDR35 PVC STORM DRAIN PIPE.
13. PROVIDE NEW 15" SDR35 PVC STORM DRAIN PIPE.
14. PROVIDE NEW 12" SDR35 PVC PERFORATED PIPE.
15. PROVIDE NEW 8" DUCTILE IRON STORM DRAIN PIPE.



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STORM WATER PLAN

C-140

REFERENCE NOTES:

① PROVIDE 3" HDPE CTS SDR9 200 PSI DOMESTIC WATER SERVICE WITH 12 GAUGE TRACER WIRE AND PRESSURE REDUCING VALVE. COORDINATE WITH CITY BUILDING DEPARTMENT AT TIME OF BUILDING CONSTRUCTION.

② PROVIDE 8" DUCTILE IRON WATER MAIN WITH 5.5' MINIMUM DEPTH TO INVERT.

③ TIE INTO EXISTING 8" WATER MAIN. CONTRACTOR SHALL FIELD LOCATE EXISTING TAP BY POTHOLE TO SELECT FINAL POSITION FOR METER VAULT.

④ CAP 8" WATER MAIN.

⑤ PROVIDE 8'x14' WATER METER VAULT PER DETAIL 8/C-500. WILBERT PRECAST #1923 OR EQUAL, WITH 42"x42" HALLIDAY ALUMINUM HATCH.

⑥ PROVIDE 6" DUCTILE IRON FIRE SERVICE. COORDINATE BACK FLOW PREVENTION WITH CITY BUILDING DEPARTMENT AT TIME OF BUILDING CONSTRUCTION.

⑦ PROVIDE SANITARY SEWER MANHOLE PER CITY OF SPOKANE STANDARD PLAN Z-101.

⑧ TIE INTO EXISTING SANITARY SEWER MANHOLE WITH DROP PER DETAIL 7/C-500.

⑨ PROVIDE 6" SDR35 PVC SANITARY SEWER MAIN.

⑩ PROVIDE POST INDICATOR VALVE PER DETAIL 10/C-500.

⑪ PROVIDE 5'x8' 1000 GALLON OIL-WATER SEPARATOR, WILBERT PRECAST #16270WTBS OR APPROVED EQUAL. SEE DETAIL 1/C-501.

⑫ PROVIDE NEW FIRE HYDRANT PER CITY OF SPOKANE STANDARD PLAN Y-101.

⑬ ABANDON EXISTING IRRIGATION LINE.

⑭ PROVIDE 6" SDR35 PVC SEWER SERVICE WITH 3.5' MINIMUM COVER. SLOPE= 2.0% MINIMUM.

⑮ PROVIDE SANITARY SEWER CLEANOUT.

⑯ PROVIDE 8" 45° BEND.

⑰ PROVIDE NEW NATURAL GAS SERVICE. COORDINATE WITH AVISTA UTILITIES.

⑱ IRRIGATION SYSTEM POINT OF CONNECTION.

⑲ PROVIDE 8" GATE VALVE.

⑳ PROVIDE 8" x 6" TEE.

㉑ PROVIDE 6" DUCTILE IRON WATER MAIN WITH 5.5' MINIMUM DEPTH TO INVERT.

㉒ PROVIDE 6" 45° BEND.

㉓ PROPOSED SITE LIGHTING. SEE ELECTRICAL PLANS

㉔ PROPOSED ELECTRICAL TRANSFORMERS. SEE ELECTRICAL PLANS.

㉕ PROVIDE BUILDING MOUNTED FIRE DEPARTMENT CONNECTION.

㉖ EXISTING FIRE HYDRANT.

㉗ RELOCATE FIRE HYDRANT INTO RIGHT-OF-WAY.

㉘ PROVIDE NEW UNDERGROUND ELECTRICAL SERVICE. SEE ELECTRICAL PLANS. COORDINATE WITH AVISTA UTILITIES.

㉙ TIE INTO EXISTING SEWER STUB. CONTRACTOR SHALL FIELD VERIFY SIZE, DEPTH, AND SLOPE OF SANITARY SEWER STUB BEFORE STARTING CONSTRUCTION. (4)

REFERENCE NOTES:

㉚ CONSTRUCT PROTECTUS METER SIGNAL 3' ABOVE GROUND NEXT TO BOLLARD, AT LOCATION SHOWN. ALL CONDUIT BENDS SHALL BE SWEEPS, NOT ELBOWS. PROVIDE AND ATTACH A 16" LONG TREATED 2X6 TO FACE OF BOLLARD JUST BELOW ITS TOP (BOARD LENGTH PARALLEL TO GROUND, FACING NEAREST STREET) TO MOUNT THE METER TRANSMITTERS. BOLLARD PER DETAIL 7/C-501.

㉛ PROVIDE 6" GATE VALVE.

㉜ PROVIDE 8" SDR35 PVC SANITARY SEWER LINE. LENGTH AND SLOPE PER PLAN.

㉝ PROVIDE 2" HDPE WATER SERVICE STUB FOR FUTURE WATER FEATURE (4)

ENGINEER'S NOTES:

1. WATER SERVICES SHALL MEET CURRENT BACKFLOW STANDARDS PER WAC 246-290-490 AND FOLLOW CITY OF SPOKANE WATER DEPARTMENT RULES AND REGULATIONS FOR WATER SERVICE INSTALLATIONS.

2. ON-PROPERTY SITE WATER LINES SHALL BE INSPECTED BY CITY WATER PRIOR TO BACKFILL.

3. ALL WATER-SEWER CROSSINGS SHALL CONFORM TO CITY OF SPOKANE STANDARD PLAN A-5.

4. NO JOINTS IN WATER LINES ALLOWED WITHIN 5' OF FOUNDATION; COORDINATE LOCATION FOR END OF SERVICE STUB AND PIV DURING MANDATORY PRE-CONSTRUCTION MEETING WITH WATER DEPT (REQUIRED MIN. TWO WEEKS BEFORE CONSTRUCTION START).

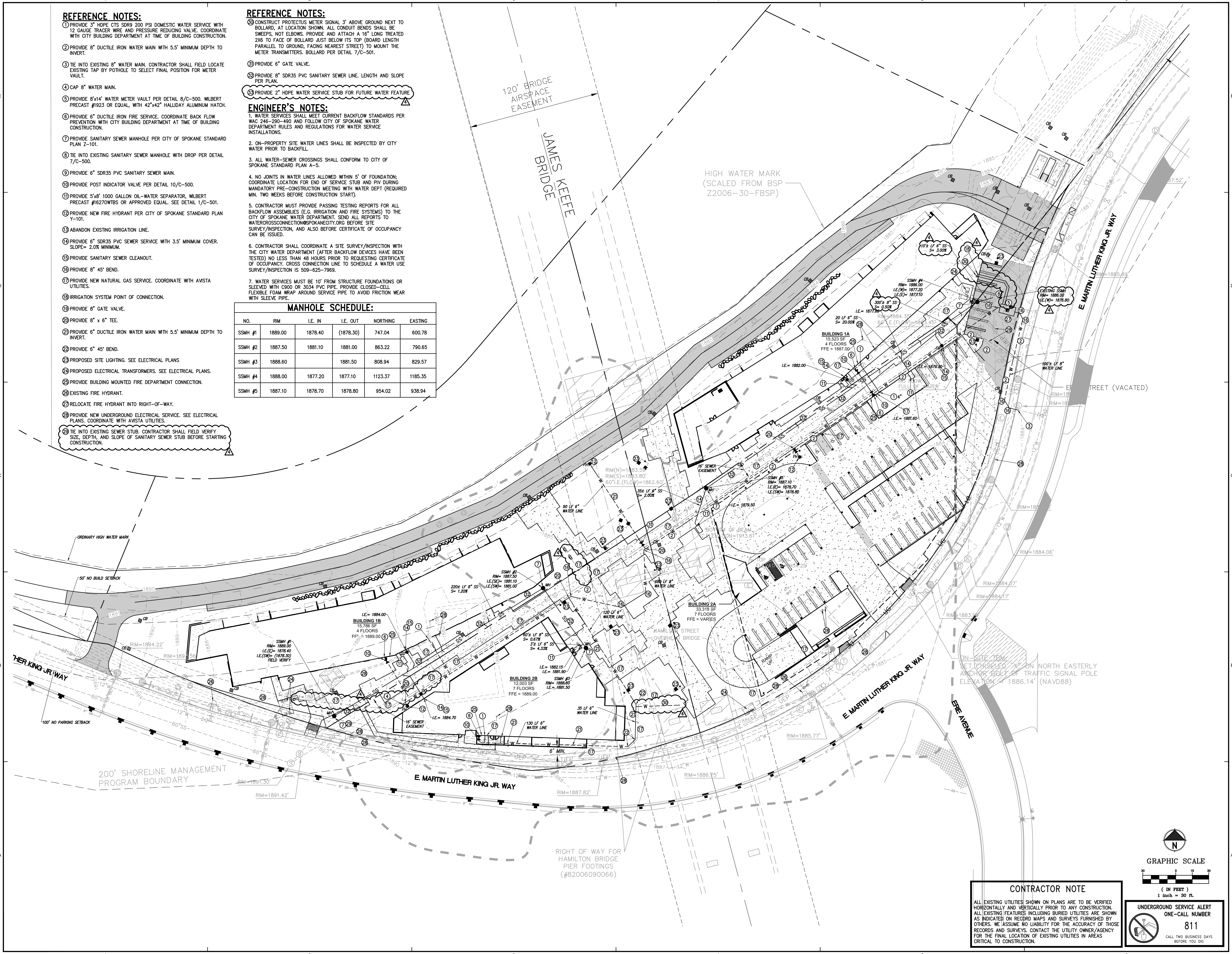
5. CONTRACTOR MUST PROVIDE PASSING TESTING REPORTS FOR ALL BACKFLOW ASSEMBLIES (E.G. IRRIGATION AND FIRE SYSTEMS) TO THE CITY OF SPOKANE WATER DEPARTMENT. SEND ALL REPORTS TO WATERCROSSCONNECTION@SPOKANECITY.ORG BEFORE SITE SURVEY/INSPECTION, AND ALSO BEFORE CERTIFICATE OF OCCUPANCY CAN BE ISSUED.

6. CONTRACTOR SHALL COORDINATE A SITE SURVEY/INSPECTION WITH THE CITY WATER DEPARTMENT (AFTER BACKFLOW DEVICES HAVE BEEN TESTED) NO LESS THAN 48 HOURS PRIOR TO REQUESTING CERTIFICATE OF OCCUPANCY. CROSS CONNECTION LINE TO SCHEDULE A WATER USE SURVEY/INSPECTION IS 509-625-7969.

7. WATER SERVICES MUST BE 10' FROM STRUCTURE FOUNDATIONS OR SLEEVED WITH C900 OR 3034 PVC PIPE. PROVIDE CLOSED-CELL FLEXIBLE FOAM WRAP AROUND SERVICE PIPE TO AVOID FRICTION WEAR WITH SLEEVE PIPE.

MANHOLE SCHEDULE:

NO.	RIM	I.E. IN	I.E. OUT	NORTHING	EASTING
SSMH #1	1889.00	1878.40	(1878.30)	747.04	600.78
SSMH #2	1887.50	1881.10	1881.00	863.22	790.65
SSMH #3	1888.60		1881.50	808.94	829.57
SSMH #4	1888.00	1877.20	1877.10	1123.37	1185.35
SSMH #5	1887.10	1878.70	1878.80	954.02	938.94



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SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

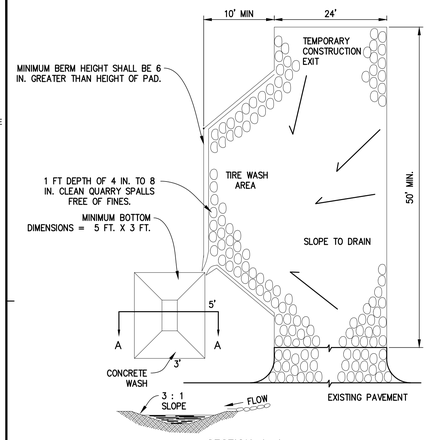
BID SET

REV	DATE	DESCRIPTION
4	3/1/21	BID SET

PROJ. NO. 2018-050
DRAWN JFS
CHECKED MRG
DATE 2/5/21

UTILITY PLAN

C-150



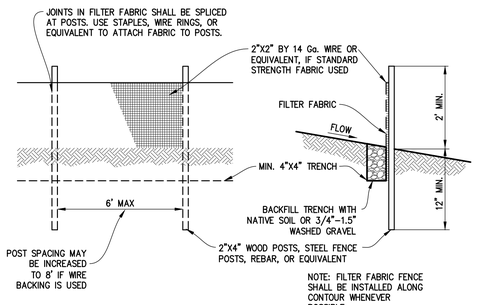
SECTION A-A

NOTES:

1. TIRE WASH AREA MUST BE INSTALLED ADJACENT TO AND DOWN GRADIENT FROM TEMPORARY CONSTRUCTION EXIT AND AS CLOSE TO EXISTING PAVEMENT AS POSSIBLE.
2. MORE TRUCK TRAFFIC MAY REQUIRE A LARGER AREA.

CONSTRUCTION ENTRANCE 1

SCALE : NTS



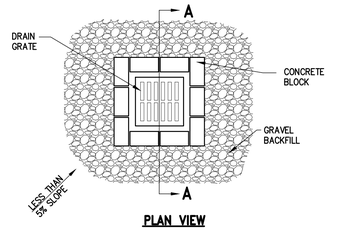
NOTE: FILTER FABRIC FENCE SHALL BE INSTALLED ALONG CONTOUR WHENEVER POSSIBLE.

MAINTENANCE STANDARDS:

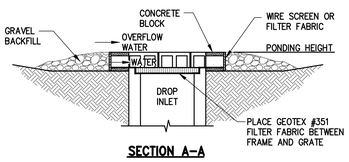
1. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.
2. IF CONCENTRATED FLOWS ARE EVIDENT UPHILL OF THE FENCE, THEY MUST BE INTERCEPTED AND CONVEYED TO A SEDIMENT TRAP OR POND.
3. IT IS IMPORTANT TO CHECK THE UPHILL SIDE OF THE FENCE FOR SIGN OF THE FENCE CLOGGING AND ACTING AS A BARRIER TO FLOW AND THEN CAUSING CHANNELIZATION OF FLOWS PARALLEL TO THE FENCE. IF THIS OCCURS, REPLACE THE FENCE AND/OR REMOVE THE TRAPPED SEDIMENT.
4. SEDIMENT MUST BE REMOVED WHEN THE SEDIMENT IS 6" HIGH.
5. IF THE FILTER FABRIC HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN, IT SHALL BE REPLACED.

FILTER FABRIC FENCE DETAIL 2

SCALE : NTS



PLAN VIEW



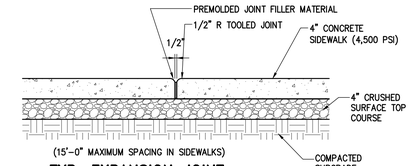
SECTION A-A

NOTES:

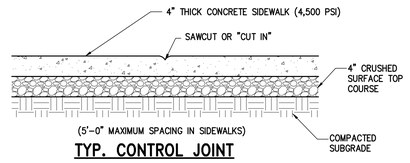
1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. EXCAVATE A BASIN OF SUFFICIENT SIZE ADJACENT TO THE DROP INLET.
3. THE TOP OF THE STRUCTURE (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BYPASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

INLET PROTECTION DETAIL 3

SCALE : NTS



TYP. EXPANSION JOINT



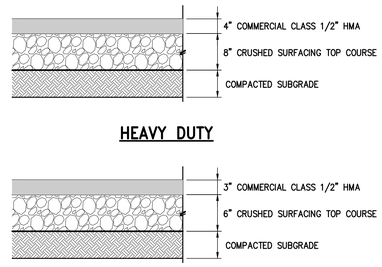
TYP. CONTROL JOINT

NOTES:

1. SUBGRADE AND 4" CRUSHED GRAVEL MUST BE PROPERLY COMPACTED TO PREVENT FUTURE DIFFERENTIAL SETTLING OF SIDEWALK.
2. SEE ARCHITECTURAL SITE PLANS FOR JOINT TYPES AND LOCATIONS IN CONCRETE SIDEWALK AREAS.

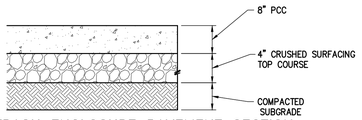
CONCRETE SIDEWALK DETAIL 4

SCALE : NTS



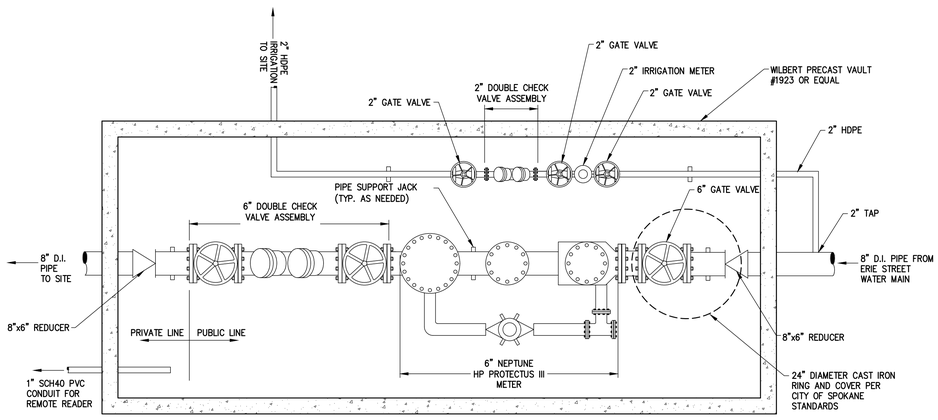
ASPHALT PAVEMENT SECTIONS 5

SCALE : NTS



TRASH ENCLOSURE PAVEMENT SECTION 6

SCALE : NTS

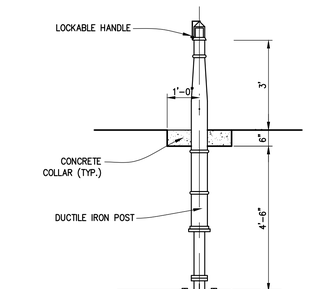


NOTES:

1. CONTRACTOR SHALL INSTALL VAULT, BACKFILL, AND COMPACT PER PROJECT SPECIFICATIONS. CITY OF SPOKANE SHALL INSTALL ALL PIPING AND APPURTENANCES.
2. ALL PIPES THROUGH WALLS AND TOP SHALL BE GROUTED AND SEALED. ALL PIPING 3" AND LARGER SHALL BE DUCTILE IRON CLASS 50.

WATER VAULT DETAIL 8

SCALE : NTS

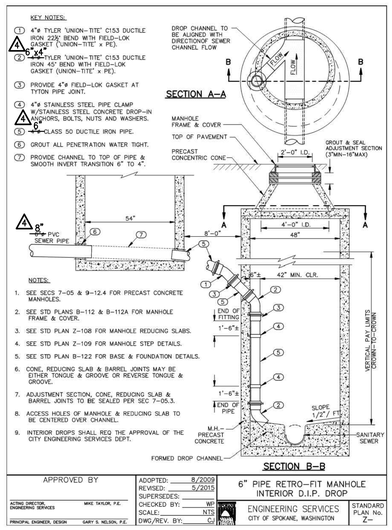


NOTE:

1. P.I.V. MUST HAVE A TAMPER SWITCH WITH 1" SCH40 PVC CONDUIT TO FIRE ALARM PANEL. SEE ELECTRICAL PLANS.

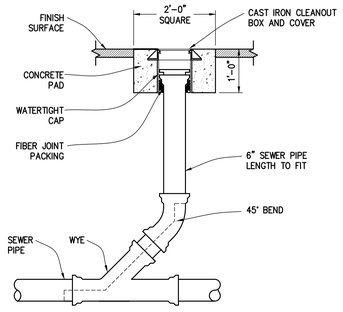
POST INDICATOR VALVE (P.I.V.) 10

SCALE : NTS



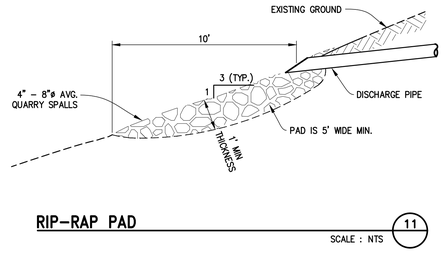
DROP MANHOLE 7

SCALE : NTS



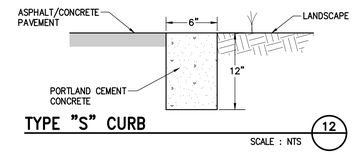
TYPICAL CLEANOUT 9

SCALE : NTS



RIP-RAP PAD 11

SCALE : NTS



TYPE "S" CURB 12

SCALE : NTS

CONTRACTOR NOTE

ALL EXISTING UTILITIES SHOWN ON PLANS ARE TO BE VERIFIED HORIZONTALLY AND VERTICALLY PRIOR TO ANY CONSTRUCTION. ALL EXISTING FEATURES INCLUDING BURIED UTILITIES ARE SHOWN AS INDICATED ON RECORD MAPS AND SURVEYS FURNISHED BY OTHERS. WE ASSUME NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS AND SURVEYS. CONTACT THE UTILITY OWNER/AGENCY FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO CONSTRUCTION.

UNDERGROUND SERVICE ALERT
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ALSC ARCHITECTS
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6500 Mineral Drive, Suite 101
Coure d' Alene, Idaho 83815
208.676.8292
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3/11/2021

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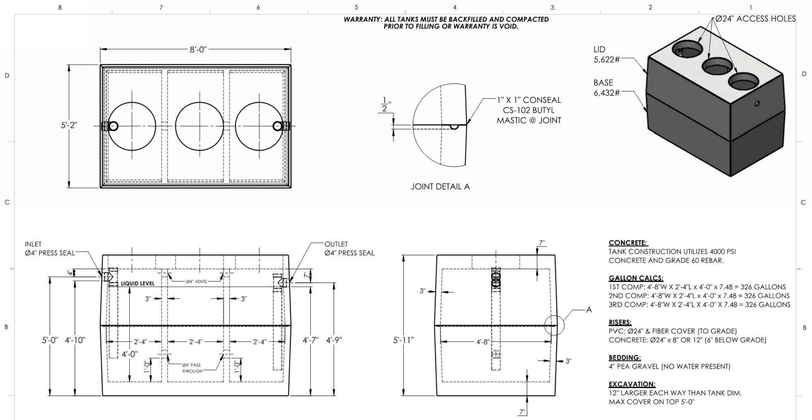
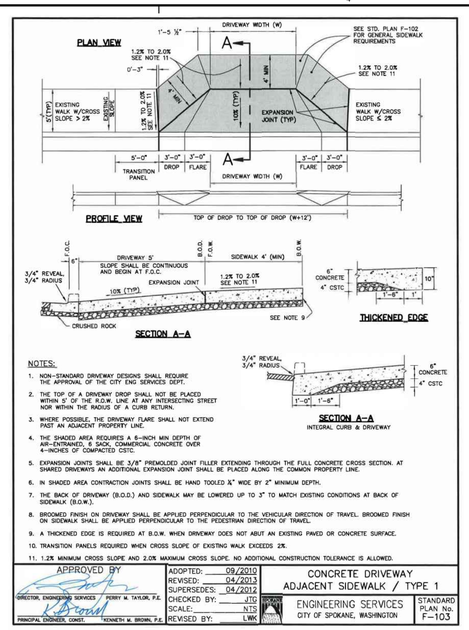
DETAILS

C-500



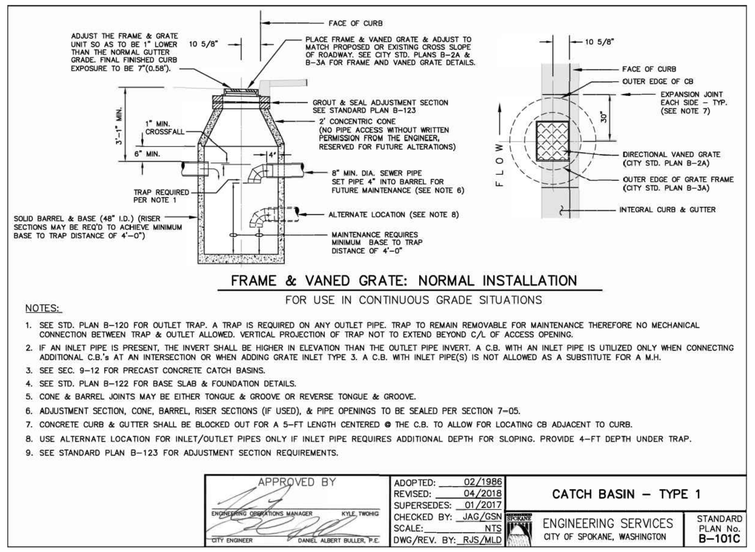
OIL/WATER SEPARATOR

SCALE : NTS (1)



CONCRETE DRIVEWAY

SCALE : NTS (2)

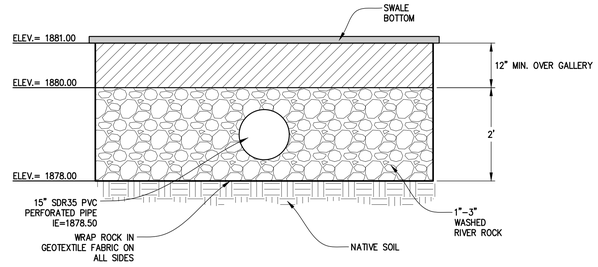


FRAME & VANED GRATE: NORMAL INSTALLATION

FOR USE IN CONTINUOUS GRADE SITUATIONS

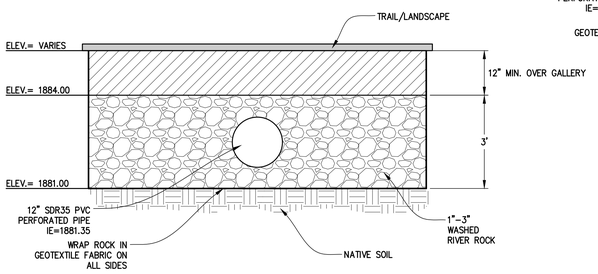
CATCH BASIN TYPE "1"

SCALE : NTS (3)



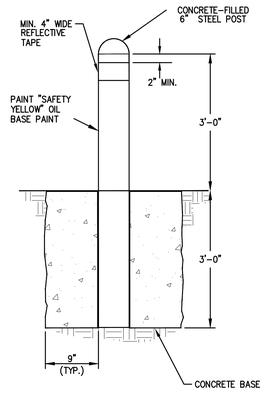
GRAVEL INFILTRATION GALLERY SECTION A

SCALE : NTS (5)



GRAVEL INFILTRATION GALLERY SECTION B

SCALE : NTS (4)

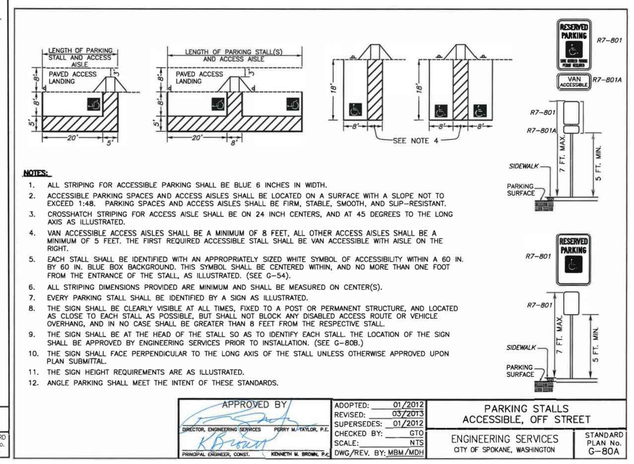


BOLLARD DETAIL

SCALE : NTS (7)

ADA SIGNAGE AND STRIPING

SCALE : NTS (6)



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DATE	2/5/21

DETAILS

C-501

APPENDIX G

Geotechnical Report and Recommendations Update Memo

GEOTECHNICAL ENGINEERING REPORT – RIVER BEND DEVELOPMENT

111 North Erie Street
Spokane, Washington

Prepared for: Sagamore Spokane LLC

Project No. 190210-01 • April 22, 2020 (revised May 22, 2020) FINAL

Aspect CONSULTING

earth + water

GEOTECHNICAL ENGINEERING REPORT – RIVER BEND DEVELOPMENT

111 North Erie Street
Spokane, Washington

Prepared for: Sagamore Spokane LLC

Project No. 190210-01 • April 22, 2020 (revised May 22, 2020) FINAL

Aspect Consulting, LLC

05/22/2020

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V:\190210 Sagamore Spokane\Deliverables\Geotechnical Engineering Report\Final_May 2020\Geotechnical Engineering Report_FINAL_20200522.docx

Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

This report presents the results of a joint environmental/geotechnical engineering investigation by Aspect Consulting, LLC (Aspect) in support of the proposed redevelopment at 111 North Erie Street in Spokane, Washington (Site). The project is known as the River Bend Development Project (Project) and also as District on the River. The Site location is shown on Figure 1, and the Site footprint and existing features are shown on Figure 2.

This report provides our geotechnical engineering recommendations in support of design and construction of the proposed developments, which comprise three residential buildings and one mixed residential and parking structure. Aspect is concurrently providing an Engineering Design Report (EDR) for environmental purposes, which will be provided under separate cover.

This report presents geotechnical engineering results, conclusions, and recommendations related to design and construction of geotechnical elements of the Project. This geotechnical report is suitable to be included with the permit application documents.

2 Project Description

The proposed Project consists of the following major elements:

1. Building 1A is proposed at the northeast quadrant of the Site. We anticipate it will be up to four stories of residential units and will have an approximately 15,523-square-foot (sf) footprint. Based on subsurface conditions at the Site, the design team is currently in agreement that Building 1A will be founded on a shallow mat foundation, with localized subexcavation of unsuitable fill and compressible native soils.
2. Building 1B is proposed at the northwest quadrant of the Site. We anticipate it will be up to four stories of residential units and will have an approximately 15,786 sf footprint. Based on subsurface conditions at the Site, the design team is currently in agreement that Building 1B will be founded on a shallow mat foundation.
3. Building 2A is proposed at the southeast quadrant of the Site. We anticipate it will be up to four stories of residential units over two levels of parking. Building 2A will have an approximately 33,318 sf footprint. Based on subsurface conditions at the Site, the design team is currently in agreement that Building 2A will be founded on deep foundations.
4. Building 2B is proposed at the southwest quadrant of the Site. We anticipate it will be up to seven stories of residential units and will have an approximately

12,003 sf footprint. Based on subsurface conditions at the Site, the design team is currently in agreement that Building 2B will be founded on deep foundations.

This report comprises geotechnical recommendations for each structure described above, as well as associated geotechnical elements related to the development of the Site. The proposed structure outlines are shown on Figure 2.

We assume the proposed structures will be designed in accordance with the 2015 International Building Code (ICC, 2015), which has been adopted by the City of Spokane (City). The Project vertical datum is North American Vertical Datum of 1988 (NAVD88), and is the basis for all elevations referred to in this report.

3 Existing Data Review and Site Investigation

This section summarizes the Site history and relevant subsurface investigations previously performed at the Site. The information presented here provides context for the geotechnical conclusions and recommendations presented in this report.

3.1 Site History

The Site was historically used as a manufactured coal gas and carbureted water gas facility from approximately 1905 to 1948. It was then used by Avista Corp. to dispense natural gas until 1963, when Brown Building Materials was established at the Site (Ecology, 2015). The historical facilities at the Site created an area of environmental contamination (illustrated on Figure 2) that required remedial action, namely placement of a soil cap, construction of detention ponds, grading for surface water control, and shoreline erosion controls.

The contamination and description of the remedial work at the Site are recorded in several environmental and geotechnical reports by others; references are cited throughout this report.

The portion of the Site made up of the properties along the Spokane River was formerly owned by the Chicago Milwaukee & Saint Paul Railroad, who constructed a rail line along the riverbank to a railroad tunnel through basalt outcropping to the west of the Site. The basalt rock removed during the construction of the tunnel was placed into the Spokane River to create the shoreline in its current configuration (Ecology, 2015). The existing riverbank and historical riverbank, that existed before the basalt fill was placed, are illustrated on Figure 2.

3.2 Subsurface Explorations by Aspect

On April 20 through 22, 2020, Aspect completed 16 test pit explorations designated ATP-01 through ATP-16. The test pits excavated by Spokane Environmental Solutions, LLC, subcontracted to Aspect. The test pit locations were chosen to inform the depths and extents of historical slab foundations at the Site (ATP-01 through ATP-07), characterize subsurface conditions beneath Building 1B (ATP-08) at the off-Site northern stormwater

swale (ATP-09 through ATP-13), and inform riverbank stability analyses (ATP-14 through ATP-16). The test pit locations are shown on Figure 2.

Soil was classified in accordance with the ASTM International, Inc. (ASTM) Method D2488 *Standard Practice for Description and Identification of Soils* (Visual-Manual Procedure) by an Aspect field scientist. Soil descriptions, field screening results, and other relevant details (e.g., staining, debris, odors, etc.) were recorded. Once a test pit was completed, it was backfilled up to ground surface in roughly 12-inch lifts and compacted with a vibratory compactor.

The test pits at the historical slab foundations were advanced to the depth of the concrete slab or to the maximum practical depth (as determined by the absence of a slab at depth). The historical slab foundation was located for each of the completed test pits ATP-01 through ATP-07. ATP-05 was initially an exception, as a slab was not located at a maximum of 7 feet below ground surface (bgs); however, the test pit was repeated nearby as ATP-05B, and the slab was located at a depth of 5 feet bgs.

Test pit ATP-08 at Building 1B was advanced to a depth of 9 feet bgs. The test pits at the northern stormwater swale (ATP-09 through ATP-13) were advanced to 12 feet bgs, or to the depth at which the water table was encountered, at which point the test pit was terminated.

The test pits along the riverbank were advanced to 9.5 feet bgs, or until excavation became impractical due to the presence of basalt bounder fill. ATP-14 was advanced to a depth of 9.5 feet bgs, various fill layers were observed to a depth of 5.5 feet bgs and were composed of silty sand to basalt spalls 2 to 6 inches in diameter. ATP-15 was advanced to a depth of 6.5 feet bgs, with basalt boulders encountered beginning at 4.5 feet bgs and various other fill layers above. ATP-16 was advanced to a depth of 3 feet bgs, with basalt cobbles and boulders encountered beginning at 2 feet bgs and various fill layers above.

The test pit exploration logs are presented in Appendix A.

3.3 Previous Subsurface Explorations

Multiple subsurface investigations were completed at the Site by others prior to Aspect's involvement with the Project. Previous explorations on the Site that were reviewed for this report and used for geotechnical analyses include:

- Eight test pits, designated TP-1 through TP-8, completed by Strata in 2014 (STRATA, 2014)
- Three soil borings, designated B-01, B-05, and B-06, completed by Buddinger & Associates in 2013 (BUD, 2013)
- Three monitoring wells, designated MW02-100, MW-4-100, and MW8-90, completed by Landau Associates in 1998 and 1999 (Landau, 1999)
- Twenty-three soil borings, designated SB-3, SB-5 through SB-10, SB-12 through SB-23, SB-25, SB-26, SB-29, and SB-34, completed by EMCON in 1997 (EMCON, 1998)

- Three soil borings, designated H-6, H-7, and H-8, completed by the Washington State Department of Transportation (WSDOT) in 1981 (WSDOT, 1982)

The approximate locations of these previous explorations are shown on Figure 2. Boring logs created by others and used for our analyses are provided in Appendix B.

3.4 Previous Geotechnical Laboratory Testing

We compiled geotechnical laboratory testing results that had been performed on select soil samples collected from the previous subsurface explorations identified in Section 3.3. The geotechnical laboratory testing results that were reviewed for this report include:

- A Modified Proctor test performed on a soil sample from TP-4 (STRATA, 2014)
- Grain-size analyses performed on soil samples from TP-2 and TP-7 (STRATA, 2014) and B-01 and B-02 (BUD, 2013)

The compiled test results are provided in Appendix C.

3.5 Geophysical Investigation

To supplement the existing subsurface data, Aspect subcontracted hydroGEOPHYSICS, Inc. (HGI) to perform a geophysical investigation at the Site. The investigation took place between June 25 and 27, 2019, and comprised a combination of magnetic, electromagnetic induction, electrical resistivity, active source multi-channel analysis of surface waves, and P-wave refraction surveys throughout the Site. The extents of the various surveys are shown on Figure 3, and the results of the geophysical investigation are summarized in the data report presented in Appendix D (HGI, 2019).

4 Surface and Subsurface Conditions

This section presents the Site conditions, including surface and subsurface conditions and groundwater data. This information provides context for the discussion of types and distribution of geologic soil units, and a basis for our geotechnical recommendations.

4.1 Surface Conditions

The undeveloped Site is located along the southern shoreline of the Spokane River. It is bounded to the north by the Spokane River, to the south by Martin Luther King Jr. (MLK) Way and a steep hillside and railroad line (Northern Pacific Railroad), and to the east and west by commercial and industrial properties. The bank on the northern boundary of the Site slopes down to Spokane River at 20 to 45 degrees. This slope is protected from erosion by vegetation and riprap revetment (cobbles and boulders up to 5 feet in diameter).

The Site gently slopes down from west to east towards a large detention pond at its eastern edge. Ground surface elevations at the Site range from approximately Elevation 1888 to 1882. The Site is bisected by the James Keefe Bridge (also known as Hamilton Bridge) right-of-way, which runs north to south through the approximate middle of the

Site. The bridge deck is about 40 feet above the Site; the structure is supported on columns bearing on pile-supported foundations. The existing bridge footings are illustrated on Figure 2 and the approximate vertical extents of the pile foundations are shown on Figures 6 and 7.

4.2 Subsurface Conditions

Geologic mapping of the area indicates that the Site is underlain by glacial flood-channel deposits of the Pleistocene age (Qfcg). West of the Site, Grande Ronde Basalt (~~M~~gr) of the Miocene age is mapped (Derkey et al., 2004). The Qfcg unit that underlies the Site generally consists of boulders, cobbles, gravel, and sand, with some sand and silt beds, and may be on the order of several hundred feet thick (Derkey et al., 2004).

Based on explorations completed at the Site, native soils beneath the Site generally agree with the geologic mapping. However, portions of the Site are covered by substantial amounts of highly variable fill.

The subsurface soils generally consist of variable fill overlying loose to dense gravel and sand with localized beds of silt and sand, overlying basalt bedrock at the western edge of the Site. Historical foundation elements are inferred to be present at localized areas of the Site, as shown on Figure 2.

The Site subsurface conditions, as characterized by historical documentation, observed during previous explorations, and inferred from the recent geophysical survey, are described in more detail below and visually presented on Figures 4 through 9.

4.2.1 Sanitary Sewer

A 60-inch-diameter concrete sanitary gravity sewer crosses beneath the middle of the Site in a generally southwest to northeast alignment at a depth of about 20 feet bgs at its invert, which corresponds to approximately Elevation 1868. The approximate sewer alignment is shown on Figure 2. The age and current condition of the concrete sewer pipe are unknown. Special considerations were made for geotechnical elements of the Project that may impact the sewer. These are discussed further in Section 5.4 of this report.

4.2.2 Historical Foundation Elements

Historical foundation elements, comprised of buried concrete near the surface, exist on the Site. Figure 2 illustrates approximate locations of historical buildings where some foundation elements may remain. Previous subsurface explorations encountered buried concrete at some of these locations. The geophysical investigation further identified a suspected area of near-surface concrete on the eastern portion of the Site (Figure 11; HGI, 2019). These historical foundation elements will present obstructions during construction grading and installation of deep foundations.

4.2.3 Fill

Fill soils underlying the Site are related to previous site grading and development, previous environmental capping, and relocation of basalt rock that was removed from the nearby railroad alignment during its development. The type and thickness of fill material is highly variable throughout the Site, and we assume it to be non-engineered, meaning that its composition is not documented, and it was not systematically compacted to a

uniform relative density. The exception to this assumption is the soil cap fill described below, which was placed and compacted. For geotechnical analysis and site characterization, we have subdivided the fill into the following five sub-units:

Soil Cap

A typically 2-foot-thick soil cap was placed during previous environmental remediation work per Washington State Department of Ecology (Ecology) requirements. The soil cap generally consists of 6 inches of imported gravel surfacing material over 18 inches of imported base course material made up of gravel and recycled concrete. The base course and gravel surfacing were compacted. The soil cap extends over and beyond the area denoted "Limits of Contamination" on Figure 2, covering the majority of the Site. The compacted soil cap exhibits moderate shear strength, high permeability, and low compressibility.

Brick Fill

Brick fill was present in some subsurface explorations from near ground surface to depths of up to 12 feet bgs. The brick fill generally consists of loose/soft to medium dense brick and concrete block fragments, coal fragments, cobbles, gravel, sand, and silt. The brick fill is typically thickest at the middle of the Site (under the James Keefe Bridge) and thins out approaching the east, west, and north. The brick fill exhibits low shear strength, moderate permeability, and variable (low to moderate) compressibility.

We anticipate that brick fill will be encountered during construction at Buildings 1A and 2A. Minor amounts of brick fill may be encountered at Buildings 1B and 2B.

Basalt Fill

Basalt fill was encountered in some subsurface explorations to depths of up to 30 feet bgs. The basalt fill generally consists of loose to medium dense angular, gravel-, cobble-, and boulder-sized basalt fragments. We inferred this as relocated fill that was generated from nearby rock tunneling excavations during the construction of the railroad alignments near the Site. The basalt fill generally exists north and west of the historical riverbank, and appears to be thickest at the west side of the Site; thinning out to the east of the James Keefe Bridge. The basalt fill is generally expected to exhibit moderate to high shear strength, high permeability, and low compressibility depending on its gradation and density.

Some of the subsurface explorations that encountered the basalt fill found areas with large air voids up to 6 inches in diameter due to lack of smaller gravel particle sizes. There is potential that the basalt fill could experience additional settlement induced by seismic shaking.

We anticipate that minor amounts of basalt fill may be encountered at Buildings 1A and 2A, and that basalt fill will be encountered during construction at Buildings 1B and 2B.

Cinder Fill

Cinder fill was present in some subsurface explorations below the brick and basalt fill to depths of up to 10 feet bgs. The cinder fill generally consists of loose, poorly graded gravel, sand, cobbles, and boulders, with cinder fragments and air voids up to

6 inches in diameter. The cinder fill is typically thickest just west of the James Keefe Bridge and quickly thins out from this location to the north, south, east, and west. The cinder fill exhibits low shear strength, high permeability, and moderate compressibility. There is potential that the cinder fill could experience additional settlement induced by seismic shaking.

We anticipate that cinder fill will be encountered during construction at Building 2B and (if excavations greater than 5 feet deep are required) at Building 1B. We do not anticipate cinder fill will be encountered at Buildings 1A and 2A.

Undifferentiated Fill

Undifferentiated fill was present in some subsurface explorations beneath the brick and basalt fill. The undifferentiated fill generally consists of various materials, including concrete, asphalt, metal, brick, and plastic debris, gravel, cobbles, and air voids up to 6 inches in diameter. The undifferentiated fill is typically thickest at the east side of the Site and thins out approaching the James Keefe Bridge. The undifferentiated fill is expected to exhibit low shear strength, high permeability, and variable (moderate to high) compressibility.

We anticipate the undifferentiated fill will be encountered during construction grading at Buildings 1A and 2A. We do not anticipate significant amounts of undifferentiated fill will be encountered at Buildings 1B and 2B.

4.2.4 Flood-Channel Deposits

Underlying the various fill material at the Site are loose to very dense cobbles, gravel, sand, and silt that we interpret to be glacial flood-channel deposits (Qfcg). The flood-channel deposits were present to the maximum depth explored (100 feet bgs in H-7). For geotechnical analysis and site characterization, we have subdivided the flood-channel deposits into the following sub-units:

Silt Overbank Deposits

Silt overbank deposits were present beneath fill material in some subsurface explorations on the east half of the Site. The silt overbank deposits generally consist of medium dense silt with varying amounts of fine sand. These deposits are up to 5½ feet thick under the east half of the Site and thin out towards the west. The silt overbank deposits are expected to exhibit moderate shear strength, low permeability, and moderate compressibility. Moisture or consolidation laboratory testing data are not available from the previous subsurface investigations within this soil unit. Therefore, although these deposits generally lie above the groundwater table, we consider this deposit moderately to highly compressible due to high fines content and geologic origin.

Alluvium

Alluvium deposits were encountered in the subsurface explorations that extended below the fill units and silt overbank deposits. The alluvium deposits generally consist of medium dense to dense sand and gravels, with some cobbles and occasional boulders. Based on our knowledge of geology at the Site, we expect the gravelly flood-channel deposits to underly the entire Site below the various fill soils

and the silt overbank deposits. The alluvium deposits exhibit moderate shear strength, high permeability, and low compressibility.

4.2.5 Basalt Bedrock

Basalt bedrock was encountered at a depth of 90 feet bgs in boring MW8-90 (Landau, 1999) at the west edge of the Site. The basalt bedrock exhibits high shear strength, very low permeability, and low compressibility.

Boring MW8-90 was the deepest subsurface exploration on the west side of the Site. Based on geology and observations of basalt outcrops to the west of the Site, we infer that basalt bedrock underlies flood-channel deposits at depth, at least along the west edge of the Site.

4.3 Groundwater

Review of the data collected during the previous subsurface investigations at the Site indicates that groundwater was encountered at the Site at an average depth of about 13 feet bgs, or approximately Elevation 1873. We recommend assuming this elevation for the design groundwater level; the design groundwater level is also shown on Figures 4 through 9 (Cross Sections A-A' through F-F').

The groundwater interacts differently with the highly permeable fill material versus the native flood-channel deposits which, although still made up of permeable material, have a lower hydraulic conductivity than the fill. Groundwater within the fill is typically recharged by the Spokane River, with high and low groundwater levels corresponding to the water levels in the Spokane River. The flow gradient is predominately away from the Spokane River and towards the south or southeast. Water levels in the native flood-channel deposits are more representative of the regional aquifer (Landau, 2003).

5 Geotechnical Engineering Conclusions and Recommendations

Our recommendations are based on our current understanding of the Project design from the conceptual plans and layouts provided by the design team, and the subsurface conditions interpreted from previous on-site explorations and the geophysical investigation. If the Project changes, we should be notified so we can review, change, or confirm our recommendations.

Our recommendations include the following:

- The design groundwater level should be taken as Elevation 1,873.
- The proposed Buildings 1A and 1B may be supported on rafted structural slabs (i.e., mat foundations) bearing on compacted structural fill over dense basalt fill or competent native material.

- The proposed Buildings 2A and 2B should be supported on deep foundations. Several deep foundation alternatives were considered for this Project, and are summarized in Section 5.3.2. Based on environmental and geotechnical considerations, and after preliminary cost estimate research, grouted helical pile or drilled-in displacement micropile foundations appear to be the most feasible and cost-effective deep foundation systems for Buildings 2A and 2B.

5.1 Earthquake Engineering

The following sections present descriptions of seismic design considerations for the Project.

5.1.1 Ground Response

Following the procedures outlined in American Society of Civil Engineers (ASCE) 7-10, Minimum Design Loads for Buildings and Other Structures (ASCE, 2013a) and the 2015 International Building Code (IBC), we have determined seismic parameters for design as presented below. The IBC seismic design is based on the "Maximum Considered Earthquake (MCE)" with a 2 percent probability of exceedance (PE) in 50 years (2,475-year return period; ICC, 2015). Seismic design should be completed with the specific ground motion parameters listed in Table 1 below.

Table 1. Seismic Design Parameters

Design Parameter	Recommended Value
Site Class	D
Peak Ground Acceleration (PGA)	0.144g(1)
Short Period Spectral Acceleration (S_s)	0.333g
1-Second Period Spectral Acceleration (S_1)	0.115g
Site Coefficient (F_a)	1.534
Site Coefficient (F_v)	2.34
Design Short Period Spectral Acceleration (S_{DS})	0.34g
Design 1-Second Period Spectral Acceleration (S_{D1})	0.179g

Notes:
1. g = gravitational force
2. Based on the latitude and longitude of the Site: 47.658912°N, 117.395687°W.
3. The risk category used was II, residential use.

5.1.2 Surficial Ground Rupture

Derkley et al., maps the Latah fault zone as the nearest suspected fault to the Site (Derkley et al., 2004). The Latah fault is inferred to pass under Spokane in a northwest to southeast alignment approximately 2.4 miles west of the Site. It is suspected of being able to produce a magnitude 5.5 earthquake. The Latah fault is not considered an active fault.

The last inferred motion along the fault was over 1.6 million years ago (USGS, 2014). Due to the suspected long recurrence interval of the known fault, and its distance from the subject Site, we do not consider potential surficial ground rupture a significant hazard during the expected life of the Project.

5.1.3 Liquefaction

Liquefaction occurs when loose, saturated, and relatively cohesionless soil deposits temporarily lose strength from seismic shaking. The primary factors controlling the onset of liquefaction include intensity and duration of strong ground motion, characteristics of subsurface soil, *in situ* stress conditions, and the depth to groundwater.

The Washington Department of Natural Resources (DNR) maps the Site as having very low liquefaction susceptibility (DNR, 2004). Given the relative density, grain size distribution, and geologic origin of the soils at the Site, we do not consider liquefaction to be a significant hazard for the Project.

To confirm this conclusion, we evaluated liquefaction potential of the Site using state-of-practice empirical methods (Youd et al., 2001). Liquefaction is expected where induced cyclic stresses exceed the cyclic resistance of the soil, resulting in a factor of safety against liquefaction triggering of less than 1. Our analyses confirm the Site soils below the groundwater table have a low potential for liquefaction during the design earthquake event. Our analyses indicate liquefaction would only be triggered in a very thin, discontinuous, soil layer localized within a small area of the overall Site, and that minimal ground surface settlement would occur.

Therefore, we conclude that soil liquefaction is not a design consideration for this Site. However, due to the density and gradation of the on-site gravel soils, permanent volumetric strain caused by earthquake-induced densification could produce additional settlement.

5.2 Temporary Dewatering

We do not anticipate building construction will require temporary excavations below the groundwater level. Construction dewatering should not be necessary. We anticipate surface water originating from runoff or precipitation and entering the shallow excavations for the proposed building foundations can be mitigated using conventional sumps and pumps.

5.3 Building Foundations

Based on the subsurface conditions described in Section 4.2, and our understanding of your desired Project investment and risk acceptability, we consider rafted structural slab foundations (mat foundations) to be an appropriate foundation type for Buildings 1A and 1B, and deep foundations to be an appropriate foundation type for Buildings 2A and 2B. As discussed above, the Site is underlain by highly variable fill deposits. This limits the accuracy of estimated performance of the proposed foundations.

Design considerations for each foundation type are summarized in the following sections.

5.3.1 Mat Foundations – Buildings 1A and 1B

We understand that Buildings 1A and 1B will be grade-supported at or slightly above existing ground surface (approximately Elevation 1884). We anticipate grading at these locations will expose variable soil units that may include basalt fill, cinder fill, undifferentiated fill, and flood-channel deposits at Building 1A and basalt fill and cinder fill at Building 1B. We recommend that all unsuitable fill soils (excluding dense basalt fill) and compressible silt overbank deposits be subexcavated and replaced with lean-mix concrete or crushed surfacing base course (CSBC). Based on the previous subsurface explorations and current topography, we anticipate subexcavation to approximately 5.5 feet bgs will be necessary at Building 1A to expose native flood-channel deposits. We anticipate minimal subexcavation will be necessary below the majority of Building 1B due to the presence of shallow basalt fill, except at the east end of the proposed building footprint where thicker deposits of unsuitable fill soils appear to exist. In this area, we recommend subexcavation to a minimum depth of 2 feet and backfill with compacted CSBC per WSDOT Standard Specification 9-03.9(3) (WSDOT, 2018) that is reinforced with a minimum of two equally-spaced layers of woven polypropylene geotextile reinforcement per WSDOT Standard Specification 9-33.2(2) (WSDOT, 2018).

For mat foundations poured directly onto dense basalt fill, lean-mix concrete, or CSBC placed and compacted directly over native flood-channel deposits, we make the following recommendations:

- We recommend an allowable bearing pressure of 0.5 kips per square foot (ksf) and 1.5 ksf for design of rafted mat foundations at Buildings 1A and 1B, respectively. These allowable bearing pressures may be increased by one-third for short-duration loading, such as wind and seismic loading.
- To resist lateral forces, assuming unsaturated conditions at the base of the mat foundations, we recommend using an allowable passive equivalent fluid density of 250 pounds per cubic foot (pcf), and an allowable base and side friction coefficient of 0.3 for design. However, if a vapor barrier is used beneath the mat foundations, we recommend an allowable base friction coefficient of 0.1 for design. These allowable values include a factor of safety of approximately 1.5.
- Due to the design groundwater level being approximately below the base of the foundations, we do not consider it necessary to design the mat foundations for an uplift pressure due to groundwater.

Allowable design values presented in the list above include a factor of safety of 1.5.

Foundation Subgrade Spring Constants

We used Section 8.4.2.5 of ASCE 41-13 (ASCE, 2013b) and shear wave velocity values collected from the geophysical investigation to compute the modulus of subgrade reaction (spring constants) for the proposed mat foundations. We made the following assumptions for our analyses:

- The preliminary structural footing layouts and dimensions shown on Figure 2 are assumed. These were provided to us by the Project structural engineer and may be revised as the Project progresses.

- Based on the assumed structural footing layouts and dimensions provided, we assume the mat foundations at both Buildings 1A and 1B to be flexible.

Based on the assumptions stated above, we recommend vertical modulus values of 18 pounds per cubic inch (pci) for Building 1A and 30 pci for Building 1B. These preliminary recommended values are adjusted for the proposed footing width and thickness and may be revised as the Project design progresses.

Settlement

Given an assumed bearing pressure of 0.5 ksf and 1.5 ksf for Buildings 1A and 1B, respectively, and assuming our recommendations for subexcavation and backfill are followed, we estimate the maximum total settlement of the mat foundations will be about 1.5 inches in the center and 0.5-inches at the edges and corners of the mat foundations. Longer-term consolidation settlement is anticipated at Building 1A, whereas foundation settlement at Building 1B is expected to occur as the loads are applied.

Since variable subsurface conditions could exist below Buildings 1A and 1B, if they are not appropriately addressed during construction, as recommended, settlement potential could exist in excess of tolerable limits for the proposed construction. For instance, gravel fill soils could potentially experience additional settlement induced by seismic shaking, even if liquefaction is not triggered.

We understand you accept the risk of potential settlement. In order to reduce the risk of settlement and associated impacts to the planned structures, additional measures could be implemented, such as ground improvement, but would incur additional cost to the Project. If the risk of potential settlement as described above is unacceptable, Aspect should be consulted to provide recommendations on alternatives that reduce the risk of settlement.

5.3.2 Deep Foundations – Buildings 2A and 2B

Based on the variable fill conditions at the southeast and southwest quadrants of the Site and the anticipated structural loads, we consider deep foundations to be appropriate for Buildings 2A and 2B.

Key geotechnical considerations for deep foundations include the effect of vibration on nearby structures (namely the James Keefe Bridge foundations and sanitary sewer line), production of potentially contaminated soil spoils during installation, ease of installation in variable soil conditions that may include debris or boulders, and axial and lateral capacity of the deep foundations.

Based on the subsurface conditions at the Site, our review of existing driven pile foundations for the James Keefe Bridge, and our experience with deep foundations, we identified the following deep foundation alternatives that are geotechnically feasible for this Project:

- conventional micropiles
- drilled-in displacement micropiles
- grouted helical piles
- auger displacement piles

- driven steel pipe piles.

Considerations and estimated construction costs for each deep foundation alternative are presented below:

Conventional Micropiles

Micropiles are composed of a steel-threaded reinforcement bar encased in grout. The micropiles are installed by drilling soil with a steel casing to the planned embedment depth, injecting the drilled hole with grout and threaded bar, and then pulling the temporary casing out of the bearing stratum soils. Installation of micropiles results in little to no vibration and picks up resistance to axial loads due to the interaction of the grout with the surrounding soils. However, resistance to lateral loading is minimal, and the drilling process produces soil spoils, which could potentially contain contaminants at the Site. Micropile installation can be very difficult in coarse (cobble and boulder) stratigraphy.

Based on our understanding of the subsurface conditions at the Site, we determined micropiles installed to an embedment depth of 40 feet bgs can develop allowable axial load capacities of 50 kips. We estimate that more than 200 micropiles will be necessary to support the preliminary anticipated design loads for Buildings 2A and 2B.

Based on the preliminary design assumptions provided by the design team and our cost research, the estimated construction cost for this alternative is on the order of $300,000 to $900,000.

Drilled-In Displacement Micropiles

Drilled-in displacement micropiles are composed of a conical soil displacement head with attached helixes and a steel core with reverse helixes that serve to displace soil laterally, which serves to densify the surrounding soils. The micropiles are spun into the ground while a continuous flow of grout is pushed through grout ports in the steel core. Installation of drilled-in displacement micropiles results in little to no vibration, no production of potentially contaminated soil spoils, and high axial and lateral load capacities due to the interaction of the grout with the surrounding densified soils. Drilled-in displacement micropiles are difficult to install in coarse (cobble and boulder) stratigraphy.

Based on our understanding of the subsurface conditions at the Site, we estimate drilled-in displacement micropiles installed to an embedment depth of 37 feet bgs will develop an allowable axial load capacity of 50 kips. We estimate that approximately 150 drilled-in displacement micropiles will be necessary to support the preliminary anticipated design loads for Buildings 2A and 2B.

Based on the preliminary design assumptions provided by the design team and our cost research, the estimated construction cost for this alternative is on the order of $260,000 to $300,000.

Grouted Helical Piles

Grouted helical piles are composed of galvanized steel pile shaft sections (5 to 7 feet long), with a lead section that includes a helical bearing plate. Supplementary bearing plates can be added to shaft sections to provide additional axial capacity from side

friction. The pile is spun into the ground while a continuous flow of grout is pushed through grout ports in the pile shaft. Installation of grouted helical piles results in little to no vibration, no production of potentially contaminated soil spoils, and high axial and lateral load capacities due to the interaction of the grout with the soils. Grouted helical pile installation can be difficult in coarse (cobble and boulder) stratigraphy; down-hole impact tooling or pre-drilling may be necessary where boulders or other obstructions are encountered.

Based on our understanding of the subsurface conditions at the Site, we anticipate that grouted helical piles installed to an embedment depth of 40 feet bgs will have an allowable axial load capacity of 50 kips. We estimate that approximately 150 grouted helical piles will be necessary to support the preliminary anticipated design loads for Buildings 2A and 2B.

Based on the preliminary design assumptions provided by the design team and our cost research, the estimated construction cost for this alternative is on the order of $180,000 to $220,000.

Auger Displacement Piles

Auger displacement piles are similar to conventional auger cast piles, but with a specialized displacement tool composed of reverse-flighted helical bearing plates that serve to displace soils laterally. The auger displacement piles are spun into the ground to the prescribed embedment depth, then the auger is removed while grout is pushed through the auger tip. Installation of auger displacement piles results in little to no vibration, minimal production of potentially contaminated soil spoils, and high axial and lateral load capacities due to the interaction of the grout with the soils. Auger displacement piles may require pre-drilling when cobbles/boulders or other obstructions are encountered.

Based on our understanding of the subsurface conditions at the Site, we anticipate that auger displacement piles installed to an embedment depth of 40 feet bgs will have an allowable axial load capacity of 50 kips. We estimate that approximately 150 auger displacement piles will be necessary to support the preliminary anticipated design loads for Buildings 2A and 2B.

Based on the preliminary design assumptions provided by the design team and our cost research, the estimated construction cost for this alternative is on the order of $250,000 to $300,000.

Pipe Piles

Conventional steel pipe piles are typically vibrated or impact-driven to a prescribed embedment depth. Installation of pipe piles results in vibrations that may affect nearby vibration-sensitive structures. Pipe pile installation does not generate potentially contaminated spoils at the surface. Steel pipe piles were used for the James Keefe Bridge at the Site; we reviewed the historical pile driving records for the bridge to guide our expectations for pipe pile interactions with the subsurface conditions at the Site.

Based on a review of the James Keefe Bridge pile driving logs, we anticipate that steel pipe piles would need to be installed to a depth of 100 feet bgs in order to develop allowable axial load capacities of 50 kips due to low amounts of friction between the

steel piles and the coarse alluvial deposits. We estimate that approximately 150 driven steel pipe piles will be necessary to support the preliminary anticipated design loads for Buildings 2A and 2B.

Based on the preliminary design assumptions provided by the design team and our cost research, the estimated construction cost for this alternative is on the order of $1,125,000 to $1,150,000.

5.3.2.1 Recommended Deep Foundation Alternative

Based on our experience and preliminary relative cost estimate, we consider either grouted helical pile or drilled-in displacement micropile foundations to be the most effective deep foundation systems at Buildings 2A and 2B. We are available to discuss the deep foundation alternatives presented in this report in further detail with you to help determine the preferred alternative. Once the proposed building design has progressed, we will work in collaboration with the Project structural engineer to finalize geotechnical design criteria.

5.3.2.2 Pile Design Criteria and Preliminary Design

Deep foundations consisting of either grouted helical piles or drilled-in displacement micropiles primarily derive bearing capacity from skin friction between the pile grout and the surrounding soil. Therefore, design for both pile types follows standard micropile design procedures.

Due to the specialty of drilling techniques, both preferred pile types are generally contracted out as performance specifications, with the contractor being responsible for design, installation, and quality assurance. Once the project structural engineers specify the required axial compressive capacity of the piles, the minimum required strength of the grout, and the strength of steel casing and reinforcement, the contractor would then submit design drawings, calculations, and installation procedures to the project engineer for review prior to mobilization.

We evaluated micropile bond lengths within the alluvial deposits below the minimum tip elevation of 1850 feet assuming Type B or E micropiles with grout to ground bond nominal resistances based on the presumptive values in Table C10.9.3.5.2-1 of the AASHTO LRFD Bridge Design Specifications (AASHTO, 2017) and our experience. For allowable design loads of up to 50 tons (100 kips) with a 12-inch micropile diameter, and assuming a nominal bond resistance of 45 psi in the alluvium, we estimate bond lengths of 10 to 20 feet will be required. These estimates include a factor of safety of 2.0, ignore skin friction within fill soils and along cased sections, and ignore end bearing.

5.3.2.3 Pile Test Program

We recommend performing instrumented static load testing to verify the presumptive grout to ground bond nominal resistances assumed for micropile design and the geotechnical resistance of the proposed pile foundations. It is our opinion that two static load tests should be performed in accordance with ASTM International (ASTM) Method D1143 (ASTM, 2012), with one load test located within the footprint of each building supported by deep foundations (Buildings 2A and 2B).

5.4 Sanitary Sewer Considerations

The exact age of the existing 60-inch-diameter concrete sanitary sewer line traversing in an east-west direction through the middle of the Site is unknown. However, due to the typical aging process of concrete sanitary sewer pipes, including hydrogen sulfide corrosion, calcification, and scale buildup, this old sanitary sewer is likely very sensitive to both settlement and vibration impacts. We understand the City of Spokane (City) recently performed cured in place pipe (CIPP) protection along a portion of the sanitary sewer alignment immediately west of the Site, in conjunction with roadway improvements along MLK Way.

Considering the proximity of Buildings 1A and 1B to the 15-foot sanitary sewer easement, and the greater than 20-foot depth of the sewer line, some increase in stress on the pipe should be anticipated. Based on our analyses, we estimate the maximum stress increase on the sanitary sewer resulting from the proposed mat foundations will be less than 100 pounds per square foot (psf), which represents less than a 5 percent increase in stress relative to overburden.

In 1982, as part of the WSDOT SR-290 project, the City indicated that the sewer line could sustain a maximum increase in vertical stress of 1200 psf, which represents about a 60 percent increase in stress relative to overburden.

It is our preliminary opinion that the stress increase on the concrete sewer pipe from the proposed building development will not be sufficient to negatively impact the sanitary sewer. However, we recommend the City undertake an evaluation of the present condition of the sewer with a video inspection along the length of the alignment as it crosses the Site. Based on the pre-construction video inspection, the City should confirm the sewer pipe can accommodate this nominal increase in stress. After the proposed building construction is completed, we recommend completing additional video inspection of the sewer to confirm that the pipe was not damaged.

The proposed pile foundations for Buildings 2A and 2B will involve installation methods with minimal vibration. However, if the City considers additional protection of the sewer is necessary, the piles along the northern edges of Buildings 2A and 2B within 15 feet (measured horizontally) of the sanitary sewer line could be pre-drilled and include permanent steel casing to a depth of 5 feet below the sewer pipe invert. This would create a buffer zone around the sewer pipe where soil displacement and load transfer to the sewer is minimized.

5.5 Concrete Slab-on-Grade

We recommend overexcavation of any loose zones of fill, disturbed soils, and any deleterious matter to a minimum depth of 2 feet below the slab subgrade elevation. Overexcavated materials should be replaced with structural fill following the recommendations in Sections 5.10.2 and 5.10.3.

To provide uniform support for the floor slab and to provide a capillary break, we recommend the floor slab be underlain by a minimum of 6 inches of capillary break material consisting of compacted CSBC per WSDOT Standard Specification 9-03.9(3)

(WSDOT, 2018) compacted to at least 90 percent of the Maximum Dry Density (MDD) as determined by ASTM Method D1557 (Modified Proctor) (ASTM, 2012).

For slabs that are designed as a beam on an elastic foundation, a preliminary modulus of vertical subgrade reaction of 30 pounds pci may be used when bearing on structural fill directly overlying suitable subgrade soils as described in Section 5.10.2.

5.6 Under-Slab Drainage

We recommend a permanent under-slab drainage system to collect and remove water from below the slab-on-grade areas. This should include an interior perimeter foundation drain and a series of laterals extending parallel and perpendicular to the slab. The drain pipes should be connected to a central drainage sump and pump.

The drainage laterals should consist of rigid 4-inch-diameter perforated pipes placed in trenches that are at least a few inches deeper than the base of the 6-inch-thick drainage layer and include cleanouts for maintenance. The drain pipes should be sufficiently thick/rigid to handle the applied bearing pressure from the slab-on-grade. The drain pipe should be surrounded by WSDOT Standard Specification 9-03.12(4) for Gravel Backfill for Drains (WSDOT, 2018). The drain pipes should include cleanouts for periodic maintenance.

The under-slab drainage system may not completely prevent seepage or leaks that could manifest as wet slab areas. We recommend consulting with a building waterproofing expert to implement waterproofing elements, in addition to the under-slab drainage system, if wet slab areas are not acceptable.

5.7 Chemical Vapor Barrier

Due to the presence of contamination at the Site, we recommend a chemical vapor barrier will be used under the mat foundation and slab-on-grades.

Protective measures should be considered to prevent contact between the foundation and contaminated groundwater or soil. A chemical vapor barrier placed beneath the foundation should be protected as much as possible during construction, and any damage should be repaired following guidance from the manufacturer. A building envelope expert should be consulted to recommend specific vapor barrier elements and conduct field inspections to establish that the barrier system has been installed as designed.

5.8 Pavement Design

We anticipate the Project pavement sections will be subjected primarily to passenger vehicle traffic traveling to and from the on-Site parking and expansion of the pedestrian trail along the Spokane River to accommodate emergency vehicle traffic. We provide the following recommendations for pavement design:

- For passenger vehicle parking lot areas, we recommend a minimum flexible pavement section of 3 inches of hot-mix asphalt (HMA) overlying 6 inches of base course meeting the requirements for WSDOT Standard Specification 9-03.9(3) for Crushed Surfacing Base Course (CSBC; WSDOT, 2018).

- For driveway, loading, unloading, delivery, or other areas subjected to truck, bus, recreational vehicle, or emergency vehicles, we recommend a minimum flexible pavement section of 4 inches of HMA overlying 8 inches of base course.
- Where rigid concrete pavement is planned, we recommend a section of at least 6 inches of Portland Cement Concrete overlying 6 inches of base course.

All pavement sections should be constructed on properly prepared subgrade as described in Section 5.10.2 below.

5.9 Riverbank Stability

To support design of the widened pedestrian/bike trail (Ben Burr Trail) converted into an emergency vehicle access lane along the river, we performed a slope stability analysis to compare stability of the riverbank under existing conditions to the proposed conditions. The existing Ben Burr Trail and the proposed fire lane are shown on Figure 2. Based on our review of the existing topography, our field observations, and subsurface exploration data, we conducted stability analyses of a critical section of the riverbank located near ATP-14 using the computer model SLIDE (Rocscience, 2018). We consider this section to be conservatively representative of the riverbank conditions at the Site.

The SLIDE program performs limit equilibrium slope stability computations based on the modeled slope conditions and calculates a factor of safety against slope failure, which is defined as the ratio of resisting forces to driving forces. A factor of safety of 1.0 indicates a "just-stable" condition, and a factor of safety less than one would indicate unstable conditions. We used Spencer's method in our SLIDE analyses and assumed an emergency vehicle live load of 250 psf.

Our slope stability analysis indicated static factors of safety greater than 1.5 under existing conditions. When considering the proposed conditions (i.e., existing plus 250 psf live-load surcharge), the analyses indicate static factors of safety still above 1.5. We conclude the proposed conversion of existing pedestrian trail to emergency vehicle access roadway will have minimal impact on riverbank stability.

5.10 Earthwork Considerations

This section outlines earthwork considerations for the proposed buildings at the Site.

5.10.1 General

Excavation to construction grade for the Project building foundations will occur in highly variable soil units including basalt, brick, cinder, and undifferentiated fill, and native flood-channel deposits. We anticipate excavation can take place with standard excavation equipment suited to working in variable soils, such as large tracked excavators, toothed buckets, and large dozers. We anticipate buried foundations, rubble, and debris in the surficial fill, and oversized particles such as cobbles and large boulders in the fill and native soils will be encountered—the contractor should be prepared to deal with this during excavation.

5.10.2 Subgrade Preparation and Construction

Adequate performance of foundations for Buildings 1A and 1B will depend on proper subgrade preparation. Preparation of foundation subgrade should include removal of all

unsuitable debris, fill, fine-grained soils, and any other deleterious material to expose granular soils suitable for foundation support. Our understanding of subgrade soils that need to be removed or are suitable for foundations is as follows:

- Based on the subsurface explorations, we anticipate soils that may need to be removed for subgrade preparation will include all fill soils (excluding basalt fill) and silt overbank deposits.
- Based on the subsurface explorations, we anticipate soils suitable for foundation support will consist of dense basalt fill or granular alluvium.

Due to the variability of the contacts between unsuitable and suitable soils for foundation support, foundation subgrade preparation should be observed and evaluated by a representative of Aspect prior to foundation construction, structural fill placement, or subgrade protection to evaluate subsurface conditions, document preparation procedures, and confirm suitable soils are exposed prior to constructing the foundations. Foundation subgrades should be firm and unyielding, and be clear of any loose, disturbed soil, organic material, or standing water prior to foundation construction.

Overexcavation and backfilling with approved structural fill (as defined in Section 5.10.3) may be required under mat foundations where fill soils (excluding basalt fill) or silt overbank deposits are present. The contractor must use care during site preparation and excavation operations so that any bearing surfaces are not disturbed. If this occurs, the disturbed material should be removed to expose undisturbed material prior to placing formwork and steel reinforcement bars. All foundation excavations should be trimmed neat and the bottom of the excavation should be carefully prepared.

Slab-on-grade and pavement subgrade preparation should also be observed and evaluated by a representative of Aspect prior to placement of the capillary break or pavement section. Subgrade should be firm and unyielding under the proof-rolling load of heavy rubber-tired construction equipment, and should be clear of any loose soil or standing water. Soft subgrade areas identified during evaluation should be excavated and replaced with compacted structural fill.

We recommend protecting exposed bearing surfaces with a layer of gravel or a 2- to 4-inch-thick mud slab to help preserve the subgrade. If gravel is used to protect the bearing surfaces, it should generally meet the requirements for WSDOT Standard Specification 9-03.12(1)A for Class A Gravel Backfill for Foundations (WSDOT, 2018).

5.10.3 Structural Fill

Soils placed beneath or around foundations, utilities, slabs-on-grade, or below paved areas should be considered structural fill. In these fill areas, we recommend the following:

- Use of on-site soils as structural fill will not be possible due to the presence of contamination, high fines (material passing the U.S. No. 200 sieve) content and moisture sensitivity in some materials, and large aggregate size in other materials.
- Imported material to be used as structural fill should generally consist of should consist of properly compacted CSBC per WSDOT Standard Specification 9-

03.9(3) (WSDOT, 2018) with less than 5 percent fines (material passing the U.S. No. 200 sieve) by weight.

- Imported material to be used as common fill (not structural fill) should meet the requirements for Gravel Borrow, WSDOT Standard Specification 9-03.14(1) (WSDOT, 2018)
- Structural fill and common fill should only be placed on a relatively firm and unyielding subgrade. The exposed subgrade soils should be compacted (in-place) to a relatively firm and unyielding condition to a minimum dry density of 95 percent of the maximum dry density as determined by ASTM Method D1557 (Modified Proctor) prior to placement of structural fill (ASTM, 2012).
- Structural fill should be compacted to a relatively firm and unyielding condition to a minimum density of 95 percent of the MDD using the modified Proctor method (ASTM D1557).
- Structural fill placed against below-grade walls should be compacted to between 90 and 92 percent of the modified Proctor maximum dry density. Care should be taken when compacting fill against subsurface walls to avoid overstressing the walls.
- All structural fill should be placed and compacted in lifts with a loose thickness no greater than 12 inches when using relatively large compaction equipment, such as a vibrating plate attached to an excavator (hoe pack) or drum roller. If small, hand-operated compaction equipment is used to compact structural fill, lifts should not exceed 6 inches in loose thickness.
- The moisture content of the structural and common fill should be controlled to within 2 to 3 percent of the optimum moisture. Optimum moisture is the moisture content corresponding to the maximum modified Proctor dry density.
- Common fill placed in softscape, general grading, landscape, or common areas that are not beneath or around structures, utilities, slabs-on-grade, or below paved areas that can accommodate some settlement should be compacted to a relatively firm and unyielding condition.

5.10.4 Utility Bedding and Backfill

General recommendations relative to the bedding of the proposed underground sewer and drainage utilities include:

- Bedding for proposed pipes should meet the gradation requirements for Gravel Backfill for Pipe Zone Bedding, WSDOT Standard Specification Section 9-03.12(3)(WSDOT, 2018) or as specified in the Standard Specification section applicable to the type of pipe being installed.
- Prior to installation of the pipe, the bedding material should be shaped to fit the lower portion of the pipe exterior with reasonable closeness to provide continuous support along the pipe.
- Bedding placed around the pipe should be placed in layers and tamped around the pipe to obtain complete contact. Pipe bedding material should be used as trench backfill to at least 6 inches above the crown of the pipe, for the full width of the

trench. In areas where a trench box is used, the bedding material should be placed before the trench box is advanced.

Trench backfill should meet the requirements for structural fill as described in Section 5.10.3 of this report. During placement of the initial lifts, the trench backfill material should not be bulldozed into the trench or dropped directly on the pipe. Furthermore, heavy vibratory equipment should not be permitted to operate over the pipe until at least 2 feet of backfill has been placed.

5.10.5 Temporary Excavations and Slopes

Temporary excavation and slopes should not exceed the limits specified in the local, state, and federal regulations. The stability of temporary excavations and slopes shall be the responsibility of the contractor. We recommend that temporary slopes made in fill or thicknesses of disturbed native soils not be steeper than 1.5H:1V (horizontal to vertical). The presence of seepage or groundwater may require that slopes be flattened further to remain stable.

We also make the following recommendations:

- Surface water should be diverted away from slopes.
- Slopes should be protected using plastic sheet, flash coating, or tarps as necessary to control erosion and stability.
- The duration that excavations or slopes are open should be limited to the shortest time possible.
- Traffic, equipment, and material stockpiles should not be allowed near the top of excavations or slopes.
- The conditions of the excavations and slopes should be periodically observed by a geotechnical engineer to evaluate stability.

5.10.6 Temporary Erosion Control

Temporary erosion control measures should be implemented to prevent the migration of soil, dust, and turbid water off site or into stormwater systems. Such measures should include silt fences and straw wattles at the Site boundary, silt socks in nearby catch basins, wetting exposed soil during dry periods, and quarry spalls and wheel wash stations at truck and equipment exits.

5.10.7 Wet Weather Construction

The soils encountered during explorations at the Site are moderately moisture sensitive and may be difficult to handle, prepare, or compact with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. If earthwork is to be performed in wet weather or under wet conditions, the following recommendations apply:

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the installation of subgrade protection (gravel or mud slab) or

placement and compaction of clean structural fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance.

- The ground surface within the construction area should be sealed by a smooth drum vibratory roller (or equivalent) and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials.
- Excavation and placement of fill should be observed by Aspect to verify that all unsuitable materials are removed and suitable compaction is achieved.

Local best management practices (BMPs) for erosion protection should be strictly followed.

5.11 Stormwater Infiltration

Due to groundwater conditions at the Site, including the presence of contamination, we consider stormwater infiltration to be infeasible within the limits of contamination. We recommend the surface storm drainage system be designed and constructed to collect and convey stormwater to portions of the Site outside the limits of contamination. Any stormwater dispersion or bioretention facilities within the limits of contamination should be equipped with underdrains to convey treated stormwater to other parts of the Site. To avoid localized and/or downgradient flooding problems and contamination conveyance, pervious pavement surfaces and/or facilities are not recommended within the limits of contamination.

Due to moderate to high permeability of the on-Site soils, use of swales with overflow to drywells is recommended to infiltrate stormwater runoff outside of the limits of contamination. It is our understanding that Buildings 1A and 2A are proposed to drain to an existing stormwater swale outside the limits of contamination and to the east of the Site, and Buildings 1B and 2B are proposed to drain to drywells placed outside the limits of contamination on the west end of the Site..

6 Recommended Additional Geotechnical Services

We are available to discuss our recommendations with the design team. We recommend Aspect review the design plans and specifications to verify that our geotechnical engineering recommendations were properly interpreted and implemented.

During construction, we recommend that Aspect be contracted to review contractor submittals related to geotechnical items. We should review the monitoring instrumentation plan prior to installation and the resulting monitoring data throughout construction. We should be on-site to observe, evaluate, and document the following construction activities:

- Ground surface settlement and vibration monitoring
- Excavation and structural fill materials placement and compaction

- Subgrade preparation, and installation of under-slab drainage system prior to the placement of foundations
- Pile installation and load testing
- Review of pre- and post-construction video surveillance of the sanitary sewer line completed by the City
- Other geotechnical issues that may arise on-site

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Limitations

Work for this project was performed for Sagamore Spokane, LLC (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. At the time of this report, design plans and construction methods have not been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

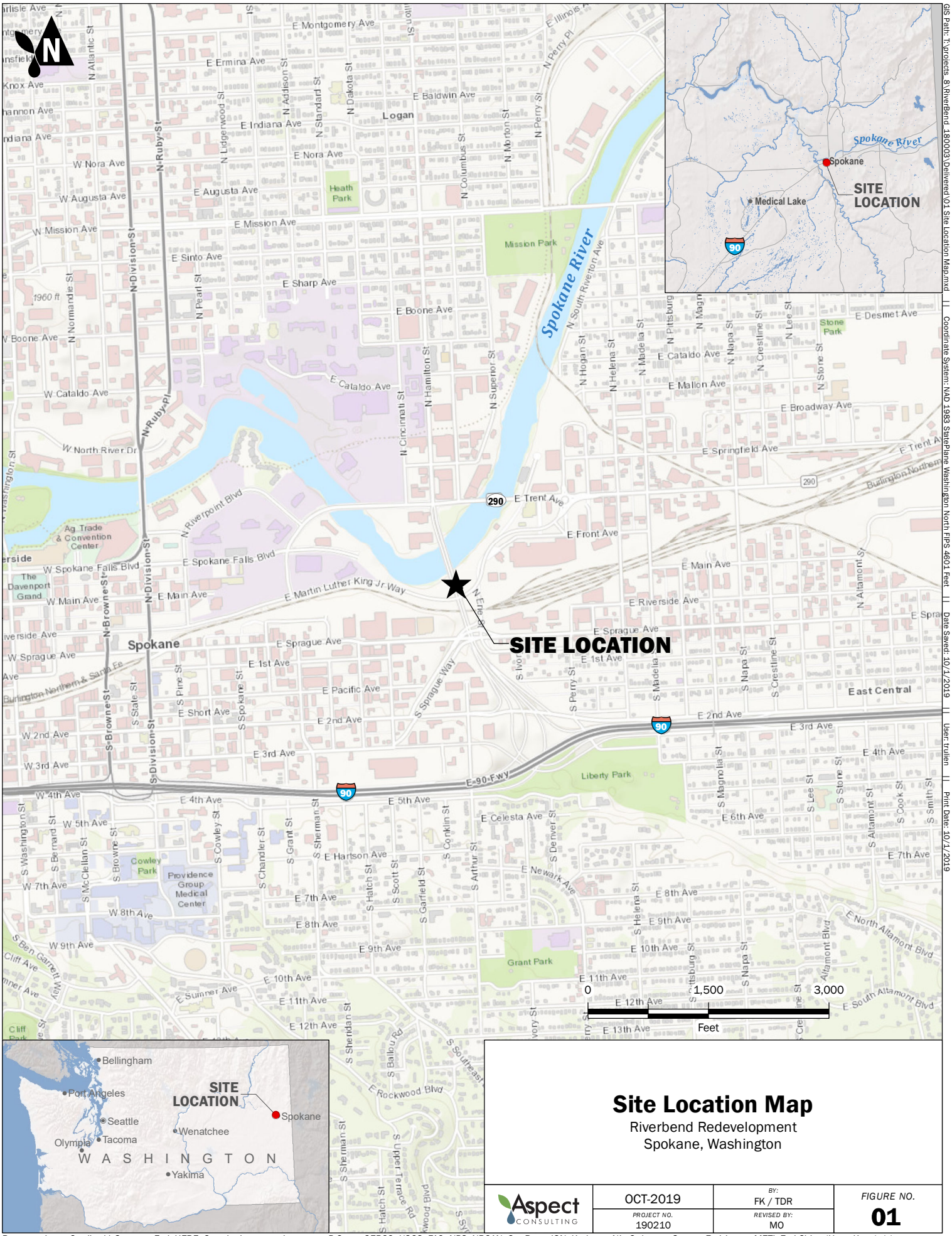
The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor’s site safety methods, techniques, sequences, or procedures. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect’s original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix E titled “Report Limitations and Guidelines for Use” for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions, please call Spencer Ambauen, PE, Project Geotechnical Engineer at 206.838.6589.

FIGURES



Site Location Map

Riverbend Redevelopment
Spokane, Washington

Aspect CONSULTING	OCT-2019	BY: FK / TDR	FIGURE NO. 01
	PROJECT NO. 190210	REVISED BY: MO	

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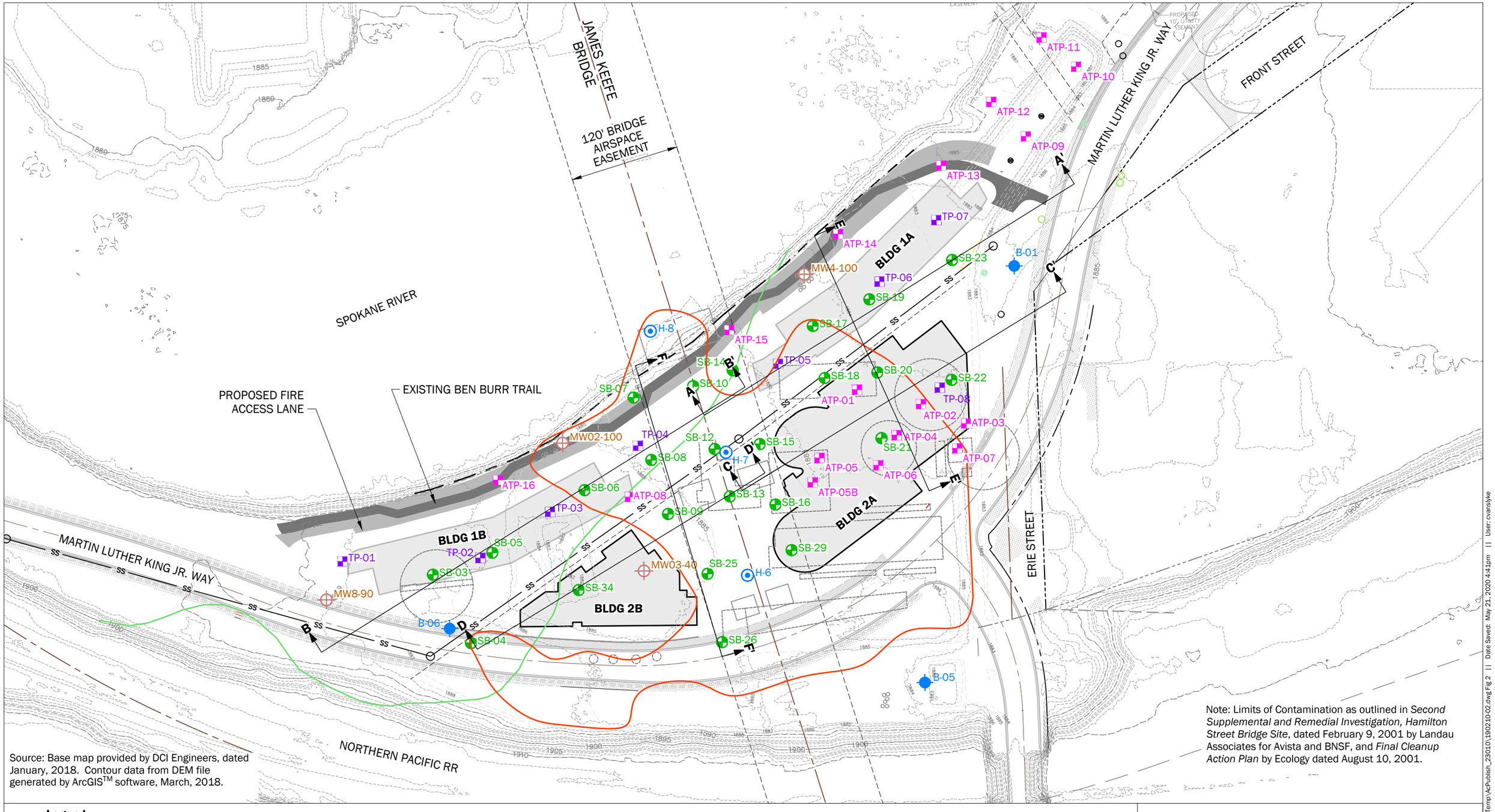

Source: Base map provided by DCI Engineers, dated January, 2018. Contour data from DEM file generated by ArcGIS™ software, March, 2018.

Note: Limits of Contamination as outlined in *Second Supplemental and Remedial Investigation, Hamilton Street Bridge Site*, dated February 9, 2001 by Landau Associates for Avista and BNSF, and *Final Cleanup Action Plan* by Ecology dated August 10, 2001.

Legend

- Existing Bridge Footings
- Historic Foundations
- Limits of Contamination
- Historic Riverbank (1910)
- Existing Riverbank
- MLK Jr. Way
- ss — Sanitary Sewer Pipe
- Right-of-Way
- Easement
- 1920 — Existing Contours
- Historic Contour Data
- Aspect Test Pit, 2020
- Strata Test Pit, 2014
- Budinger & Associates Boring, 2013
- Landau Monitoring Well, 1998-1999
- EMCON Boring, 1997
- WSDOT Boring, 1981
- Proposed Shallow Foundation
- Proposed Deep Foundation
- A — A' Cross Section Location

0 100 200 Feet

Site and Exploration Map

River Bend Development
Spokane, Washington

Aspect CONSULTING

May-2020	BY: MOO/CMV	FIGURE NO. 02
PROJECT NO. 190210	REVISED BY: SCC	

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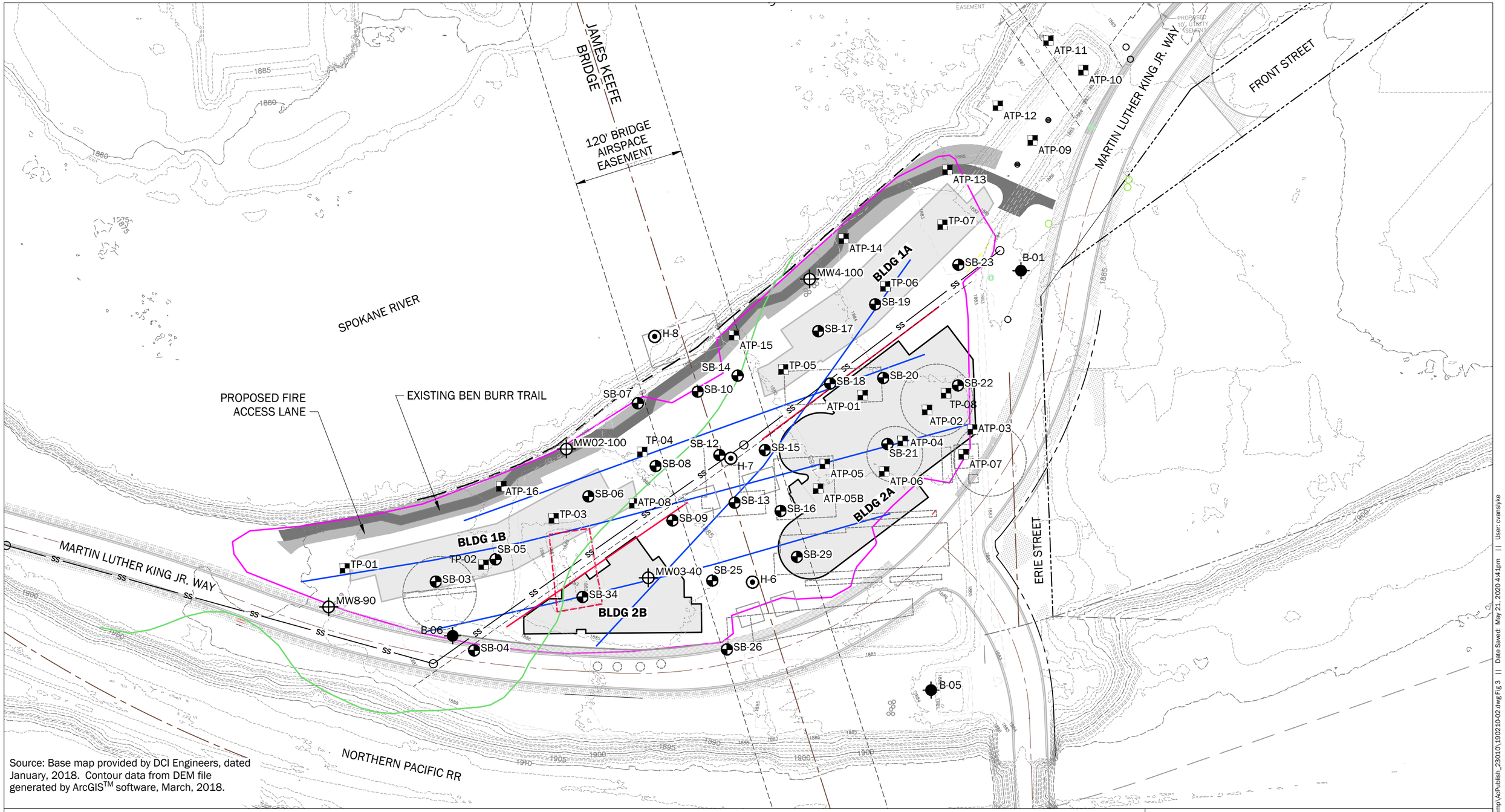


Source: Base map provided by DCI Engineers, dated January, 2018. Contour data from DEM file generated by ArcGIS™ software, March, 2018.

Legend

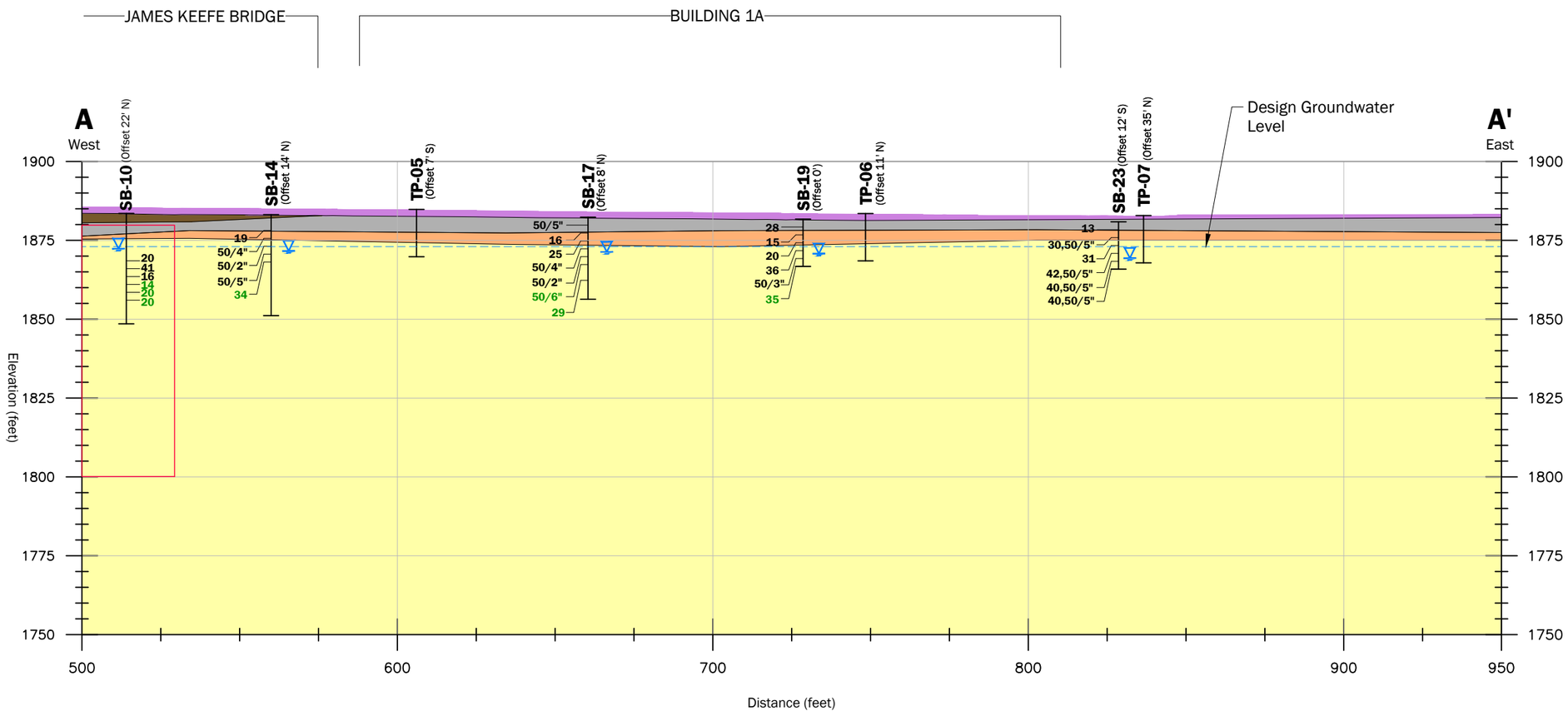
- Existing Bridge Footings
- Historic Foundations
- Historic Riverbank (1910)
- Existing Riverbank
- MLK Jr. Way
- Sanitary Sewer Pipe
- Right-of-Way
- Easement
- Existing Contours
- Historic Contour Data
- Aspect (2020) ; Strata (2014) Test Pit
- Budinger & Associates Boring, 2013
- Landau Monitoring Well, 1998-1999
- EMCON Boring, 1997
- WSDOT Boring, 1981
- Resistivity Line
- Seismic Line
- EM/Mag Coverage
- Depression/Trench
- Proposed Foundations

0 100 200 Feet

Geophysical Coverage Map

River Bend Developemnt
Spokane, Washington

Aspect Consulting	May-2020	BY: MOO/CMV	FIGURE NO. 03
	PROJECT NO. 190210	REVISED BY: SCC	



0 40 80 Feet

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Vertical Scale: 1" = 40'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S)
— Offset and direction
— Borehole ID

Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23

Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer — 23

Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer — 23

Water Level at Time of Drilling

Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section A-A'
(West-East Subsurface, Building 1A)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 04
	PROJECT NO. 190210	REVISED BY: SCC	

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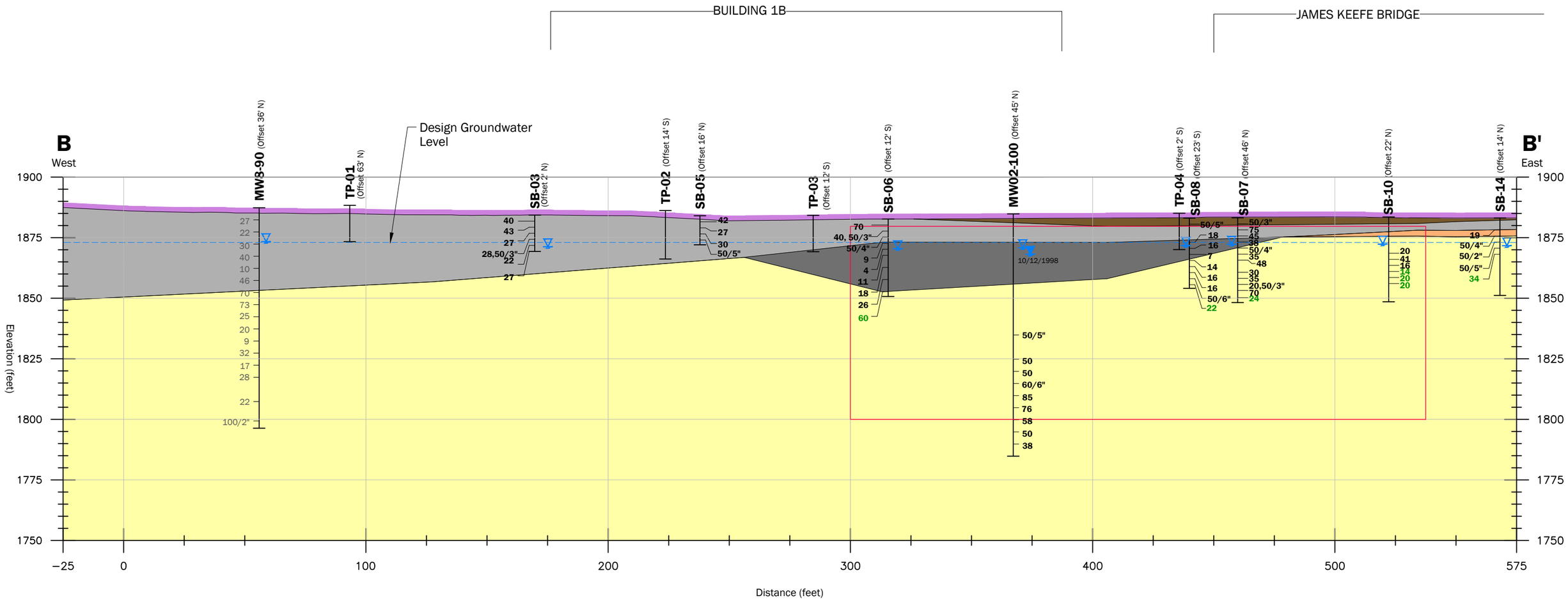


0 40 80 Feet

Horizontal Scale: 1" = 40'
Vertical Scale: 1" = 40'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S)
- Offset and direction
- Borehole ID
- Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23
- Water Level at Time of Drilling
- **Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer** — 23
- Static Water Level and Date Measured 10/12/1998
- **Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer** — 23
- Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

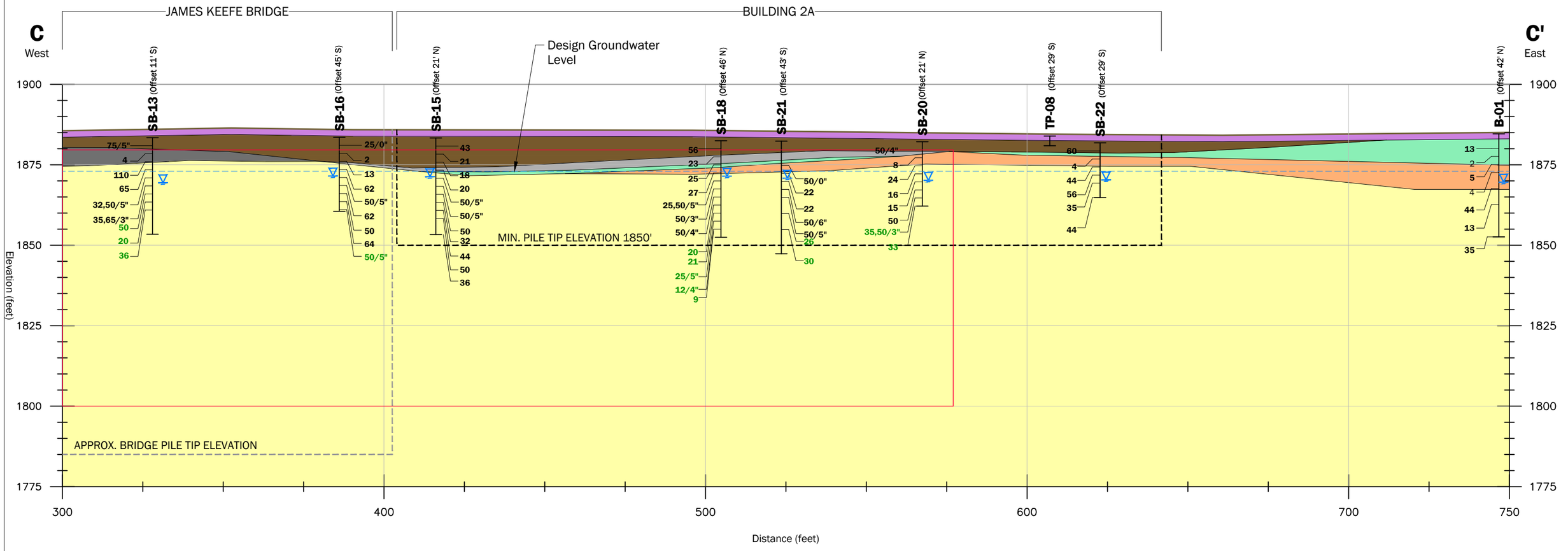
Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section B-B'
(West-East Subsurface, Building 1B)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 05
	PROJECT NO. 190210	REVISED BY: SCC	



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Vertical Scale: 1" = 30'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S)

- Offset and direction
- Borehole ID
- Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23
- **Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer** — 23
- **Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer** — 23
- Water Level at Time of Drilling
- Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

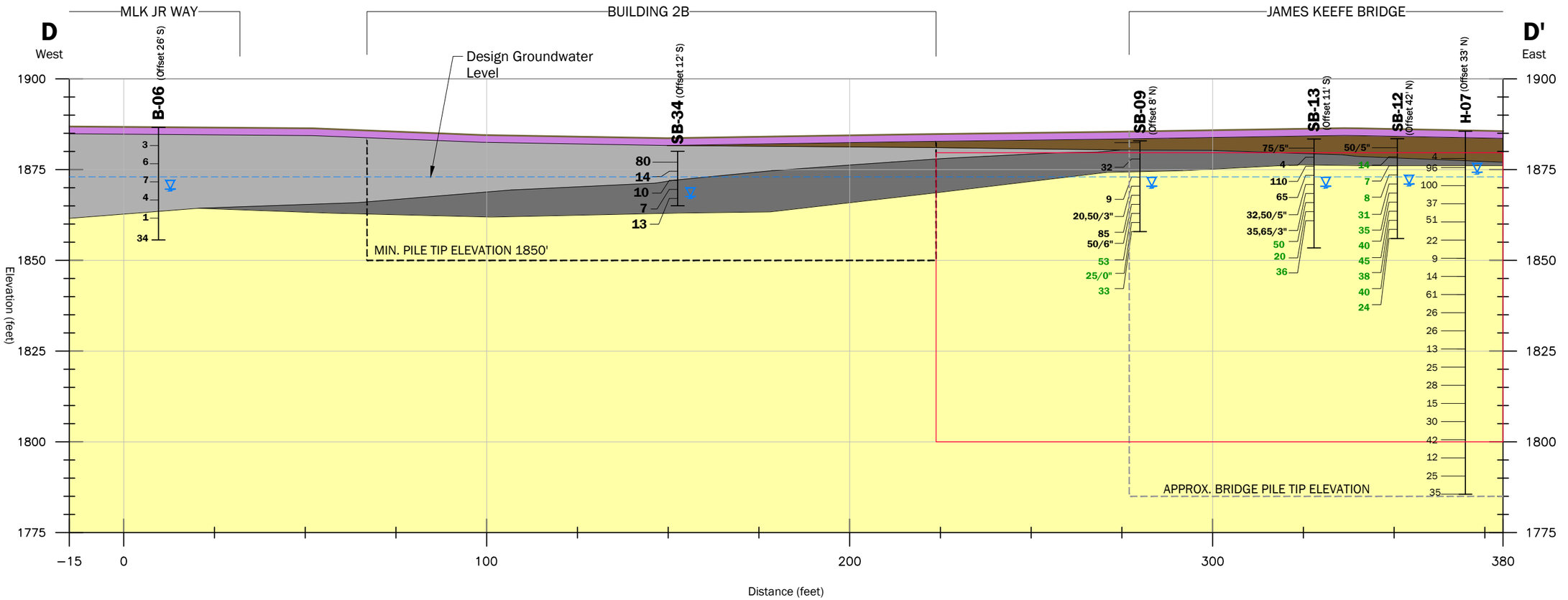
Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section C-C'
(West-East Subsurface Building 2A)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 06
	PROJECT NO. 190210	REVISED BY: SCC	



0 30 60 Feet

Horizontal Scale: 1" = 30'
Vertical Scale: 1" = 30'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S)
- Offset and direction
- Borehole ID

Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23

Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer — 23

Water Level at Time of Drilling

Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer — 23

Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

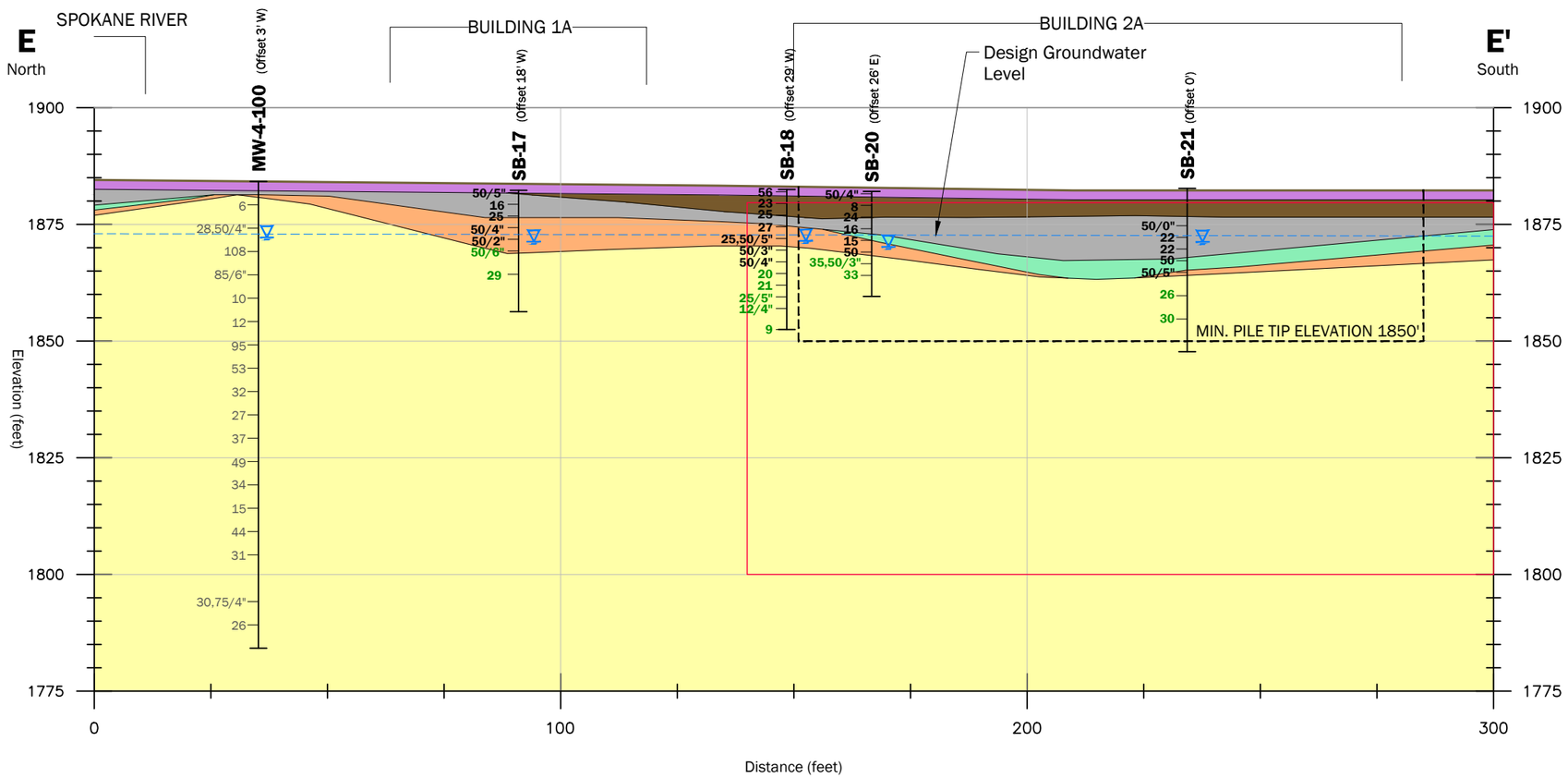
Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section D-D'
(West-East Subsurface, Building 2B)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 07
	PROJECT NO. 190210	REVISED BY: SCC	



0 30 60 Feet

Horizontal Scale: 1" = 30'
Vertical Scale: 1" = 30'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S)
— Offset and direction
— Borehole ID

Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23

Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer — 23

Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer — 23

Water Level at Time of Drilling

Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section E-E'
(North-South Subsurface, Buildings 1A and 2A)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 08
	PROJECT NO. 190210	REVISED BY: SCC	

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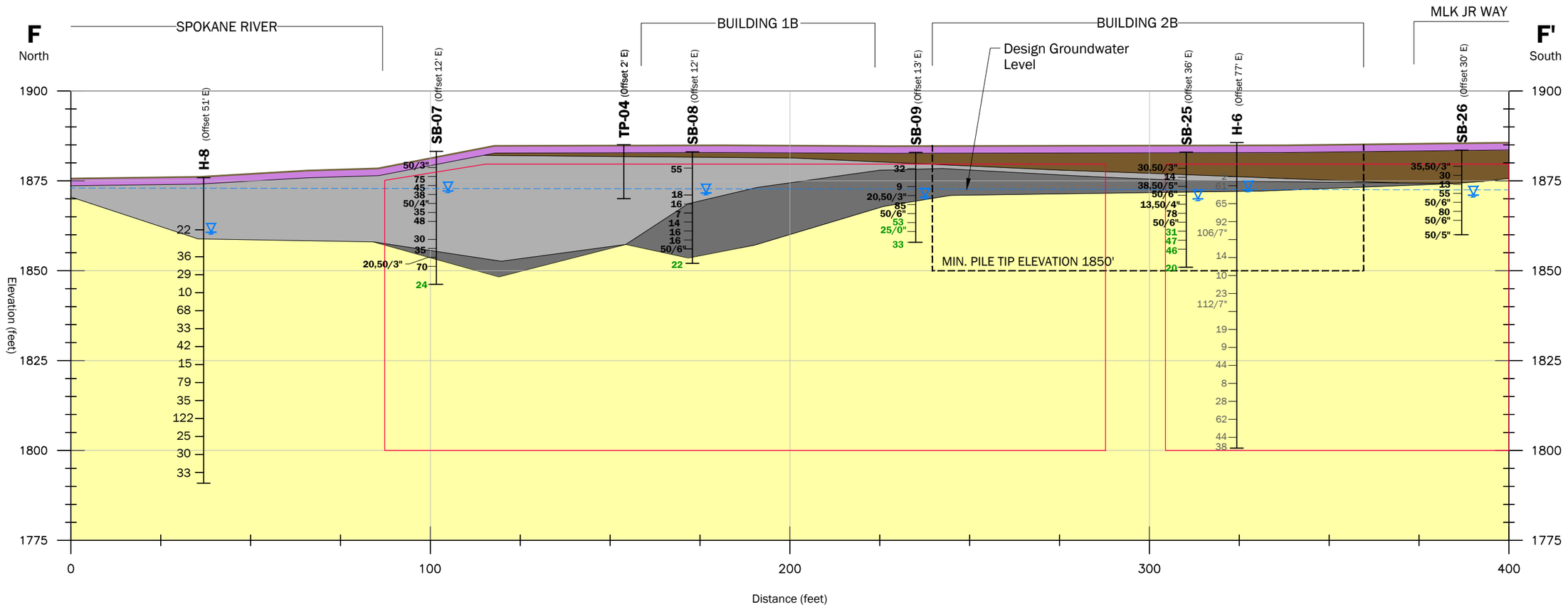

0 30 60 Feet

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Vertical Scale: 1" = 30'
Vertical Exaggeration 1x

Legend

SB-03 (Offset 2' S) — Offset and direction; Borehole ID

Standard Penetration Test (2.5-inch sampler) blow counts per foot — 23

Modified California sampler (3-inch sampler) blow counts per foot 140-lb hammer — 23

Modified California sampler (3-inch sampler) blow counts per foot 300-lb hammer — 23

Water Level at Time of Drilling

Inferred Geologic Contact

Lithology

- Soil Cap
- Basalt Fill
- Undifferentiated Fill
- Cinder Fill
- Brick Fill
- Silt Overbank Deposits
- Alluvium Deposits

Approximate Limits of Contamination inferred from 2001 Remedial Investigation report prepared by Landau Associates

Source: Base map provided by DCI Engineers, dated January, 2018. Surface data from DEM file generated by ArcGIS™ software, March, 2018.

Cross Section F-F'
(North-South Subsurface, Buildings 1B and 2B)

River Bend Developemnt
Spokane, Washington

Aspect Consulting	Apr-2020	BY: SJA/CMV	FIGURE NO. 09
	PROJECT NO. 190210	REVISED BY: SCC	

APPENDIX A

Subsurface Explorations by Aspect

Coarse-Grained Soils - More than 50%[1] Retained on No. 200 Sieve	Gravels - More than 50%[1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines	GW	Well-graded GRAVEL Well-graded GRAVEL WITH SAND
			GP	Poorly-graded GRAVEL Poorly-graded GRAVEL WITH SAND
		≥15% Fines	GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
			GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
	Sands - 50%[1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines	SW	Well-graded SAND Well-graded SAND WITH GRAVEL
			SP	Poorly-graded SAND Poorly-graded SAND WITH GRAVEL
		≥15% Fines	SM	SILTY SAND SILTY SAND WITH GRAVEL
			SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
Fine-Grained Soils - 50%[1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50%		ML	SILT SANDY or GRAVELLY SILT SILT WITH SAND SILT WITH GRAVEL
			CL	LEAN CLAY SANDY or GRAVELLY LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL
			OL	ORGANIC SILT SANDY or GRAVELLY ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL
	Silts and Clays Liquid Limit 50% or More		MH	ELASTIC SILT SANDY or GRAVELLY ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL
			CH	FAT CLAY SANDY or GRAVELLY FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL
			OH	ORGANIC CLAY SANDY or GRAVELLY ORGANIC CLAY ORGANIC CLAY WITH SAND ORGANIC CLAY WITH GRAVEL
Highly Organic Soils			PT	PEAT and other mostly organic soils

"WITH SILT" or "WITH CLAY" means 5 to 15% silt and clay, denoted by a "-" in the group name; e.g., SP-SM • "SILTY" or "CLAYEY" means >15% silt and clay • "WITH SAND" or "WITH GRAVEL" means 15 to 30% sand and gravel. • "SANDY" or "GRAVELLY" means >30% sand and gravel. • "Well-graded" means approximately equal amounts of fine to coarse grain sizes • "Poorly graded" means unequal amounts of grain sizes • Group names separated by "/" means soil contains layers of the two soil types; e.g., SM/ML.

Soils were described and identified in the field in general accordance with the methods described in ASTM D2488. Where indicated in the log, soils were classified using ASTM D2487 or other laboratory tests as appropriate. Refer to the report accompanying these exploration logs for details.

1. Estimated or measured percentage by dry weight
2. (SPT) Standard Penetration Test (ASTM D1586)
3. Determined by SPT, DCPT (ASTM STP399) or other field methods. See report text for details.

GEOTECHNICAL LAB TESTS

MC	=	Natural Moisture Content
GS	=	Grain Size Distribution
FC	=	Fines Content (% < 0.075 mm)
GH	=	Hydrometer Test
AL	=	Atterberg Limits
C	=	Consolidation Test
Str	=	Strength Test
OC	=	Organic Content (% Loss by Ignition)
Comp	=	Proctor Test
K	=	Hydraulic Conductivity Test
SG	=	Specific Gravity Test

CHEMICAL LAB TESTS

Organic Chemicals

BTEX	=	Benzene, Toluene, Ethylbenzene, Xylenes
TPH-Dx	=	Diesel and Oil-Range Petroleum Hydrocarbons
TPH-G	=	Gasoline-Range Petroleum Hydrocarbons
VOCs	=	Volatile Organic Compounds
SVOCs	=	Semi-Volatile Organic Compounds
PAHs	=	Polycyclic Aromatic Hydrocarbon Compounds
PCBs	=	Polychlorinated Biphenyls

Metals

RCRA8	=	As, Ba, Cd, Cr, Pb, Hg, Se, Ag, (d = dissolved, t = total)
MTCA5	=	As, Cd, Cr, Hg, Pb (d = dissolved, t = total)
PP-13	=	Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn (d=dissolved, t=total)

FIELD TESTS

PID	=	Photoionization Detector
Sheen	=	Oil Sheen Test
SPT[2]	=	Standard Penetration Test
NSPT	=	Non-Standard Penetration Test
DCPT	=	Dynamic Cone Penetration Test

COMPONENT DEFINITIONS

Descriptive Term		*Size Range and Sieve Number*
Boulders	=	Larger than 12 inches
Cobbles	=	3 inches to 12 inches
Coarse Gravel	=	3 inches to 3/4 inches
Fine Gravel	=	3/4 inches to No. 4 (4.75 mm)
Coarse Sand	=	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	=	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	=	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	=	Smaller than No. 200 (0.075 mm)

ESTIMATED[1] PERCENTAGE

% by Weight		*Modifier*	*% by Weight*		*Modifier*
<1	=	Subtrace	15 to 25	=	Little
1 to <5	=	Trace	30 to 45	=	Some
5 to 10	=	Few	>50	=	Mostly

MOISTURE CONTENT

Dry	=	Absence of moisture, dusty, dry to the touch
Slightly Moist	=	Perceptible moisture
Moist	=	Damp but no visible water
Very Moist	=	Water visible but not free draining
Wet	=	Visible free water, usually from below water table

RELATIVE DENSITY

Non-Cohesive or Coarse-Grained Soils

Density[3]		*SPT*[2] *Blows/Foot*	*Penetration with 1/2" Diameter Rod*
Very Loose	=	0 to 4	≥ 2'
Loose	=	5 to 10	1' to 2'
Medium Dense	=	11 to 30	3" to 1'
Dense	=	31 to 50	1" to 3"
Very Dense	=	> 50	< 1"

CONSISTENCY

Cohesive or Fine-Grained Soils

Consistency[3]		*SPT*[2] *Blows/Foot*	*Manual Test*
Very Soft	=	0 to 1	Penetrated >1" easily by thumb. Extrudes between thumb & fingers.
Soft	=	2 to 4	Penetrated 1/4" to 1" easily by thumb. Easily molded.
Medium Stiff	=	5 to 8	Penetrated >1/4" with effort by thumb. Molded with strong pressure.
Stiff	=	9 to 15	Indented ~1/4" with effort by thumb.
Very Stiff	=	16 to 30	Indented easily by thumbnail.
Hard	=	> 30	Indented with difficulty by thumbnail.

GEOLOGIC CONTACTS

Observed and Distinct — Observed and Gradual — Inferred

Aspect CONSULTING

Exploration Log Key

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location 111 North Erie Street, Spokane, Washington, Former Condensing Room		*Coordinates (SPN NAD83 ft)* E:2487500 N:259430 (est)	*Exploration Number* **ATP-01**
Contractor SES	*Equipment* Excavator or Backhoe	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 1884.2' (est)	
Operator	*Exploration Method(s)* Backhoe or trackhoe	*Work Start/Completion Dates* 4/22/2020	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884				PID=0.0 Sheen=None		**FILL** SAND WITH SILT AND GRAVEL (SP-SM); slightly moist, brown; fine to coarse sand, fine subangular gravel, no odor.	0
1	1883						GRAVEL WITH SILT AND SAND (GP-GM); dark gray; fine to coarse subangular gravel, fine to coarse sand, no odor.	1
2	1882	Test pit backfilled with slough			PID=0.0 Sheen=Slight		GRAVEL (GP); brick and ash material; crushed and whole, no odor.	2
3	1881						SAND WITH GRAVEL (SP); slightly moist, black; fine to coarse sand, fine to coarse, subrounded gravel, trace clinker, no odor.	3
4	1880				PID=0.2 Sheen=Slight			4
5	1879				PID=330 Sheen=Moderate		GRAVEL WITH SAND (GW); black; debris including wood, tar, asphalt, trace metal debris, tar-like odor.	5
6	1878						Bottom of exploration at 6 ft. bgs. Note: End of test pit at slab	6
7	1877							7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-01

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location 111 North Erie Street, Spokane, Washington, Gas Holder Slab		*Coordinates (SPN NAD83 ft)* E:2487500 N:259420 (est)	*Exploration Number* **ATP-02**
Contractor SES	*Equipment* Excavator or Backhoe	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 1884.2' (est)	
Operator	*Exploration Method(s)* Backhoe or trackhoe	*Work Start/Completion Dates* 4/22/2020	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** SAND WITH SILT AND GRAVEL (SP-SM); slightly moist, brown; medium sand, fine, subangular gravel, no odor.	0
1	1883				PID=0.0 Sheen=Slight		GRAVEL WITH SILT (GP-GM); dark gray; fine subrounded gravel, fine to coarse gravel, no odor.	1
2	1882	Test pit backfilled with slough			PID=0.0 Sheen=Slight		GRAVEL WITH SAND (GP); bricks and ash.	2
3	1881						Bottom of exploration at 3 ft. bgs. Note: End of test pit at slab	3
4	1880							4
5	1879							5
6	1878							6
7	1877							7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-02
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	111 North Erie Street, Spokane, Washington, Pump House/Vaporizer		E:2487600 N:259400 (est)	**ATP-03**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
SES	Excavator or Backhoe	Grab	1884.2' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
	Backhoe or trackhoe	4/22/2020	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884				PID=0.0 Sheen=None		**FILL** SAND WITH SILT AND GRAVEL (SP-SM); slightly moist, brown; medium sand, fine, subangular gravel, no odor.	0
1	1883				PID=0.2 Sheen=Slight		GRAVEL WITH SILT (GP-GM); dark gray; fine subrounded gravel, fine to coarse gravel, no odor.	1
2	1882	Test pit backfilled with slough					GRAVEL WITH SAND (GP); bricks and ash.	2
3	1881						Bottom of exploration at 3 ft. bgs. Note: End of test pit at slab	3
4	1880							4
5	1879							5
6	1878							6
7	1877							7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-03

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING

River Bend Development - 190210

Test Pit Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
111 North Erie Street, Spokane, Washington, Former Gas Holder Slab	E:2487500 N:259380 (est)	**ATP-04**

Contractor	Equipment	Sampling Method	Ground Surface Elev. (NAVD88)	
SES	Excavator or Backhoe	Grab	1884.2' (est)	
Operator	**Exploration Method(s)**	**Work Start/Completion Dates**	**Top of Casing Elev. (NAVD88)**	**Depth to Water (Below GS)**
	Backhoe or trackhoe	4/22/2020	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** SAND WITH SILT AND GRAVEL (SP-SM); light brown; fine to coarse sand, fine subangular gravel, no odor.	0
1	1883				PID=0.0 Sheen=Slight		GRAVEL (GP); brown; fine to coarse sand, trace silt, no odor.	1
2	1882	Test pit backfilled with slough					GRAVEL WITH SAND (GP); brick debris, basalt spalls; trace concrete debris, tar, woody debris, rebar, strong tar-like odor.	2
3	1881				PID=1 Sheen=Slight			3
4	1880				PID=178 Sheen=Slight		SILTY SAND (SM); light brown to black; fine sand, strong tar-like odor.	4
5	1879				PID=52 Sheen=Slight			5
6	1878							6
7	1877						Bottom of exploration at 6.5 ft. bgs. Note: Test pit centered over two slabs--west slab at 3.5 ft. bgs, east slab at 3 ft. bgs	7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-04

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location: 111 North Erie Street, Spokane, Washington, Former Compressor (no slab)		Coordinates (SPN NAD83 ft): E:2487400 N:259360 (est)	Exploration Number: **ATP-05**
Contractor: SES	Equipment: Excavator or Backhoe	Sampling Method: Grab	Ground Surface Elev. (NAVD88): 1884.2' (est)	
Operator	Exploration Method(s): Backhoe or trackhoe	Work Start/Completion Dates: 4/22/2020	Top of Casing Elev. (NAVD88): NA	Depth to Water (Below GS): No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** SAND WITH SILT AND GRAVEL (SP-SM); slightly moist, brown; medium sand, fine, subangular gravel, no odor.	0
1	1883				PID=0.0 Sheen=Slight		GRAVEL WITH SILT (GP-GM); dark gray; fine subrounded gravel, fine to coarse gravel, no odor.	1
					PID=0.5 Sheen=Slight		GRAVEL WITH SAND (GP); bricks and ash.	
2	1882	Test pit backfilled with slough					SILTY SAND (SM); brown; fine to coarse sand, fine subrounded gravel, no odor.	2
3	1881				PID=89 Sheen=Slight		SANDY SILT WITH GRAVEL (ML); black; pipes, tar-like material, and concrete debris, some basalt spalls, strong tar-like odor.	3
4	1880							4
					PID=180 Sheen=Slight			
5	1879						**FLOODPLAIN DEPOSITS** SILTY SAND (SM); dark brown; fine sand, no odor.	5
6	1878							6
					PID=2 Sheen=Slight			
7	1877						Bottom of exploration at 7 ft. bgs. Note: Many pipes 2 to 15 inches in diameter from 4 to 7 feet bgs	7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-05
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	111 North Erie Street, Spokane, Washington, Former Compressor (slab)		E:2487400 N:259330 (est)	**ATP-05B**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
SES	Excavator or Backhoe	Grab	1884.2' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
	Backhoe or trackhoe	4/22/2020	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** SAND WITH SILT AND GRAVEL (SP-SM); slightly moist, brown; medium sand, fine, subangular gravel, no odor.	0
1	1883						GRAVEL WITH SAND (GP); bricks and ash.	1
2	1882	Test pit backfilled with slough					SILTY SAND (SM); brown; fine to coarse sand, fine subrounded gravel, no odor.	2
3	1881							3
4	1880						SAND (SP); black clinker. Bottom of exploration at 4 ft. bgs. Note: End of test pit at slab	4
5	1879							5
6	1878							6
7	1877							7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-05B
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	111 North Erie Street, Spokane, Washington, Former Gas Holder Slab		E:2487500 N:259350 (est)	**ATP-06**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
SES	Excavator or Backhoe	Grab	1884.2' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
	Backhoe or trackhoe	4/22/2020	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** SAND WITH SILT AND GRAVEL (SP-SM); slightly moist, brown; medium sand, fine, subangular gravel, no odor.	0
1	1883				PID=0.0 Sheen=Slight		GRAVEL WITH SILT (GP-GM); dark gray; fine subrounded gravel, fine to coarse gravel, no odor.	1
2	1882	Test pit backfilled with slough			PID=0.0 Sheen=Slight		GRAVEL WITH SAND (GP); bricks and ash.	2
3	1881				PID=0.0 Sheen=Slight			3
4	1880							4
5	1879						Bottom of exploration at 4.5 ft. bgs. Note: Slab at 4 ft. bgs on west end, slab at 4.5 ft. bgw on east end	5
6	1878							6
7	1877							7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-06

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	111 North Erie Street, Spokane, Washington, Near SE Property Boundary		E:2487600 N:259370 (est)	**ATP-07**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
SES	Excavator or Backhoe	Grab	1884.2' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
	Backhoe or trackhoe	4/22/2020	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** SAND WITH SILT AND GRAVEL (SP-SM); slightly moist, brown; medium sand, fine, subangular gravel, no odor.	0
1	1883				PID=0.0 Sheen=None		GRAVEL WITH SILT (GP-GM); dark gray; fine subrounded gravel, fine to coarse gravel, no odor.	1
2	1882	Test pit backfilled with slough					GRAVEL WITH SAND (GP); bricks and ash.	2
3	1881				PID=0.0 Sheen=None			3
4	1880						SAND (SP); moist, black; fine to coarse clinker, no odor.	4
5	1879				PID=0.5 Sheen=Slight		Bottom of exploration at 5 ft. bgs.	5
6	1878							6
7	1877							7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-07
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	111 North Erie Street, Spokane, Washington, West Side, Building 1B		E:2487200 N:259320 (est)	**ATP-08**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
SES	Excavator or Backhoe	Grab	1884.2' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
	Backhoe or trackhoe	4/21/2020	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884				PID=0.0 Sheen=None		**FILL** SAND (SP); brown; medium to coarse sand, fine to coarse subangular gravel, no odor.	0
1	1883						GRAVEL WITH SAND (GP); bricks and ash.	1
2	1882	Test pit backfilled with slough			PID=0.0 Sheen=None			2
3	1881						SILT WITH SAND (ML); black; with gravel and cobbles, no odor.	3
4	1880							4
5	1879				PID=2 Sheen=None			5
6	1878						GRAVEL WITH SILT AND SAND (GP-GM); slightly moist, black; fine to coarse gravel, fine to coarse sand, trace cobbles, tar-like odor.	6
7	1877				PID=45 Sheen=None			7
8	1876				PID=35 Sheen=None		GRAVEL WITH COBBLES (GP); black; with boulders and trace silt.	8
9	1875						Bottom of exploration at 9 ft. bgs.	9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-08

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location		*Coordinates (SPN NAD83 ft)*	*Exploration Number*
	111 North Erie Street, Spokane, Washington, Central Bottom of NE Swale		E:2487600 N:259710 (est)	**ATP-09**
Contractor	*Equipment*	*Sampling Method*	*Ground Surface Elev. (NAVD88)*	
SES	Excavator or Backhoe	Grab	1884.2' (est)	
Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*	*Depth to Water (Below GS)*
	Backhoe or trackhoe	4/22/2020	NA	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** GRAVEL (GP); basalt spalls with sand and gravel.	0
1	1883						**FLOODPLAIN DEPOSITS** SILTY SAND (SM); slightly moist, dark brown; fine sand, no odor.	1
2	1882	Test pit backfilled with slough						2
3	1881			ATP-09-3.0	PID=0.0 Sheen=None			3
4	1880							4
5	1879						SAND (SP); moist, tan; fine sand, no odor.	5
6	1878							6
7	1877							7
8	1876				PID=0.0 Sheen=None			8
9	1875							9
10	1874							10
11	1873							11
				ATP-09-11.5	PID=0.0 Sheen=None		Bottom of exploration at 11.5 ft. bgs.	
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-09

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location 111 North Erie Street, Spokane, Washington, E Side in North Swale		*Coordinates (SPN NAD83 ft)* E:2487700 N:259790 (est)	*Exploration Number* **ATP-10**
Contractor SES	*Equipment* Excavator or Backhoe	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 1884.2' (est)	
Operator	*Exploration Method(s)* Backhoe or trackhoe	*Work Start/Completion Dates* 4/22/2020	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* 9' (ATD)

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** SILTY GRAVEL WITH SAND (GM); slightly moist, dark brown; fine to coarse sand, trace basalt spalls, no odor.	0
1	1883				PID=0.0 Sheen=None		SAND (SW); slightly moist, light brown; fine to coarse sand, fine to coarse gravel, trace silt, no odor.	1
2	1882	Test pit backfilled with slough					SAND (SP); slightly moist, light brown; coarse sand, fine to coarse rounded gravel, no odor.	2
3	1881							3
4	1880							4
5	1879			ATP-10-4.5	PID=0.0 Sheen=None			5
6	1878							6
7	1877							7
8	1876						GRAVEL (GW); wet; fine to coarse gravel, coarse sand, no odor.	8
9	1875	▽ 4/22/2020		ATP-10-9.0	PID=0.0 Sheen=None		Bottom of exploration at 9 ft. bgs.	9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level ▽ Water Level ATD

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-10
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location 111 North Erie Street, Spokane, Washington, NE Side of NE Swale		*Coordinates (SPN NAD83 ft)* E:2487700 N:259820 (est)	*Exploration Number* **ATP-11**
Contractor SES	*Equipment* Excavator or Backhoe	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 1884.2' (est)	
Operator	*Exploration Method(s)* Backhoe or trackhoe	*Work Start/Completion Dates* 4/22/2020	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** GRAVEL (GW); slightly moist, black; basalt spalls with fine to coarse sand, trace bricks, trace boulders.	0
1	1883							1
2	1882	Test pit backfilled with slough			PID=0.0 Sheen=None			2
3	1881							3
4	1880						SILTY SAND (SM); slightly moist, brown; medium to coarse sand, fine to coarse subrounded gravel, no odor.	4
5	1879				PID=0.0 Sheen=None			5
6	1878			ATP-11-6.0	PID=0.0 Sheen=None		**FLOODPLAIN DEPOSITS** SILTY SAND (SM); slightly moist, dark brown; fine sand, no odor.	6
7	1877							7
8	1876							8
9	1875							9
10	1874				PID=0.0 Sheen=None			10
11	1873							11
12	1872			ATP-11-12.5	PID=0.0 Sheen=None			12
13	1871						Bottom of exploration at 13 ft. bgs.	13
14	1870							14

Legend

Sample Type

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-11
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location 111 North Erie Street, Spokane, Washington, N of Stormwater Structure (NE)		*Coordinates (SPN NAD83 ft)* E:2487600 N:259750 (est)	*Exploration Number* **ATP-12**
Contractor SES	*Equipment* Excavator or Backhoe	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 1884.2' (est)	
Operator	*Exploration Method(s)* Backhoe or trackhoe	*Work Start/Completion Dates* 4/21/2020	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** GRAVEL WITH SAND (GW); fine to coarse, subrounded gravel, fine to coarse sand; trace silt.	0
1	1883				PID=0.1 Sheen=None			1
2	1882	Test pit backfilled with slough						2
3	1881							3
4	1880							4
5	1879							5
6	1878						SILTY SAND WITH GRAVEL (SM); dark brown; fine to coarse subrounded gravel, abundant woody, metal, and plastic debris, no odor.	6
7	1877			ATP-12-7.5	PID=0.1 Sheen=None		**FLOODPLAIN DEPOSITS** SILTY SAND (SM); dark brown; fine sand, no odor.	7
8	1876							8
9	1875							9
10	1874							10
11	1873						SAND (SP); moist, light brown; fine sand, trace silt.	11
				ATP-12-11.5	PID=0.1 Sheen=None		Bottom of exploration at 11.5 ft. bgs.	
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-12

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location 111 North Erie Street, Spokane, Washington, N of Stormwater Structure (W)		*Coordinates (SPN NAD83 ft)* E:2487500 N:259680 (est)	*Exploration Number* **ATP-13**
Contractor SES	*Equipment* Excavator or Backhoe	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 1884.2' (est)	
Operator	*Exploration Method(s)* Backhoe or trackhoe	*Work Start/Completion Dates* 4/21/2020	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** SILTY GRAVEL WITH SAND (GM); slightly moist, dark brown; basalt spalls, fine to coarse gravel, fine to coarse sand, trace clinker from 4 ft. to 5 ft. bgs, no odor.	0
1	1883							1
2	1882	Test pit backfilled with slough			PID=0.0 Sheen=None			2
3	1881							3
4	1880							4
5	1879			ATP-13-5.0	PID=0.0 Sheen=None		**FLOODPLAIN DEPOSITS** SILTY SAND (SM); brown; fine sand, no odor.	5
6	1878							6
7	1877			ATP-13-7.0	PID=0.0 Sheen=None			7
8	1876							8
9	1875				PID=0.0 Sheen=None		SAND (SP); light brown; fine to medium sand, trace silt.	9
10	1874						GRAVEL WITH SAND (GW); light brown; fine to coarse rounded gravel, medium sand, trace silt, no odor.	10
11	1873			ATP-13-11.5	PID=0.0 Sheen=None			11
12	1872						Bottom of exploration at 12 ft. bgs.	12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-13
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location 111 North Erie Street, Spokane, Washington, E Side, N of Path		*Coordinates (SPN NAD83 ft)* E:2487400 N:259600 (est)	*Exploration Number* **ATP-14**
Contractor SES	*Equipment* Excavator or Backhoe	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 1884.2' (est)	
Operator	*Exploration Method(s)* Backhoe or trackhoe	*Work Start/Completion Dates* 4/20/2020	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** GRAVEL WITH SAND (GP); brown-gray; medium to coarse sand, fine angular gravel, trace silt, no odor.	0
1	1883						SILTY SAND WITH GRAVEL (SM); dark brown.	1
							GRAVEL (GP); crushed brick.	
2	1882	Test pit backfilled with slough			PID=0.0 Sheen=Sheen		SILTY SAND WITH GRAVEL (SM); dark brown; fine to coarse sand, no odor.	2
3	1881						GRAVEL WITH SAND (GW); dark brown; medium to coarse sand, no odor.	3
4	1880				PID=0.0 Sheen=Sheen		GRAVEL WITH SILT (GP-GM); brown; coarse, rounded gravel, trace cobbles, no odor.	4
5	1879							5
6	1878				PID=0.0 Sheen=Sheen		**FLOODPLAIN DEPOSITS** SILTY SAND (SM); black; fine sand, abundant organics, no odor.	6
7	1877				PID=0.0 Sheen=Sheen		GRAVEL WITH SAND (GP); light brown; fine to coarse rounded gravel, fine sand, trace silt, no odor.	7
8	1876							8
9	1875							9
10	1874						Bottom of exploration at 9.5 ft. bgs.	10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-14
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location 111 North Erie Street, Spokane, Washington, E of Bridge, N of Path		*Coordinates (SPN NAD83 ft)* E:2487300 N:259500 (est)	*Exploration Number* **ATP-15**
Contractor SES	*Equipment* Excavator or Backhoe	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 1884.2' (est)	
Operator	*Exploration Method(s)* Backhoe or trackhoe	*Work Start/Completion Dates* 4/21/2020	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884						**FILL** GRAVEL WITH SAND (GP); brown; fine subangular gravel, medium to coarse sand, no odor.	0
							CONCRETE; with underlying fabric.	
1	1883				PID=0.0 Sheen=None		GRAVEL WITH SAND (GW); slightly moist, brown; fine to coarse, subrounded gravel, medium to coarse sand, trace silt, no odor.	1
2	1882	Test pit backfilled with slough						2
3	1881						GRAVEL (GP); crushed brick.	3
							SANDY SILT WITH GRAVEL (ML); moist, brown; fine to coarse sand, fine to coarse gravel, no odor.	
4	1880				PID=0.0 Sheen=None			4
							GRAVEL (GW); basalt spalls and boulders.	
5	1879							5
6	1878				PID=0.0 Sheen=None			6
							Bottom of exploration at 6.5 ft. bgs.	
7	1877							7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level — No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-15

Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

Aspect CONSULTING	River Bend Development - 190210		Test Pit Log	
	Project Address & Site Specific Location 111 North Erie Street, Spokane, Washington, N of Path, W Side		*Coordinates (SPN NAD83 ft)* E:2487100 N:259330 (est)	*Exploration Number* **ATP-16**
Contractor SES	*Equipment* Excavator or Backhoe	*Sampling Method* Grab	*Ground Surface Elev. (NAVD88)* 1884.2' (est)	
Operator	*Exploration Method(s)* Backhoe or trackhoe	*Work Start/Completion Dates* 4/21/2020	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	1884				PID=0.0 Sheen=None		**FILL** SAND WITH GRAVEL (SW); fine sand, fine to coarse gravel, trace silt; no odor.	0
							GRAVEL (GW); crushed brick.	
1	1883			ATP-16-1.5	PID=0.0 Sheen=None		SILTY SAND WITH GRAVEL (SM); dark brown; fine to coarse sand, fine to coarse subrounded gravel, no odor.	1
2	1882	Test pit backfilled with slough					GRAVEL (GW); basalt spalls with cobbles and boulders.	2
3	1881				PID=0.0 Sheen=None		Bottom of exploration at 3 ft. bgs.	3
4	1880							4
5	1879							5
6	1878							6
7	1877							7
8	1876							8
9	1875							9
10	1874							10
11	1873							11
12	1872							12
13	1871							13
14	1870							14

Legend

Sample Type

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: BMG
Approved by: SJA 2020.05.21

Exploration Log ATP-16
Sheet 1 of 1

NEW STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\RIVERBEND 190210.GPJ May 21, 2020

APPENDIX B

Subsurface Explorations by Others

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
(GP) Poorly-graded GRAVEL with Sand and Cobbles (Soil Cap - Blend of Surfacing Material and Base Course). Dark brown to gray, medium dense, moist.	0.0	GP		BK						Observed upper 2.5' appeared to be a blend of surficial material from recent grading activities. Observed trace red brick and metal debris from 0' to 4.0' BGS. Observed cobbles 3" to 12" in diameter and boulders 1.0' to 2.5' in diameter from 2.5 to 12.5' BGS.
(GP) Poorly-graded GRAVEL with Sand, Cobbles and Boulders (Deep Gravel Fill). Brown, loose to medium dense, moist.	2.5									
	5.0									Could not obtain representative bulk sample from 2.5' to 7.5' BGS due to caving activity and presence of cobbles and boulders.
	7.5	GP		BK	4.0					
	10.0			BK	3.6					
Test Pit Terminated at 12.5 Feet.	12.5									Test pit terminated due to caving conditions.

Client: Spokane River Properties	**Test Pit Number:** TP-1
Project: Riverbend Business Park	**Date Excavated:** 07-16-2014
Backhoe: CAT 416C	**Bucket Width:** 2'
Depth to Groundwater: N.E.	**Logged By:** RML

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EXPLORATORY TEST PIT LOG

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
(GP-GM) Poorly-graded GRAVEL with Silt and Sand (Soil Cap - Surfacing Material). Dark brown to gray, medium dense, moist.	0.0	GP-GM				134.8	3.8			
(GP-GM) Poorly-graded GRAVEL with Silt and Sand (Soil Cap - Base Course). Dark brown, medium dense, moist.		GP-GM		BK	7.3					Observed trace red brick and metal debris from 0.5' to 2.0' BGS.
(GP) Poorly-graded GRAVEL with Sand, Cobbles and Boulders (Deep Gravel Fill). Brown, loose to medium dense, moist.	2.5									Observed cobbles 3" to 12" in diameter and boulders 1.0' to 2.5' in diameter from 2.0' to 9.0' BGS.
	5.0	GP								
				BK						
Test Pit Terminated at 9.0 Feet.	7.5									Test pit terminated due to caving conditions.

Client: Spokane River Properties	**Test Pit Number:** TP-2
Project: Riverbend Business Park	**Date Excavated:** 07-16-2014
Backhoe: CAT 416C	**Bucket Width:** 2'
Depth to Groundwater: N.E.	**Logged By:** RML

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EXPLORATORY TEST PIT LOG

Sheet 1 Of 1

STRATA TEST PIT - STRATA.GDT - 8/15/14 08:03 - V:\ENGINEERING\SOFTWARE\GINT\PROJECTS\SPORIV SP14058A TP-1 TO TP-8.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
(GP-GM) Poorly-graded GRAVEL with Silt and Sand (Soil Cap - Surfacing Material). Dark brown to gray, medium dense, moist.	0.0	GP-GM		BK		138.2	4.5			Trace vegetation and organics observed to 2" BGS.
(GP) Poorly-graded GRAVEL with Sand, Cobbles and Boulders (Deep Gravel Fill). Brown, loose to medium dense, moist.	2.5	GP								Observed cobbles 3" to 12" in diameter and boulders 1.0' to 6.0' in diameter from 0.5' to 7.5' BGS. Observed trace red brick and metal debris from 0.5' to 7.5' BGS. Observed significant air voids up to 6" in diameter due to lack of <3" diameter particles from 1.0' to 7.5' BGS.
(SP) Poorly-graded SAND with Gravel (Contaminated Fill). Tan to brown, loose, moist.	7.5	SP		BK						Observed suspected contaminated soil from 7.5' to 10.0' BGS.
Test Pit Terminated at 10.0 Feet.	10.0									Test pit terminated due to caving conditions.

Client: Spokane River Properties	**Test Pit Number:** TP-3
Project: Riverbend Business Park	**Date Excavated:** 07-16-2014
Backhoe: CAT 416C	**Bucket Width:** 2'
Depth to Groundwater: N.E.	**Logged By:** RML

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EXPLORATORY TEST PIT LOG

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
(GP-GM) Poorly-graded GRAVEL with Silt and Sand (Soil Cover - Surfacing Material). Dark brown to gray, medium dense, moist.	0.0	GP-GM		BK		134.9	5.0			Trace vegetation and organics observed to 2" BGS.
(GP-GM) Poorly-graded GRAVEL with Silt and Sand (Soil Cover - Base Course). Dark brown, medium dense, moist.		GP-GM								
(CC) Brick debris (Undocumented Fill). Red, medium dense, moist.		CC								Material observed from 1.0' to 1.5' appears to consist of pulverized red brick. Observed moderate red brick and metal debris from 1.5' to 6.0' BGS.
(GP) Poorly-graded GRAVEL with Sand, Cobbles and Boulders (Deep Gravel Fill). Brown, medium dense, moist.	2.5	GP								Observed cobbles 3" to 12" in diameter and boulders 1.0' to 6.0' in diameter from 1.5' to 6.0' BGS.
	5.0			BK						Observed 0.5' diameter air voids in material from 3' to 6' BGS.
Test Pit Terminated at 6.0 Feet.										Test pit terminated due refusal from 6' diameter boulder.

Client: Spokane River Properties	**Test Pit Number:** TP-4
Project: Riverbend Business Park	**Date Excavated:** 07-15-2014
Backhoe: CAT 416C	**Bucket Width:** 2'
Depth to Groundwater: N.E.	**Logged By:** RML

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EXPLORATORY TEST PIT LOG

Sheet 1 Of 1

STRATA TEST PIT - STRATA.GDT - 8/15/14 08:03 - V:\ENGINEERING\SOFTWARE\GINT\PROJECTS\SPORIV SP14058A TP-1 TO TP-8.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
(GP-GM) Poorly-graded GRAVEL with Silt and Sand (Soil Cap - Surfacing Material). Dark brown to gray, medium dense, moist.	0.0	GP-GM				134.3	4.4			Trace vegetation and organics observed to 2" BGS. Observed cobbles 3" to 6" in diameter from 0.5' to 2.0' BGS. Observed 1" diameter, white PVC water pipe at 1.0' BGS. Observed moderate concrete, asphalt, metal, brick, and plastic debris from 0.5' to 3.0' BGS. Material observed from 2.0' to 3.0' BGS consisted of gravel that was difficult to excavate with backhoe. Observed cobbles 3" to 12" in diameter and boulders 1.0' to 4.0' in diameter from 3.0' to 4.0' BGS. Observed up to 0.5' diameter air voids in material from 3.0' to 4.0' BGS. Test pit terminated due refusal from 2 interlocking 4' diameter boulders.
(GP) Poorly-graded GRAVEL with Sand (Soil Cap - Base Course). Dark brown, medium dense, moist.		GP		BK						
(GP) Poorly-graded GRAVEL with Sand (Soil Cap - Base Course). Gray, dense, moist.	2.5	GP								
(GP-GM) Poorly-graded GRAVEL with Silt, Sand, Cobbles and Boulders (Deep Gravel Fill). Brown, loose to medium dense, moist.		GP-GM								
Test Pit Terminated at 4.0 Feet.										

Client: Spokane River Properties	**Test Pit Number:** TP-5	STRATA A Professional Services Corporation Integrity From the Ground Up	**EXPLORATORY TEST PIT LOG**
Project: Riverbend Business Park	**Date Excavated:** 07-15-2014		
Backhoe: CAT 416C	**Bucket Width:** 2'		Sheet 1 Of 1
Depth to Groundwater: N.E.	**Logged By:** RML		

STRATA TEST PIT - STRATA.GDT - 8/15/14 08:03 - V:\ENGINEERING\SOFTWARE\GINT\PROJECTS\SPORIV SP14058A TP-1 TO TP-8.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
(GP-GM) Poorly-graded GRAVEL with Silt and Sand (Undocumented Fill). Dark brown to gray, medium dense, moist.	0.0	GP-GM				136.2	5.1			Moderate vegetation and organics observed to 2" BGS. Observed moderate concrete debris from 0.5' to 2.0' BGS.
(AC) Asphalt Concrete (3")		AC								
(GP) Poorly-graded GRAVEL (Undocumented Fill). Gray, medium dense, moist.		GP								
(CC) PCC (1")		CC								
(SP) Poorly-graded SAND (Undocumented Fill). Brown, dense, moist.		SP		BK						
(GP) Poorly-graded GRAVEL with Sand, Cobbles and Boulders (Undocumented Fill). Dark brown, loose, moist.	2.5	GP								Observed cobbles 3" to 12" in diameter and boulders 1.0' to 1.5' in diameter from 2.0' to 4.5' BGS. Observed trace railroad debris (nails, wood, etc.) from 2.0' to 4.5' BGS.
(ML) Sandy SILT (Native). Brown to dark brown, medium dense, moist.	5.0	ML		BK						Observed color change from dark brown to brown at 7.0' BGS.
(GP) Poorly-graded GRAVEL with Sand (Native). Brown, medium dense, moist.	7.5	GP		BK						
Test Pit Terminated at 13.5 Feet.	10.0 12.5									Test pit terminated due to caving conditions.

Client: Spokane River Properties	**Test Pit Number:** TP-6
Project: Riverbend Business Park	**Date Excavated:** 07-15-2014
Backhoe: CAT 416C	**Bucket Width:** 2'
Depth to Groundwater: N.E.	**Logged By:** RML

STRATA
A Professional Services Corporation
Integrity From the Ground Up

EXPLORATORY TEST PIT LOG

Sheet 1 Of 1

STRATA TEST PIT - STRATA.GDT - 8/15/14 08:03 - V:\ENGINEERING\SOFTWARE\GINT\PROJECTS\SPOR\V SP14058A TP-1 TO TP-8.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
(GP-GM) Poorly-graded GRAVEL with Silt and Sand (Undocumented Fill). Gray, medium dense, moist.	0.0	GP-GM				134.6	3.7			Moderate vegetation and organics observed to 2" BGS. Observed moderate red brick and wood debris from 0.5' to 2.5' BGS. Observed cobbles 3" to 12" in diameter and boulders 1.0' to 2.0' in diameter from 0.5' to 2.5' BGS.
(GP) Poorly-graded GRAVEL with Sand, Cobbles and Boulders (Undocumented Fill). Brown, loose, moist.		GP		BK	7.4					
(ML) Sandy SILT (Native). Brown to dark brown, medium dense, moist.	2.5	ML		BK	52.0					
(GP) Poorly-graded GRAVEL with Sand (Native). Brown, medium dense, moist to saturated.	7.5	GP		BK						
	10.0									
	12.5									Observed water content change from moist to wet at 12.0' BGS and from wet to saturated at 12.5' BGS.
Test Pit Terminated at 14.0 Feet.										Test pit terminated due to caving conditions.

Client: Spokane River Properties	**Test Pit Number:** TP-7
Project: Riverbend Business Park	**Date Excavated:** 07-15-2014
Backhoe: CAT 416C	**Bucket Width:** 2'
Depth to Groundwater: 12.5'	**Logged By:** RML

STRATA
A Professional Services Corporation
Integrity From the Ground Up

EXPLORATORY TEST PIT LOG

Sheet 1 Of 1

STRATA TEST PIT - STRATA.GDT - 8/15/14 08:03 - V:\ENGINEERING\SOFTWARE\GINT\PROJECTS\SPORIV SP14058A TP-1 TO TP-8.GPJ

USCS Description	Depth (ft)	U.S.C.S. Class	Symbol	Sample Type	% Passing No. 200 Sieve	Dry Density (pcf)	Moisture Content (%)	Pocket Pen. (tsf)	Atterberg Limits LL PI	Remarks Note: BGS = Below Ground Surface
(GP-GM) Poorly-graded GRAVEL with Silt and Sand (Undocumented Fill). Gray, medium dense, moist.	0.0	GP-GM				135.5	5.5			Moderate vegetation and organics observed to 2" BGS.
(SP) Poorly-graded SAND (Undocumented Fill). Brown, medium dense, moist.		SP								
(CC) Brick debris (Undocumented Fill). Red, medium dense, moist.	2.5	CC								Observed moderate metal and plastic debris from 1.5' to 3.0' BGS.
(CC) PCC (Thickness unknown).		CC								Test pit terminated due to refusal from Portland Cement Concrete (PCC) slab.
Test Pit Terminated at 3.1 Feet.										

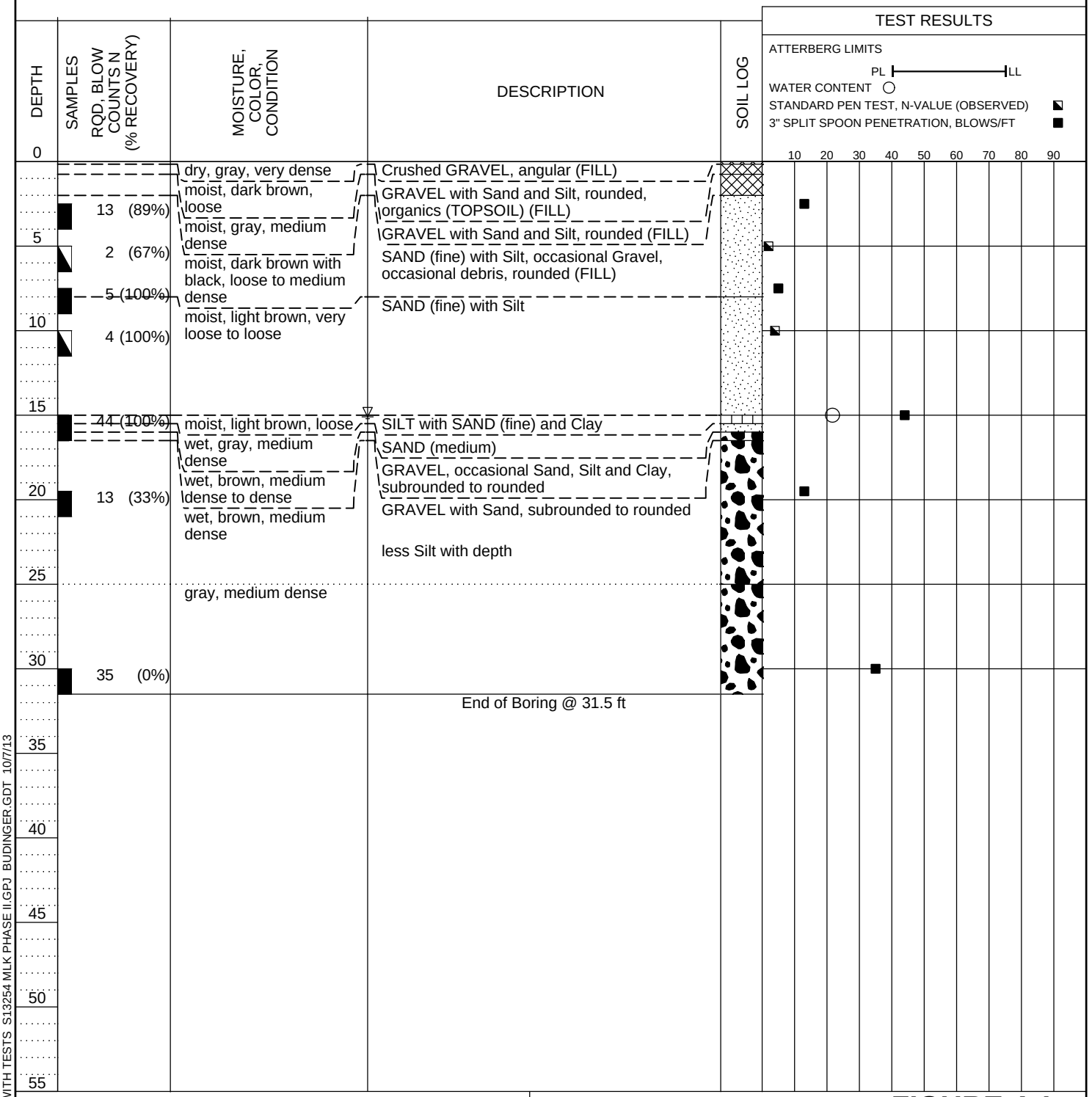
Client: Spokane River Properties	**Test Pit Number:** TP-8	STRATA A Professional Services Corporation Integrity From the Ground Up	**EXPLORATORY TEST PIT LOG**
Project: Riverbend Business Park	**Date Excavated:** 07-15-2014		
Backhoe: CAT 416C	**Bucket Width:** 2'		
Depth to Groundwater: N.E.	**Logged By:** RML		Sheet 1 Of 1

STRATA TEST PIT - STRATA.GDT - 8/15/14 08:03 - V:\ENGINEERING\SOFTWARE\GINT\PROJECTS\SPORIV SP14058A TP-1 TO TP-8.GPJ

TEST BORING 1

Date of Boring: 9-6-13
Driller: Budinger & Assoc., Inc.
Type of Drill: TEI HEMH-5012
Location: South of the intersection of Erie Street and Front Avenue (G)
Surface: gravel

Elevation: 1887 ft
Logged by: T. Black
Size of hole: air rotary overburden system, 4.5 in O.D. casing



LOGS WITHOUT WELL WITH TESTS S13254 MLK PHASE II.GPJ BUDINGER.GDT 10/7/13

Budinger & Associates
1101 North Fancher Road
Spokane Valley, WA 99212

BORING LOGS **FIGURE 4-1**

Project: MLK Phase II
Location: Spokane, WA
Number: S13254

TEST BORING 6

Date of Boring: 9-11-13
Driller: Budinger & Assoc., Inc.
Type of Drill: TEI HEMH-5012
Location: West of Hamilton bridge, southeast corner parcel 35174.0606 (E)
Surface: grass and weeds

Elevation: 1890 ft
Logged by: D.Lehn
Size of hole: air rotary overburden system, 4.5 in O.D. casing

DEPTH	SAMPLES RQD, BLOW COUNTS N (% RECOVERY)	MOISTURE, COLOR, CONDITION	DESCRIPTION
0	R (60%)	moist, dark brown, very dense	GRAVEL (coarse to fine), with Sand (coarse to fine) some Silt, angular to rounded (FILL)
		moist, black, loose	SAND and Silt (FILL)
5	3 (27%)	moist, dark brown, very loose to loose	GRAVEL (fine). with Sand (coarse to fine), some Silt, angular, (FILL). many voids from 5 to 10 feet
10	6 (20%)	moist to wet, brown, loose	GRAVEL (fine). with Sand (coarse to fine), some Silt, angular (FILL).
15	7 (0%)		
20	4 (0%)		
		dry, gray, very dense	BOULDER (FILL)
25	1 (15%)	wet, brown, very loose	GRAVEL with Silt and Sand, rounded
		wet, brown, very loose	SAND (medium to fine) with Silt and fine Gravel, micaceous, rounded
		wet, brown, dense	
30	34 (60%)		GRAVEL with Sand (coarse to fine) trace Silt, rounded
			End of Boring @ 31 ft
35			
40			
45			
50			
55			

SOIL LOG

TEST RESULTS

ATTERBERG LIMITS
PL — LL
WATER CONTENT ○
STANDARD PEN TEST, N-VALUE (OBSERVED) ◪
3" SPLIT SPOON PENETRATION, BLOWS/FT ■

10 20 30 40 50 60 70 80 90 100

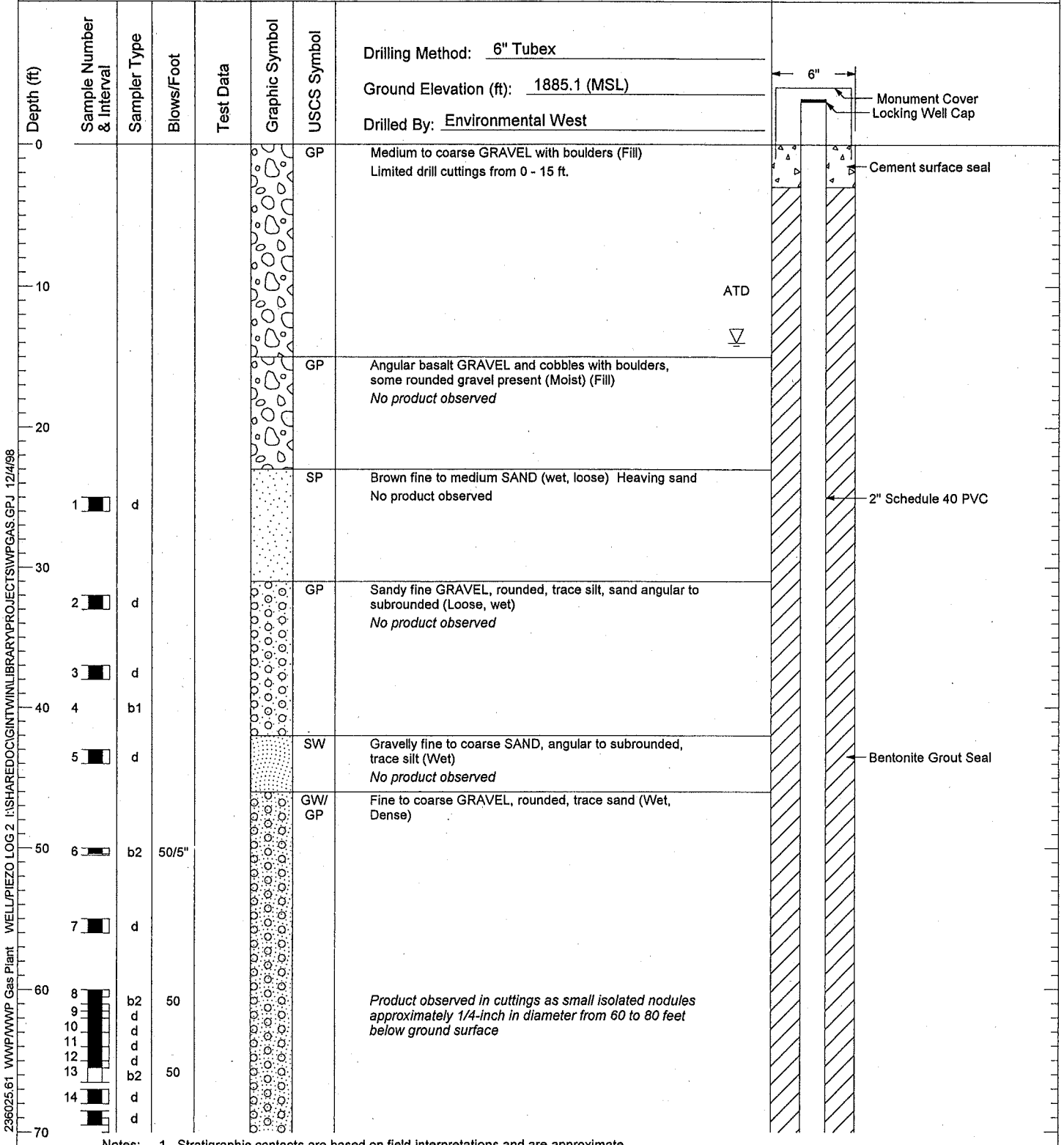
LOGS WITHOUT WELL WITH TESTS S13254 MLK PHASE II.GPJ BUDINGER.GDT 10/7/13

Budinger & Associates
1101 North Fancher Road
Spokane Valley, WA 99212

BORING LOGS **FIGURE 4-6**

Project: MLK Phase II
Location: Spokane, WA
Number: S13254

MW02-100



236025.61 WWP/WWP Gas Plant WELL/PIEZO LOG 2 I:\SHAREDOC\GINT\WIN\LIBRARY\PROJECTS\WPGAS.GPJ 12/4/98

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

Boring and Monitoring Well MW02-100

Figure A-2
(1 of 2)

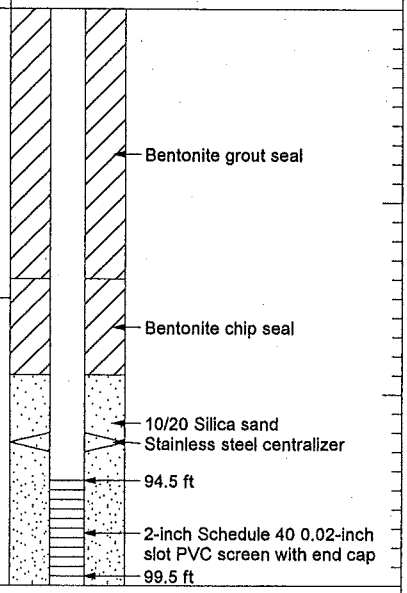
MW02-100

SAMPLE DATA				SOIL PROFILE			WELL DETAIL
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	
70	15	b2	17/60-6"				
	16					GW/ GP	Fine to coarse GRAVEL, rounded, trace sand (Wet, Dense)
	17	d					
	18	b2	85				
	19	d					
80	20	b2	76				
	21	b2	58			GW	Sandy medium to coarse GRAVEL, rounded, some cobbles (Wet, Dense)
	22	d					No product observed
90	23	b2	50				
	24	d					
	25	b2	38				
	26	d					
100							
110							
120							
130							
140							

Drilling Method: 6" Tubex

Ground Elevation (ft): 1885.1 (MSL) 1884 USGS

Drilled By: Environmental West



Boring Completed 08/19/98
Total Depth of Boring = 100.0 ft.

Well Completed 08/22/98
Elevation at Top of Protective Casing = 1887.95 ft.
Elevation at Top of Well Casing = 1888.25 ft.
Total Depth of Well = 100 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

236025.61 WWP/WWP Gas Plant WELL/PIEZO LOG 2 I:\SHAREDOC\GINT\WIN\LIBRARY\PROJECTS\WPGAS.GPJ 12/4/98

Boring and Monitoring Well MW02-100

Figure A-2
(2 of 2)

Project Location: Hamilton Street Bridge Site
Client: Avista Corporation

Well No. **MW4-100**

Drilling Method: Air rotary with TUBEX
Logged By: TDB
Drilling Co.: Environmental West Exploration, Inc.
Ground Elevation (ft): 1884 (MSL)

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/6 inches	PID / (U.V. Response)	Graphic Symbol	Geologic Symbol	Description
0	1	a2	3/3/3	3.7 (None)		SM	Dark brown silty SAND. Fine Sand. Trace rounded gravel. Soft. Dry. (ALLUVIUM)
						GP	Brown sandy GRAVEL. Gravel, no distinguishible grains and lacking structure (massive), fine to medium, subrounded to subangular. Some sand. Trace silt. Very dense. Wet. (ALLUVIUM)
10	2	a2	4/28/ 50-4"	3.0 (None)			
	3	a2	10/58/ 60	(None)			Blue/gray. Gravel is massive and granitic, fine to coarse, rounded to subrounded Sand is subangular to angular.
20	4	a2	85-6"	1.8 (None)			Tan/gray/red/black. Sand is subrounded
	5	a2	5/5/5	(None)			Multicolored. Gravel is granitic. Gravel and sand are rounded to subrounded.
30	6	a2	8/6/6	(None)			Gravel is fine to medium, some granitic. Trace coarse sand.
	7	a2	7/30/ 65	(None)			Gray-brown/black. Gravel is granitic and massive, fine to coarse
40	8	a2	15/23/ 30	(None)			
	9	a2	12/15/ 17	(None)			Gravel is medium to coarse, rounded to subrounded. No sand or fines.
50	10	a2	7/12/ 15	6.0 (None)			Few rounded to subrounded coarse sand.
	11	a2	10/17/ 20/12	0.0 (None)			Black/gray. Some sand that is fine to coarse, angular to subrounded.
60	12	a2	12/25/ 24/20	4.3 (None)			Brown, gray/black. Gravel is medium to coarse
	13	a2	20/20/ 14/8	0.0			Multicolored. Gravel is massive, fine to medium.
	14	d		3.5 (None)			Brown. Little medium to coarse
70							

Groundwater: ATD

Well detail: 6; Monument Cover; Locking Well Cap; Cement Grout; Bentonite Grout Seal

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.
3. U.V. response = none, weak (wk.), strong (st.)
4. PID readings in ppm.

Log of Boring and Well MW4-100

Figure A-8
(1 of 2)

Project Location: Hamilton Street Bridge Site
Client: Avista Corporation

Well No. **MW4-100**

SAMPLE DATA					GEOLOGIC PROFILE			WELL DETAIL
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/6 inches	PID / (U.V. Response)	Graphic Symbol	Geologic Symbol	Drilling Method: Air rotary with TUBEX Logged By: TDB Drilling Co.: Environmental West Exploration, Inc. Ground Elevation (ft): 1884 (MSL)	Groundwater
70	15	a2	15/8/7/7	0.0			Multicolored. Gravel is medium to coarse. No sand or fines.	
	16	d		2.3 (None)				
	17	a2	17/20/24/22	0.0				
80	18	a2	9/14/17/15					
	19	d		(None)			Gravel is granitic and massive, fine to medium. Some subangular to rounded sand. Water is dark brown.	
	20	a2	30/75-4"	(None)			Gravel is medium to coarse.	
90						SP	Brown/gray/black SAND with gravel. Sand is medium to coarse, subangular to subrounded. Few fine gravel that is subangular to subrounded. (ALLUVIUM)	
	21	d		(None)				
	22	d		(None)				
100	23	a2	9/12/14/20	(None)		GP	Multi-colored sandy GRAVEL. Gravel is granitic, subrounded to rounded. Some sand that is medium to coarse, subrounded to rounded. Medium dense. (ALLUVIUM)	

Boring Completed 05/04/99
Total Depth of Boring = 102.0 ft.

20/40 Silica Sand
10/20 Silica Sand
93.7 ft
2-inch Schedule 40 0.02-inch slot PVC screen with end cap
98.7
Slough at bottom of hole

Elevation at Top of Protective Casing = 1887.53 ft.
Elevation at Top of Well Casing = 1887.53 ft.
Total Depth of Well = 99.2 ft.

110
120
130
140

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.
3. U.V. response = none, weak (wk.), strong (st.)
4. PID readings in ppm.

236025-73 Avista Corporation\Phase 3\Remedial Investigation SPOKANE WELL LOG L\MODELING\GINT\WINLIBRARY\PROJECTS\GASP-P3E.GPJ 10/4/99

Log of Boring and Well MW4-100

Figure A-8
(2 of 2)

Project Location: Hamilton Street Bridge Site
Client: Avista Corporation

Well No. **MW8-90**

Drilling Method: Air rotary with TUBEX
Logged By: TDB
Drilling Co.: Environmental West Exploration, Inc.
Ground Elevation (ft): 1889 (MSL)

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/6 inches	PID / (U.V. Response)	Graphic Symbol	Geologic Symbol	Description
0	1	a2	8/12/ 15/14	0.8 (None)		GP	**Dark gray/black GRAVEL.** Gravel is basaltic, angular, fine to medium. Trace sand and silt. Loose. Dense. Moist. (FILL)
10	2	a2	7/14/ 8/25	0.0 (None)			
	3	a2	14/18/ 12/16	0.0 (None)			
20	4	a2	3/19/ 21/20				Fine gravel. Some coarse sand. Multicolored. Some sand, medium to coarse, subrounded.
	5	d		(None)			Gray/Black. Few sand, fine to medium, subangular.
	6	a2	38/5/ 5/20	(Wk. White/ Gray)			
	7	d		None			
30	8	a2	13/24/ 22/35	1.2 (Wk. White/ Gray)		GP	**Brown sandy GRAVEL.** Gravel, no distinguishible grains and lacking structure (massive), medium to coarse.
	9	a2	25/25/ 45/22	1.2 (None)		GW	Some sand, fine to medium, rounded to subrounded. Medium Dense. Wet. Angular basalt between 30 and 30.3 feet. (ALLUVIUM)
40	10	a2	10/23/ 50/30	0.7 (None)		GP	**Brown sandy GRAVEL.** Gravel is massive, subrounded to rounded, fine to medium. Sand is angular to subrounded, some fine to medium, few coarse. Dense. Wet. (ALLUVIUM)
	11	a2	8/10/ 15/17	1.0 (None)			**Brown sandy GRAVEL.** Gravel is massive, fine to medium, rounded to subrounded. Sand is angular to subrounded, some fine to medium, few coarse. Trace silt. (ALLUVIUM)
50	12	a2	8/8/ 12/16	0.8 (None)			Multicolored. Gravel is fine to coarse, subangular to subrounded. Sand is subangular to subrounded, some coarse. No silt.
	13	d		(None)		SP	
	14	a2	3/3/ 6/12	0.1			Brown, gray, black. Gravel is fine to medium, subrounded. Sand, some coarse, few medium. No fines. Medium dense. Wet (ALLUVIUM)
60	15	a2	15/16/ 16/25	1.2 (None)		GP	**Multicolored gravelly SAND.** Sand is subrounded to rounded, medium to coarse. Gravel is massive, fine, subrounded. Trace fine sand and silt. No gravel.
	16	a2	10/9/ 8/10				**Mulicolored sandy GRAVEL.** Gravel is massive, fine to medium, subrounded. Sand is angular to subrounded. No silt. Medium dense. Wet. Gravel is medium to coarse. No sand or
70							

Groundwater: ATD

WELL DETAIL: 6 in; Monument Cover; Locking Well Cap; Cement Grout; Bentonite Grout Seal

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.
3. U.V. response = none, weak (wk.), strong (st.)
4. PID readings in ppm.

236025-73 Avista Corporation/Phase 3/Remedial Investigation SPOKANE WELL LOG I:\MODELING\GINTWIN\LIBRARY\PROJECTS\GASP-P3E.GPJ 10/4/99

Log of Boring and Well MW8-90

Figure A-13
(1 of 2)

Project Location: Hamilton Street Bridge Site
Client: Avista Corporation

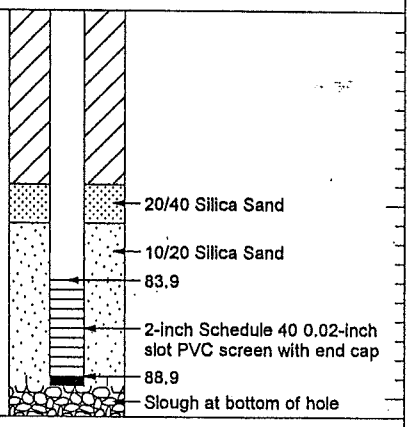
Well No. **MW8-90**

SAMPLE DATA				GEOLOGIC PROFILE			WELL DETAIL
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/6 inches	PID / (U.V. Response)	Graphic Symbol	Geologic Symbol	Groundwater

Drilling Method: Air rotary with TUBEX
Logged By: TDB
Drilling Co.: Environmental West Exploration, Inc.
Ground Elevation (ft): 1889 (MSL)

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/6 inches	PID / (U.V. Response)	Geologic Symbol	Description
70	17	a2	8/13/ 15/23	0.0 (None)		fines. Loose. Gravel is fine to medium, rounded to subrounded. Sand is rounded to subangular, some medium to coarse, few fine. Medium dense.
	18	d				
80	19	a2	10/10/ 12/16	(None)		Gravel is medium to coarse.
	20	d				Brown. Gravel is fine to medium. Sand, rounded to subrounded, some medium, little fine.
90	21	a2	100-2"	0.0		
	22	d			BA	Gray/black, massive BASALT BEDROCK.

Boring Completed 05/06/99
Total Depth of Boring = 91.0 ft.



Elevation at Top of Protective Casing = 1891.94 ft.
Elevation at Top of Well Casing = 1892.07 ft.
Total Depth of Well = 89.4 ft.

100
110
120
130
140

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.
3. U.V. response = none, weak (wk.), strong (st.)
4. PID readings in ppm.

236025-73 Avista Corporation/Phase 3/Remedial Investigation SPOKANE WELL LOG I:\MODELING\GINTWIN\LIBRARY\PROJECTS\GASP-P3E.GPJ 10/4/99

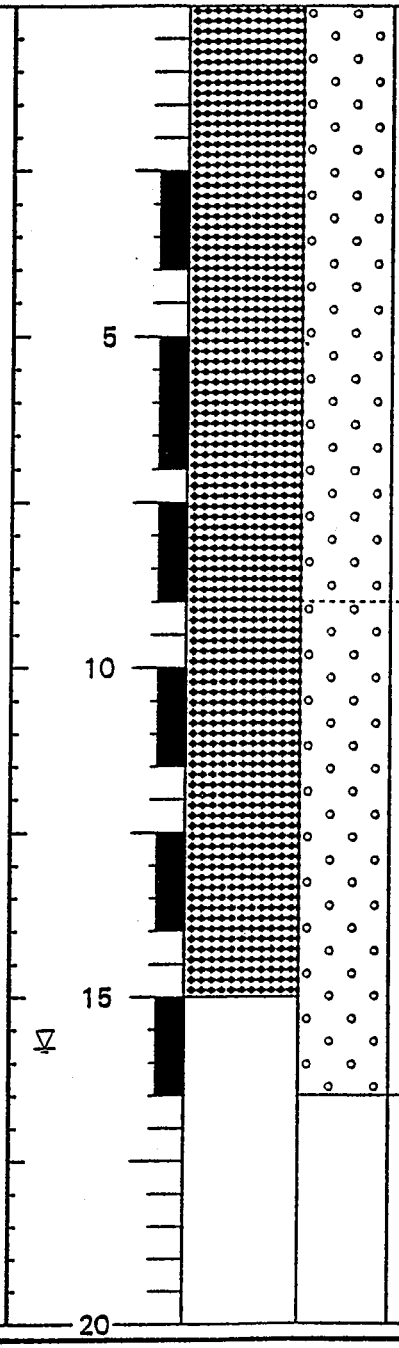
Log of Boring and Well MW8-90

Figure A-13
(2 of 2)

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB- 3
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 1
DRILLED BY	Environmental West Exploration	GROUND ELEV.	979.05'
DRILL METHOD	TUBEX	TOTAL DEPTH	15.00'
LOGGED BY	John Latta	DATE COMPLETED	09/08/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 9.0 feet: FINE TO MEDIUM GRAVEL (GP), dark gray, basalt, angular, with a little sand, medium dense, dry to damp. (FILL)
SB-3-2.5 (2.5"SS)	30-18-22 (6/18)	385 (NT)	
(2.5"SS)	25-25-18-11 (8/24)	301 (NT)	
(2.5"SS)	30-12-15 (6/18)	NT (NT)	
			9.0 to 16.5 feet: MEDIUM TO COARSE GRAVEL (GP), dark gray, basalt, angular, some fines locally, dense, damp. (FILL)
(2.5"SS)	8-28-50/3" (2/18)	204 (NT)	
(2.5"SS)	12-12-10 (6/18)	NT (NT)	
(2.5"SS)	10-15-12 (3/18)	40 (NT)	@ 15.0 feet: wet.
			Total depth drilled = 15.0 feet. Total depth sampled = 16.5 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.



REMARKS

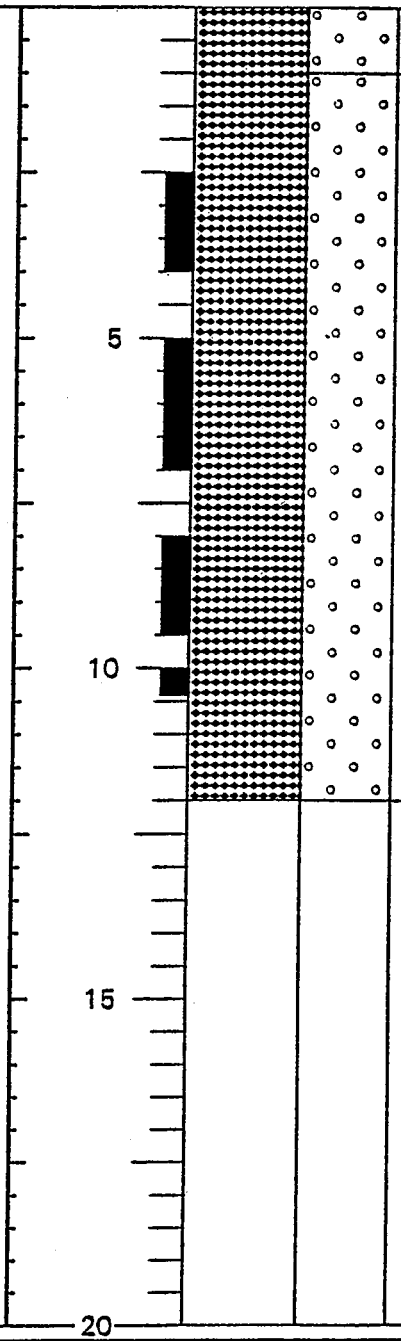
(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) UV response based on visual interpretation of strength and color. (6) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB- 5
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 1
DRILLED BY	Environmental West Exploration	GROUND ELEV.	978.78'
DRILL METHOD	TUBEX	TOTAL DEPTH	12.00'
LOGGED BY	John Latta	DATE COMPLETED	09/09/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 1.0 foot: GRAVEL (GP), gray brown. Road oil. (FILL)
			1.0 to 12.0 feet: MEDIUM TO COARSE GRAVEL (GP), gray brown, angular to subangular, with a little fine gravel and fines locally, basalt, medium dense to dense, damp. (FILL)
(2.5"SS)	25-20-22 (8/18)	150 (NT)	
(2.5"SS)	13-13-14-16 (10/24)	117 (Wk yellow)	
			@ 7.0 to 8.0 feet: 1-foot basalt boulder.
SB-5-8 (2.5"SS)	12-14-16 (9/18)	367 (Wk dark yellow)	
(2.5"SS)	50/5" (0/5)	377 (NT)	
			@ 11.0 to 12.0 feet: hard drilling in basalt boulder.
			Total depth drilled = 12.0 feet. Total depth sampled = 9.5 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) UV response based on visual interpretation of strength and color. (6) NT = Not tested.

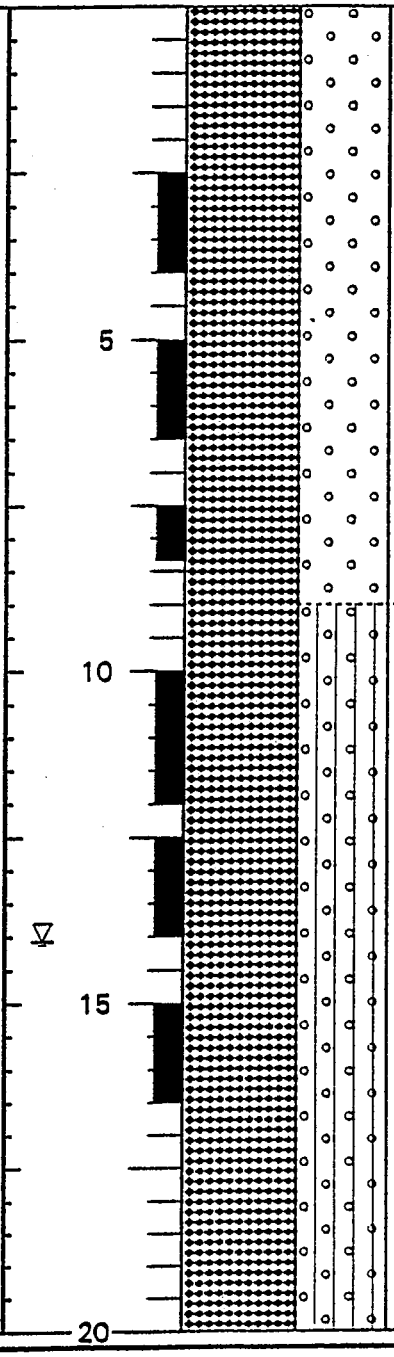
BLDG # 2

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB- 6
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	977.53'
DRILL METHOD	TUBEX	TOTAL DEPTH	30.00'
LOGGED BY	John Latta	DATE COMPLETED	10/01/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 9.0 feet: FINE TO COARSE GRAVEL (GP). Dark gray to black angular basalt gravel and boulders. (FILL)
(3"SS)	25-40-30 (6/18)	33 (NT)	
(3"SS)	10-40-50/3" (0/18)	NT (NT)	
(3"SS)	25-50/4" (0/10)	NT (NT)	
			9.0 to 30.5 feet: CINDER GRAVEL (GP-GM), sand and gravel size, angular up to 1-inch, with some silt, soft. (FILL)
(3"SS)	4-4-5-8 (10/24)	41 (Mod blue)	@ 10.0 to 12.0 feet: orange, moist.
(3"SS)	2-2-2 (15/18)	32 (Wk blue)	@ 12.5 to 30.0 feet: black, dark brown and dark gray, wet.
SB-6-15 (3"SS)	4-5-6 (6/18)	36 (Str grn blue)	@ 15.0 feet: very weak hydrocarbon sheen.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

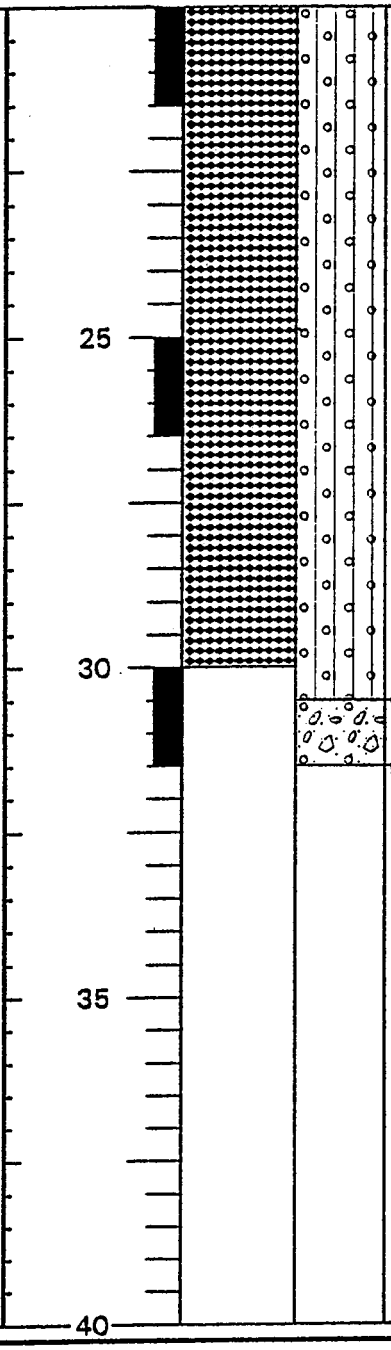
(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 30 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB- 6
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	977.53'
DRILL METHOD	TUBEX	TOTAL DEPTH	30.00'
LOGGED BY	John Latta	DATE COMPLETED	10/01/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	5-6-12 (3/18)	51 (Str blue)	**9.0 to 30.5 feet: CINDER GRAVEL (GP-GM),** continued.
(3"SS)	8-10-16 (7/18)	44 (Str grn blue)	@ 25.0 to 30.0 feet: some black tarry hydrocarbons and sheen on cuttings and drill steel during retrieval.
SB-6-30 (3"SS)	1-10-50 (8/18)	217 (NT)	@ 30.0 feet: black cinders, black free-phase tar-like hydrocarbons, hydrocarbon sheen, naptha-like odor.
			30.5 to 31.5 feet: SANDY COARSE GRAVEL (GW), black, dense, wet. Black free-phase tar-like hydrocarbons, hydrocarbon sheen, naptha-like odor. (ALLUVIUM)
			Total depth drilled = 30.0 feet. Total depth sampled = 31.5 feet.
			Boring backfilled with hydrated 3/8-inch bentonite chips.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

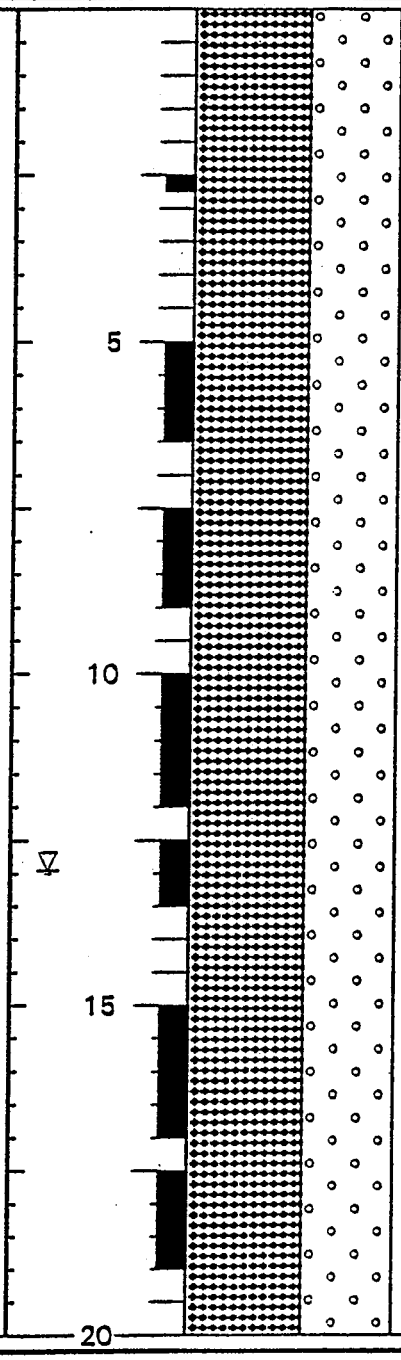
(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 30 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB- 7
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.42'
DRILL METHOD	TUBEX	TOTAL DEPTH	35.00'
LOGGED BY	John Latta	DATE COMPLETED	09/19/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 27.5 feet: BASALT GRAVEL AND BOULDERS (GP), dark gray to black, angular basalt up to +2-feet, locally with some silt, dense. (FILL)
(3"SS)	50/3" (0/3)	NT (NT)	@ 0 to 2.5 feet: reddish brown, gravel and silt, some brick, dense, moist.
(3"SS)	20-45-30 (1/18)	NT (NT)	
(3"SS)	12-20-25 (6/18)	NT (NT)	@ 7.5 to 9.0 feet: silty gravel, dark gray to dark brown, dense, damp. A trace black asphaltic hydrocarbon.
(3"SS)	15-17-21-14 (6/24)	NT (NT)	
(3"SS)	30-50/4" (0/12)	NT (NT)	@ 13.5 feet: drilling becomes easier.
SB-7-15 (3"SS)	8-15-20-20 (6/24)	NT (NT)	@ 15.0 to 19.0 feet: black, angular fine to coarse basalt gravel, dense, wet. Black, coal tar, hydrocarbon odor.
(3"SS)	10-28-20 (2/18)	NT (NT)	@ 19.0 to 20.5 feet: drilling a basalt boulder, no sample.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 35 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	**WSDOT SR 290** Realignment	BORING NO.	SB- 7
LOCATION	**Southriver Drive**, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	**Environmental** West Exploration	GROUND ELEV.	976.42'
DRILL METHOD	**TUBEX**	TOTAL DEPTH	35.00'
LOGGED BY	**John Latta**	DATE COMPLETED	09/19/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS / DEPTH IN FEET / SAMPLES / WELL DETAILS / LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				0 to 27.5 feet: BASALT GRAVEL AND BOULDERS (GP), continued.
(3"SS)	18-10-20-20 (7/24)	NT (NT)		@ 22.5 to 29.0 feet: black, angular basalt, black coal tar and tar-like sludge, strong odor.
(3"SS)	10-15-20-22 (8/24)	NT (NT)	25	
SB-7-27.5 (3"SS)	20-20-50/3" (18/18)	NT (NT)		**27.5 to 33.0 feet: SILTY SANDY GRAVEL (GM)**, black, with much tarry sludge, wet. Strong hydrocarbon-like odor. (FILL)
(3"SS)	20-50 (18/12)	NT (NT)	30	@ 30.0 to 31.0 feet: hair.
				33.0 to 37.0 feet: SANDY FINE TO COARSE GRAVEL (GW), dark brown gray, gravel up to +3-inches, fine to coarse sand, dense, wet. Hydrocarbon stain and odor. (ALLUVIUM)
(3"SS)	12-12-12-12 (2/24)	NT (NT)	35	
			40	Total depth drilled = 35.0 feet. Total depth sampled = 37.0 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

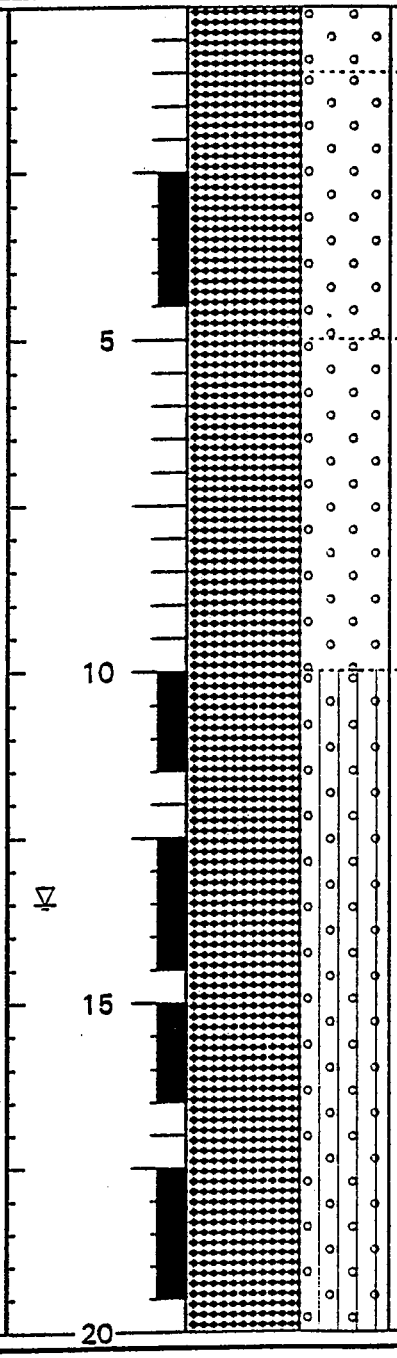
REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 35 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	**WSDOT SR 290** Realignment	BORING NO.	SB- 8
LOCATION	**Southriver Drive**, Spokane, Washington	PAGE	1 OF 2
DRILLED BY	**Environmental West Exploration**	GROUND ELEV.	976.62'
DRILL METHOD	**TUBEX**	TOTAL DEPTH	27.50'
LOGGED BY	**John Latta**	DATE COMPLETED	09/16/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 1.0 foot: LIGHT GRAY SURFACE GRAVEL. Red gray gravel and bricks. (FILL)
(3"SS)	10-20-35-50/5" (6/23)	NT (NT)	**1.0 to 5.0 feet: FINE TO COARSE GRAVEL (GP),** dark brown to dark reddish brown, angular, basalt, up to 2 to 3 feet, and some sand and silt, chiefly basalt, a few percent brick, dense, dry. Some weak hydrocarbon stain. (FILL)
(--)	-- (--)	NT (NT)	**5.0 to 10.0 feet: BASALT BOULDERS (GP),** dark brown to black, angular, coarse up to 2 to 3 feet, dense, dry. (FILL)
(--)	-- (--)	NT (NT)	
SB-8-10 (3"SS)	6-6-12 (15/18)	NT (NT)	**10.0 to 24.5 feet: CINDER GRAVEL (GP-GM),** black to dark orange gray, fine to medium, up to 1-inch, angular, some sand- and silt-sized, soft. Consists of cinders with trace bricks. (FILL)
(3"SS)	6-8-8-10 (16/24)	NT (NT)	@ 10.0 to 14.5 feet: damp. Black tar-like free-phase hydrocarbons, naptha-like odor.
SB-8-15 (3"SS)	5-4-3 (13/18)	NT (NT)	@ 15.0 to 21.5 feet: wet. Black tar-like free phase hydrocarbons, naptha-like odor.
(3"SS)	6-6-8-10 (9/24)	NT (NT)	



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 27.5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB- 8
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.62'
DRILL METHOD	TUBEX	TOTAL DEPTH	27.50'
LOGGED BY	John Latta	DATE COMPLETED	09/16/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	4-6-10 (7/18)	NT (NT)	**10.0 to 24.5 feet: CINDER GRAVEL (GP-GM),** continued.
(3"SS)	8-8-8-8 (9/24)	NT (NT)	@ 22.5 to 24.5 feet: hydrocarbon sheen, odor.
(3"SS)	40-50 (5/12)	NT (NT)	**24.5 to 29.0 feet: SANDY FINE TO COARSE GRAVEL (GW),** black, subangular to round, up to 2.5-inch, fine to coarse sand, dense, wet. Black free-phase tar-like hydrocarbons, hydrocarbon odor. (ALLUVIUM)
SB-8-27.5 (3"SS)	6-5-17 (6/18)	NT (NT)	
			Total depth drilled = 27.5 feet. Total depth sampled = 29.0 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN

25 30 35 40

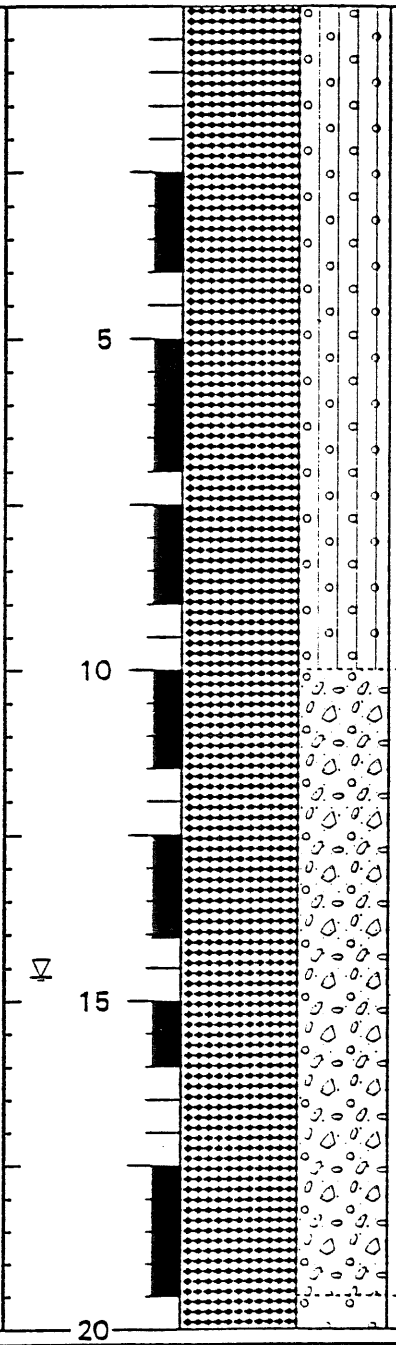
REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 27.5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB- 9
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.98'
DRILL METHOD	TUBEX	TOTAL DEPTH	22.50'
LOGGED BY	John Latta	DATE COMPLETED	09/22/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 10.0 feet: SANDY GRAVEL (GP-GM), cinders, a few percent native gravel and brick locally. (FILL)
SB-9-2.5 (3"SS)	14-12-20 (12/18)	207 (Str blue)	@ 2.5 to 4.0 feet: dark orange brown, dense, damp. Hydrocarbon stain.
(3"SS)	18-12-[illegible]-6 [illegible]/24)	65 (Str blue)	@ 5.0 to 7.0 feet: orange brown, soft, damp.
'SS)	4-5-4 (18/18)	90 (Mod blue)	@ 7.5 to 9.0 feet: orange, soft, moist.
SB-9-10 (3"SS)	12-20-50/3" (9/15)	60 (NT)	**10.0 to 19.5 feet: SANDY FINE TO COARSE GRAVEL (GW)**, subangular to round, some fine to coarse sand, dense. (ALLUVIUM)
(3"SS)	5-35-50 (1/18)	42 (NT)	@ 10.0 to 11.5 feet: moist. Strong diesel-like odor, strong tar-like hydrocarbon stain. Boulder at 11.5 feet.
			@ 12.5 to 14.0 feet: less diesel-like odor than above.
(3"SS)	12-50 (5/12)	36 (NT)	@ 15.0 to 16.0 feet: wet. No hydrocarbon odor or sheen.
(3"SS)	5-20-33-35 (9/24)	56 (Mod blue)	@ 17.5 to 19.5 feet: wet. Weak diesel-like odor and sheen.
			19.5 to 24.5 feet: FINE TO COARSE GRAVEL



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 17.5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB- 9
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.98'
DRILL METHOD	TUBEX	TOTAL DEPTH	22.50'
LOGGED BY	John Latta	DATE COMPLETED	09/22/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS / DEPTH IN FEET / SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
(3"SS)	10-25/0" (3/6)	51 (NT)				(GP), gray, some coarse sand, dense, wet. (ALLUVIUM)
(3"SS)	3-15-18-15 (Not recor-ded)	32 (NT)				
			25			Total depth drilled = 22.5 et. Total depth sampled = 2- feet. Boring backfilled with hydrated 3/8-inch bentonite chips.
			30			
			35			
			40			

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-10
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	975.96'
DRILL METHOD	TUBEX	TOTAL DEPTH	30.00'
LOGGED BY	John Latta	DATE COMPLETED	09/16/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 2.0 feet: BRICKS AND GRAVEL (GP-GM), red, dense, dry. (FILL)
	(--)		**2.0 to 14.0 feet: BASALT BOULDERS AND GRAVEL (GP)**, dark gray to black, angular, up to 3-foot diameter, dense, dry. (FILL)
	(--)		
	(--)		
	(--)		
	(--)		
(3"SS)	8-10-10 (6/18)	33 (NT)	**14.0 to 24.0 feet: SILTY SANDY GRAVEL (GP-GM)**, black to dark gray, angular basalt gravel up to 1.5-inches, medium dense, wet. Very strong black hydrocarbon stain, sheen, and odor. Wood fragments. (FILL)
SB-10-17.5 (3"SS)	8-20-21-18 (20/24)	164 (NT)	

GROUND WATER LEVELS; DEPTH IN FEET; SAMPLES; WELL DETAILS; LITHOLOGIC COLUMN

5 10 15 20

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 22.5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

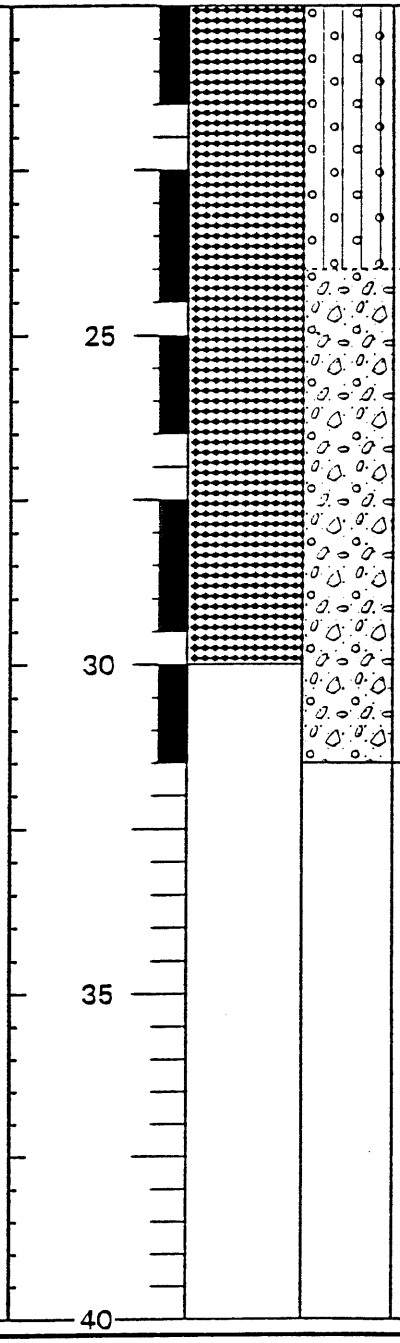
PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-10
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	975.96'
DRILL METHOD	TUBEX	TOTAL DEPTH	30.00'
LOGGED BY	John Latta	DATE COMPLETED	09/16/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	2-4-12 (2/18)	126 (NT)	**14.0 to 24.0 feet: SILTY SANDY GRAVEL (GP-GM),** continued. @ 21.0 feet: black, fine to medium gravel, rounded, some medium sand, and some silt, dense, wet. Strong black hydrocarbon stain. Odor combination of hydrocarbon and septic. (ALLUVIUM)
(3"SS)	2-6-8-12 (8/24)	62 (NT)	
(3"SS)	1-8-12 (6/18)	52 (Wk blue)	**24.0 to 31.5 feet: SANDY GRAVEL (GW),** subround to round, dense, wet. No hydrocarbon stain or odor. (ALLUVIUM) @ 25.0 to 26.5 feet: dark brown gray to yellow gray, medium gravel, some fine to coarse sand.
(3"SS)	4-8-12-18 (7/24)	90 (V. wk blue)	@ 27.5 to 29.5 feet: yellow gray, medium to coarse gravel up to 4-inches, some medium to coarse sand.
(3"SS)	Not recorded (9/18)	148 (None)	@ 30.0 to 31.5 feet: gray to dark gray, fine to medium gravel, some sand.

Total depth drilled = 30.0 feet.
Total depth sampled = 31.5 feet.

Boring backfilled with hydrated 3/8-inch bentonite chips.

Comment: Temporary well screen set on 9/16/97 at 17.3 to 21.3 feet bgs for water sample collection. Two-inch PVC blank casing and .010-slot screen used along with 10 x 20 sand pack. Sand pack set from 16.1 to 22.5 feet bgs. Casing and screen were removed and sand pack drilled out after groundwater sample collection in order to deepen boring to TD.



REMARKS

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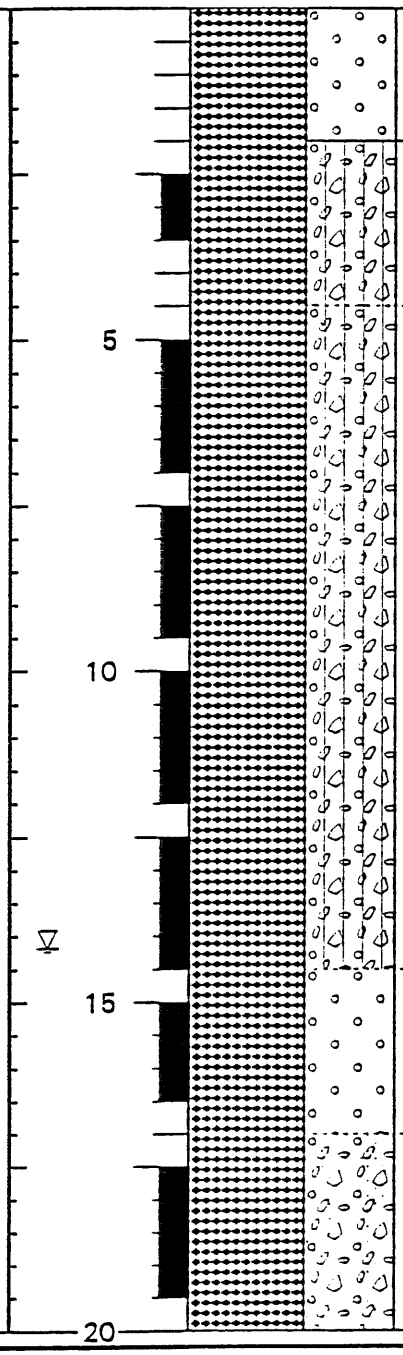
LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-12
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 3
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.41'
DRILL METHOD	TUBEX	TOTAL DEPTH	40.00'
LOGGED BY	John Latta	DATE COMPLETED	09/10/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 2.0 feet: SURFACE GRAVEL. BRICKS (GP), red, dense, dry. Brick floor. (FILL)
(2.5"SS)	20-50/5" (8/12)	NT (NT)	**2.0 to 4.5 feet: SILTY GRAVEL (GM),** red brown, fine to coarse, subangular to round granitic clasts, angular basalt and brick, dense, damp. Hydrocarbon stain. (FILL)
SB-12-5 (3"SS)	7-7-7-9 (18/24)	NT (Str green)	**4.5 to 14.5 feet: SILTY SANDY GRAVEL (GM),** dark gray, subangular to round, with some sand and silt, medium dense, damp. Hydrocarbon stain and odor. Material includes cinders. (FILL)
(3"SS)	3-3-4-4 (18/24)	NT (Str green)	@ 7.5 to 9.5 feet: strong hydrocarbon stain.
(3"SS)	2-5-3-5 (18/24)	NT (Str green)	@ 10.0 to 12.0 feet: strong hydrocarbon stain and odor.
SB-12-12.5 (3"SS)	12-14-17-20 (13/24)	NT (Str green)	@ 12.5 to 14.5 feet: dark greenish gray free-phase hydrocarbon and strong hydrocarbon odor.
(3"SS)	15-15-20 (10/18)	NT (NT)	**14.5 to 17.0 feet: FINE TO COARSE GRAVEL (GP),** dark gray, subangular to subround, little or no fines, dense, wet. Hydrocarbon stain. (ALLUVIUM)
(3"SS)	8-20-20-20 (11/24)	NT (Strong)	**17.0 to 24.5 feet: SANDY GRAVEL (GW),** dark gray to black, dense, wet. Hydrocarbon stain. (ALLUVIUM)



REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	**WSDOT SR 290 Realignment**	BORING NO.	**SB-12**
LOCATION	**Southriver Drive, Spokane, Washington**	PAGE	**2 OF 3**
DRILLED BY	**Environmental West Exploration**	GROUND ELEV.	**976.41'**
DRILL METHOD	**TUBEX**	TOTAL DEPTH	**40.00'**
LOGGED BY	**John Latta**	DATE COMPLETED	**09/10/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	8-20-25 (11/18)	NT (NT)	**17.0 to 24.5 feet: SANDY GRAVEL (GW),** continued.
			@ 20.0 to 21.5 feet: gravel coated with black tar-like hydrocarbons, strong odor.
(3"SS)	12-20-18-10 (12/24)	NT (NT)	@ 22.5 to 24.5 feet: gravel appears cemented by viscous tar-like hydrocarbons.
(3"SS)	8-15-25 (0/18)	NT (NT)	**24.5 to 35.0 feet: GRA[illegible]SAND (SP),** black, fine to medium sand, so[illegible]me gravel, dense, wet. Tar-like viscous hydrocarbon. Hydrocarbon odor. Sand cemented by hydrocarbons. (ALLUVIUM)
SB-12-27.5 (3"SS)	6-12-12-12 (14/24)	NT (NT)	
			@ 30.0 feet: unable to get sample because of heaving tar sand.
			@ 30.0 to 40.0 feet: drilling rate indicates sand.
			35.0 to 41.5 feet: COARSE SAND (SP), black, dense, wet. No hydrocarbon stain or sheen. Weak hydrocarbon odor. (ALLUVIUM)

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN

25 30 35 40

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME **WSDOT SR 290 Realignment**
LOCATION **Southriver Drive, Spokane, Washington**
DRILLED BY **Environmental West Exploration**
DRILL METHOD **TUBEX**
LOGGED BY **John Latta**

BORING NO. **SB-12**
PAGE **3 OF 3**
GROUND ELEV. **976.41'**
TOTAL DEPTH **40.00'**
DATE COMPLETED **09/10/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-12-40 (2.5"SS)	8-25-50 (9/18)	288 (Mod/ str)		45 50 55 60				**35.0 to 41.5 feet: COARSE SAND (SP)**, continued. @ 40.0 feet: 2-feet of heaving after pulling hammer bit from casing. Sampled heave using 2.5-inch split-spoon. Total depth drilled = 40.0 feet. Total depth sampled = 41.5 feet. Boring backfilled with hydrated 3/8-inch bentonite chips. Comment: Temporary well screen set on 9/10/97 at 13 to 17 feet bgs for water sample collection. Two-inch PVC blank casing and .010 slot screen used along with 10 x 20 sand pack. Sand pack set from 11.5 to 20 feet bgs. Casing and screen were removed and sand pack drilled out after groundwater sample collection in order to deepen boring to TD.

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

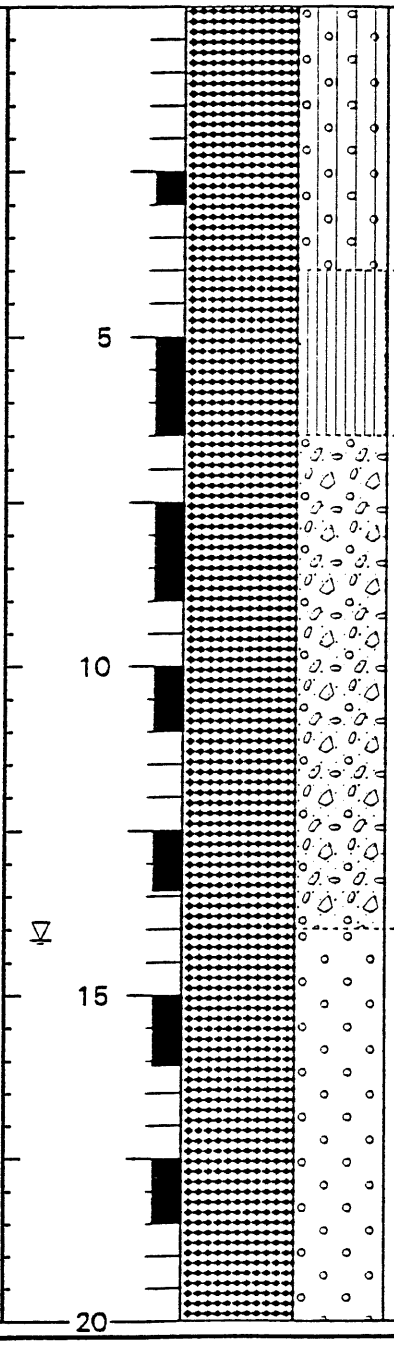
EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-13
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.13'
DRILL METHOD	TUBEX	TOTAL DEPTH	25.00'
LOGGED BY	John Latta	DATE COMPLETED	09/15/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	75/5" (0/6)	112 (Str blue)	**0 to 4.0 feet: GRAVEL, BASALT, SILT, AND BRICKS (GP-GM)**, red gray, gravel and bricks, dense, dry to damp. (FILL)
SB-13-5 (3"SS)	2-1-3 (16/18)	54 (NT)	**4.0 to 6.5 feet: SILT (ML)**, black, soft, damp. Strong hydrocarbon stain. (ALLUVIUM)
(3"SS)	35-55-55 (8/18)	85 (NT)	**6.5 to 14.0 feet: SANDY FINE TO MEDIUM GRAVEL (GW)**, dark gray, subround to round, up to 1.5-inches, dense, damp to moist. Hydrocarbon stain. (ALLUVIUM)
(3"SS)	32-65 (9/12)	49 (NT)	
SB-13-12.5 (3"SS)	32-50/5" (9/11)	74 (NT)	
(3"SS)	12-35-65/3" (7/13)	182 (NT)	**14.0 to 20.0 feet: FINE TO COARSE GRAVEL (GP)**, dark gray to gray, subround to round, a few percent medium to coarse sand, dense, wet. Hydrocarbon stain, sheen and odor. (ALLUVIUM)
(3"SS)	32-50 (5/12)	63 (NT)	@ 15.0 to 18.5 feet: samples appear washed.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 20 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

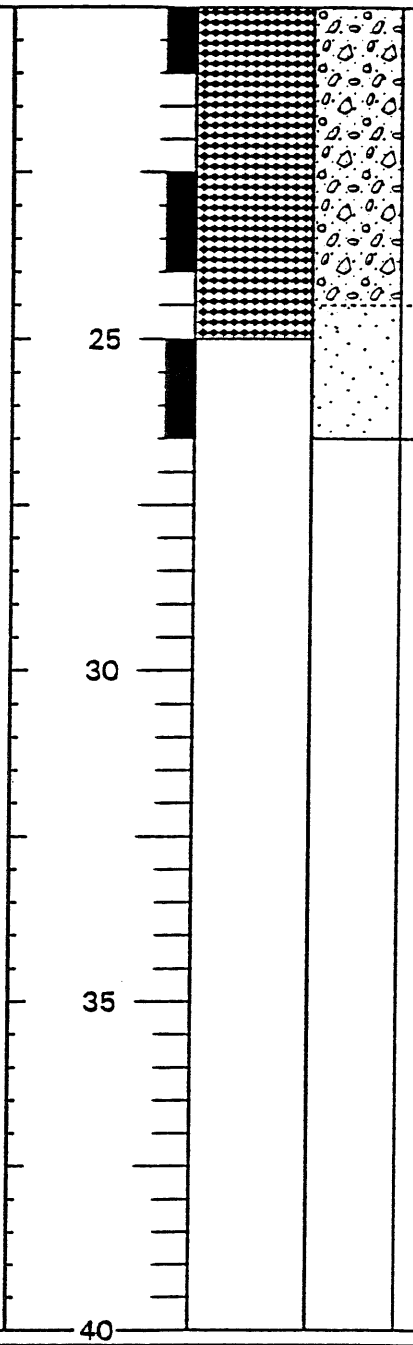
LOG OF EXPLORATORY BORING

PROJECT NAME **WSDOT SR 290 Realignment**
LOCATION **Southriver Drive, Spokane, Washington**
DRILLED BY **Environmental West Exploration**
DRILL METHOD **TUBEX**
LOGGED BY **John Latta**

BORING NO. **SB-13**
PAGE **2 OF 2**
GROUND ELEV. **976.13'**
TOTAL DEPTH **25.00'**
DATE COMPLETED **09/15/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	5-20 (4/12)	40 (None)	**20.0 to 24.5 feet: SANDY FINE TO MEDIUM GRAVEL (GW)**, yellow gray, subround to round, with some fine to medium sand, dense, wet. No hydrocarbon stain, sheen and odor. (ALLUVIUM)
(3"SS)	2/14/22 (6/18)	43 (None)	
(3"SS)	Not recor-ded (0/18)	37 (NT)	**24.5 to 26.5 feet: COARSE SAND (SP)**, yellow gray, dense, wet. No hydrocarbon stain, sheen and odor. (ALLUVIUM) @ 25.0 feet: heaving during sample drive.
			Total depth drilled = 25.0 feet. Total depth sampled = 26.5 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 20 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

BLDG #3

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-14
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 1
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.08'
DRILL METHOD	TUBEX	TOTAL DEPTH	15.00'
LOGGED BY	John Latta	DATE COMPLETED	09/24/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 1.0 foot: SURFACE GRAVEL AND BRICKS (GP-GM), dark red gray, dense, dry. (FILL)
			1.0 to 3.0 feet: BASALT FILL (GP), dark gray to black, angular basalt boulders, dense, dry. (FILL)
(3"SS)	– (–)	NT (NT)	**3.0 to 7.0 feet: SILT (ML)**, dark brown, soft, moist. Weak hydrocarbon stain and odor. (ALLUVIUM)
(3"SS)	3-3-16 (15/18)	22 (None)	
(3"SS)	16-50/4" (3/10)	36 (Wk blue)	**7.0 to 16.5 feet: SANDY FINE TO COARSE GRAVEL (GW)**, 30 percent fine to coarse sand, trace fines, dense. (ALLUVIUM)
			@ 7.5 to 8.5 feet: brown, damp. Hydrocarbon stain, no odor.
SB-14-10 (3"SS)	26-50/2" (5/8)	33 (Wk blue)	@ 10.0 to 10.5 feet: yellow gray, damp.
(3"SS)	50/5" (2/5)	32 (Wk blue)	
SB-14-15 (3"SS)	5-14-20-20 (9/24)	63 (Wk green)	@ 15.0 to 17.0 feet: yellow gray, wet.
			Total depth drilled = 15.0 feet. Total depth sampled = 17.0 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 15 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

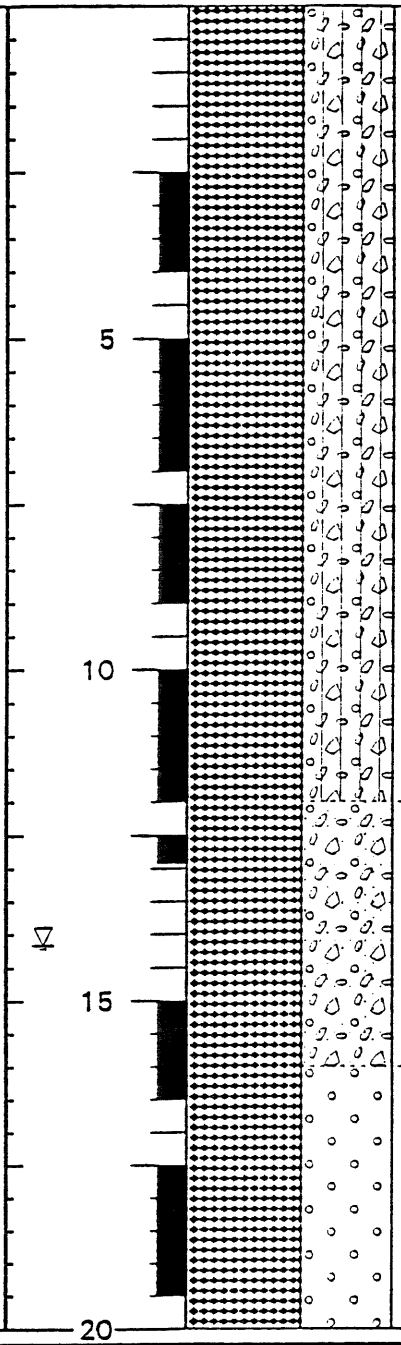
EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME **WSDOT SR 290** Realignment
LOCATION **Southriver Drive**, Spokane, Washington
DRILLED BY **Environmental West Exploration**
DRILL METHOD **TUBEX**
LOGGED BY **John Latta**

BORING NO. **SB-15**
PAGE **1 OF 2**
GROUND ELEV. **976.39'**
TOTAL DEPTH **30.00'**
DATE COMPLETED **09/24/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 12.0 feet: SANDY SILTY FINE TO COARSE GRAVEL (GM), gray, subangular to rounded gravel, some silt, a few percent sand. (FILL)
(3"SS)	25-40-3 (12/18)	73 (None)	@ 2.5 to 7.0 feet: brown, dense, damp.
(3"SS)	10-10-11-10 (9/24)	144 (Str blue)	
(3"SS)	6-8-10 (9/18)	75 (Str blue)	@ 7.5 to 9.0 feet: abundant red brick mixed in with the fill. Black, soft to medium dense, damp to moist. Hydrocarbon stain, no odor.
(3"SS)	6-10-10-8 (6/24)	90 (Wk blue)	@ 10.0 to 12.0 feet: black to dark gray, with brick, medium dense to dense, damp to moist. Hydrocarbon stain and odor.
(3"SS)	50/5" (1/5)	114 (NT)	**12.0 to 16.0 feet: SANDY FINE TO COARSE GRAVEL (GW)**, black, with cobbles up to +3-inches, dense, wet. Black tar-like free-phase hydrocarbon, strong naptha-like odor. (ALLUVIUM)
SB-15-15 (3"SS)	42-50/5" (13/18)	231 (NT)	**16.0 to 20.0 feet: FINE TO MEDIUM GRAVEL (GP)**, dark gray, a few percent sand, dense, wet. More of a washed appearing sample. Black tar-like free-phase hydrocarbon, naptha-like odor. (ALLUVIUM)
(3"SS)	15-27-23-22 (7/24)	1220 (NT)	



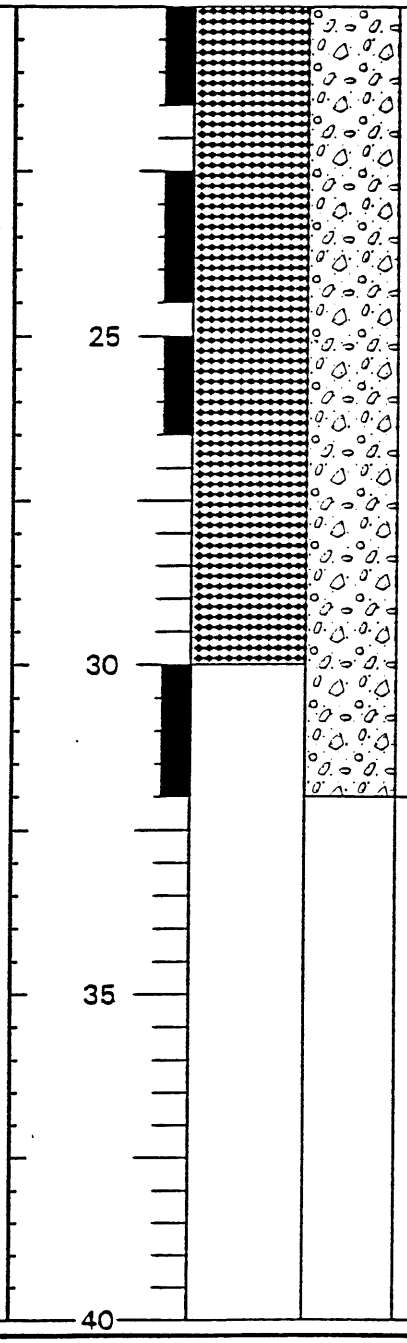
REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 15 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-15
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.39'
DRILL METHOD	TUBEX	TOTAL DEPTH	30.00'
LOGGED BY	John Latta	DATE COMPLETED	09/24/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	4-12-20 (9/18)	605 (NT)	**20.0 to 32.0 feet: SANDY FINE TO COARSE GRAVEL (GW)**, black, with cobbles up to +3-inches, dense, wet. Black tar-like free-phase hydrocarbon, naptha-like odor. (ALLUVIUM)
(3"SS)	9-22-22-20 (15/24)	427 (NT)	
(3"SS)	9-21-29 (9/18)	280 (NT)	
SB-15-30 (3"SS)	15-20-16-8 (9/24)	71 (NT)	
			Total depth drilled = 30.0 feet. Total depth sampled = 32.0 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 15 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME **WSDOT SR 290** Realignment
LOCATION **Southriver Drive**, Spokane, Washington
DRILLED BY **Environmental** West Exploration
DRILL METHOD **TUBEX**
LOGGED BY **John Latta**

BORING NO. **SB-16**
PAGE **1 OF 2**
GROUND ELEV. **976.19'**
TOTAL DEPTH **22.50'**
DATE COMPLETED **09/23/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 5.5 feet: SANDY SILTY FINE TO COARSE GRAVEL (GP-GM), light gray, subangular to rounded gravel, some bricks and coal, some silt, a few percent sand, soft, damp. (FILL)
(3"SS)	25/0" (2/0)	678 (Str blue)	0 to 2.5 feet: appeared to drill through brick flooring. @ 2.5 to 3.0 feet: hard drilling, concrete. @ 3.0 to 5.0 feet: 2-foot void.
(3"SS)	1-1-1 (15/18)	65 (Mod blue)	@ 5.0 to 6.5 feet: damp to moist.
			5.5 to 9.0 feet: SILT (ML), dark brown to black, soft. (ALLUVIUM)
(3"SS)	3-5-8 (15/18)	102 (NT)	@ 7.5 to 9.0 feet: damp. Strong hydrocarbon stain, diesel-like odor.
			9.0 to 17.0 feet: SANDY FINE TO COARSE GRAVEL (GW), black to dark gray, subangular to subround up to +3-inches, 35 percent fine to coarse sand, dense, damp. Strong diesel-like odor, stain, and sheen. (ALLUVIUM)
SB-16-10 (3"SS)	12-22-40-32 (18/24)	312 (NT)	
(3"SS)	18-50/5" (11/11)	32 (NT)	
(3"SS)	12-22-40-50/3" (13/24)	48 (NT)	@ 15.0 feet: becomes wet.
			17.0 to 19.0 feet: FINE TO MEDIUM GRAVEL (GP), dark gray, a few percent sand, dense, wet. Diesel-like odor, stain and sheen. (ALLUVIUM)
(3"SS)	20-50 (3/12)	29 (Str blue)	**19.0 to 23.5 feet: SANDY FINE TO COARSE GRAVEL (GW)**, subangular to subround up to

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 22.5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-16
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.19'
DRILL METHOD	TUBEX	TOTAL DEPTH	22.50'
LOGGED BY	John Latta	DATE COMPLETED	09/23/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
(3"SS)	8-22-42 (3/18)	26 (Wk blue)						2-inches, 35 percent fine to coarse sand, dense, wet. (ALLUVIUM)
								@ 20.0 to 21.5 feet: (poor sample) gray, no hydrocarbon odor or sheen.
SB-16-22.5 (3"SS)	22-50/5" (6/12)	34 (Wk blue)						@ 22.5 to 23.5 feet: yellow gray, no hydrocarbon stain, sheen or odor.
								Total depth drilled = 22.5 feet.
								Total depth sampled = 23.5 feet.
				25				Boring backfilled with hydrated 3/8-inch bentonite chips.
				30				
				35				
				40				

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 22.5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	**WSDOT SR 290** Realignment	BORING NO.	**SB-17**
LOCATION	**Southriver Drive, Spokane, Washington**	PAGE	**1 OF 2**
DRILLED BY	**Environmental** West Exploration	GROUND ELEV.	**975.92'**
DRILL METHOD	**TUBEX**	TOTAL DEPTH	**25.00'**
LOGGED BY	**John Latta**	DATE COMPLETED	**09/24/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	50/5" (0/5)	NT (NT)	**0 to 4.0 feet: ANGULAR BASALT GRAVEL AND BOULDERS (GP)**, light gray to black, dense, dry. (FILL)
(3"SS)	4-7-9-9 (18/24)	27 (None)	**4.0 to 10.0 feet: SILT AND FINE SANDY SILT (ML)**, brown to yellow gray, soft, damp. Fine sandy silt is micaceous. (ALLUVIUM)
(3"SS)	6-11-14 (12/18)	38 (Mod blue)	
(3"SS)	50/4" (0/4)	32 (NT)	**10.0 to 11.5 feet: SILTY SANDY GRAVEL (GM)**, inferred, dense. (ALLUVIUM)
(3"SS)	20-50/2" (1/8)	111 (Mod blue)	**11.5 to 13.5 feet: GRAVELLY MEDIUM SAND (SP)**, yellow gray, a few percent fine to medium gravel, subangular to round, a few percent fines, dense, damp.
SB-17-15 (3"SS)	14-50 (9/18)	83 (NT)	**13.5 to 23.0 feet: SANDY FINE TO COARSE GRAVEL (GW)**, black to dark gray, with cobbles up to +3-inches, dense, wet. (ALLUVIUM) @ 15.0 to 16.0 feet: hydrocarbon stain and odor.

5 10 15 20

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 15 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-17
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	975.92'
DRILL METHOD	TUBEX	TOTAL DEPTH	25.00'
LOGGED BY	John Latta	DATE COMPLETED	09/24/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS / DEPTH IN FEET / SAMPLES / WELL DETAILS / LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
(3"SS)	7-17-12-14 (3/24)	172 (NT)		**13.5 to 23.0 feet: SANDY FINE TO COARSE GRAVEL (GW),** continued. @ 20.0 to 22.0 feet: hydrocarbon stain like a carbon residue, no hydrocarbon odor.
				23.0 to 26.0 feet: SANDY FINE GRAVEL (GP), yellow gray, medium dense, wet. No hydrocarbon stain, sheen or odor.
SB-17-25 (2.5"SS)	Not recorded (Not recorded)	NT (NT)	25	
			30	Total depth drilled = 25.0 feet. Total depth sampled = 26.0 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.
			35	
			40	

REMARKS

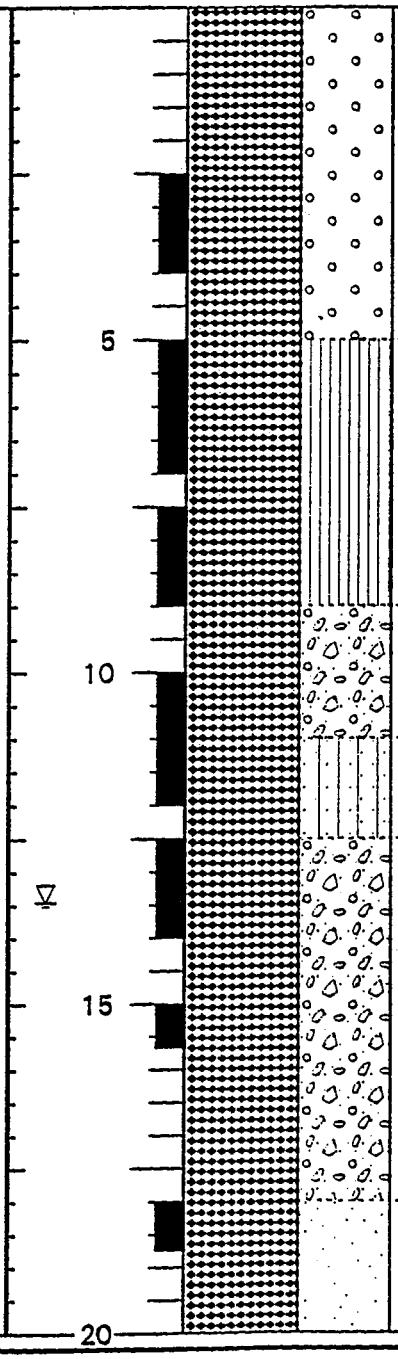
(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 15 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-18
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	975.76'
DRILL METHOD	TUBEX	TOTAL DEPTH	30.00'
LOGGED BY	John Latta	DATE COMPLETED	09/17/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 5.0 feet: BRICK, ASH AND SANDY GRAVEL (GP), dark gray to black, dense, damp. Hydrocarbon stain. (FILL)
(3"SS)	20-24-32 (12/18)	NT (NT)	
(3"SS)	17-22-1-10 (19/24)	NT (NT)	**5.0 to 9.0 feet: SILT (ML)**, black, medium dense, damp. Hydrocarbon stain and naptha-like odor. (ALLUVIUM)
SB-18-7.5 (3"SS)	7-10-15 (18/18)	NT (NT)	
(3"SS)	20-25-2-20 (24/24)	NT (NT)	**9.0 to 11.0 feet: SANDY FINE TO MEDIUM GRAVEL (GW)**, black, dense, damp. Heavy black hydrocarbon stain, hydrocarbon odor. (ALLUVIUM)
			11.0 to 12.5 feet: SILTY FINE SAND (SP-SM), black, dense, damp. Heavy black hydrocarbon stain, hydrocarbon odor. (ALLUVIUM)
SB-18-12.5 (3"SS)	12-25-50/5" (16/18)	NT (NT)	**12.5 to 18.0 feet: SANDY FINE TO MEDIUM GRAVEL (GW)**, black to silvery black, some fine to coarse sand, dense. (ALLUVIUM)
			@ 12.5 to 14.0 feet: damp to moist. Free-phase black hydrocarbon, strong hydrocarbon odor.
(3"SS)	25-50/3" (5/8)	NT (NT)	@ 15.0 to 16.0 feet: wet. Black hydrocarbon stain.
			@ 17.0 feet: +6-inch boulder.
(3"SS)	30-50/4" (0/9)	NT (NT)	**18.0 to 20.0 feet: COARSE SAND (SP)**, black, dense, wet. Black hydrocarbon stain and odor. (ALLUVIUM)

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 20 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME **WSDOT SR 290 Realignment**
LOCATION **Southriver Drive, Spokane, Washington**
DRILLED BY **Environmental West Exploration**
DRILL METHOD **TUBEX**
LOGGED BY **John Latta**

BORING NO. **SB-18**
PAGE **2 OF 2**
GROUND ELEV. **975.76'**
TOTAL DEPTH **30.00'**
DATE COMPLETED **09/17/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	6-10-10 (3/18)	NT (NT)	**20.0 to 31.5 feet: FINE TO MEDIUM GRAVEL (GP)**, subround to round, a few percent fine to coarse sand, dense, wet. (ALLUVIUM)
(3"SS)	3-9-12 (6/18)	NT (NT)	@ 20.0 to 22.5 feet: black. Black hydrocarbon stain. @ 22.5 to 24.0 feet: yellow gray. Hydrocarbon sheen.
(3"SS)	10-25/5" (2/11)	NT (NT)	@ 25.0 to 26.0 feet: yellow gray. Weak hydrocarbon sheen.
(3"SS)	10-12/4" (0/14)	NT (NT)	@ 27.5 to 31.5 feet: yellow gray.
(3"SS)	3-8-1 (4/18)	NT (NT)	

Total depth drilled = 30.0 feet.
Total depth sampled = 31.5 feet.

Boring backfilled with hydrated 3/8-inch bentonite chips.

Comment: Temporary well screen set on 9/17/97 at 12 to 16 feet bgs for water sample collection. Two-inch PVC blank casing and .010 slot screen used along with 10 x 20 sand pack. Sand pack set from 10.8 to 20 feet bgs. Casing and screen were removed and sand pack drilled out after groundwater sample collection in order to deepen boring to TD. No groundwater sample collected because of hydrocarbon sheen.

REMARKS
(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 20 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

BLDE #4

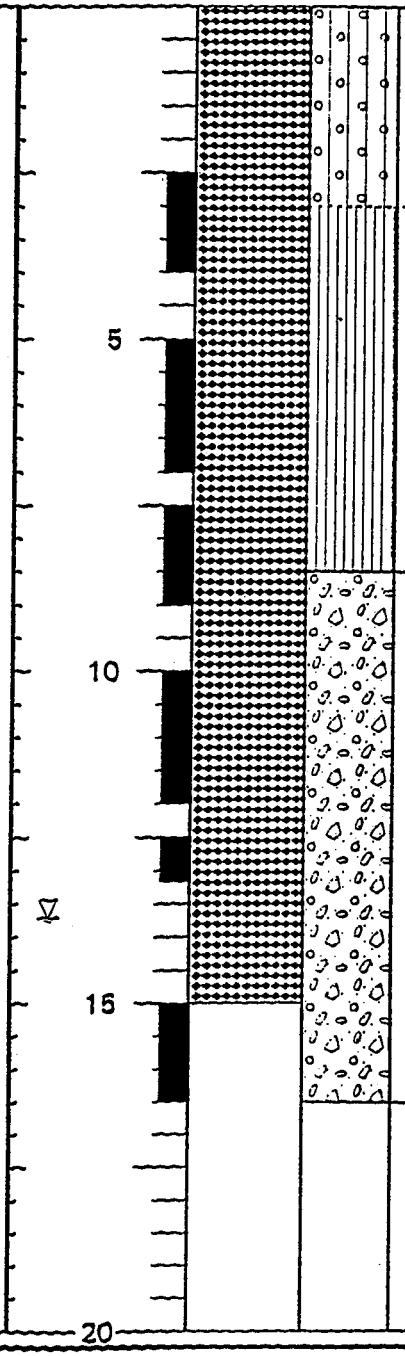
LOG OF EXPLORATORY BORING

PROJECT NAME **WSDOT SR 290** Realignment
LOCATION **Southriver Drive, Spokane, Washington**
DRILLED BY **Environmental West Exploration**
DRILL METHOD **TUBEX**
LOGGED BY **John Latta**

BORING NO. **SB-19**
PAGE **1 OF 1**
GROUND ELEV. **975.83'**
TOTAL DEPTH **15.00'**
DATE COMPLETED **09/26/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 3.0 feet: SURFACE GRAVEL AND BASALT FILL (GP-GM), dark gray, dense, dry. (FILL)
(3"SS)	8-13-15 (12/18)	43 (None)	**3.0 to 8.5 feet: SILT AND FINE SANDY SILT (ML)**, dark brown to yellow gray, soft, damp. Content of fine sand increases downward in unit. Micaceous. (ALLUVIUM)
(3"SS)	6-7-8-9 (18/24)	31 (None)	
(3"SS)	6-7-13 (16/18)	26 (None)	
(3"SS)	15-21-15-15 (15/24)	3 (None)	**8.5 to 16.5 feet: SANDY FINE TO COARSE GRAVEL (GW)**, yellow gray, up to 3-inches, subangular to rounded, 20 to 40 percent fine to coarse sand, dense. Content of sand increases downward in unit, associated with decrease in gravel size and content. (ALLUVIUM)
(3"SS)	12-50/3" (2/8)	126 (None)	@ 12.5 to 13.5 feet: damp.
SB-19-15 (3"SS)	4-15-20 (6/18)	240 (V. wk blue)	@ 14.5 feet: hard drilling, infer coarse gravel. @ 15.0 to 16.5 feet: wet.
			Total depth drilled = 15.0 feet. Total depth sampled = 16.5 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 15 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

BLDG. #5

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-20
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	975.62'
DRILL METHOD	TUBEX	TOTAL DEPTH	20.00'
LOGGED BY	John Latta	DATE COMPLETED	09/26/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 2.5 feet: SURFACE GRAVEL AND BRICKS (GP-GM), dark red gray, dense, dry. (FILL)
(3"SS)	50/4" (0/4)	NT (NT)	**2.5 to 3.5 feet: BASALT FILL (GP)**, dark gray to black, angular basalt, dense, dry. (FILL)
			3.5 to 7.0 feet: FINE SANDY SILT (ML), brown, soft, damp to moist. (ALLUVIUM)
(3"SS)	5-4-4 (8/18)	23 (None)	
SB-20-7.5 (3"SS)	12-12-12-2 (17/24)	27 (Wk blue)	**7.0 to 9.5 feet: SANDY FINE TO MEDIUM GRAVEL (GW)**, brown, 40 percent fine gravel, 25 percent medium gravel, subrounded to rounded, 35 percent coarse sand, 5 percent medium and fine sand and fines, medium dense, damp. (ALLUVIUM)
(3"SS)	12-10-6 (1/18)	30 (None)	**9.5 to 15.5 feet: FINE TO MEDIUM GRAVEL (GP)**, brown, medium dense. (ALLUVIUM)
			@ 10.0 to 11.5 feet: 70 percent medium gravel, 25 percent fine gravel, subrounded to rounded, 5 percent mainly coarse sand, trace fines, moist.
(3"SS)	10-5-10-10 (16/24)	32 (Wk blue)	@ 12.5 to 14.5 feet: fine "pea" gravel, subrounded to round, wet.
SB-20-15 (3"SS)	50 (3/6)	32 (Mod blue)	@ 15.0 feet: drill steel coated with product and sheen during retrieval. @ 15.0 to 15.5 feet: wet. Strong hydrocarbon sheen and odor.
(3"SS)	35-50/3" (3/9)	30 (None)	**15.5 to 21.5 feet: SANDY FINE TO COARSE GRAVEL (GW)**, up to +3-inches, 35 to 45 percent fine to coarse sand, less than 5 percent fines, dense, wet. Content of sand increases downward in unit, associated with decrease in gravel content. Hydrocarbon stain

GROUND WATER LEVELS · DEPTH IN FEET · SAMPLES · WELL DETAILS · LITHOLOGIC COLUMN

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 20 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-20
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	975.62'
DRILL METHOD	TUBEX	TOTAL DEPTH	20.00'
LOGGED BY	John Latta	DATE COMPLETED	09/26/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
SB-20-20 (3"SS)	9-14-19 (9/18)	33 (None)		25 30 35 40				or odor not observed. (ALLUVIUM) Total depth drilled = 20.0 feet. Total depth sampled = 21.5 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 20 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME WSDOT SR 290 Realignment
LOCATION Southriver Drive, Spokane, Washington
DRILLED BY Environmental West Exploration
DRILL METHOD TUBEX
LOGGED BY John Latta

BORING NO. SB-21
PAGE 1 OF 2
GROUND ELEV. 975.98'
TOTAL DEPTH 35.00'
DATE COMPLETED 09/26/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 3.0 feet: SURFACE GRAVEL AND BRICKS (GP-GM), dark red gray, dense, dry. (FILL)
(~)	~ (~)	NT (NT)						**3.0 to 11.5 feet: BASALT FILL (GP)**, dark gray to black, angular basalt, dense, dry. (FILL)
(~)	~ (~)	NT (NT)		5				
(3"SS)	50/0" (0/0)	NT (NT)						
(3"SS)	16-10-12 (0/18)	46 (NT)		10				
								11.5 to 14.5 feet: GRA[illegible]L AND BRICKS (GP-GM), dark brown, medium [illegible]nse, wet, free phase hydrocarbon, naptha-like odor. (FILL)
(3"SS)	6-8-14 (3/18)	43 (NT)	▽					
SB-21-15 (3"SS)	10-50 (9/12)	77 (NT)		15				**14.5 to 21.0 feet: SANDY FINE TO COARSE GRAVEL (GW)**, up to 2.5 inches, 40 percent fine to coarse sand, dense, wet. (ALLUVIUM) @ 15.0 to 16.0 feet: tarry, silvery black. Free phase hydrocarbon and odor.
(3"SS)	37-50/5" (3/11)	57 (Wk blue)						@ 17.5 to 18.5 feet: dark yellow gray. No hydrocarbon sheen. Weak hydrocarbon odor.
				20				

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 22.5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-21
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	975.98'
DRILL METHOD	TUBEX	TOTAL DEPTH	35.00'
LOGGED BY	John Latta	DATE COMPLETED	09/26/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS / DEPTH IN FEET / SAMPLES / WELL DETAILS / LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				14.5 to 21.0 feet: SANDY FINE TO COARSE GRAVEL (GW), continued.
SB-21-22.5 (3"SS)	4-11-15-14 (5/24)	47 (NT)	25	**21.0 to 26.5 feet: MEDIUM SAND AND SANDY GRAVEL (SP AND GW),** dark gray, gravel up to 1-inch subangular to rounded, 30 percent fine to coarse sand, dense, wet. Strong hydrocarbon sheen and naptha-like odor. Some free-phase tarry hydrocarbon on liners, etc. (ALLUVIUM)
(3"SS)	4-20-10-12 (4/24)	32 (NT)	30	**26.5 to 32.0 feet: FINE TO MEDIUM GRAVEL (GP),** dense, wet. (ALLUVIUM) @ 26.5 feet: strong sheen and hydrocarbon odor noted during drilling. @ 27.5 to 29.5 feet: silvery black to silvery dark gray. Free-phase tarry hydrocarbons coating clasts, strong sheen, strong hydrocarbon odor.
(3"SS)	Not recor-ded (5/24)	26 (Wk blue)	35	**32.0 to 37.0 feet: COARSE SAND (SP),** yellow gray, soft to medium dense, wet. Hydrocarbon impact not observed. (ALLUVIUM) @ 32.0 feet: quality of cuttings with respect to hydrocarbons visibly improved, color changed to yellow gray.
			40	Total depth drilled = 35.0 feet. Total depth sampled = 37.0 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

REMARKS

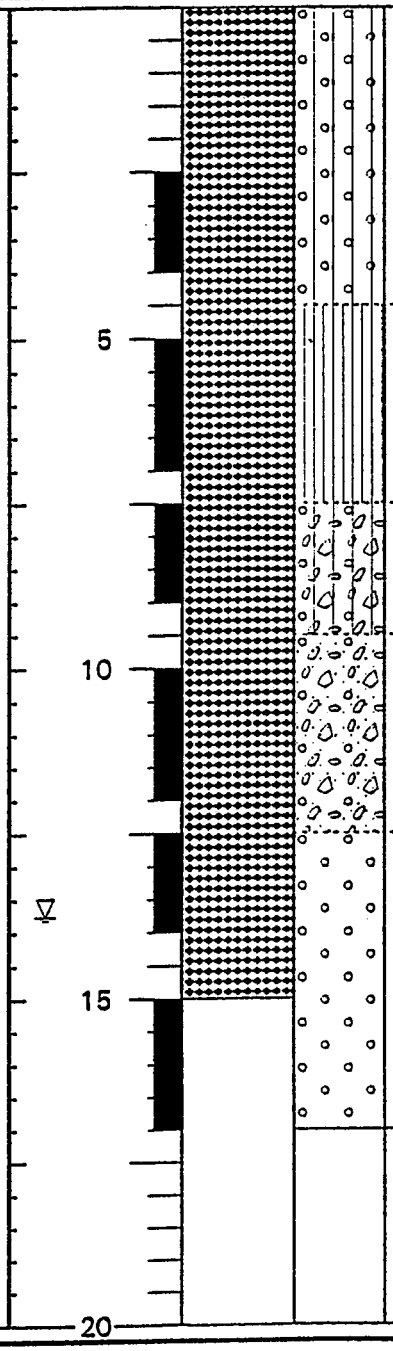
(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 22.5 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-22
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 1
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.13'
DRILL METHOD	TUBEX	TOTAL DEPTH	15.00'
LOGGED BY	John Latta	DATE COMPLETED	09/22/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	7-15-45 (14/18)	0 (Mod blue)	**0 to 4.5 feet: SURFACE GRAVEL UNDERLAIN BY SILT, CONCRETE, BRICKS AND COAL (GP-GM),** medium dense to dense, damp. Some hydrocarbon stain, no odor. (FILL)
SB-22-5 (3"SS)	2-2-2-15 (22/24)	0 (Wk blue)	**4.5 to 7.5 feet: SILT (ML),** dark brown to brown, soft, moist. (ALLUVIUM)
(3"SS)	6-14-30 (14/18)	0 (Mod blue)	**7.5 to 9.5 feet: SILTY SANDY FINE TO MEDIUM GRAVEL (GM),** brown, subround to round, dense, damp. (ALLUVIUM)
(3"SS)	28-26-30-30 (16/24)	0 (Wk green)	**9.5 to 12.5 feet: SANDY FINE TO MEDIUM GRAVEL (GW),** yellow gray, dense, moist. (ALLUVIUM)
SB-22-12.5 (3"SS)	12-15-20 (13/18)	0 (Wk green)	**12.5 to 17.0 feet: SANDY FINE TO MEDIUM GRAVEL (GP),** yellow gray, fine to medium gravel, a few percent fine to coarse sand, dense, moist to wet. (ALLUVIUM)
(3"SS)	6-18-26-28 (16/24)	0 (Mod green)	
			Total depth drilled = 15.0 feet. Total depth sampled = 17.0 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

GROUND WATER LEVELS · DEPTH IN FEET · SAMPLES · WELL DETAILS · LITHOLOGIC COLUMN



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) UV response based on visual interpretation of strength and color. (6) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	**WSDOT SR 290** Realignment	BORING NO.	SB-23
LOCATION	**Southriver Drive**, Spokane, Washington	PAGE	1 OF 1
DRILLED BY	**Environmental** West Exploration	GROUND ELEV.	975.70'
DRILL METHOD	**TUBEX**	TOTAL DEPTH	15.00'
LOGGED BY	**John Latta**	DATE COMPLETED	09/25/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
								0 to 2.5 feet: SURFACE GRAVEL UNDERLAIN BY BASALT BOULDER AND BRICKS (GP-GM), dense, dry. (FILL)
(3"SS)	10-6-7 (12/18)	55 (None)						**2.5 to 6.0 feet: SILT (ML),** dark brown, soft, damp to moist. (ALLUVIUM)
(3"SS)	3-30-50/5" (15/17)	51 (None)		5				**6.0 to 7.0 feet: SILTY SANDY FINE TO MEDIUM GRAVEL (GM),** yellow gray, subangular to round, 40 percent fine to medium sand, 15 percent silt, dense, damp. Micaceous. (ALLUVIUM)
(3"SS)	21-15-16 (13/18)	56 (None)						**7.0 to 9.0 feet: SANDY FINE TO MEDIUM GRAVEL (GP),** yellow brown, a few percent fine to coarse sand, a few percent fines, medium dense, damp. (ALLUVIUM)
(3"SS)	22-42-50/5" (17/17)	108 (None)		10				**9.0 to 12.5 feet: SANDY FINE TO MEDIUM GRAVEL (GW),** yellow gray, 60 percent gravel, subround to round, 35 percent fine to coarse sand, 5 percent fines, dense, damp. (ALLUVIUM)
SB-23-12.5 (3"SS)	16-40-50/4" (12/16)	164 (V. wk green)	▽					**12.5 to 14.5 feet: SANDY FINE TO MEDIUM GRAVEL (GP),** yellow gray, 50 percent subangular to round gravel, 45 percent coarse sand, less than 5 percent fine to medium sand, dense, damp. (ALLUVIUM)
(3"SS)	15-40-50/5" (10/17)	73 (None)		15				**14.5 to 16.5 feet: SANDY FINE TO MEDIUM GRAVEL (GW),** yellow gray, 25 percent coarse gravel, 30 percent fine to medium gravel, subround to round, 30 percent coarse sand, 15 percent fine to medium sand, trace fines, dense, wet. (ALLUVIUM)
				20				Total depth drilled = 15.0 feet. Total depth sampled = 16.5 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

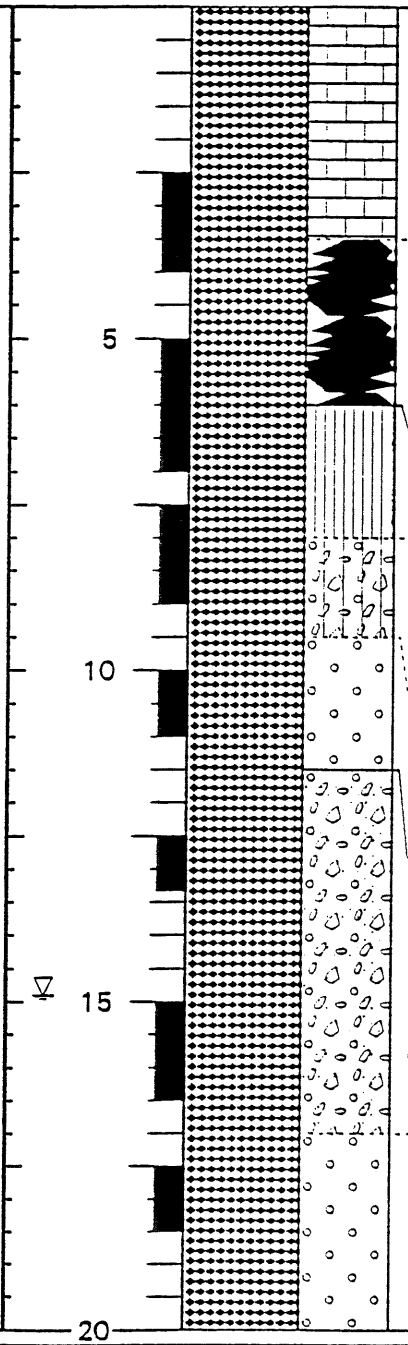
REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) UV response based on visual interpretation of strength and color. (6) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-25
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.87'
DRILL METHOD	TUBEX	TOTAL DEPTH	30.00'
LOGGED BY	John Latta	DATE COMPLETED	09/23/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 3.5 feet: BROKEN BRICKS, red, dense, dry. (FILL)
(3"SS)	7-30-50/3" (14/18)	70 (NT)	
			3.5 to 6.0 feet: COAL, black, dry. (FILL)
(3"SS)	8-8-6-6 (16/24)	106 (NT)	@ 6.0 feet: damp to moist, coal has a strong naptha-like odor.
			6.0 to 8.0 feet: SILT (ML), black to dark gray, medium dense, damp to moist. Strong naptha-like odor. (ALLUVIUM)
(3"SS)	14-38-50/5" (10/18)	160 (NT)	**8.0 to 9.5 feet: SILTY SANDY GRAVEL (GM)**, dark gray, fine to coarse gravel, dense, damp to moist. Strong hydrocarbon stain and free phase tar-like hydrocarbons, strong naptha-like odor. (ALLUVIUM)
(3"SS)	20/50 (7/12)	62 (NT)	**9.5 to 11.5 feet: FINE TO MEDIUM GRAVEL (GP)**, dark gray, subangular to round, trace sand and fines, dense, damp to moist. Heavy hydrocarbon stain and naptha-like odor. (ALLUVIUM)
25-3 (3)	13-50/4" (7/10)	78 (NT)	**11.5 to 17.0 feet: SANDY FINE TO MEDIUM GRAVEL (GW)**, dark greenish gray, subround to round, some fine to coarse sand, dense. (ALLUVIUM)
(3"SS)	14-28-50 (9/18)	82 (NT)	@ 12.5 to 13.5 feet: moist. Heavy hydrocarbon stain and strong naptha-like odor.
			@ 15.0 to 16.5 feet: wet. Strong sheen and naptha-like odor.
(3"SS)	15/50 (2/12)	58 (NT)	**17.0 to 20.0 feet: FINE TO MEDIUM GRAVEL (GP)**, dark gray, no sand or fines, dense, wet. Hydrocarbon sheen. (ALLUVIUM)



REMARKS

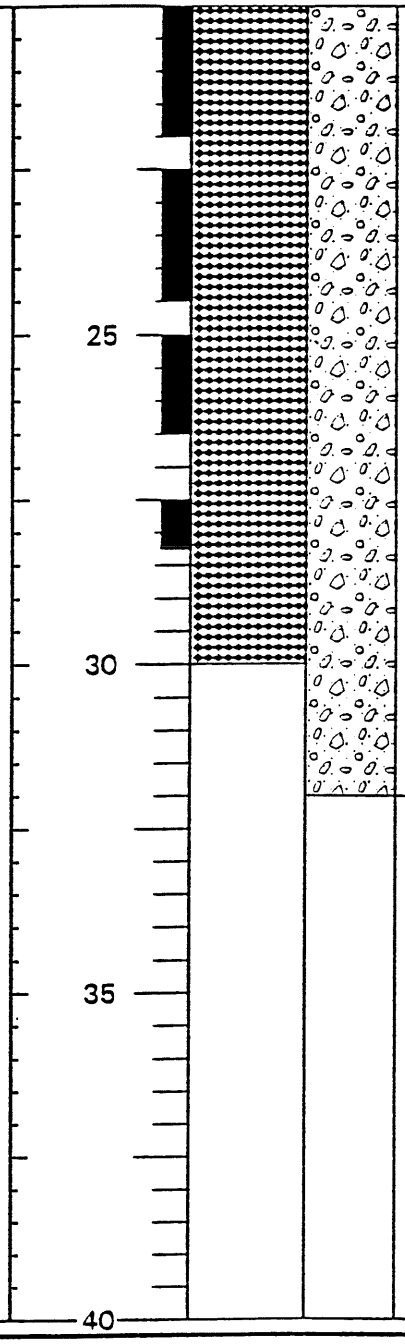
(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 20 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-25
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	976.87'
DRILL METHOD	TUBEX	TOTAL DEPTH	30.00'
LOGGED BY	John Latta	DATE COMPLETED	09/23/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	5-15-16-18 (6/24)	41 (NT)	**20.0 to 32.0 feet: SANDY FINE TO MEDIUM GRAVEL (GW)**, 30 percent fine to coarse sand, dense, wet. (ALLUVIUM)
SB-25-22.5 (3"SS)	15-22-25-17 (13/24)	NT (Str blue)	
(3"SS)	8-24-22 (7/18)	NT (Mod blue)	
(3"SS)	Not recorded (0/9)	NT (Str blue)	
(3"SS)	6-6-14-50/24"	NT (Str blue)	



Total depth drilled = 30.0 feet.
Total depth sampled = 32.0 feet.

Boring backfilled with hydrated 3/8-inch bentonite chips.

Comment: Temporary well screen set on 9/22/97 at 14 to 18 feet bgs for water sample collection. Two-inch PVC blank casing and .010 slot screen used along with 10 x 20 sand pack. Sand pack set from 12.7 to 19 feet bgs. Casing and screen were removed and sand pack drilled out after groundwater sample collection in order to deepen boring to TD.

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) 300 pound hammer used to drive sampler beginning with sample collected at 20 feet bgs. (6) UV response based on visual interpretation of strength and color. (7) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME **WSDOT SR 290** Realignment
LOCATION **Southriver Drive, Spokane, Washington**
DRILLED BY **Environmental West Exploration**
DRILL METHOD **TUBEX**
LOGGED BY **John Latta**

BORING NO. **SB-26**
PAGE **1 OF 2**
GROUND ELEV. **977.09'**
TOTAL DEPTH **22.50'**
DATE COMPLETED **09/29/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 5.0 feet: SURFACE GRAVEL AND BROKEN CONCRETE, BRICKS AND BASALT FILL (GP-GM), dark gray, dense, dry. (FILL)
(3"SS)	25-35-50/3" (15)	0 (NT)	
(3"SS)	35-20-10-9 (24)	38 (Str green)	**5.0 to 7.0 feet: BRICKS, WOOD AND SOIL WITH TARRY CREOSOTE-LIKE HYDROCARBONS (GP-GM)**, dark brown, soft, damp. (FILL)
SB-26-7.5 (3"SS)	3-5-8 (18)	1563 (NT)	**7.0 to 10.0 feet: SILT (ML)**, dark gray, soft, damp. Strong diesel-like odor and coloration, soft, damp. (ALLUVIUM)
(3"SS)	15-25-30-50 (24)	1902 (NT)	**10.0 to 12.5 feet: SILTY SANDY GRAVEL (GM)**, dark gray, fine to coarse gravel up to 2.5-inches, subangular to rounded, 40 percent fine to coarse sand, 15 percent silt, dense, damp. Strong diesel-like odor and coloration. (ALLUVIUM)
(3"SS)	32-50 (12)	421 (NT)	**12.5 to 23.5 feet: SANDY FINE TO COARSE GRAVEL (GW)**, 40 percent fine to coarse sand, dense. (ALLUVIUM)
SB-26-15 (3"SS)	16-30-50 (18)	268 (NT)	@ 12.5 to 13.5 feet: dark gray, damp to moist. Strong diesel-like odor and stain. @ 15.0 to 16.5 feet: dark silvery gray, wet. Diesel-like odor and sheen.
(3"SS)	15-50 (12)	0 (Mod blue)	

GROUND WATER LEVELS ▽ — DEPTH IN FEET: 5, 10, 15, 20 — SAMPLES — WELL DETAILS — LITHOLOGIC COLUMN

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) UV response based on visual interpretation of strength and color. (6) NT = Not tested.

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-26
LOCATION	Southriver Drive, Spokane, Washington	PAGE	2 OF 2
DRILLED BY	Environmental West Exploration	GROUND ELEV.	977.09'
DRILL METHOD	TUBEX	TOTAL DEPTH	22.50'
LOGGED BY	John Latta	DATE COMPLETED	09/29/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
(3"SS)	26-50/5" (11)	0 (None)		25 30 35 40				**12.5 to 23.5 feet: SANDY FINE TO COARSE GRAVEL (GW)**, continued. @ 20.0 feet: drilling hard, infer coarse gravels. @ 22.5 to 23.5 feet: dark yellow gray, 65 percent fine to coarse gravel up to 2-inch, 35 percent fine to coarse sand, wet. Hydrocarbon odor, sheen, or stain not observed. Total depth drilled = 22.5 feet. Total depth sampled = 23.5 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) UV response based on visual interpretation of strength and color. (6) NT = Not tested.

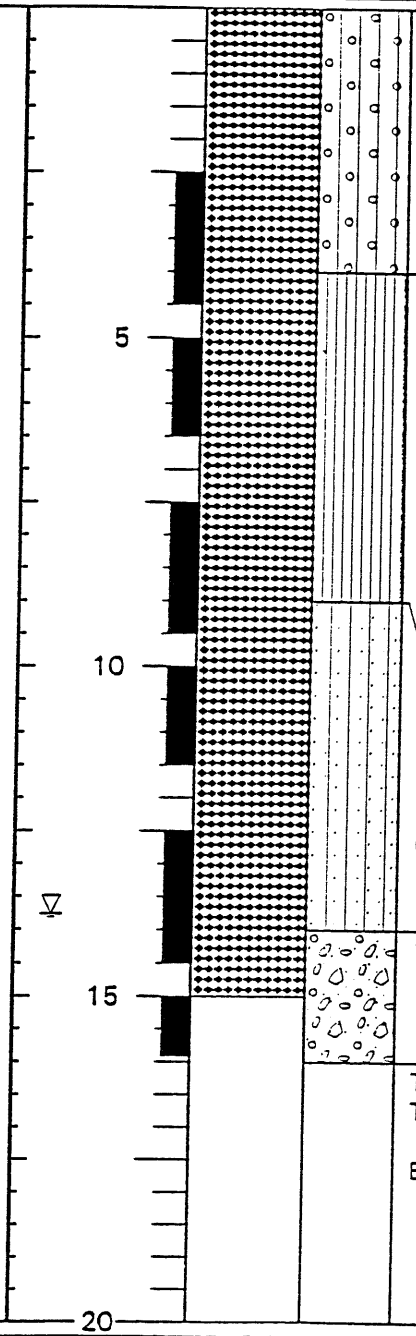
LOG OF EXPLORATORY BORING

PROJECT NAME **WSDOT SR 290 Realignment**
LOCATION **Southriver Drive, Spokane, Washington**
DRILLED BY **Environmental West Exploration**
DRILL METHOD **TUBEX**
LOGGED BY **John Latta**

BORING NO. **SB-29**
PAGE **1 OF 1**
GROUND ELEV. **976.17'**
TOTAL DEPTH **15.00'**
DATE COMPLETED **09/30/97**

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
			0 to 4.0 feet: SURFACE GRAVEL AND SILTY SANDY GRAVEL WITH BRICKS AND COAL (GP-GM), black, medium dense, dry. (FILL)
SB-29-2.5 (3"SS)	25-23-10-8 (15/24)	31 (Mod blue)	
(3"SS)	2-3-5 (15/18)	37 (None)	**4.0 to 9.0 feet: FINE SANDY SILT (ML)**, yellow gray, a few percent fine sand, soft, damp. Micaceous. (ALLUVIUM)
			@ 5.0 to 6.5 feet: mottled brown.
(3"SS)	3-5-8-10 (21/24)	45 (None)	
			@ 9.0 feet: FINE SANDY SILT grades into SILTY FINE SAND (SM) with a trace of fine gravel.
(3"SS)	4-6-6 (18/18)	49 (Wk blue)	**9.0 to 14.0 feet: SILTY FINE SAND (SM)**, yellow gray, a few percent silt, with a trace of fine gravel, soft, damp. (ALLUVIUM)
SB-29-12.5 (3"SS)	8-26-32-34 (18/24)	50 (Wk blue)	@ 12.5 to 14.5 feet: appearance of wetness suggests presence of diesel-like hydrocarbons.
(3"SS)	20-50/5" (4/11)	69 (Mod blue)	**14.0 to 16.0 feet: SANDY FINE TO COARSE GRAVEL (GW)**, yellow gray, 40 percent fine to coarse sand, dense, wet. (ALLUVIUM)
			Total depth drilled = 15.0 feet. Total depth sampled = 16.0 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

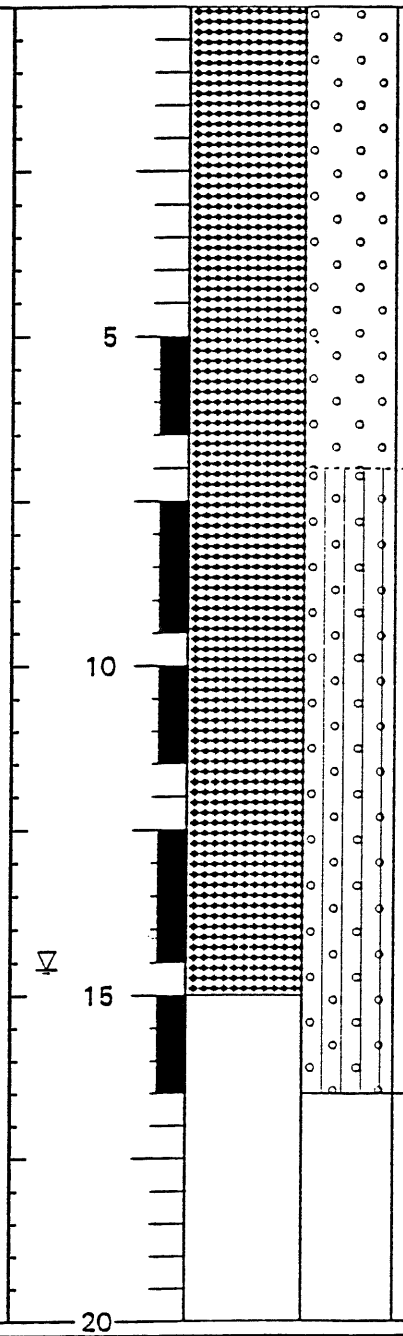
(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) UV response based on visual interpretation of strength and color. (6) NT = Not tested.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	WSDOT SR 290 Realignment	BORING NO.	SB-34
LOCATION	Southriver Drive, Spokane, Washington	PAGE	1 OF 1
DRILLED BY	Environmental West Exploration	GROUND ELEV.	978.18'
DRILL METHOD	TUBEX	TOTAL DEPTH	15.00'
LOGGED BY	John Latta	DATE COMPLETED	09/30/97

SAMPLE NUMBER (SAMPLE TYPE)	BLOWS PER 6 INCHES (RECOVERY)	PID (in ppm) (UV RESPONSE)	LITHOLOGIC DESCRIPTION
(3"SS)	– (–)	NT (NT)	**0 to 7.0 feet: LIGHT GRAY SURFACE GRAVEL BASALT FILL (GP)**, dark gray to black angular basalt gravel and boulders, concrete, bricks, dense, damp.
SB-34-5 (3"SS)	25-40-40 (7/18)	28 (Mod blue green)	@ 5.0 feet: dark hydrocarbon stain. (FILL)
(3"SS)	10-7-7-5 (18/24)	29 (Mod blue)	**7.0 to 16.5 feet: CINDER GRAVEL (GP-GM)**, sand and gravel size, angular up to 1-inch, with some silt size, soft. (FILL) @ 7.5 to 11.5 feet: black to orange black, coal and cinders, damp.
(3"SS)	5-5-5 (18/18)	32 (None)	
SB-34-12.5 (3"SS)	3-3-4-3 (11/24)	40 (None)	@ 12.5 to 14.5 feet: orange brown to orange, moist.
(3"SS)	2-5-8 (12/18)	27 (None)	@ 15.5 to 16.5 feet: orange brown to orange, wet.
			Total depth drilled = 15.0 feet. Total depth sampled = 16.5 feet. Boring backfilled with hydrated 3/8-inch bentonite chips.



REMARKS

(1) SS = Steel barrel samplers (3-inch diameter). (2) Blow counts using 140 pound hammer with 30-inch drop, do not represent SPT results. (3) White triangle = observed water level at time of drilling. (4) Photoionization detector (PID) results in parts per million (ppm). (5) UV response based on visual interpretation of strength and color. (6) NT = Not tested.

LOG OF TEST BORING

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

___ S.H. ___ S.R. 290 SECTION SR-90 to Trent Avenue Job No. L-6143

Hole No. H-6 Sub Section Spokane River Bridge Cont. Sec. 3220

Station 22+60 Offset 14' Lt. Ground El. 1897.4'

Type of Boring Wash and Chop Casing 3" I.D., -86.0' W.T. El. 1884.2'

Inspector ___ Date Feb. 19, 1981 Sheet 1 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
				Crushed ROCK (surfacing - lumber and equipment yard).
				Old BRICK FRAGMENTS, CONCRETE BLOCK FRAGMENTS, ROCKS to 20 inch diameter, sandy GRAVEL (fill).
5				BRICK FRAGMENTS, ROCKS, and SANDY GRAVEL mixed with PEAT.
	2		2 STD 1 PEN 1 1 12"	Very loose, moist, black, very silty, fine gravelly, fine to coarse SAND. Retained 4 inches.
			B C U- D 2	Soft brown PEAT.
10				
	61		13 STD 25 PEN 36 3	Very dense, moist, gray-brown, silty, sandy GRAVEL. Retained 9 inches.
15				
	65		47 STD 28 PEN 37 4	Very dense, gray, wet, silty, fine to coarse sandy GRAVEL. Retained 13 inches.
20				

For explanation of description see sheet 1, hole no. H-1.

DOT FORM 351-003 REVISED 12/79

Original to Materials Engineer
Copy to Bridge Engineer
Copy to District Administrator

Copy to ___

HWY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-6 Sub Section Spokane River Bridge Sheet 2 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	103		43 STD 49 PEN 54 5	Very dense, gray, wet, silty, fine to coarse sandy GRAVEL. Retained 5 inches.
25	106 7"		56 STD 50 PEN 1" 6	Very dense, gray, wet, silty, fine to coarse sandy GRAVEL. Retained 5 inches.
30	14		8 STD 7 PEN 7 7 12	Medium dense, gray, wet, silty, fine to coarse sandy GRAVEL. Retained 7 inches.
35	10		8 5 STD 5 PEN 4 8	No recovery.
40	23		13 STD 11 PEN 12 9 13	Medium dense, coarse grained SAND and fine GRAVEL. Retained 11 inches.
45				

For explanation of description see sheet 1, hole no. H-1.

HWY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-6 Sub Section Spokane River Bridge Sheet 3 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			25 STD	No recovery.
	112		62 PEN	
	7"		50 10	
			1"	
50				
			7 STD	No recovery.
			8 PEN	
	19		11 11	
			11	
55				
			9 STD	
	9		5 PEN	Loose, medium to coarse sandy GRAVEL, trace of silt.
			4 12	Retained 3 inches.
			8	
60				
			25 STD	
			25 PEN	Dense, wet, gray-brown, silty, fine to coarse sandy GRAVEL.
	44		19 13	Retained 5 inches.
			12	
65				
			8 STD	
	8		4 PEN	Loose, wet, clean, coarse sandy GRAVEL.
			4 14	Retained 9 inches.
			5	
70				

For explanation of description see sheet 1, hole no. H-1.

HWY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-6 Sub Section Spokane River Bridge Sheet 4 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	28		18 STD 18 PEN 10 15 8	Dense, wet, clean, coarse sandy GRAVEL. Retained 6 inches.
75				
	62		8 STD 8 PEN 54 16 75	Very dense, wet, clean, coarse sandy GRAVEL. Retained 5 inches.
80				
	44		16 STD 19 PEN 25 17 33	Dense, wet, gray, silty, fine to coarse sandy GRAVEL. Retained 14 inches.
85				
88	38		30 STD 27 PEN 11 18 8	Dense, wet, gray, silty, fine to coarse sandy GRAVEL. Retained 6 inches.
				Test boring stopped at 88.0' below ground elevation.

For explanation of description see sheet 1, hole no. H-1.

LOG OF TEST BORING

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

___ S.H. ___ S.R. 290 SECTION SR-90 to Trent Avenue Job No. L-6143

Hole No. H-7 Sub Section Spokane River Bridge Cont. Sec. 3220

Station 23+96 Offset 7' Rt. Ground El. 1897.2'

Type of Boring Wash and Chop Casing 3" I.D., -95'9" W.T. El. 1885.9'

Inspector ___ Date Feb. 22, 1981 Sheet 1 of 5

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
				Crushed ROCK (surfacing for lumber and equipment yard).
				Old BRICK FRAGMENTS, ROCKS, sandy GRAVEL (fill).
5				
	4		8 STD a 2 PEN 2 1 b 3 B U- 2	Very loose, dark brown, wet, very silty, fine to coarse sandy GRAVEL. Soft, dark brown, moist, organic SILT and TAR SLUDGE. Retained 15 inches.
10				
	96		31 STD 43 PEN 53 3	Very dense, dry to moist, very silty, gravelly, fine to coarse SAND - with calcareous material and tar sludge coating. Retained 7 inches. (large gravel in bit).
15				
	100		80 STD 59 PEN 41 4	Very dense, gray-brown, dry, silty, fine to coarse sandy GRAVEL. (material still has oily film). Retained 11 inches.
20				

For explanation of description see sheet 1, hole no. H-1.

DOT FORM 351-003 REVISED 12/79

Original to Materials Engineer
Copy to Bridge Engineer
Copy to District Administrator

Copy to ___

HWY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-7 Sub Section Spokane River Bridge Sheet 2 of 5

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	37		17 STD 16 PEN 21 5 28	Dense, gray-brown, dry, silty, fine to coarse sandy GRAVEL (material still has oily film on it). Retained 11 inches.
25				
	51		24 STD 24 PEN 27 6 18	Very dense, sandy GRAVEL, trace of silt. (material still has oily film on it). Retained 13 inches.
30				
	22		10 STD 10 PEN 12 7 5	Medium dense, gray-brown, silty, fine to coarse sandy GRAVEL. Retained 3 inches.
35				
	9		4 STD 6 PEN 3 8 3	Loose, fine to coarse SAND and fine GRAVEL (wash sample) Retained 4 inches.
40				
	14		16 STD 8 PEN 6 9 17	Medium dense, no recovery.
45				

For explanation of description see sheet 1, hole no. H-1.

HWY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-7 Sub Section Spokane River Bridge Sheet 3 of 5

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			25 STD	
			24 PEN	
	61		37 10	Very dense, gray, wet, silty, fine to coarse sandy GRAVEL.
			20	Retained 20 inches.
50				
			17 STD	Dense, gray, wet, silty, fine to coarse sandy GRAVEL.
			13 PEN	Retained 5 inches.
	26		13 11	
			14	
55				
			15 STD	Dense, gray, wet, silty, fine to coarse sandy GRAVEL.
			11 PEN	Retained 8 inches.
	26		15 12	
			17	
60				
			8 STD	
			7 PEN	
	13		6 13	No Recovery
			6	
65				
			17 STD	Dense, gray, wet, silty, fine to coarse sandy GRAVEL.
			12 PEN	Retained 6 inches.
	25		13 14	
			12	
70				1 ft. flowback of sand, from -70.5' to -69.5'.

For explanation of description see sheet 1, hole no. H-1.

HWY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-7 Sub Section Spokane River Bridge Sheet 4 of 5

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			11 STD	Dense, dark gray, wet, slightly silty, fine gravelly, fine
			13 PEN	to coarse SAND. Retained 18 inches.
	28		15 15	
			12	
				1 ft. flowback of sand, after cleaning out to bottom; -75.5'
75				back up to -74.5'.
			9 STD	Medium dense, layered, clean, medium to coarse SAND and fine
			7 PEN	to medium sandy SILT - with calcareous material.
	15		8 16	Retained 12 inches.
			10	
80				
			15 STD	Dense, dark gray, wet, slightly silty, fine gravelly, fine
			12 PEN	to coarse SAND. Retained 8 inches.
	30		18 17	
			20	
85				
			77 STD	Dense, dry, silghtly silty, fine gravelly, fine to coarse
			27 PEN	SAND - with calcareous material. Retained 5 inches.
	42		15 18	
			17	
90				
			6 STD	Medium dense, clean, coarse sandy GRAVEL.
			5 PEN	Retained 5 inches.
	12		7 19	
			7	
95				

For explanation of description see sheet 1, hole no. H-1.

HWY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-7 Sub Section Spokane River Bridge Sheet 5 of 5

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	25		22 STD 12 PEN 13 20 14	No recovery.
	35		13 STD 20 PEN 15 21 14	Dense, clean, coarse sandy GRAVEL. Retained 7 inches.
100				
				Test boring stopped at 100.0' below ground elevation.

For explanation of description see sheet 1, hole no. H-1.

LOG OF TEST BORING

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

S.H. ____ S.R. 290 SECTION SR-90 to Trent Avenue Job No. L-6143

Hole No. H-8 Sub Section Spokane River Bridge Cont. Sec. 3220

Station 25+65 Offset 23' Lt. Ground El. 1870.5'

Type of Boring Wash, Chop and Drive Casing 3" I.D., -79'4" W.T. El. see bottom of log

Inspector ____ Date March 7, 1981 Sheet 1 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
				Riprap ROCK FRAGMENTS to approximately 4 feet in size with watery muck between.
5				
10				Gravelly SAND; contains tar sludge.
			20 STD 13 PEN 9 1 6	Medium dense, oily, fine to coarse sandy fine GRAVEL, trace of silt. Retained 8 inches.
	22			
15				
			16	
			17 STD 19 PEN 23 2	Dense, gray, wet, silty, fine to coarse sandy GRAVEL. Large gravel in bit probably made blow count high. Retained 11 inches.
	36			
20				

For explanation of description see sheet 1, hole no. H-1.

Original to Materials Engineer
Copy to Bridge Engineer
Copy to District Administrator

DOT FORM 351-003 REVISED 12/79

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HWY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-8 Sub Section Spokane River Bridge Sheet 2 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
				Sandy GRAVEL.
	29		73 STD 17 PEN 12 3	No recovery.
25			7	
				Gravelly SAND.
	10		8 STD 5 PEN 5 4	No recovery.
30			5	
			24	
			37 STD 31 PEN	
35	68		10 5	Very dense, gray-brown, dry, silty, fine to coarse sandy GRAVEL. (large gravel in augers). Retained 4 inches.
				Alternating layers of gravelly SAND and silty fine SAND.
			17 STD 15 PEN	
	33		18 6	Dense, gray-brown, dry, silty, fine to coarse sandy GRAVEL. Retained 5 inches.
40			18	
			45 STD 24 PEN	Dense, gray, wet, silty fine to coarse sandy GRAVEL - with calcareous material. Retained 12 inches.
45	42		18 7	

For explanation of description see sheet 1, hole no. H-1.

HWY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-8 Sub Section Spokane River Bridge Sheet 3 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
			12	
			13 STD	
	15		7 PEN	Medium dense, clean, coarse sandy GRAVEL.
50			8 8 7	Retained 4 inches.
			37 STD	Very dense, clean, coarse sandy GRAVEL.
			42 PEN	Retained 2 inches.
55	79		37 9	
			43	
			17 STD	
	35		21 PEN	Dense, gray, wet, silty, fine to coarse sandy GRAVEL.
60			14 10 12	Retained 8 inches.
			48 STD	
	122		60 PEN	Very dense, dry, slightly silty, fine gravelly, fine to
			62 11	coarse SAND - with calcareous material.
65				Retained 2 inches.
			STD	
			26 PEN	
70			13 12	

For explanation of description see sheet 1, hole no. H-1.

4WY Form 351-003-a (H. F. 26.66-A).
Revised 5-67.

Hole No. H-8 Sub Section Spokane River Bridge Sheet 4 of 4

DEPTH	BLOWS PER FT.	PROFILE	SAMPLE TUBE NOS.	DESCRIPTION OF MATERIAL
	25		12 STD 10 PEN 12	Dense, dry, slightly silty, gravelly, fine to coarse SAND - with calcareous material. Retained 5 inches.
			47 15 STD 15 PEN 22 13	
75	30			Dense, moist, slightly silty, gravelly, fine to coarse SAND - with calcareous material. Retained 4 inches.
80			17 STD 16 PEN 17 14 20	Dense, gray-brown, slightly silty, fine to coarse sandy GRAVEL. Retained 9 inches.
	33			
				Test boring stopped at 82.0' below ground elevation.
				Water level: River level 15.5' above ground elevation.

For explanation of description see sheet 1, hole no. H-1.

APPENDIX C

Geotechnical Laboratory Testing by Others

MOISTURE-DENSITY RELATIONSHIP CURVE

ASTM D 1557
Method C

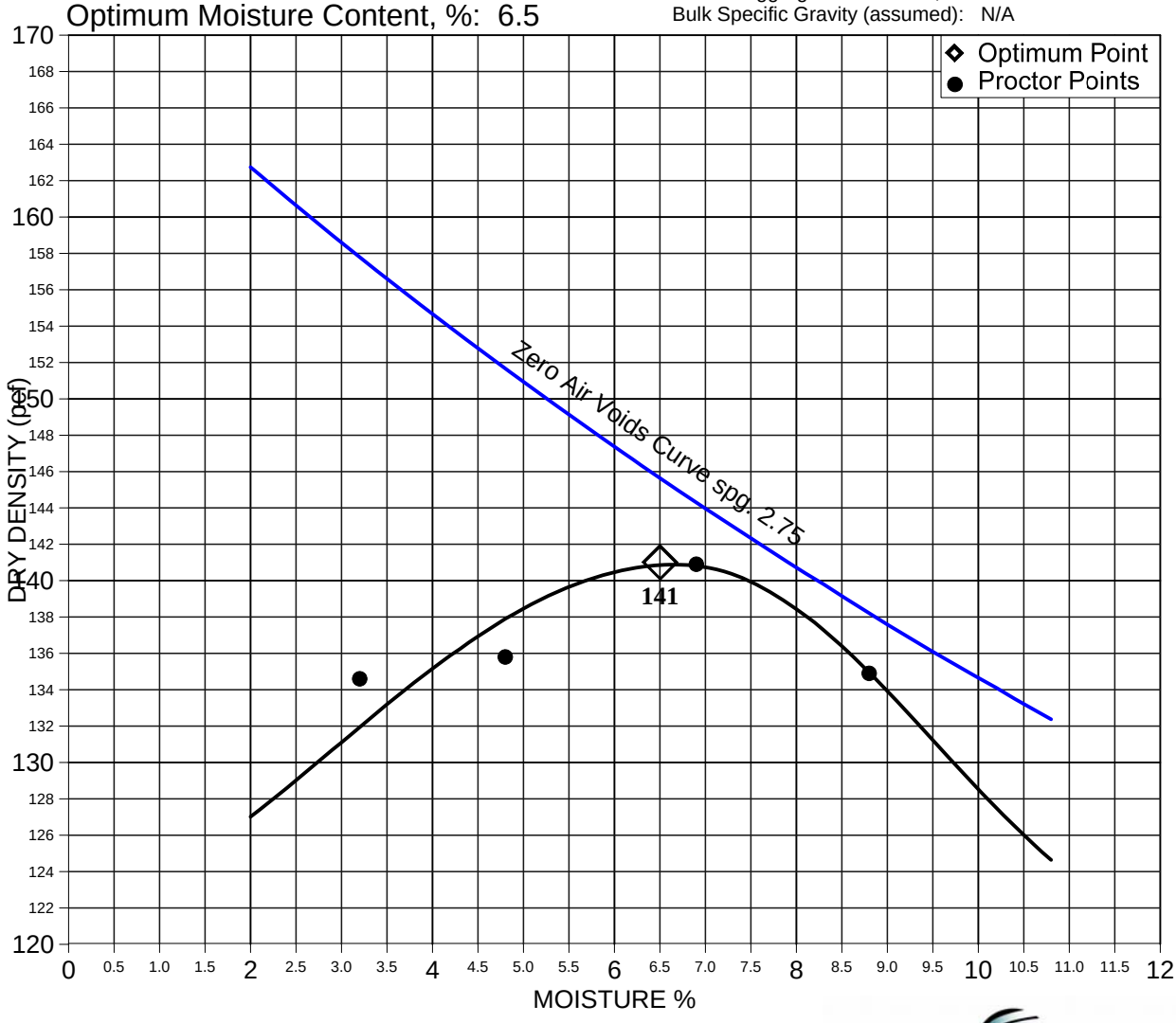
Project: Spokane Riverbend Business Park
Client: Spokane Riverbend Business Park
File Name: SPORIV SP14058A
Date Tested: July 18, 2014
Tested By: T. Tucker
Sample Number: SL071714-1
Sample Location: Test Pit TP-4 at 0 to 0.5 Feet
Sample Description: GRAVEL with Sand and Silt

GRADING ANALYSIS

SCREEN SIZE	% PASSING	AS TESTED
6 inch		
4 inch		
2 inch		
3/4 inch	100	100
3/8 inch		
#4 screen		

Corrected Dry Density, pcf: N/A
Corrected Moisture Content, %: N/A
Coarse Aggregate Correction, %: N/A
Bulk Specific Gravity (assumed): N/A

Maximum Dry Density, pcf : 141.0
Optimum Moisture Content, %: 6.5



Reviewed By _____

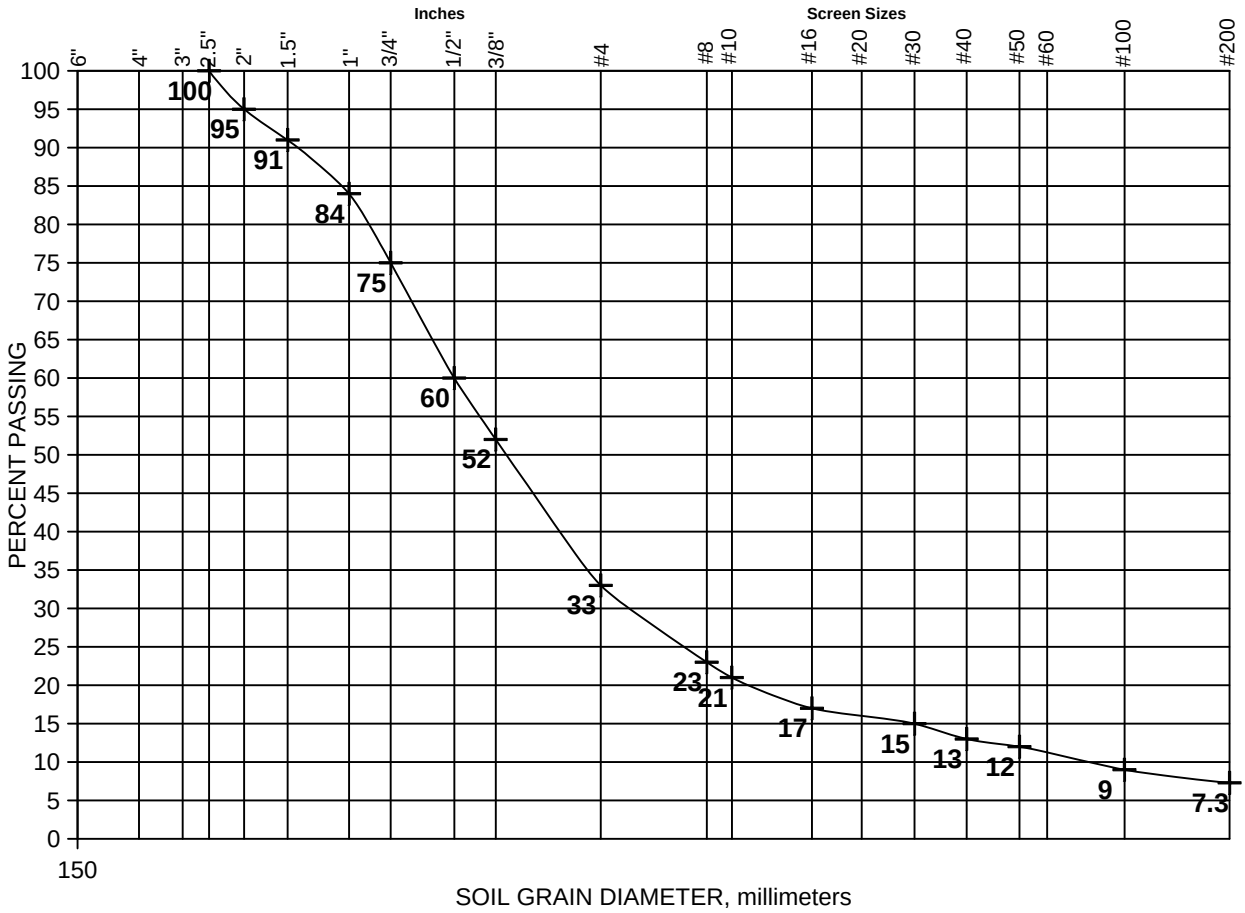
STRATA
A Professional Services Corporation
Integrity From the Ground Up

GRADATION ANALYSIS

ASTM D 6913

Project: Riverbend Business Park
Client: Spokane River Properties
File: SPORIV SP14058A
Sample No.: SL071714-5
Sample Location: Test Pit TP-2 from 1.0 to 1.5 feet BGS
Description: Poorly-Graded GRAVEL with Sand and Silt
Date Tested: July 25, 2014

Cobbles	Gravel		Sand		
	Coarse	Fine	Coarse	Medium	Fine



Reviewed by:_____

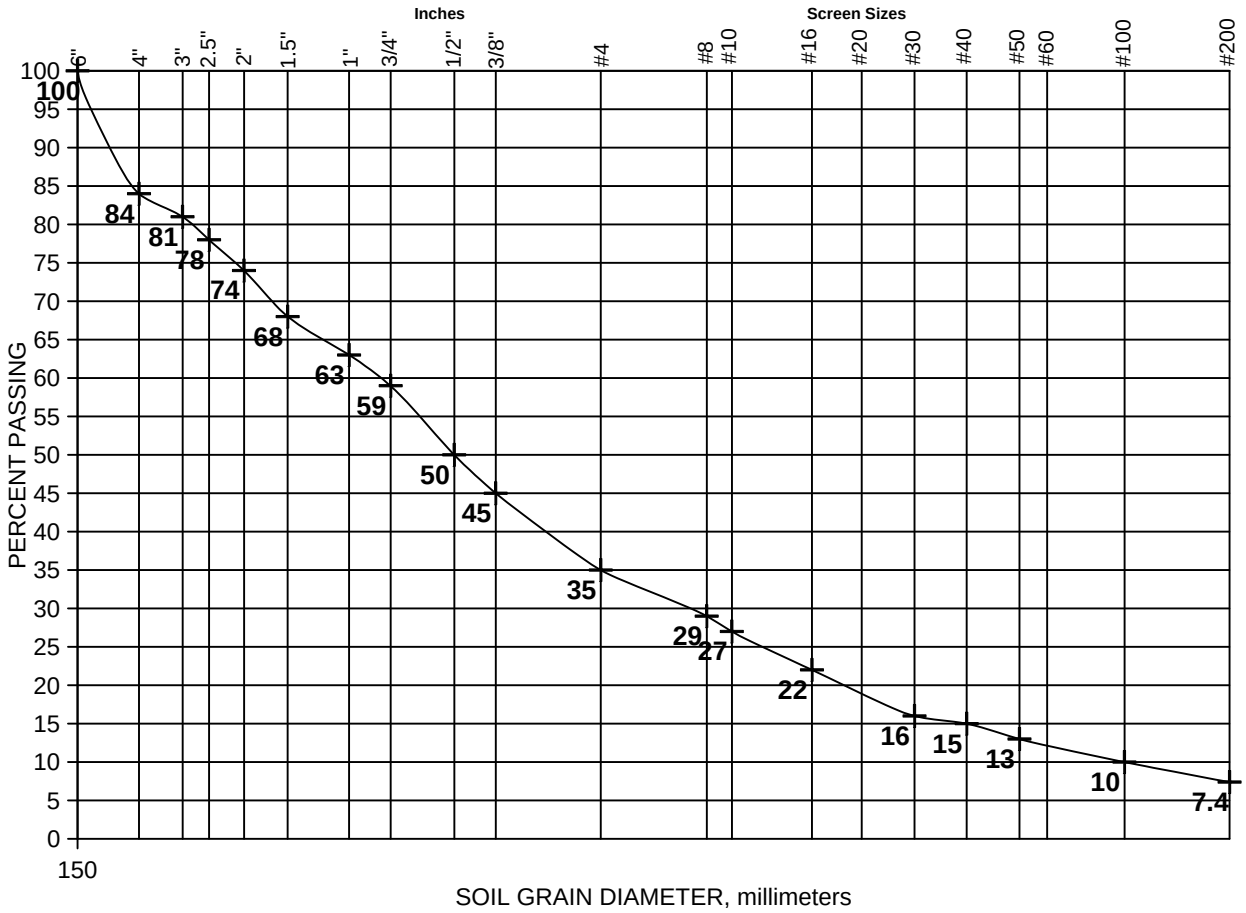
STRATA
A PROFESSIONAL SERVICES CORPORATION
Integrity from the Ground Up

GRADATION ANALYSIS

ASTM D 6913

Project: Riverbend Business Park
Client: Spokane River Properties
File: SPORIV SP14058A
Sample No.: SL071714-6
Sample Location: Test Pit TP-7 from 1.0 to 1.5 feet BGS
Description: Poorly-Graded GRAVEL with Sand and Silt and Cobbles
Date Tested: July 25, 2014

Cobbles	Gravel		Sand		
	Coarse	Fine	Coarse	Medium	Fine



Reviewed by:_____

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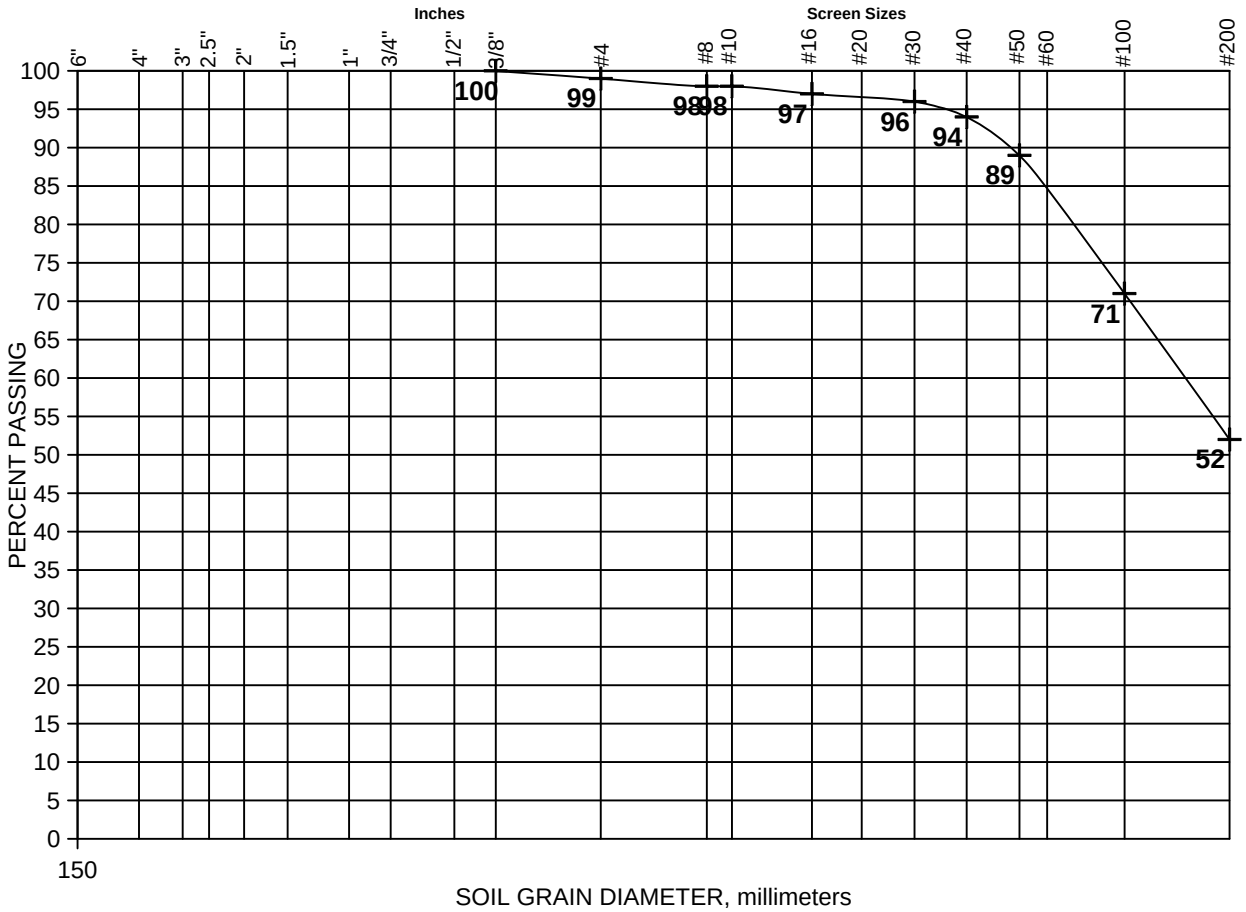
GRADATION ANALYSIS

ASTM D 6913

Project: Riverbend Business Park
Client: Spokane River Properties
File: SPORIV SP14058A
Sample No.: SL071714-4
Sample Location: Test Pit TP-7 from 3.0 to 3.5 feet BGS
Description: Sandy SILT
Date Tested: July 25, 2014

Cobbles	Gravel		Sand		
	Coarse	Fine	Coarse	Medium	Fine



SOIL GRAIN DIAMETER, millimeters

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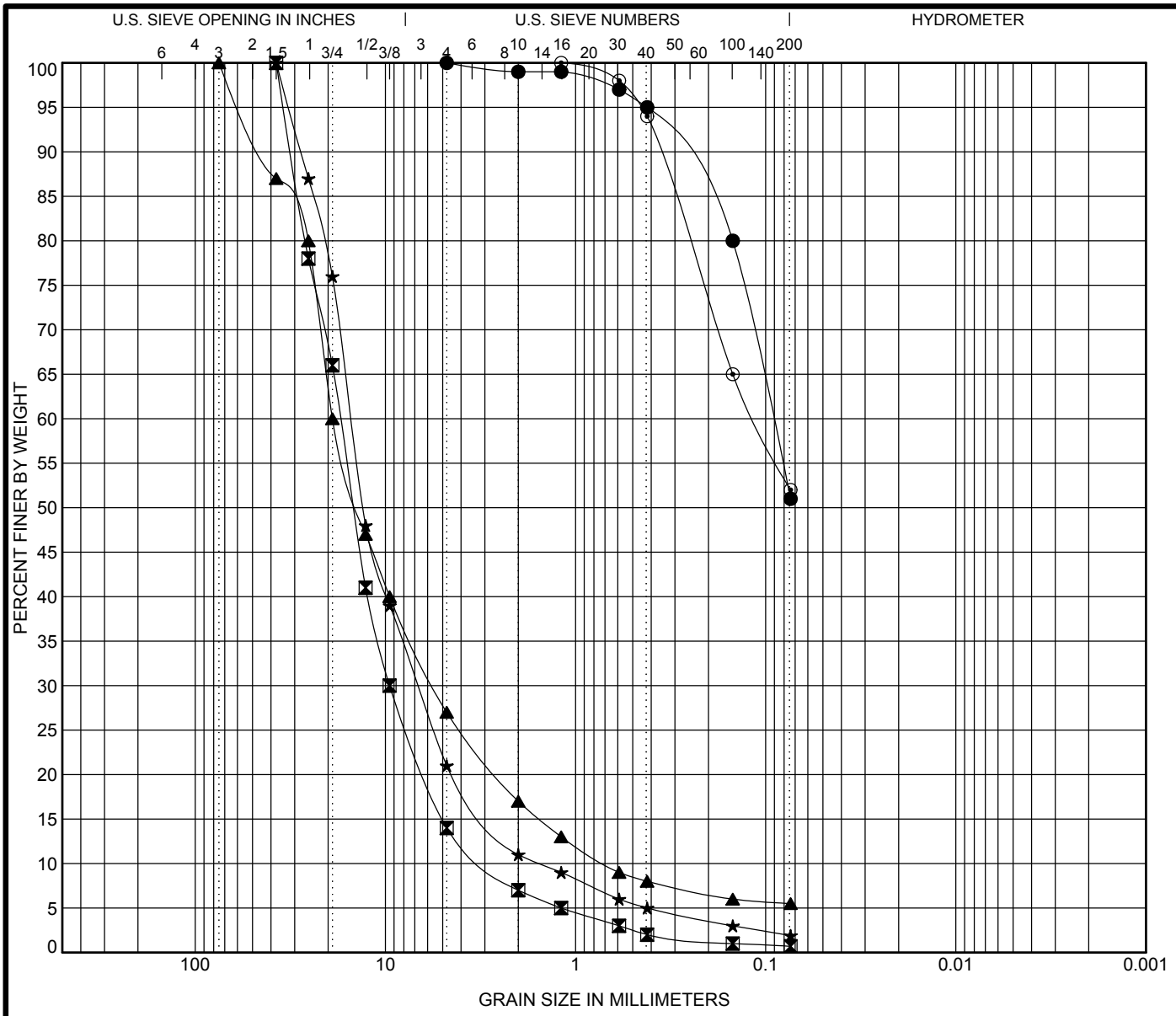
SOILS
LABORATORY SUMMARY

		Units	Test Methods						
LABORATORY NUMBER				13-5772	13-5778	13-5796	13-5800	13-5801	13-5804
BORING NUMBER				1	2	4	5	5	6
DEPTH	TOP	feet		15	5	14.5	9.5	14.5	0
	BOTTOM	feet		15.5	6.5	16	11	16	1
SAMPLE TYPE				3"	3"	3"	3"	3"	3"
BLOW/FOOT				44	25	22	8	21	R
MOISTURE		%	ASTM D 2216	21.7	1.4	1.6	18.6	1.9	3.8
LIQUID LIMIT		%		-		-	29	-	-
PLASTIC LIMIT		%	ASTM 4318	-		-	22	-	-
PLASTICITY INDEX		%		-		-	7	-	-
UNIFIED CLASSIFICATION				ML	GW	GW	ML	GP	GW
	3"		ASTM D 422					100	100
S	1½"				100	100		86	85
I	1"				78	87		79	85
E	3/4"				66	76		72	80
V	1/2"	%			41	48		51	68
E	3/8"				30	39	100	43	63
	#4	P		100	14	21	100-	16	43
S	#10	A		99	7	11	100-	3	28
I	#16	S		99	5	9	100-	2	23
Z	#30 SAND	S		97	3	6	98	1	19
E	#40	I		95	2	5	94	1	17
	#100	N		80	1	3	65	1	12
	#200	G		51	0.7	1.9	52	0.5	9.6

FIGURE 5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	1	15.0						
⊠	2	5.0	**WELL-GRADED GRAVEL(GW)**				**1.80**	**5.95**
▲	3	14.5					**2.33**	**27.02**
★	4	14.5	**WELL-GRADED GRAVEL with SAND(GW)**				**1.94**	**9.78**
⊙	5	9.5	**SANDY SILTY CLAY(CL-ML)**	**29**	**22**	**7**		

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	1	15.0	**4.76**	**0.092**			**0.0**			
⊠	2	5.0	**37.5**	**17.249**	**9.5**	**2.9**	**86.0**			
▲	3	14.5	**75**	**19**	**5.583**	**0.703**	**73.0**			
★	4	14.5	**37.5**	**15.093**	**6.725**	**1.543**	**79.0**			
⊙	5	9.5	**1.19**	**0.114**			**0.0**			

Budinger & Associates
1101 North Fancher Road
Spokane Valley, WA 99212

GRAIN SIZE DISTRIBUTION RESULTS

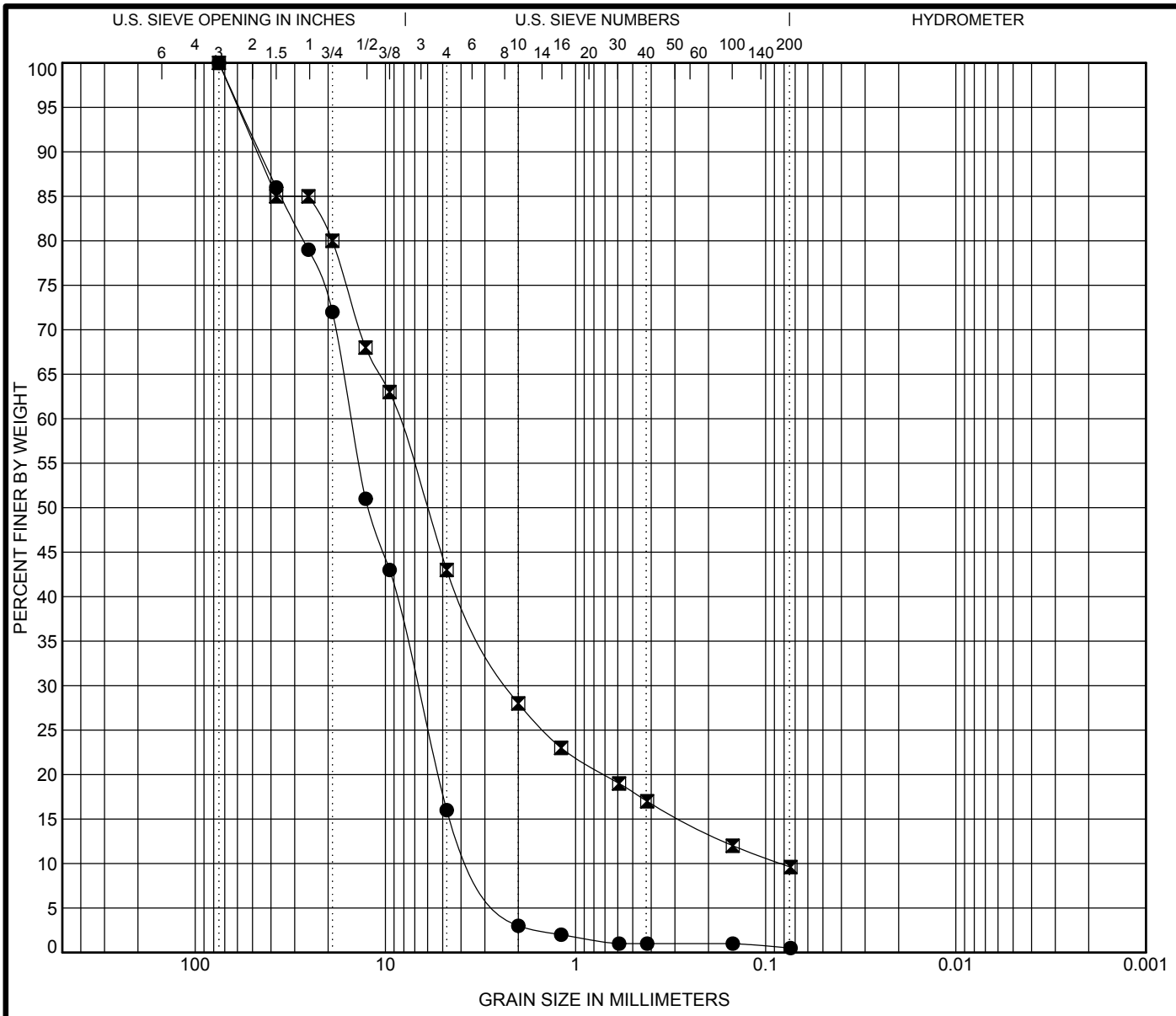
Project: MLK Phase II

Location: Spokane, WA

Number: S13254

FIGURE 6-1

US_GRAIN_SIZE_S13254 MLK PHASE II.GPJ BUDINGER.GDT 10/7/13



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	5	14.5	**POORLY GRADED GRAVEL with SAND(GP)**				**0.96**	**4.73**
⊠	6	0.0					**7.08**	**102.99**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	5	14.5	**75**	**15.093**	**6.811**	**3.19**	**84.0**			
⊠	6	0.0	**75**	**8.565**	**2.245**	**0.083**	**57.0**			

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GRAIN SIZE DISTRIBUTION RESULTS

Project: MLK Phase II

Location: Spokane, WA

Number: S13254

FIGURE 6-2

US_GRAIN_SIZE_S13254 MLK PHASE II.GPJ BUDINGER.GDT 10/7/13

APPENDIX D

Geophysical Investigation Data Report

RPT-2019-027, Rev. 1

GEOPHYSICAL INVESTIGATION AT RIVERBEND SITE, SPOKANE, WASHINGTON

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Date Published
July 2019

Prepared for:

Aspect Consulting

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 PROJECT OBJECTIVE

This report documents results from a combined electromagnetic induction (EM), magnetic (MAG), active source multi-channel analysis of surface waves (MASW), P-wave refraction, and electrical resistivity survey at the Riverbend site, located in Spokane, Washington. The objective of the geophysical survey was to evaluate an approximately 3 acre area of the former Spokane Manufactured Gas Plant and American Tar Company property. The remaining structures on the site have been demolished and a compacted gravel surface serves as a cap to the underlying contaminated soils. The current surface is relatively flat and free of obstructions, with sparse vegetation.

The EM method is sensitive to metallic objects (both ferrous and non-ferrous) and relative changes in soil moisture content and ground conductivity (such as foundations, burial pits, trenches, or voids). The EM method provides a plan view map of variations in soil conductivity and metallic objects within the survey area. The electrical resistivity imaging method results in two-dimensional (2D) cross sections of the electrical properties of the subsurface materials, providing an estimate of the thickness of the fill material. The P-wave refraction method, due to the dependence of seismic velocity on the elasticity and density of the material through which the energy is passing, provides a measure of material strengths. The MASW method complements the P-wave refraction method by providing shear wave velocity models, which delineate variations in soil stiffness.

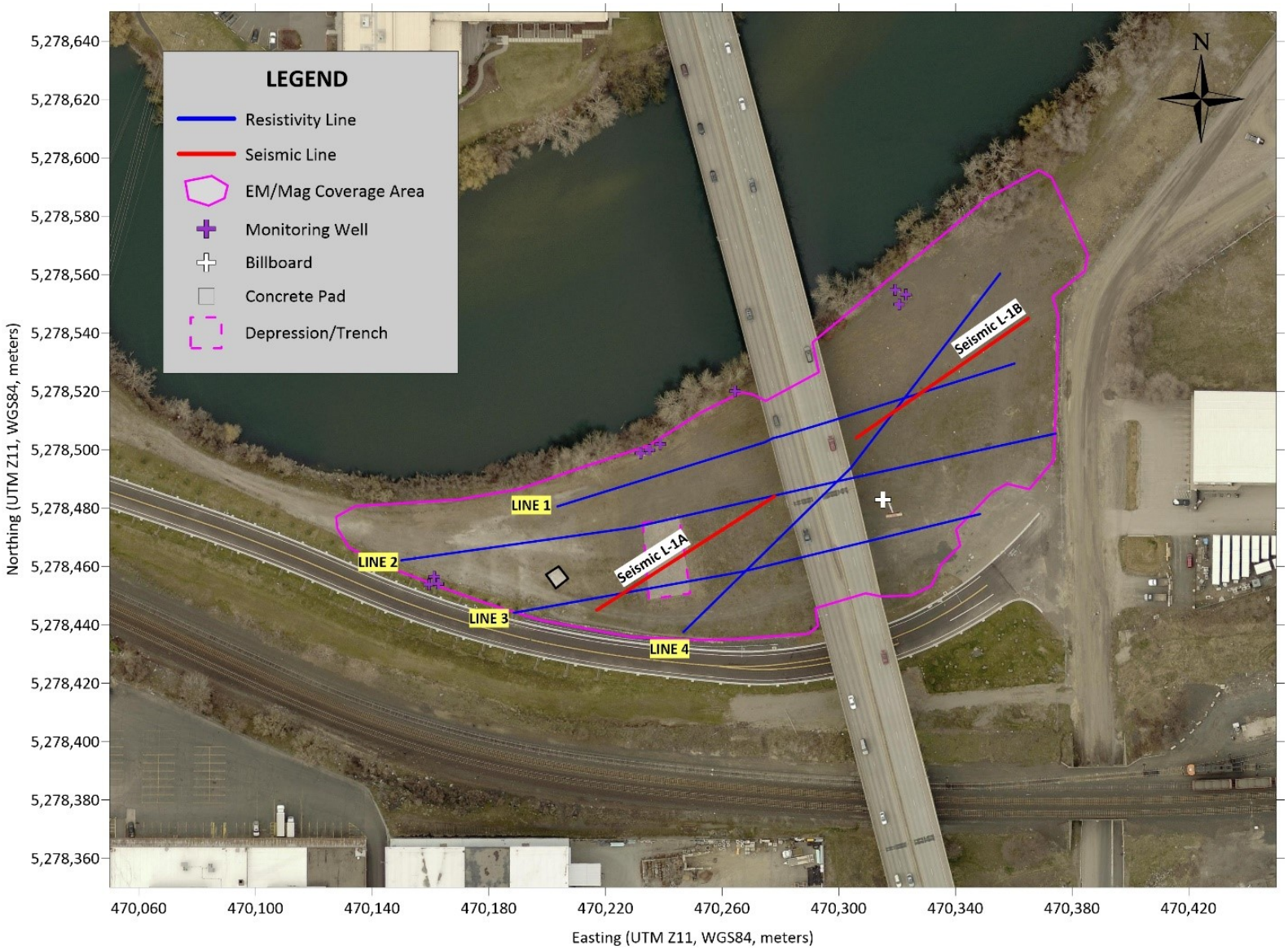
1.2 PROJECT DESCRIPTION

Between June 25 and 27, 2019, hydroGEOPHYSICS, Inc. (HGI) performed multiple geophysical surveys over an approximately 3 acre site on the south side of the Spokane River, as requested by Aspect Consulting (Aspect). The geophysical surveying consisted of a combination of EM, MAG, electrical resistivity profiles, and a combined P-wave refraction and MASW profile.

1.3 SITE LOCATION

The Riverbend site is located near 1112 East Martin Luther King Way in Spokane, Washington. A map detailing the geophysical coverage at the site is shown in Figure 1.

Figure 1. Geophysical Coverage at Riverbend Site.



2.0 METHODOLOGY

2.1 GEOPHYSICAL METHODS

2.1.1 Electromagnetic Induction

The EM-31 terrain conductivity instrument (Geonics, Inc., Canada) was used to collect electromagnetic data. This induction-type instrument measures terrain conductivity without electrodes or direct soil contact. This technique operates on the principle that secondary electromagnetic currents can be induced in metal objects and conductive bodies when an electromagnetic field is applied. This instrument measures the secondary electromagnetic field strength relative to the primary electromagnetic field and converts it directly into a conductivity value. Data are recorded for two phases: the quadrature phase (terrain conductivity), which is measured in milliSiemens per meter (mS/m), and the in-phase component, which is measured in parts per thousand (ppt). The terrain conductivity is responsive to variations in conductivity regardless of material content, whereas the in-phase component responds primarily to metallic objects. The transmitting and receiving coils in the EM31 have a fixed separation of 12 feet and achieve a depth of penetration of approximately 20 feet. Typically, surveys are performed by carrying the instrument and traversing the site on foot or towing the instrument using an all-terrain vehicle (ATV). EM31 surveys are subject to cultural interference from power lines and other surface metal objects.

The EM-31 consists of a sensor housing, electronics console, and a Juniper Systems Allegro 2 field computer. The console includes the data acquisition electronics and battery pack, with data recording and storage conducted by the Allegro 2 field computer. The field computer connects to the EM-31 and a separate Leica survey grade differential GPS system via Bluetooth, and uses the Geomar Software NAV31 software package to control acquisition parameters and record the data. The GPS time and location are appended to each electromagnetic data point. The instrument is commercially available and is widely used within the geophysical arena.

2.1.2 Magnetics

Magnetometry is the measure of the magnetic patterns in the Earth's crust. The Earth's field is composed of three main parts:

- Internal Main Field: source within the earth that varies slowly with time and space, also known as the dynamo
- Secondary Field: source external to the Earth which varies rapidly in time and space due to solar wind

- Small internal fields: constant in time and space and caused by local magnetic anomalies in the near-surface crust (due to paleomagnetism or metallic features).

Of interest to the geophysicist are the localized anomalies. These anomalies are caused by either magnetic minerals (mainly magnetite or pyrrhotite) or buried metal and are the result of contrasts in magnetic susceptibility (k) with respect to the background sediments. The average values for k are typically less than 1 for sedimentary formations and upwards to 20,000 for magnetic minerals.

The magnetic field is measured with a magnetometer. Magnetometers permit rapid, non-contact surveys to locate buried metallic objects and features. A one person portable field unit can be used virtually anywhere a person can walk; although, they may be sensitive to local interferences, such as fences and overhead wires. Field-portable magnetometers maybe single- or dual-sensor. Single-sensor magnetometers measure total field. Dual-sensor magnetometers are called gradiometers and measure gradient of the magnetic field. The rover magnetometer is moved along a predetermined linear grid laid out at the site. Readings are virtually continuous and results can be monitored in the field as the survey proceeds.

The shortcoming with most magnetometers is that they only record the total magnetic field (F) and not the separate components of the vector field. This can make the interpretation of magnetic anomalies difficult, especially since the strength of the field between the magnetometer and target is reduced as a function of the inverse of distance between the magnetometer and target, cubed. Additional complications can include the inclination and declination of the Earth's field, the presence of any remnant magnetization associated with the target, and the shape of the target.

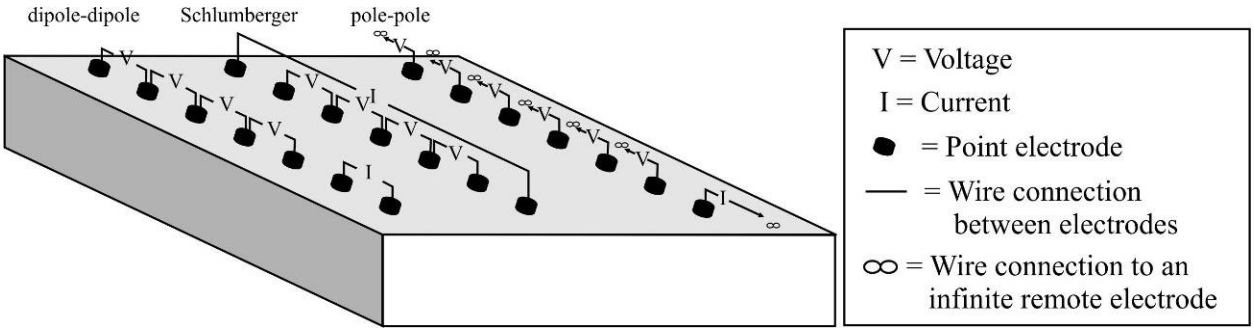
2.1.3 Electrical Resistivity

Electrical resistivity is a volumetric property that describes the resistance of electrical current flow within a medium (Rucker et al., 2011; Telford et al., 1990). Direct electrical current is propagated in rocks and minerals by electronic or electrolytic means. Electronic conduction occurs in minerals where free electrons are available, such as the electrical current flow through metal. Electrolytic conduction, on the other hand, relies on the dissociation of ionic species within a pore space and is more common in partially saturated sandy alluvium and fractured bedrock, for example. With electrolytic conduction, the movement of electrons varies with the mobility, concentration, and the degree of dissociation of the ions. Competent rock free of fissures and fractures will have a higher resistivity compared to less competent rock.

Mechanistically, the resistivity method uses electric current (I) that is transmitted into the earth through one pair of electrodes (transmitting dipole) that are in contact with the soil. The resultant voltage potential (V) is then measured across another pair of electrodes (receiving dipole). Numerous electrodes can be deployed along a transect (which may be anywhere from feet to miles in length), or within a grid. Figure 2 shows examples of electrode layouts for surveying. The figure shows transects with a variety of array types (dipole-dipole, Schlumberger, pole-pole). A complete

set of measurements occurs when each electrode (or adjacent electrode pair) passes current, while all other adjacent electrode pairs are utilized for voltage measurements. Modern equipment automatically switches the transmitting and receiving electrode pairs through a single multi-core cable connection. Rucker et al. (2009) describe in more detail the methodology for efficiently conducting an electrical resistivity survey.

Figure 2. Possible Arrays for use in Electrical Resistivity Characterization.



The modern application of the resistivity method uses numerical modeling and inversion theory to estimate the electrical resistivity distribution of the subsurface given the known quantities of electrical current, measured voltage, and electrode positions. A common resistivity inverse method incorporated in commercially available codes is the regularized least squares optimization method (Sasaki, 1989; Loke, et al., 2003). The objective function within the optimization aims to minimize the difference between measured and modeled potentials (subject to certain constraints, such as the type and degree of spatial smoothing or regularization) and the optimization is conducted iteratively due to the nonlinear nature of the model that describes the potential distribution. The relationship between the subsurface resistivity (ρ) and the measured voltage is given by the following equation (from Dey and Morrison, 1979):

$$-\nabla\cdot\left[\frac{1}{\rho(x,y,z)}\nabla V(x,y,z)\right]=\left(\frac{I}{U}\right)\delta(x-x_s)\delta(y-y_s)\delta(z-z_s) \quad (1)$$

where I is the current applied over an elemental volume U specified at a point (x_s, y_s, z_s) by the Dirac delta function.

Equation **Error! Reference source not found.** is solved many times over the volume of the earth by iteratively updating the resistivity model values using either the L_2-norm smoothness-constrained least squares method, which aims to minimize the square of the misfit between the measured and modeled data (de Groot-Hedlin & Constable, 1990; Ellis & Oldenburg, 1994):

$$\left(J_i^T J_i+\lambda_i W^T W\right)\Delta r_i = J_i^T g_i - \lambda_i W^T W r_{i-1} \quad (2)$$

or the L_1-norm that minimizes the sum of the absolute value of the misfit:

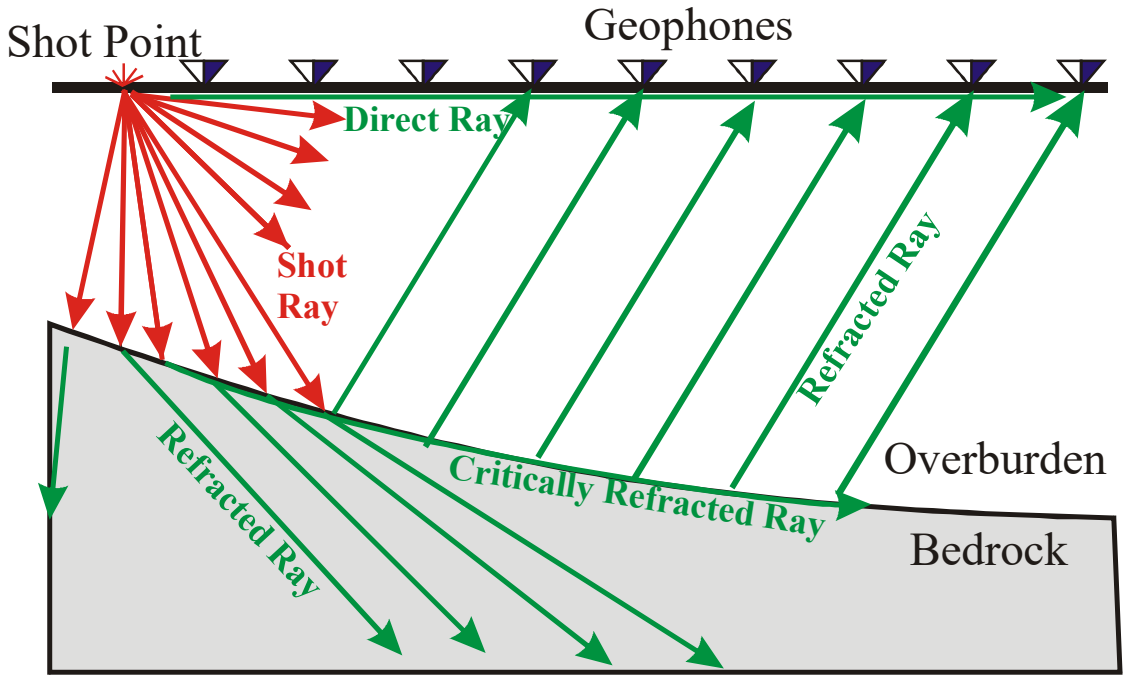
$$\left(J_i^T R_d J_i + \lambda_i W^T R_m W\right)\Delta r_i = J_i^T R_d g_i - \lambda_i W^T R_m W r_{i-1} \quad (3)$$

where g is the data misfit vector containing the difference between the measured and modeled data, J is the Jacobian matrix of partial derivatives, W is a roughness filter, R_d and R_m are the weighting matrices to equate model misfit and model roughness, Δr_i is the change in model parameters for the i^{th} iteration, r_i is the model parameters for the previous iteration, and λ_i = the damping factor.

2.1.4 P-Wave Refraction Method

The P-wave refraction method is based on the measurement of the travel time of seismic waves refracted at the interfaces between subsurface layers of different velocity, which can relate to differing lithologies or degree of weathering for example. Figure 3 shows an example of the seismic refraction method. Seismic energy is provided by a source ('shot') located on the surface. For shallow applications, the shot normally comprises a hammer and plate, weight drop, or small explosive charge (blank shotgun cartridge). Energy radiates out from the shot point, either traveling directly through the upper layer (direct arrivals), or traveling down to and then laterally along higher velocity layers (refracted arrivals) before returning to the surface. The refracted energy is detected on the surface using a linear array (or spread) of geophones spaced at regular intervals. Beyond a certain distance from the shot point, known as the cross-over distance, the refracted signal is observed as a first-arrival signal at the geophones (arriving before the direct arrival). Observation of the travel times of the direct and refracted signals provides information on the depth profile of the refractor.

Figure 3. Ray Travel Paths for Seismic Refraction Survey.



Data are recorded on a seismograph and later downloaded to a computer for analysis of the first-arrival times to the geophones from each shot position. Travel-time versus distance graphs are then constructed and velocities calculated for the overburden and refractor layers through analysis of the direct arrival and T-minus graph gradients. Depth profiles for each refractor are produced by an analytical procedure based on consideration of shot and receiver geometry and the measured travel-times and calculated velocities. The final output comprises a depth profile of the refractor layer and a velocity model of the subsurface.

The primary applications of seismic refraction are for determining depth to bedrock and bedrock structure. Due to the dependence of seismic velocity on the elasticity and density of the material through which the energy is passing, seismic refraction surveys provide a measure of material strengths and can consequently be used as an aid in assessing rippability and rock quality. The technique has been successfully applied to mapping depth to the base of backfilled quarries, depth of waste materials at landfills, thickness of overburden, voids, and the topography of groundwater.

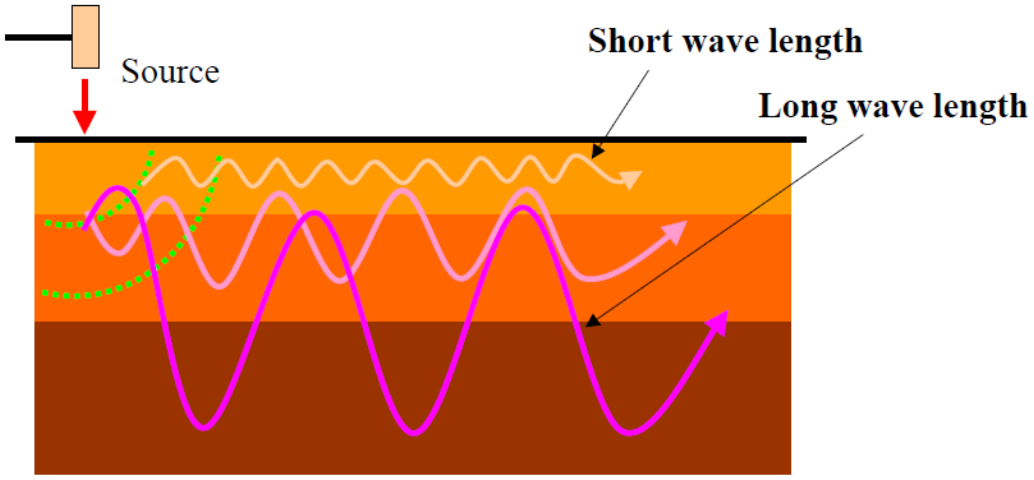
2.1.5 Multi-Channel Analysis of Surface Waves (MASW)

Dispersion, or change in phase velocity with frequency, is the fundamental property utilized in surface-wave seismic methods. Phase velocity of surface-wave is sensitive to the shear wave velocity (Vs); phase velocity of surface-wave is typically 90-95% that of the shear wave velocity. Surface wave dispersion can be significant in the presence of velocity layering, which is common in the near-surface environment. There are other types of surface waves, or waves that travel along a surface, but in this application we are concerned with the Rayleigh wave, which is also called "ground roll" since the Rayleigh wave is the dominant component of ground roll.

"Active source" surface-wave surveying means that seismic energy is intentionally generated at a specific location relative to the geophone spread and recording begins when the source energy is imparted into the ground. This is in contrast to "passive source" surveying, also called "microtremor" surveying or "refraction microtremor" (or the commercial term "ReMi") surveying, where there is no time break and motion from ambient energy (generated by cultural noise, wind, wave motion, etc. at various, and usually unknown, locations relative to the geophone spread) is recorded.

Surface-wave energy decays exponentially with depth beneath the surface. Longer wavelength (that is, longer-period and lower-frequency) surface waves travel deeper and thus contain more information about deeper velocity structure (Figure 4). Shorter wavelength (that is, shorter-period and higher-frequency) surface waves travel shallower and thus contain more information about shallower velocity structure. In this context, by their nature and proximity to the geophone spread, it can be said that higher-frequency active source surface waves resolve the shallower velocity structure and lower-frequency passive source surface waves resolve the deeper velocity structure.

Figure 4. Example of Surface Wave Dispersion Produced During MASW Survey.



MASW surveys are conducted using the same source and seismograph equipment as the more common P-wave seismic refraction surveys, requiring only a change to lower frequency geophones (typically 4.5Hz). They are much easier to conduct than shear wave surveys, and benefit from increasing source power efficiency (for each sledgehammer blow 67% of the energy produced is in the form of surface-waves, 26% shear waves, and 7% P-waves) and consequently improved signal-to-noise ratio. The technique works best in soft rock geology conditions with minimal or constant topography change across the spread.

Shear wave velocity is one of the elastic constants and is closely related to Young's modulus. Under most circumstances, shear wave velocity is a direct indicator of the ground strength (stiffness) and therefore can be used to derive load-bearing capacity.

2.2 GEOPHYSICAL EQUIPMENT

2.2.1 Electromagnetic Induction

The EM-31 terrain conductivity instrument (Geonics, Inc., Canada) was used to collect electromagnetic data. The EM-31 consists of a sensor housing, electronics console, and a Juniper Systems Allegro 2 field computer. The console includes the data acquisition electronics and battery pack, with data recording and storage conducted by the Allegro 2 field computer. The field computer connects to the EM-31 and separate Leica survey grade differential GPS system via Bluetooth and uses the Geomar Software NAV31 software package to control acquisition parameters and record the data. The GPS time and location were appended to each electromagnetic data point.

2.2.2 Magnetometer

A G-858 cesium vapor gradiometer system (Geometrics, Inc., California) was used to provide magnetic data for the project. The instrument is commercially available and was designed to provide detection of subsurface ferrous metals by mapping distortions to the measured localized magnetic field. The G-858 comes with a non-magnetic backpack with integrated Tallysman™ WAAS/EGNOS enabled GPS system. The G-858 console contains a serial input and necessary firmware that is used to interface with and store GPS data. Interchangeable low voltage 12V dc gel cell batteries are used to power the G-858 console.

2.2.3 Electrical Resistivity

Data were collected using a Supersting™ R8 multichannel electrical resistivity system (Advanced Geosciences, Inc. [AGI], Texas) and associated cables, electrodes, and battery power supply. The Supersting™ R8 meter is commonly used in surface geophysical projects and has proven itself to be reliable for long-term, continuous acquisition. The stainless steel electrodes were laid out along lines with a constant electrode spacing of approximately 10 feet (3 meters). Multi-electrode systems allow for automatic switching through preprogrammed combinations of four electrode measurements.

Electrode locations were determined based on the distance along the cable length. A Leica survey grade differential GPS system was used to record the locations and elevations of the line endpoints and select electrodes along each line.

2.2.4 Seismic

Two Geode Ultra-Light Exploration 24 –Channel Seismographs (Geometrics Inc., California) were used for the P-wave refraction and MASW surveying, providing a total of 48 channels. Of the 48 channels (geophones) laid out, only 24 channels were active during recording. The 4.5 Hz geophones were laid out along the survey line with a constant spacing of approximately 5 feet. The seismic energy source was a 12-lb sledgehammer and steel strike plate.

For the MASW survey, the source was located approximately 20 feet off the end of the active geophone spread. The off-end source distance and geophone spacing were determined by collecting test data on site before proceeding with the survey. Shots were collected at intervals of 10 feet, with the 'roll-along' technique being used to advance the active channels down the line.

For the refraction survey, shot point spacing was approximately 60 feet, located at the midpoint of geophone positions along the spread, with off-end shots varying between 25 and 100 feet beyond the first and last geophones. The off-end shot point distance depended on both the calculated cross-over distances from the shot records and local constraints on shot locations. Additional hammer blows forming a new "stack" of data were added until the desired data quality was achieved.

The Geodes were controlled from a laptop in order to view each shot record to ensure acceptable data quality. The shot record (seismogram) was also saved to the computer and stored for subsequent processing. A real-time noise monitor showing all geophones was carefully scrutinized during shots to ensure that noise levels were at a minimum for each shot. This included waiting for breaks in wind noise, train traffic, aircraft, and other sources of noise.

3.0 DATA PROCESSING

3.1 QUALITY CONTROL – ONSITE

Data for each survey method were given a preliminary assessment for quality control (QC) in the field to assure quality of data before progressing the survey. Following onsite QC, the data were transferred to the HGI server for storage and detailed data processing and analysis.

3.2 EM & MAG PROCESSING

The magnetic data were downloaded to a field laptop computer. The data were saved in binary format, with the instrument type, date stamp, and location as part of the naming structure. A preliminary assessment of each survey grid was conducted onsite each day. Where unacceptable data was found, data were recollected.

3.2.1 Electromagnetics Processing and Plotting

Electromagnetic data processing was similar to magnetic data processing. Processing occurred in discrete steps, within multiple Microsoft Excel files, so that all data from a previous step could be recovered or viewed. The process included the following steps:

1. Removing data spikes from the individual data files, using Microsoft Excel.
2. Visualization of results using Surfer mapping software (Golden Software, Inc.).

3.2.2 Magnetics Processing and Plotting

Due to the large quantity of data, the majority of magnetic data processing was performed in multiple Microsoft Excel files. The process included the following steps:

1. Removing data spikes from the individual data files, using Microsoft Excel.
2. Visualization of results using Surfer mapping software (Golden Software, Inc.).

3.3 ELECTRICAL RESISTIVITY PROCESSING

3.3.1 Resistivity Data Editing

The geophysical data for the resistivity survey, including measured voltage, current, measurement (repeat) error, and electrode position, were recorded digitally with the AGI SuperSting R8 resistivity meter. Each line of acquisition was recorded with a separate file name. Following field data collection, the raw resistivity data files were transmitted to the HGI server located in Tucson, Arizona. Data quality was inspected and checked for consistency with respect to adjacent line results, then data files were saved to designated folders on the server. The server was backed up nightly and backup tapes were stored at an offsite location on a weekly and monthly basis.

The raw data were evaluated for measurement noise. Those data that appeared to be extremely noisy and fell outside the normal range of accepted conditions were removed. Examples of conditions that would cause data to be removed include: negative or very low voltages, high-calculated apparent resistivity, extremely low current, and high repeat measurement error.

3.3.2 2D Resistivity Inversion

RES2DINVx64 software (Geotomo, Inc.) was used for inverting individual lines in two dimensions. RES2DINVx64 is a commercial resistivity inversion software package available to the public from www.geotomosoft.com An input file was created from the edited resistivity data and inversion parameters were chosen to maximize the likelihood of convergence. It is important to note that up to this point, no resistivity data values had been manipulated or changed, such as smoothing routines or box filters. Noisy data had only been removed from the general population.

The inversion process followed a set of stages that utilized consistent inversion parameters to maintain consistency between each model. Inversion parameter choices included the starting model, the inversion routine (robust or smooth), the constraint defining the value of smoothing and various routine halting criteria that automatically determined when an inversion was complete. Convergence of the inversion was judged whether the model achieved an RMS of less than 5% within three to five iterations.

3.3.3 2D Resistivity Plotting

The inverted data were output from RES2DINVx64 into an .XYZ data file and were then gridded and color contoured in Surfer (Golden Software, Inc.). Electrode locations and other relevant line features were plotted on the resistivity sections to assist in data analysis. Qualified in-house inversion experts subjected each profile to a final review.

3.4 P-WAVE REFRACTION PROCESSING

Data processing for the seismic refraction method consisted primarily of accounting for energy source and geophone locations, making adjustments for topographic changes along the geophone array profiles, and determining the first arrival times at the geophones. The final step was to determine subsurface acoustic properties using the tomographic inversion method. The software incorporated all of the features necessary for accurate representation of subsurface properties, including the first break pick, inversion, and plotting.

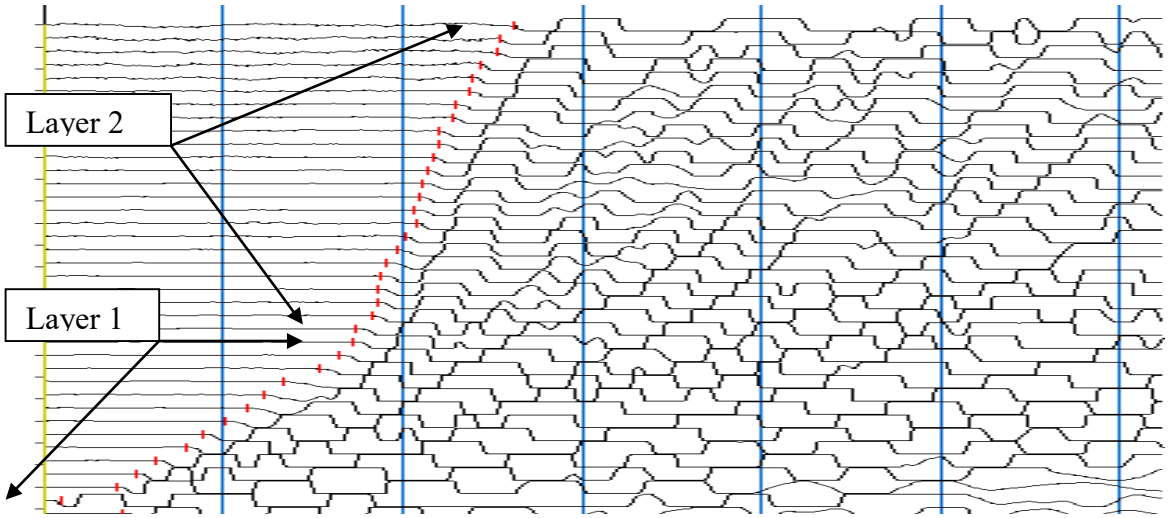
Input Data: Data were reformatted to SEG-Y internal format while preserving trace header information. The geometry was created to define the relationship between the field file and channel numbers, and the source and receiver station numbers. Records marked in the Observer's logs as needing to be omitted were edited from the data.

Geometry & Editing: The data was output as a SEG-Y formatted file for input into the refraction statics program SeisImager (Geometrics, Inc.). At this stage and within the software, edits and corrections were made to account for any errors made in the field.

First Arrival Selection: The first step for data processing was to pick the time for first arrival of energy at the geophone from each of the shot records, also known as first break picking. Each geophone had a separate first break pick for each shot. The first break picking was conducted interactively within the SeisImager's software called Pickwin.

Figure 5 shows an example shot record. The x-axis is time in milliseconds and the y-axis is distance between geophones. The first break picks of energy arriving at the geophones are annotated as red marks below. There is an automatic picking option that is used initially in the software and then each trace in each shot record is manually reviewed and adjusted. There were two distinct velocity slopes in arrivals representing the two layers as illustrated in Figure 5. The first slope, which is much steeper, indicates the slower velocity alluvium layer. The other layer is the refracted energy as it returns from the second and higher velocity layer. The second higher velocity layer was either a more consolidated alluvium or weathered bedrock.

Figure 5. Example Shot Record Showing First Break Picks.



Tomographic Inversion: Tomographic velocity inversion was completed using the SeisImager software. This method starts with an initial velocity model (generated manually or by a time-term inversion and iteratively traces rays through the numerical model) with the goal of minimizing the root-mean squared (RMS) error between the observed and calculated travel times. Tomographic inversion is generally best used when velocity contrasts are known to be more gradational than discrete. In cases where strong horizontal velocity variations are known to exist, and in extreme topography, processing can lead to erroneous results with time-term least squares and delay-time inversion, depending on the severity of variations. Thus, tomographic inversion was chosen for the profiles here. The final output of the inversion modeling is a profile (X and Z dimensions) of acoustic velocity beneath each geophone spread. Generally tomographic inversion requires a larger quantity and higher quality of data to produce viable results.

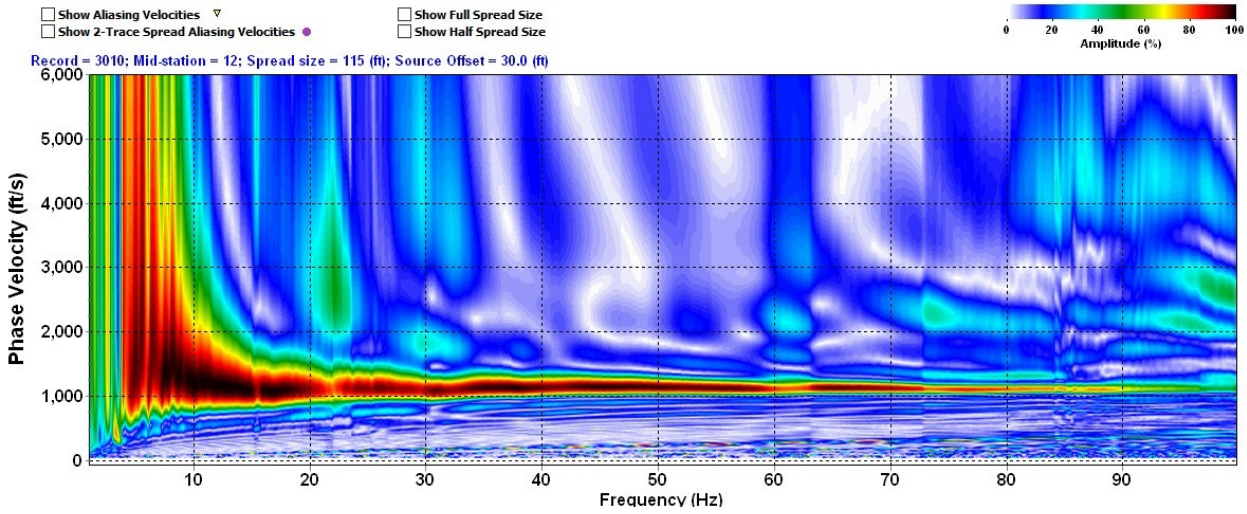
3.5 MASW PROCESSING

The data processing flow for the MASW used the SurfSeis (Kansas Geological Survey, Lawrence, KS) MASW processing software. The processing sequence included: encoding the field geometry, generating dispersion images (example shown in Figure 6), extracting dispersion curves, and inversion of the dispersion curves using a gradient-based iterative approach, with the goal of minimizing the RMS error between the observed and calculated velocity curves. Convergence of the inversion was judged whether the model achieved an RMS of less than 5% within five to seven iterations.

One-dimensional (1D) shear wave velocity models were generated from the data collected every 10 feet along each survey line, and are plotted to the center of the active geophone spread. These models were then output from SurfSeis as .XYZ data files, and were then combined, gridded, and contoured using Surfer software (Golden Software, Inc., Golden CO) to produce 2D cross-

sectional models of shear wave velocity. Qualified in-house inversion experts subjected each profile to a final review.

Figure 6. Example Dispersion Curve.



4.0 RESULTS

4.1 EM RESULTS

EM conductivity data respond with positive magnitudes, where larger readings can indicate either a larger response, close proximity to a target, or a combination of the two. Therefore, the contoured results are presented with background areas highlighted in dark blue tones (indicating low magnitude responses), potential disturbed areas in light blue to green tones, and high magnitude features (for example foundation responses) in yellow to red tones.

In contrast, EM in-phase data produce both positive and negative numerical responses to various features depending on the physical location and orientation of instrument to target, the physical arrangement of the target, the target's physical composition, or some combination of these properties. To highlight these features, the in-phase color scale uses light blue tones to indicate background areas of low magnitude readings, and both red/magenta (positive) and dark blue (negative) tones to indicate high magnitude readings that may indicate above- and below-ground objects.

Figure 7 shows the results of the EM conductivity (sensitive to bulk conductivity changes) survey for the whole survey site in milliSiemens per meter (mS/m).

In general, the EM conductivity results display a number of responses across the survey area. The western and northern areas of the site, near the river, exhibits a response indicative of background (blue hues), likely meaning that the areas are either undisturbed or do not show a conductive

signature. There is significant interference observed along the south and eastern edges of the survey area, most likely a response to the metal fence around the site boundary. Four linear anomalies, labeled A, may be responses from buried utilities, or may be related to voids that have formed along old building foundations. Several high magnitude responses (orange to red shading regions) are observed in the south-central portion of the survey area that could be related to old building foundations. Some of the high magnitude responses under the overpass may be caused by the overpass and/or support structures (labeled B). However, the continuity of some of the linear features under the overpass indicates that some of the lower magnitude responses (greens and yellows) may be caused by buried materials.

Figure 8 shows the results of the EM in-phase (sensitive to ferrous and nonferrous objects) survey for the whole survey site in parts per thousand (ppt).

The EM in-phase results seem to be in general agreement with the EM conductivity results. Several strong negative (dark blue) responses are observed southwest of the depression/trench, including one of the linear features, which indicate metal objects. Two additional linear features, labeled C, are observed in the eastern area of the site, which could be a response to buried utilities or old building foundations.

4.2 MAG RESULTS

Vertical magnetic gradient data respond with both positive and negative numerical responses to various ferrous metal features depending on the physical location and orientation of the instrument to the target and the physical arrangement of the target. Larger readings can indicate either a larger response, close proximity to a target, or a combination of the two. The contoured results are presented with background areas highlighted in green tones (indicating low magnitude responses), and high magnitude features (for example buried metal) in blues and yellow to red tones.

Figure 9 shows the results of the magnetic gradient survey for the whole survey site in nanoTeslas (nT).

Most of the survey area presents a background (green tones) response. The overpass has a significant influence on the MAG results, extending 80 to 100 feet out from the edges of the overpass to both the east and west. Other high magnitude responses include responses from known surface features such as monitoring wells and a concrete pad. High amplitude responses southwest of the depression/trench are in agreement with the EM in-phase results, although the EM results appear to define these features better than the MAG results. Additional isolated high amplitude responses are observed in the survey area, especially in the eastern portion of the site.

Figure 7. EM Conductivity Results.

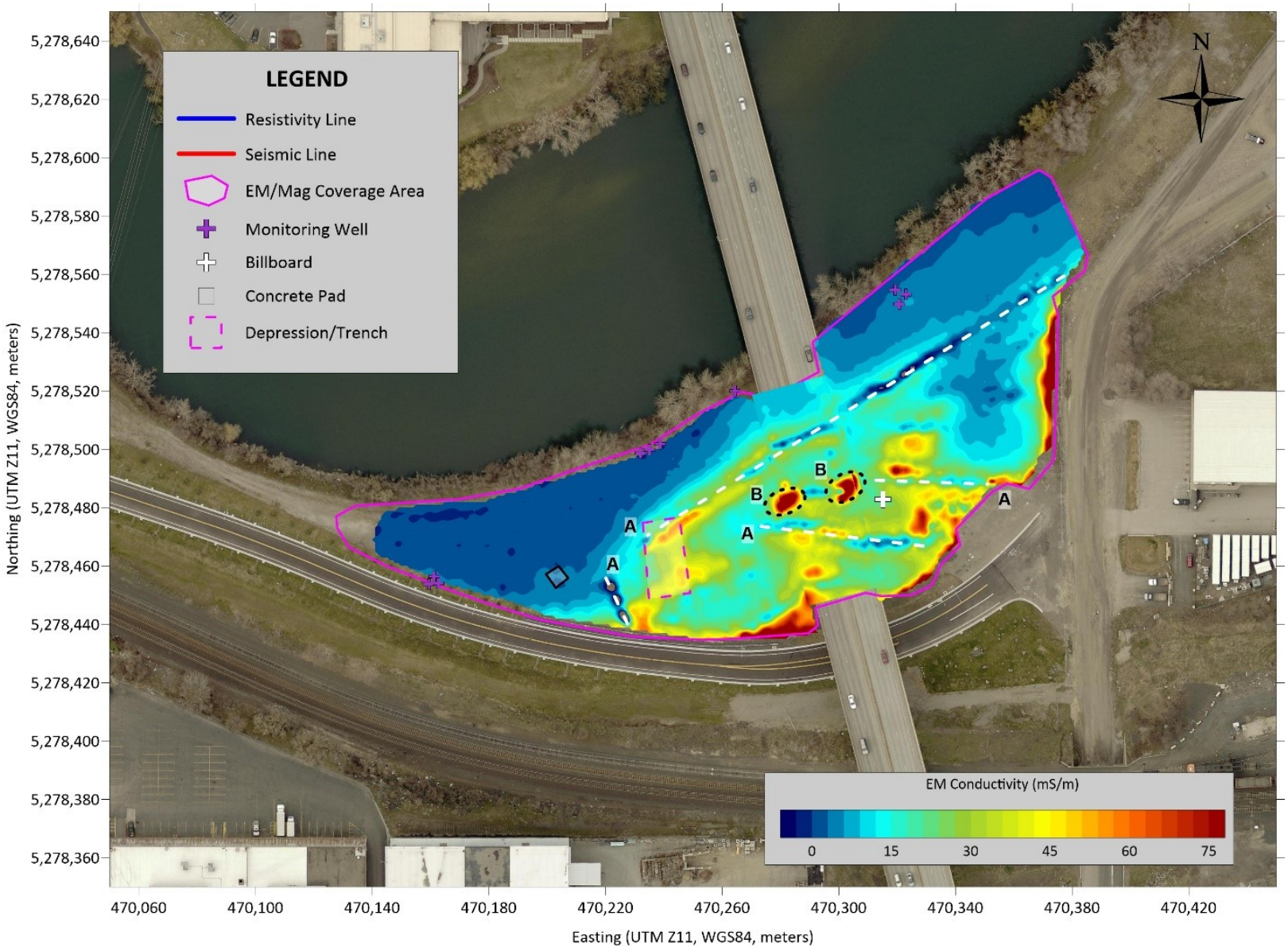


Figure 8. EM In-Phase Results.

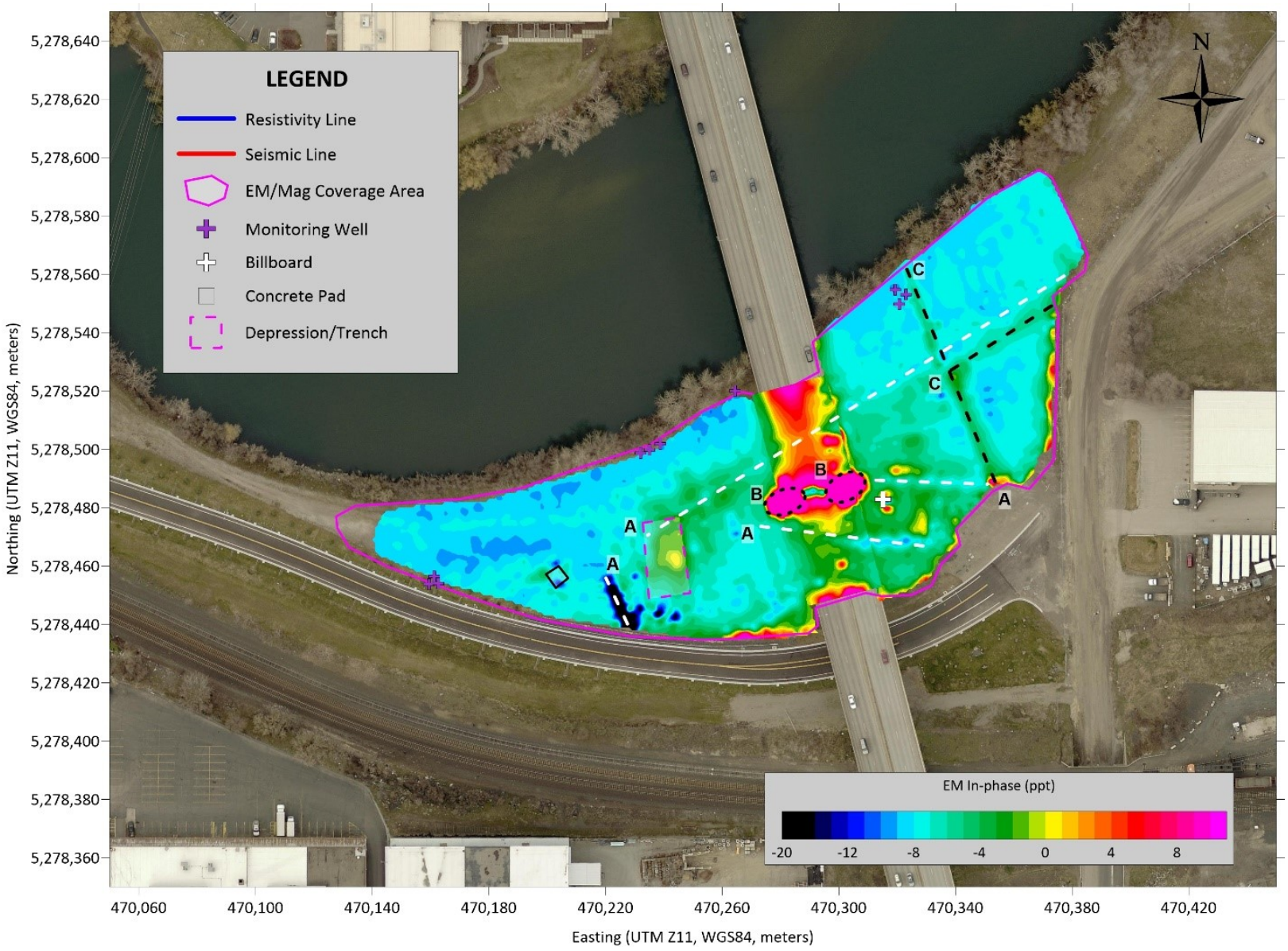
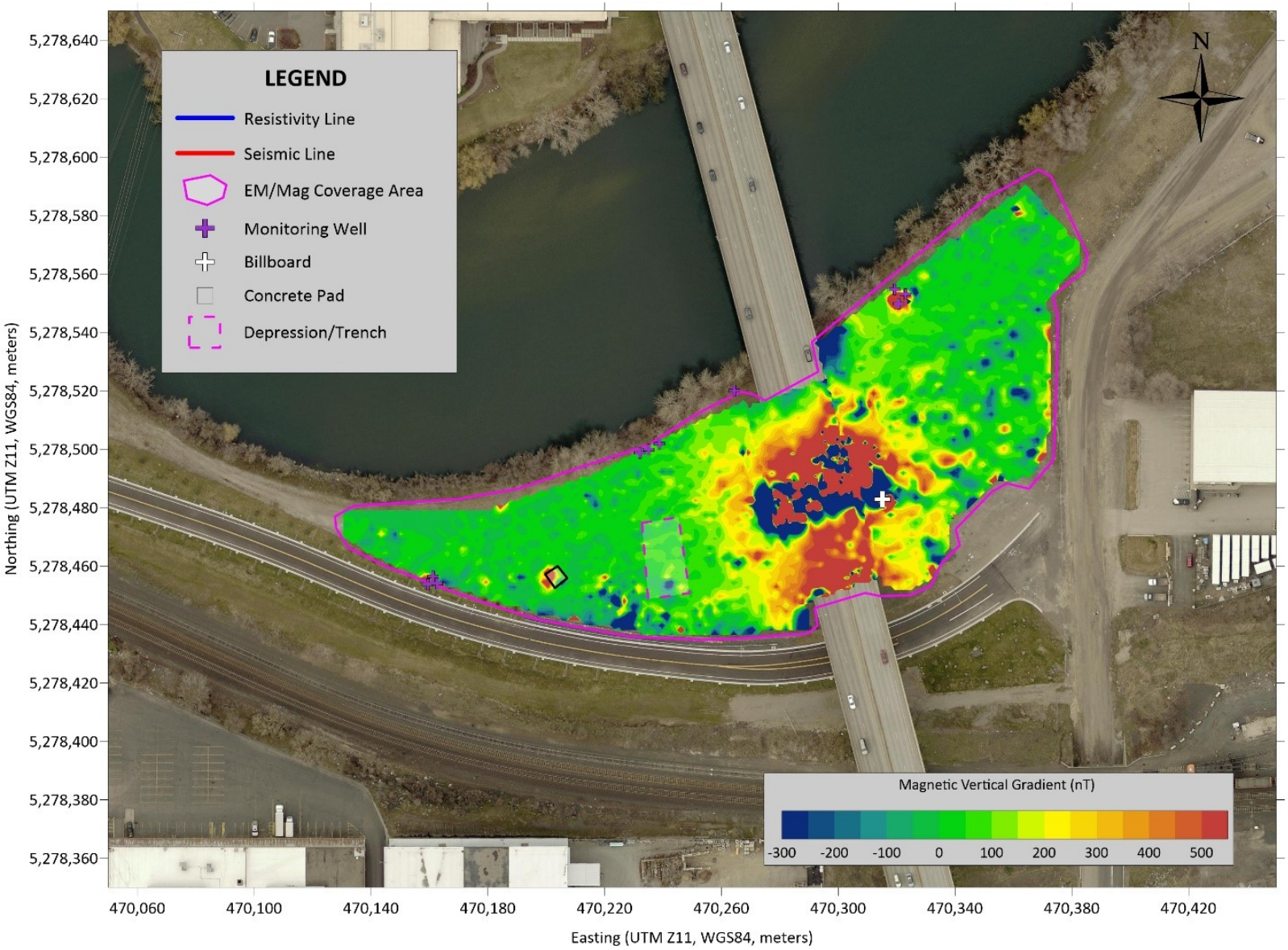


Figure 9. MAG Results.



4.3 RESISTIVITY RESULTS

Figure 10 shows the resistivity profiles for Lines 1 through 4, which ran approximately southwest to northeast across the site. The site was very flat, with no noticeable topographic relief.

In general, the near surface materials in the western portion of the site are highly resistive (reds and browns), and the near surface materials in the central and eastern portion of the site are moderately resistive (olive to yellow). The geology across the site appears to be very complex, with various areas of conductive and resistive materials, likely indicating increased clay content (conductive areas) or increased sand content (resistive areas).

Suspected fill materials typically present as a resistive target (olive and red colors) with the underlying natural sediments present as a conductive layer (blue and purple colors). The interpreted fill layer thickness is variable between lines, and the interpreted base of the fill material is highlighted by the black dashed lines in Figure 10.

The Line 1 results show a highly resistive near surface material from 0 to about 210 feet that varies in thickness from 20 to 25 feet. This material is likely basalt fill from railroad excavations that is known to have been placed in the western areas of the site. From the overpass to the east, 210 feet to the edge of the model, there is a moderately resistive and somewhat discontinuous layer of near surface material that varies from 5 to 15 feet thick. This material may represent either less resistive natural materials, or fill materials.

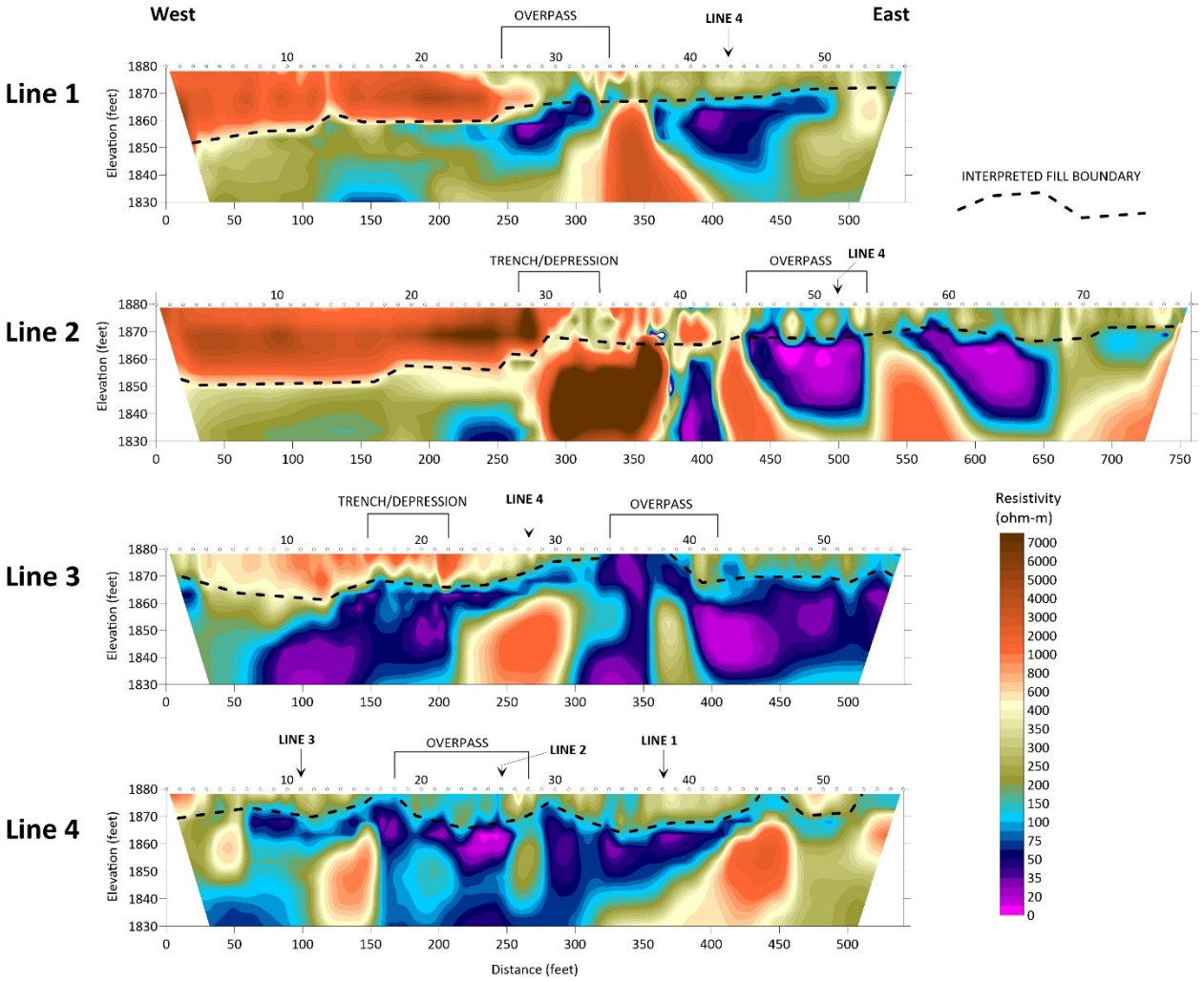
Line 2 model results are very similar to Line 1, and show a highly resistive near surface material from 0 to about 280 feet that varies in thickness from 20 to 25 feet. This material is likely basalt fill from railroad excavations that is known to have been placed in the western areas of the site. From the trench/depression to the east, 280 feet to the edge of the model, there is a moderately resistive and somewhat discontinuous layer of near surface material that varies from 5 to 20 feet thick. This material may represent either less resistive natural materials, or fill materials.

The model results for Line 3 are similar to Lines 1 and 2, and show a moderate to highly resistive near surface material from 0 to about 280 feet that varies in thickness from 5 to 20 feet. This material may include some of the basalt fill from railroad excavations that is known to have been placed in the western areas of the site. From the overpass to the east, 370 feet to the edge of the model, there is a moderately resistive and somewhat discontinuous layer of near surface material that varies from 5 to 10 feet thick. This material may represent either less resistive natural materials, or fill materials.

The Line 4 model results are similar to eastern portion of the Lines 1, 2, and 3. The entire model shows a near surface moderately resistive and discontinuous layer of near surface material that varies from 5 to 10 feet thick. This material may represent either less resistive natural materials, or fill materials.

Generally, the resistivity and EM results are in agreement. The western and northern portions of the site are very resistive, and the central and eastern portions of the site are more conductive (though not highly conductive).

Figure 10. Resistivity Survey Results.



4.4 SEISMIC RESULTS

The model results for the P-wave refraction profile is presented as a 2D cross section in Figure 11. The tomographic inversion presented accounts for lateral and vertical variations in the seismic velocity and can be useful in identifying more subtle changes in the subsurface. The tomographic inversion is typically better suited to investigations where sharp changes in topography or lateral variations in seismic velocity are present. Low seismic velocities are represented by cool shades (purple and blue) and higher seismic velocities as warm shades (yellow and orange).

The P-wave refraction profile displays a two-layer structure based on the initial time-term modeling. A low seismic velocity layer with a maximum thickness of approximately 15 feet, extends across the profile, likely representing the near-surface soils or materials. Below this layer is a layer that displays seismic velocities between approximately 3,000 and 6,200 feet/sec. This layer likely represents unconsolidated alluvium or weathered basalt. The increase in seismic velocity observed at depth, especially in the northeastern segment, may be a response to increase consolidation of the alluvium, a higher degree of cementation of the sediments, or less weathered basalt in this area. According to Caterpillar's rippability chart for a D8 ripper, basalt is rippable below a velocity of approximately 6,500 feet/sec, and the highest modeled velocity along the survey line is 6,200 feet/sec. Some shot gathers from the northeastern segment exhibited higher velocity near surface arrivals, which are a typical response from nearby buried foundations. This response was evident from approximately 425 to 535 feet along the survey line, and the model shows a higher velocity near surface anomaly between approximately 490 to 520 feet, which is likely where the concrete was closest, or directly below, the survey line.

The results for the MASW models is presented as a two dimensional (2D) profile of shear wave velocity in Figure 12. Low seismic velocities are represented by cool shades (blue to green) and higher seismic velocities as warm shades (yellow to red).

The southwestern segment of the profile shows a gradual increase in velocity with depth. The northeastern segment of the profile shows a more complex situation, with near surface materials rapidly increasing in velocity to a depth of approximately 20 feet. Below 20 feet depth a lower velocity layer is apparent in the northeastern segment that extends down to about 35 feet depth. Beneath the lower velocity layer is much higher velocity layer that extends to the bottom of the model. Velocity inversions (high over low over high) are not likely to be seen in P-wave refraction results because of the physics involved, but can be successfully imaged in MASW results. The higher near surface velocities of the northeast segment of the profile could be a result of nearby buried foundations, or stiffer near surface materials in this area.

A single MASW one dimensional (1D) profile of shear wave velocity is presented in Figure 13. The average shear wave velocity for this profile in the upper 100 feet below the ground surface (Vs_{100}) is approximately 1,205 feet/sec. This velocity corresponds to Site Class "C" (very dense soil and soft rock, 1,200 to 2,500 feet/sec) per Section 1613 of the 2009 International Building Code (IBC); however, this velocity is very close to Site Class "D" (stiff soil, 600 to 1,200 feet/sec), so caution may be prudent for designing future construction.

Figure 11. P-wave Refraction Results.

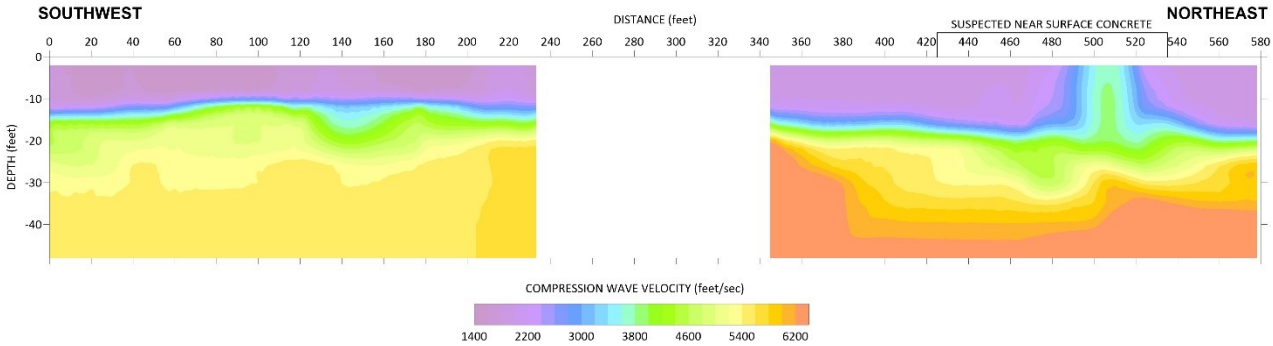


Figure 12. MASW 2D Results.

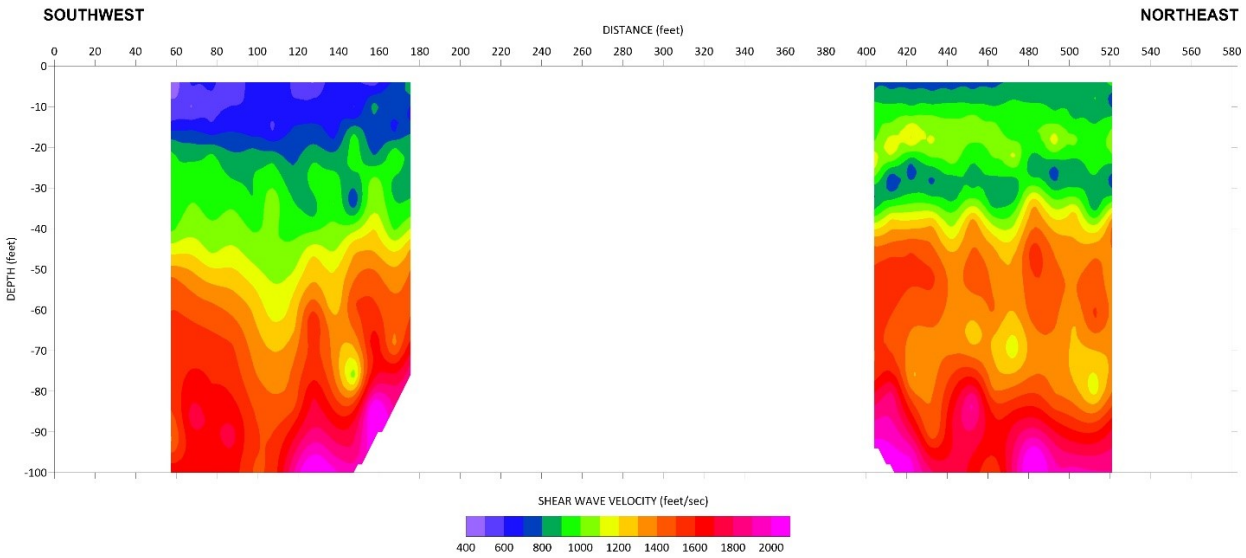
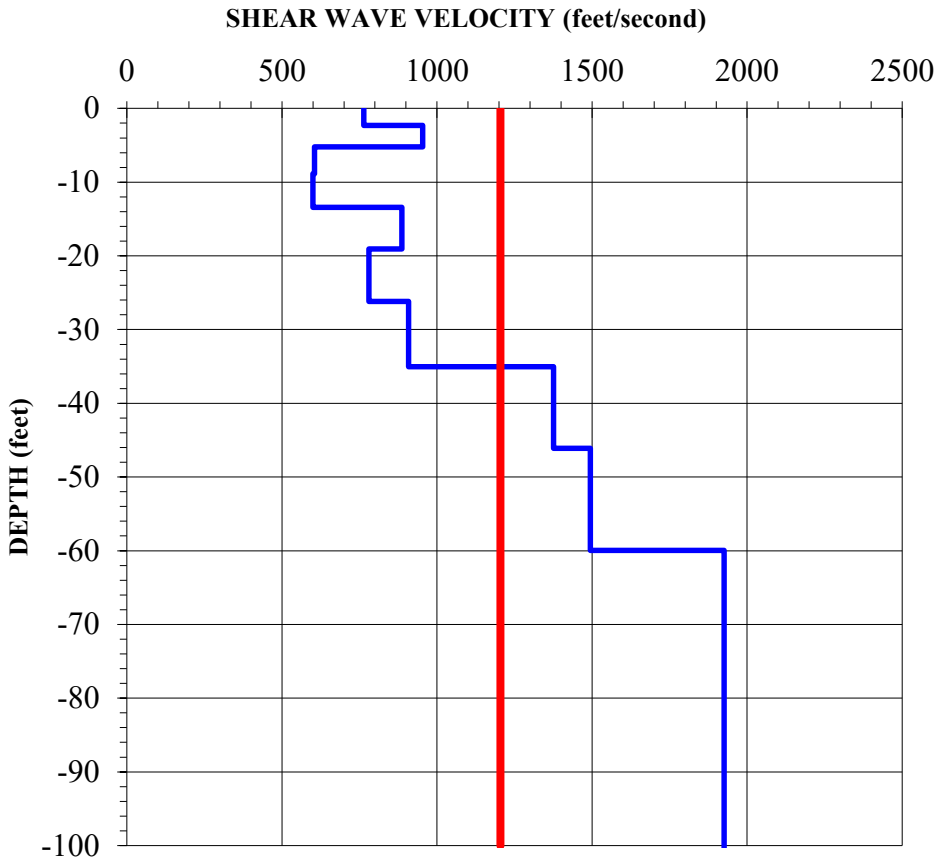


Figure 13. MASW 1D Results.



5.0 CONCLUSIONS

A multi-method geophysical survey was performed at the Riverbend Site in Spokane, Washington, in June of 2019. The survey was performed to determine the lateral extents and thickness of buried debris and foundations, as well as seismic properties along a sanitary sewer line. Combined electromagnetic and magnetic surveys over the entire accessible area, as well as four lines of 2D electrical resistivity, and one line of P-wave refraction and MASW were completed. The EM and Mag measurements provided an indication of the lateral limits of the disturbed area and possible buried foundations (Figures 7, 8, and 9). The electrical resistivity imaging method confirmed these boundary results and allowed the depth and thickness of possible fill material to be estimated (Figure 10). The P-wave refraction and MASW methods provided information on the density and stiffness of near surface materials along the sanitary sewer alignment, and corroboration that buried foundations are likely nearby the sanitary sewer alignment northeast of the overpass.

6.0 REFERENCES

deGroot-Hedlin, C., and S.C. Constable, 1990, Occam's inversion to generate smooth, two-dimensional models from magnetotelluric data: Geophysics 55, 1613– 1624.

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APPENDIX E

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

Geoscience is Not Exact

The geoscience practices (geotechnical engineering, geology, and environmental science) are far less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or property, you should contact Aspect Consulting, LLC (Aspect).

This Report and Project-Specific Factors

Aspect's services are designed to meet the specific needs of our clients. Aspect has performed the services in general accordance with our agreement (the Agreement) with the Client (defined under the Limitations section of this project's work product). This report has been prepared for the exclusive use of the Client. This report should not be applied for any purpose or project except the purpose described in the Agreement.

Aspect considered many unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

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- Not prepared for the specific purpose identified in the Agreement;
- Not prepared for the specific subject property assessed; or
- Completed before important changes occurred concerning the subject property, project, or governmental regulatory actions.

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods,

earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical, Geologic, and Environmental Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions, please contact the Aspect Project Manager for this project.

MEMORANDUM

Project No. 190210

April 14, 2021

To: Gale Stanley, ALSC Architects

cc: Robert Hayes, Sagamore Spokane LLC
Jeff Jurgensen, OAC Services, Inc.

From:

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Dave Cook, LG, CPG
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Re: **Updates to Recommendations in Geotechnical Report for District on the River (formerly Riverbend) Development**

This memorandum provides documentation of updated geotechnical recommendations for the Riverbend Redevelopment (Site) since publication of the final Geotechnical Engineering Report dated May 22, 2020 (Aspect, 2020). The intent is also to clarify the document of record for each of the items below.

Updated Recommendations

Vapor Intrusion Mitigation

Recommendations related to vapor intrusion mitigation are included in the environmental Engineering Design Report (EDR) for the District on the River Redevelopment (Aspect, draft

2021). The EDR was completed to satisfy the requirements of Prospective Purchaser Consent Decree (PPCD) No. 21200059-32 between Sagamore Spokane, LLC and the Washington State Department of Ecology (Ecology). The PPCD includes an Amendment to the Cleanup Action whereby Sagamore must undertake certain environmental actions to enhance the past cleanup action (capping of manufactured gas plant contamination) at this long-standing contaminated Site. One of those actions is vapor mitigation to prevent the potential migration of chemical vapors into overlying buildings constructed at this Site.

Per the EDR, vapor intrusion mitigation will be provided by installation of a sub-slab venting system beneath buildings 1A, 1B, and 2B (a venting system is unnecessary beneath building 2A because there is no occupancy at grade as it will be a parking garage). This venting system will maintain active depressurization beneath the buildings via in-line fans installed in riser pipes extended to the roof. Sub-slab piping will be oriented so that it will not conflict with elevator pits. The vapor intrusion mitigation system will be protective of both chemicals regulated by the Washington State Model Toxics Control Act (MTCA) and radon. Instead of a chemical vapor barrier beneath the slab, a simple moisture barrier will be used such as black 6-millimeter polyethylene sheeting. Section 5.7 - Chemical Vapor Barrier, of the Geotechnical Engineering Report, which recommends the use of a chemical vapor barrier below the mat foundations and slab-on-grades, is obsolete and is replaced by recommendations in the EDR under Section 6 – Vapor Mitigation.

Under-Slab Drainage

An under-slab perimeter drainage system is not required for the residential redevelopment. The soils have been demonstrated to be adequately infiltrative and the water table deep enough below the proposed top of slab elevation to prevent seepage or leaks. Section 5.6 – Under-Slab Drainage, of the Geotechnical Engineering Report is therefore no longer applicable.

Elevator Pits

The Geotechnical Engineering Report did not specifically reference elevator pit waterproofing, so the recommendation is documented solely by this memorandum. The elevator pits are the only component of the foundation design that extend deep enough below ground surface to warrant waterproofing. It is our understanding that bentonite clay sheeting with HDPE backing is the planned waterproofing system. If an alternative waterproofing system is selected, it shall require approval by Aspect prior to installation. No other component of the foundation design shall require waterproofing beyond a moisture barrier referenced above. Elevator pits for Buildings 1A, 1B, and 2B are outside the source area of contamination and are not anticipated to be a contributor to vapor intrusion inside the building.

Piles

The preliminary estimates pertaining to grouted helical pile loads and quantity in Section 5.3.2 – Deep Foundations – Buildings 2A and 2B of the Geotechnical Engineering Report are superseded by this memorandum and the final pile design. The current pile design as presented by DCI Engineers on the February 5, 2021 version of the Foundation Set on Sheet S-101 for both Buildings 2A and 2B includes 649 grouted helical piles. The vast majority of these are designed at 100-kip allowable axial load, however, a select few are designed for 40-kips or 60-kips. As indicated on the plans, the pile locations are for reference only, and the pile designer is responsible for final locations.

Conclusions

This memorandum provides updates to the Geotechnical Engineering Report on the topics of vapor intrusion mitigation, under-slab drainage, elevator pit waterproofing, and pile load and quantity. The environmental Engineering Design Report (to be finalized in May 2021) contains recommendations for vapor intrusion mitigation and the representation in this memorandum related to vapor intrusion mitigation is for informational purposes only. This memorandum responds to questions posed by ALSC Architects via email communication on March 15, 2021. Please consult the reference documents or Aspect on all other geotechnical or environmental considerations.

References

Aspect Consulting, LLC (Aspect), 2020, Geotechnical Engineering Report – Riverbend Development, Revised May 22, 2020.

Aspect Consulting, LLC (Aspect), 2021, Final Engineering Design Report – District on the River Redevelopment, PPCD No. 21200059-32, Draft, March 5, 2021.

Limitations

Work for this project was performed for Sagamore Spokane, LLC (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this memorandum and the referenced reports in their entirety. At the time of this report, design plans and construction methods have not yet been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor’s site safety methods, techniques, sequences, or procedures.

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Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions please call Spencer Ambauen, Project Geotechnical Engineer, 206.838.6589.

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APPENDIX A

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of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

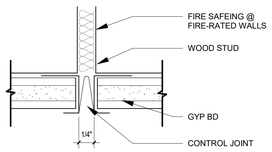
Geotechnical, Geologic, and Environmental Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions please contact the Aspect Project Manager for this project.

APPENDIX H

Architectural Plans
(with sub-slab vapor monitoring points)



E5 GYP CONTROL JOINT

SCALE : 12" = 1'-0"

KEYNOTES

I:18	AT LOCATIONS WHERE WALL TYPES WITH DIFFERENT NUMBER OF LAYERS OF GYP AND SHEATHING COME TOGETHER, EXTEND THE OUTER LAYER OF GYPSUM TO THE NEXT WALL CORNER. MAINTAIN FIRE RATING AT MATERIAL JOINTS.

GENERAL NOTES

1. DIMENSIONS ARE TO FACE OF STUD AT PARTITIONS, GRID LINES, CENTERLINE OF COLUMNS AND CENTERLINE OF PARTY WALLS, UNO.
2. CLR DIMENSIONS INDICATE CLEAR DIMENSIONS FROM FACE OF WALL FINISH
3. WALL TYPES DEFINE THE ENTIRE LENGTH OF A WALL ON THE WALL SIDE NOTED FROM CORNER TO CORNER UNO. SEE SHEET A-050 & A-051 FOR WALL TYPES LEGEND.
4. ALL WALLS NOT DESIGNATED WITH A WALL TYPE OR NOTED OTHERWISE SHALL BE AW6s1.
5. SEE DOOR SCHEDULE FOR DOOR AND RELITE FRAME TYPES AND DETAIL REFERENCES
6. SEE SHEETS G-004 AND G-005 FOR RATED WALL LOCATIONS. PROVIDE FIRE STOPPING TO MEET FIRE RATINGS REQUIRED. WHERE OPENINGS ARE OVERSIZED, PROVIDE WALL INFILL TO MEET WALL FIRE RATINGS
7. SEE ENLARGED PLANS FOR ADDITIONAL NOTES, INTERIOR ELEVATION CALLOUTS AND OTHER DETAILS WITHIN THE CALLOUT AREA.
8. FE-1 FIRE EXTINGUISHER CABINETS: MAINTAIN FIRE RATING AND COORDINATE WITH STRUCTURAL AT ALL SEMI-RECESSED FEC LOCATIONS.
9. SEE ENLARGED UNIT PLANS FOR INFORMATION WITHIN UNITS:

UNIT A	SHEET A-420
UNIT B	SHEET A-421
UNIT C	SHEET A-422
UNIT D	SHEET A-423
UNIT E	SHEET A-424
UNIT E.1	SHEET A-425
UNIT F	SHEET A-426
UNIT G	SHEET A-427
UNIT H	SHEET A-428

1 LEVEL 01 - FLOOR PLAN

SCALE : 3/32" = 1'-0"

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BUILDING 1A

SAGAMORE SPOKANE LLC

RIVERBEND APARTMENTS

PRICING SET ADDENDUM

REV	DATE	DESCRIPTION
ADD 4	5/22/20	PRICING SET ADD 4

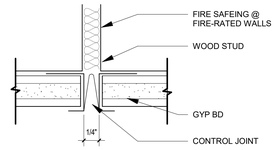
PROJ. NO. 2019-009

PROJECT MANAGER KR/GS

DATE 5/22/20

FLOOR PLAN
- LEVEL 1

A-101



E5 GYP CONTROL JOINT

SCALE : 12" = 1'-0"

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UNIT B	SHEET A-421
UNIT C	SHEET A-422
UNIT D	SHEET A-423
UNIT E	SHEET A-424
UNIT E.1	SHEET A-425
UNIT F	SHEET A-426
UNIT G	SHEET A-427
UNIT H	SHEET A-428

KEYNOTES

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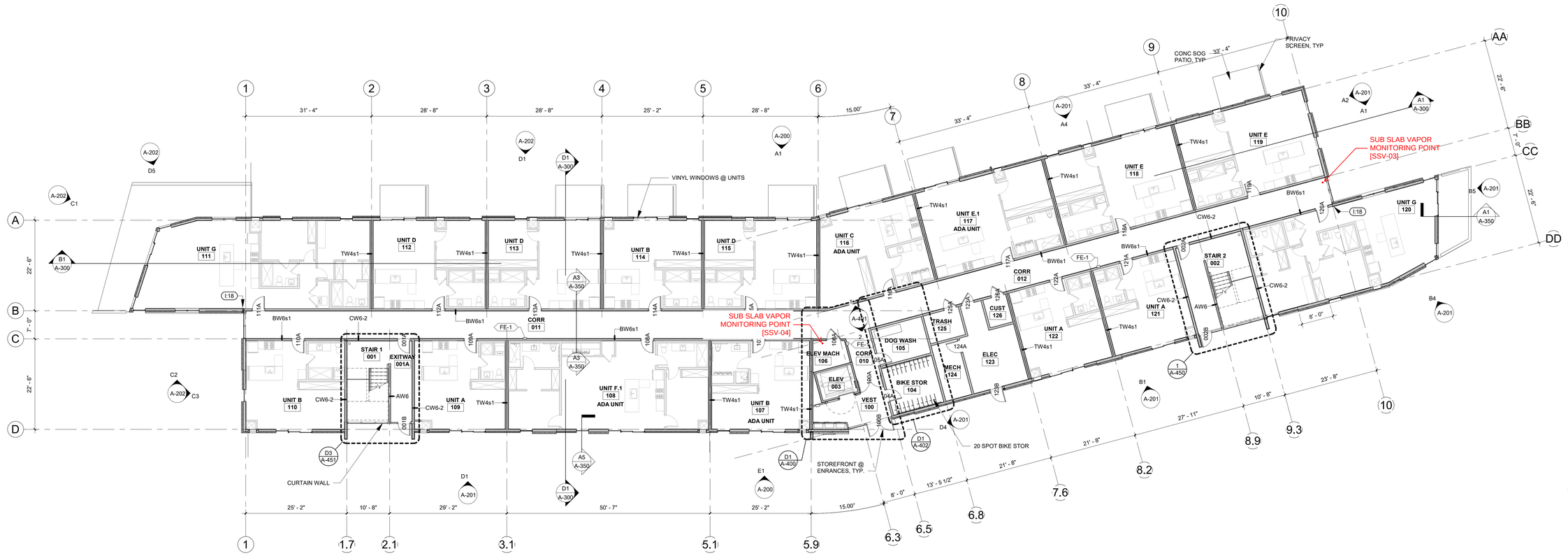

1 LEVEL 01 - FLOOR PLAN

SCALE : 3/32" = 1'-0"

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Coeur d'Alene, Idaho 83815
208.676.8292

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BUILDING 1B

SAGAMORE SPOKANE LLC

RIVERBEND APARTMENTS

PRICING SET ADDENDUM

REV	DATE	DESCRIPTION
ADD 4	5/22/20	PRICING SET ADD 4

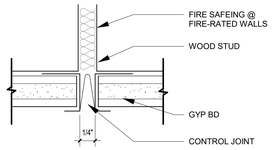
PROJ. NO. 2019-009

PROJECT MANAGER KR/GS

DATE 5/22/2020

FLOOR PLAN - LEVEL 1

A-101



E5 GYP CONTROL JOINT

SCALE : 12" = 1'-0"

KEYNOTES

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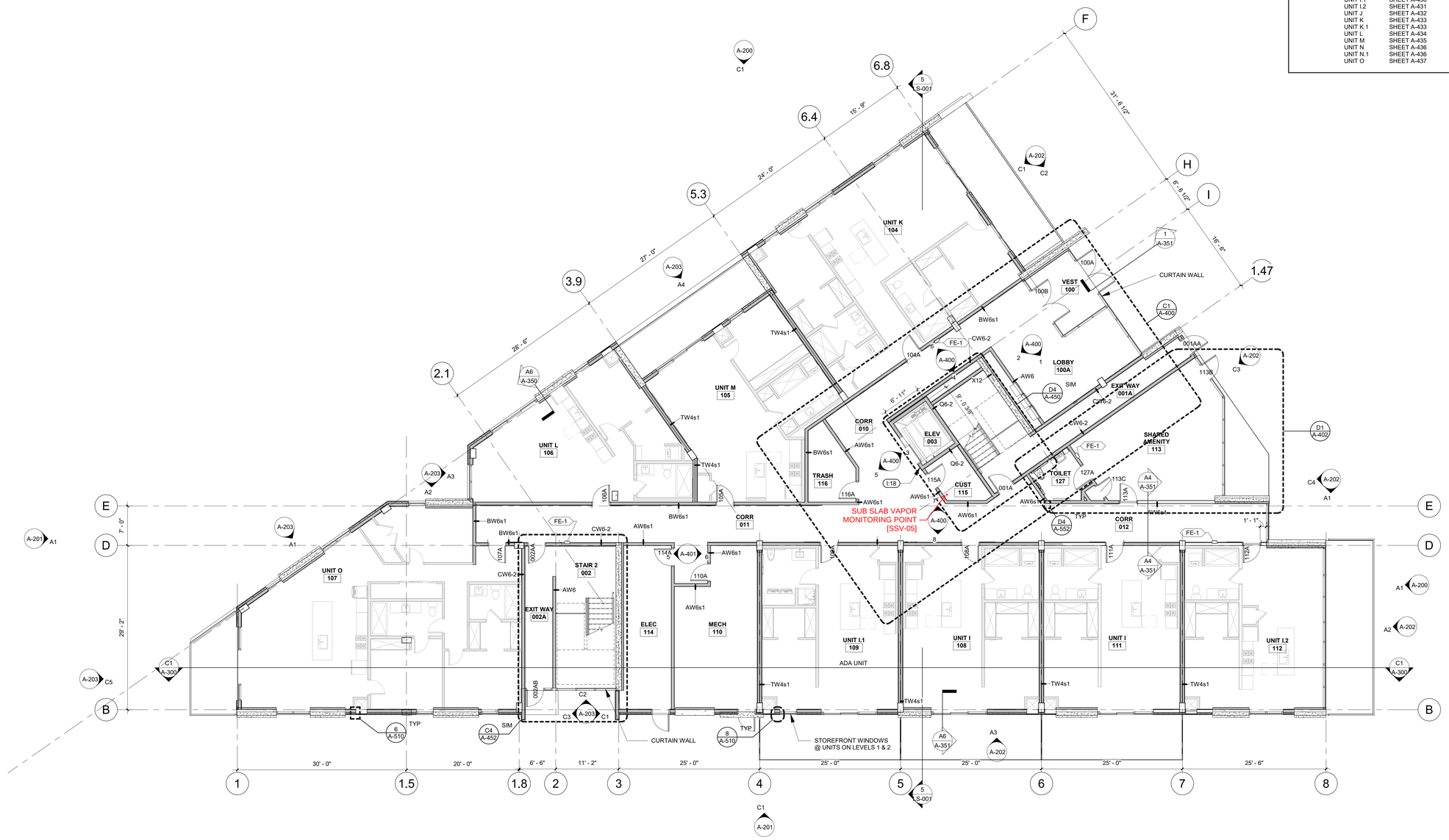
9. SEE ENLARGED UNIT PLANS FOR MORE INFORMATION WITHIN UNITS:

UNIT I	SHEET A-430
UNIT I.1	SHEET A-430
UNIT I.2	SHEET A-431
UNIT J	SHEET A-432
UNIT K	SHEET A-433
UNIT K.1	SHEET A-433
UNIT L	SHEET A-434
UNIT M	SHEET A-435
UNIT N	SHEET A-436
UNIT N.1	SHEET A-436
UNIT O	SHEET A-437



A1 LEVEL 01 - FLOOR PLAN

SCALE : 1/8" = 1'-0"

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STATE OF WASHINGTON

BUILDING 2B

SAGAMORE SPOKANE LLC

RIVERBEND MULTI-FAMILY APARTMENTS

SECOND PRICING SET

REV	DATE	DESCRIPTION

PROJ. NO. 2019-009

PROJECT MANAGER KR/GS

DATE 06/29/20

FLOOR PLAN
- BUILDING
2B - LEVEL 1

A-101

APPENDIX I

Vapor Pin® Information

VaporPin®

Product Catalog 2018

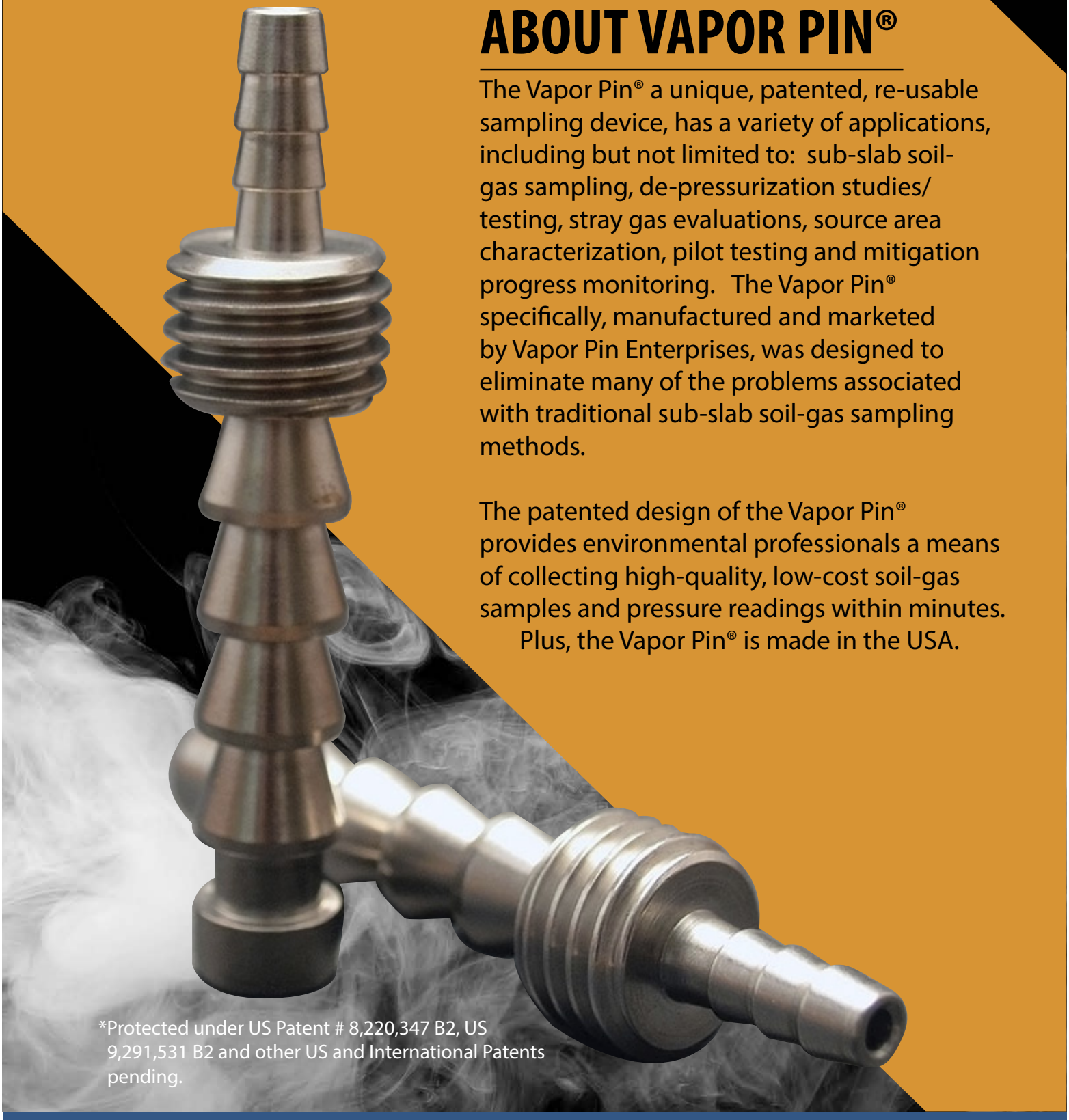
VaporPin®

ABOUT VAPOR PIN®

The Vapor Pin® a unique, patented, re-usable sampling device, has a variety of applications, including but not limited to: sub-slab soil-gas sampling, de-pressurization studies/ testing, stray gas evaluations, source area characterization, pilot testing and mitigation progress monitoring. The Vapor Pin® specifically, manufactured and marketed by Vapor Pin Enterprises, was designed to eliminate many of the problems associated with traditional sub-slab soil-gas sampling methods.

The patented design of the Vapor Pin® provides environmental professionals a means of collecting high-quality, low-cost soil-gas samples and pressure readings within minutes.

Plus, the Vapor Pin® is made in the USA.



*Protected under US Patent # 8,220,347 B2, US 9,291,531 B2 and other US and International Patents pending.

THE VAPOR PIN® ADVANTAGE

- Reduces damage to the slab
- Improves diagnostic testing
- Improves spatial resolution
- Connects easily to sampling equipment
- Is easily installed, sampled, and retrieved for reuse
- Eliminates the need for grout, increasing productivity
- Reduces sampling time, allowing collection of more samples for less cost, and improves the understanding of site conditions
- Unique patented design reduces the potential for leaks and improves sample quality

VAPOR PIN® KITS

Vapor Pin® Kits are the all-in-one solution to your gas sampling needs.

The Standard Kits come in 3 varieties* and Include:

- 10 VAPOR PINS®
- 20 VAPOR PIN® Sleeves
- 20 VAPOR PIN® Caps
- 10 Plastic Flush Mount Covers
- 1 Installation/Extraction Tool
- 1 Bottle Brush
- 1 Water Dam for leak testing
- Vapor Pin® SOPs
- Hard-sided carrying Case

STANDARD KITS

* Brass, Stainless Steel, or FLX-VP Stainless Steel

CONTRACTOR KITS

* Brass, Stainless Steel, FLX-VP, or FLX-VP with Quick Connect

The Contractor Kits come in 4 varieties* and Include:

- 10 VAPOR PINS®
- 20 VAPOR PIN® Sleeves
- 20 VAPOR PIN® Caps
- 10 Stainless Steel Secure Covers
- 1 Spanner Screwdriver
- 1 Stainless Steel Drilling Guide
- 1 Installation/Extraction Tool
- 1 Bottle Brush
- 1 Water Dam for leak testing
- Vapor Pin® SOPs
- Hard-sided carrying Case

Single Point Installation

Not all Projects call for multiple installation points, sometimes you only need one. In this case the essentials will get the job done.

At a minimum you will need:

- 1 VAPOR PIN®
- 1 installation/ Extraction tool
- 1 Bag of sleeves
- 1 Bag of white protective caps

Additionally, if you want a finished look, or if you are in an area with some foot traffic, you may want the optional plastic or stainless steel secure covers. The Stainless Steel Drilling Guide and Stainless Steel Secure Covers are recommended for flush mount installations in high traffic areas.

Individual Products

When you need an "a la carte" product we've got you covered. Order individual parts and pieces for your projects as you see fit. Placing an order is easy. The website works like Amazon, place items in your cart and checkout online at https://www.vaporpin.com/. If you have any questions, please contact us at 614-504-6915.

FLX-VPSS

The FLX-VPSS provides additional connectivity for the collection of soil-gas samples and subslab pressure readings. In addition to the barbed fitting that comes with the FLX-VPSS, the FLX-VPSS allows you to connect to sampling equipment though the use of Swagelok® fittings or Quick Connects. With the FLX-VPSS you can directly connect to TO-17 tubes connected to a Swagelok® fitting or to Bottle-VacsTM equipped with Quick Connects. Available in stainless steel only.

Stainless Steel Vapor Pin®

The barb at the top of the Vapor Pin® connects to ¼-inch OD sample tubing (typically Nylon or Teflon®) with softer tubing, preferably Tygon®. Because stainless steel is more durable than brass and more corrosion resistant, we recommend stainless steel for long-term installations and in corrosive environments.

Brass Vapor Pin®

Brass Vapor Pins® are less durable than stainless steel, but they can be reused repeatedly with proper care. We recommend brass Vapor Pins® for short-term installations, especially those installed in the stick-up configuration.

Mini Pin

The Mini Pin is ideal for use in buildings with thin slabs (as thin as 2 inches). Additionally, the Mini Pin is installed in the flush-mount position after drilling only a 5/8-inch hole. Mini Pins are supplied with Secure Covers, which act as a seal. While Mini Pins are designed for permanent installation and cannot be removed and reused, they are constructed of anodized aluminum, making them very economical.

FLX-VPBarb

The FLX-VPSS comes with a removable ¼-inch barb fitting, but the barb can be replaced, should it become lost or damaged. Available in stainless steel only.

MQT-SVPS Quick Connect

The optional Quick Connect attaches to the top of the FLX-VPPS, and connects directly to some sample containers, including Entech's glass Bottle-Vacs™. Quick Connect fittings provide the fastest way to connect to sample containers or field instruments, and they minimize the loss of soil gas to indoor air. Available in stainless steel only. Contact your analytical lab to make sure they provide compatible connections between the pin and the container.

Swagelok® and Ferrules

The optional Swagelok® fitting replaces the barb on top of the FLX-VPSS, should you desire to connect ¼-inch OD nylon or Teflon® tubing directly to the Vapor Pin®. The Swagelok® fitting also connects directly to most TO-17 sorbent tubes. Dedicated Swagelok® ferrules (not shown) are used to make connections, and are discarded whenever sample tubing is replaced. These are the same ferrules used for connecting ¼-inch OD sample tubing to most Summa-type canisters. Available in stainless steel only.

Vapor Pin® Filters

Vapor Pin® Filters screw into the bottom of Vapor Pins® to prevent particulates from entering the sample train. Due to the process used to manufacture them, Vapor Pin® Filters are available in brass only.

Vapor Pin® Barb Extension

With the Vapor Pin® Barb Extension screwed into to the bottom of the Vapor Pin®, sample tubing can be attached to extend deeper beneath the slab. The Barb Extension is the same diameter as the barb on top of the Vapor Pin®, and it accepts the same tubing. A Vapor Pin® Filter or Vapor Pin® Sieve can be attached to the bottom of the nylon tubing with Tygon® to prevent clogging the opening with soil.

Vapor Pin® 1.5" Extension

The Vapor Pin® 1.5" Extension is an alternative to the Barb Extension, and is screwed into the bottom of the Vapor Pin® to minimize contact between soil gas and the slab. Vapor Pin® Extensions can be connected end-to-end for collecting soil gas at various depths in increments of 1.5 inch. They can also be used with the Sealing Extension, described below.

Sealing Extension

Like the Vapor Pin® Barb Extension or the Vapor Pin® 1.5-inch Extension, the Sealing Extension is placed beneath the Vapor Pin®. The Sealing Extension is used to isolate the slab from the soil-gas environment to ensure that collected soil-gas samples are not affected by VOCs that may have saturated the slab. Depending on slab thickness, one or more Vapor Pin® 1.5" Extensions can be placed between the Vapor Pin® and the Sealing Extension to extend the assembly to the bottom of the slab. Available in stainless steel only.

Vapor Pin® Sieve

The Vapor Pin® Sieve can be attached to the bottom of a Vapor Pin®, a Barb Extension with tubing, or a Vapor Pin® 1.5" Extension to prevent soil from clogging the sample train.

Stainless Steel Drilling Guide

When installing Vapor Pins® in the flush-mount configuration, the Stainless Steel Drilling Guide is placed in the 1.5-inch hole prior to drilling the 5/8-inch hole, to ensure that the holes are co- centered, and perpendicular to the slab. The guide also functions as a depth gauge while drilling the 1.5-inch hole. When the flange on the Drilling Guide just touches the slab, the hole is at the proper depth.

Stainless Steel Secured Cover

The Stainless Steel Secured Cover screws onto the Vapor Pin® installed in the flush-mount configuration, to reduce trip hazards and to discourage tampering. The Secured Cover can be used with brass or stainless steel Vapor Pins®, and with the FLX-VPSS. The Secure Cover is available in stainless steel only.

Flush Mount Covers

The basic Flush Mount Cover is made of black plastic, and is a low-cost alternative to the Stainless Steel Secured Cover used in flush-mount installations.

Vapor Pin® Sleeves

The Vapor Pin® Sleeve is what distinguishes the Vapor Pin® from other sampling points. The Vapor Pin® Sleeve instantly forms a tight seal between the concrete slab and the Vapor Pin®, without the use of grout, cement, or adhesives. Like most plastic parts, including sample tubing, Vapor Pin® Sleeves are replaced each time the Vapor Pin® is installed.

Vapor Pin® Caps

Vapor Pin® Caps are placed on top of any type of Vapor Pins® equipped with barb fittings, and prevent soil gas from escaping between sample events. Caps should be replaced each time the Vapor Pin® is installed.

Spanner for Secured Cover

The spanner is used to secure and remove the Stainless Steel Secured Cover from Vapor Pins® installed in the flush-mount configuration.

Installation/Extraction Tool

The Installation/Extraction Tool is placed on the barb of the Vapor Pin® or FLX-VPSS during installation to prevent damage to the barb while hammering it into the slab. At project completion, the Vapor Pin® is extracted by screwing the Installation/Extraction Tool onto the Vapor Pin® and twisting, in the way one extracts a wine cork.

Elastrator Tool

The elastrator simplifies placing the Vapor Pin® Sleeve onto the Vapor Pin®. While wearing work gloves, screw the Vapor Pin® into a Stainless Steel Secured Cover, and place it upside down on a desk or work bench. Place the elastrator into the end of a sleeve, squeeze the elastrator handles, and with the other hand, push the sleeve onto the Vapor Pin®.

Water Dam

The Water Dam is used to leak test the seal between the Vapor Pin® and the concrete slab. The Water Dam is placed around the Vapor Pin® and in contact with the slab using a ring of clean modeling clay or Play-Doh®. Make your sample train connections, then pour distilled water into the Water Dam before purging, and if water isn't lost into the slab, the seal is tight.

Bottle Brush

The Bottle Brush is used to remove dust from the 5-8-inch hole prior to hammering in the Vapor Pin®.

O-Rings

The O-Rings form the seal between the FLX-VPSS and the interchangeable Barb Fitting, Swagelok® fitting, Quick Connect fitting or MiniPin cover. These fittings are sold with O-rings, but the rings can be replaced if desired.

Tygon® Tubing

Tygon® Tubing connects the Vapor Pin® ¼-inch barb to ¼-inch OD Nylon or Teflon® tubing. Tygon® is the best available tubing for making connections, but like all soft tubing, it is less chemically inert than Nylon or Teflon®, and it should not be used for longer tubing runs. Tygon® tubing should be replaced between samples.

Nylaflow® Tubing

Nylon tubing (¼-inch OD) has low chemical reactivity, and it should make up as much of the sample train as possible. Nylaflow® LM tubing is comparable to Teflon® at a lower cost. Nylaflow® tubing should be replaced between samples.

Hard Sided Case

The Vapor Pin® Contractor Kit is sold with a Hard Sided Case, but you can replace it should your case become lost or damaged.

Countersink Drill Bit

The Stainless Steel Secure Cover projects approximately 1/16" above grade and poses minimal trip hazard. The Countersink Drill Bit allows you to place the entire cover below grade, and drills both the 1.5-inch diameter hole, and a shallow 2-inch diameter hole. Besides making installations even neater, the Countersink Drill Bit makes it obvious when the 1.5-inch hole reaches total depth, without periodically having to stop and check.

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Standard Operating Procedure Installation and Extraction of the Vapor Pin®

Updated March 16, 2018

Scope:

This standard operating procedure describes the installation and extraction of the VAPOR PIN® for use in sub-slab soil-gas sampling.

Purpose:

The purpose of this procedure is to assure good quality control in field operations and uniformity between field personnel in the use of the VAPOR PIN® for the collection of sub-slab soil-gas samples or pressure readings.

Equipment Needed:

- Assembled VAPOR PIN® [VAPOR PIN® and silicone sleeve(Figure 1)]; Because of sharp edges, gloves are recommended for sleeve installation;
- Hammer drill;
- 5/8-inch (16mm) diameter hammer bit (hole **must** be 5/8-inch (16mm) diameter to ensure seal. It is recommended that you use the drill guide). (Hilti™ TE-YX 5/8" x 22" (400 mm) #00206514 or equivalent);
- 1½-inch (38mm) diameter hammer bit (Hilti™ TE-YX 1½" x 23" #00293032 or equivalent) for flush mount applications;
- ¾-inch (19mm) diameter bottle brush;
- Wet/Dry vacuum with HEPA filter (optional);
- VAPOR PIN® installation/extraction tool;
- Dead blow hammer;
- VAPOR PIN® flush mount cover, if desired;
- VAPOR PIN® drilling guide, if desired;
- VAPOR PIN® protective cap; and
- VOC-free hole patching material (hydraulic cement) and putty knife or trowel for repairing the hole following the extraction of the VAPOR PIN®.

Figure 1. Assembled VAPOR PIN®

Installation Procedure:

1) Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.

2) Set up wet/dry vacuum to collect drill cuttings.

3) If a flush mount installation is required, drill a 1½-inch (38mm) diameter hole at least 1¾-inches (45mm) into the slab. Use of a VAPOR PIN® drilling guide is recommended.

4) Drill a 5/8-inch (16mm) diameter hole through the slab and approximately 1-inch (25mm) into the underlying soil to form a void. Hole **must** be 5/8-inch (16mm) in diameter to ensure seal. It is recommended that you use the drill guide.

5) Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings with the vacuum.

6) Place the lower end of VAPOR PIN® assembly into the drilled hole. Place the small hole located in the handle of the installation/extraction tool over the vapor pin to protect the barb fitting, and tap the vapor pin into place using a dead blow hammer (Figure 2). Make sure the installation/extraction tool is aligned parallel to the vapor pin to avoid damaging the barb fitting.

Figure 2. Installing the VAPOR PIN®

During installation, the silicone sleeve will form a slight bulge between the slab and the VAPOR PIN® shoulder. Place the protective cap on VAPOR PIN® to prevent vapor loss prior to sampling (Figure 3).

Figure 3. Installed VAPOR PIN®

7) For flush mount installations, cover the vapor pin with a flush mount cover, using either the plastic cover or the optional stainless-steel Secure Cover (Figure 4).

Figure 4. Secure Cover Installed

8) Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to re-equilibrate prior to sampling.

9) Remove protective cap and connect sample tubing to the barb fitting of the VAPOR PIN®. This connection can be made using a short piece of Tygon™ tubing to join the VAPOR PIN® with the

Nylaflow tubing (Figure 5). Put the Nylaflow tubing as close to the VAPOR PIN® as possible to minimize contact between soil gas and Tygon™ tubing.

Figure 5. VAPOR PIN® sample connection

10) Conduct leak tests in accordance with applicable guidance. If the method of leak testing is not specified, an alternative can be the use of a water dam and vacuum pump, as described in SOP Leak Testing the VAPOR PIN® via Mechanical Means (Figure 6). For flush-mount installations, distilled water can be poured directly into the 1 1/2 inch (38mm) hole.

Figure 6. Water dam used for leak detection

11) Collect sub-slab soil gas sample or pressure reading. When finished, replace the protective cap and flush mount cover until the next event. If the sampling is complete, extract the VAPOR PIN®.

Extraction Procedure:

1) Remove the protective cap, and thread the installation/extraction tool onto the barrel of the VAPOR PIN® (Figure 7). Turn the tool clockwise continuously, don't stop turning, the VAPOR PIN® will feed into the bottom of the installation/extraction tool and will extract from the hole like a wine cork, DO NOT PULL.

2) Fill the void with hydraulic cement and smooth with a trowel or putty knife.

Figure 7. Removing the VAPOR PIN®

- Prior to reuse, remove the silicone sleeve and protective cap and discard. Decontaminate the VAPOR PIN® in a hot water and Alconox® wash, then heat in an oven to a temperature of 265° F (130° C) for 15 to 30 minutes. For both steps, **STAINLESS – ½ hour, BRASS 8 minutes**

3) Replacement parts and supplies are available online.

APPENDIX J

Contractor Health and Safety Plan

SITE HEALTH AND SAFETY PLAN

Martin Luther King Way
Hamilton Street Bridge

Prepared for

April 16th 2021
Prepared by: Greg Leach

N.A. Degerstrom, Inc

3303 N Sullivan Rd

Spokane Valley, WA 99216

509-928-3333

1.0 INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed for the Martin Luther King Way Hamilton Street Bridge Project, to protect on-site personnel, visitors, and the public from physical harm. The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. This plan is a project specific supplement and acts as a companion to the NAD general Accident Prevention Plan. The provisions of this plan will be followed, and updated as necessary to reflect current working environments.

All work practices and procedures implemented on site shall be designated to minimize worker exposure to hazards and to reduce the possibility of physical injury. All work will be performed in accordance with the applicable Code of Federal Regulations 23 CFR 635 and 29 CFR 1926 Safety standards for construction work.

1.1 Weekly On-Site Safety Meetings

Weekly safety meetings will be held to ensure that all personnel understand site conditions and operating procedures, to ensure that personal protective equipment is being used correctly and to address worker health and safety concerns.

1.2 Site Specific Training and Acknowledgement

The Site Superintendent shall be responsible for informing all individuals assigned to this project of the contents of this plan and ensuring that each person signs the Site-Specific Training Record. By signing the Site-Specific Training Record, individuals acknowledge receipt of this training and that they recognize the potential hazards present on-site and the policies and procedures required for reducing the risk of exposure or adverse effects associated with these hazards.

2.0 ROLES AND RESPONSIBILITIES

2.1 Site Superintendent:

The Superintendent, as the field representative for NAD and its subcontractors, has the responsibility for fulfilling the terms of the contract. The Superintendent must oversee the project and ensure that all technical, regulatory and safety requirements are met. The Superintendent is the onsite Health and Safety Officer (HSO) for this project. He has functional responsibility for implementing the Site Health and Safety Plan for NAD. Specific Duties Include:

a. Be on-site at all times during project activities, or train and designate a qualified individual to assume his duties in his absence.
b. Notify the Project Manager, and Law Enforcement (if applicable) immediately if unexpected issues or incidents occur.
c. Arrange for removal and transportation of materials that are not suitable for on-site structural fill or reuse/recycling to the designated disposal site.
d. Ensure that no employee, subcontractor, or visitor to the project enter the project without first having completed the site-specific safety training.
e. Provide a safe and healthful work environment.
f. Report and investigate all incidents.
g. Inventory and inspect PPE.

h. Ensure proper PPE is being utilized as required by task.
i. Obtain required personnel training and medical clearance for respirator use if required.
j. Inspect first aid kits and fire extinguishers.

2.1 Other: It is the individual responsibility of every employee to continually look for and identify hazards or potential hazards on the job site or individual workplace/task. This team approach will ensure that hazards are recognized, reduced, or eliminated. Every employee is authorized to stop work if they see or have a safety concern until it is address by supervision. Employees who willfully or negligently violate applicable safety rules will be subject to disciplinary action, up to immediate termination of employment.

3.0 SCOPE OF WORK

3.1 Scope of Work (SOW)

This Contract provides for the Mass X Grading earthwork, excavation for underground utilities.

4.0 HAZARD ASSESSMENT

This section is to be addressed in the daily tool box safety meeting as each task is to be initiated. Each Activity Hazard Analysis (AHA)/Green Light Card is designed to develop awareness to chemical and physical hazards specific to each task. It would be impractical to repeat in complete detail each control measure and policy for each job task. Sources, Hazards and Control Measures shall be addressed for each job task.

Specific work tasks with unique hazards and/or PPE requirements must be evaluated or reevaluated prior to beginning work. PPE requirements, based on this assessment, shall be included in the AHA for the specific task. AHAs will be developed for each of the SOW activities listed in Section 4.2 and submitted prior to the start of field work. The AHAs will be revised as necessary for site-specific activities and reviewed with the work crew before commencing any activity.

All workers must be trained in the requirements of this plan and the applicable AHAs prior to beginning work. A copy of this plan will be available at this project, along with a copy of the general NAD Accident Prevention Plan.

4.1 Chemical Hazards and Controls

Fleet management and maintenance will be performed by NAD personnel and they have the most potential of exposure to chemicals on this job site. They have received the appropriate training on exposure and environmental controls.

All employees on site must be made aware of where hazardous chemicals are used in their work areas. They must also be informed of the requirements of the Hazard Communication Standard, the availability and location of the written program, the list of hazardous chemicals, and the safety data sheets location for this site.

4.2 Physical Hazards and Controls

1. Mobilization/All Tasks

Issues and Concerns	Consequences	Recommended Controls
Vehicle/Equipment	Employee injury, citations, delays, injuries to the public, equipment damage	All traffic control will be in accordance with the traffic control plan; Maintain eye contact with the vehicle operators, do not approach moving vehicles. All vehicles/equipment must have an audible back-up alarm. All personnel working onsite shall wear high visibility traffic vests. Use spotters as necessary.
Material Handling	Possible back injury or further consequences with bodily injury.	Prior to lifting, size up the load, ask for assistance when necessary, and follow proper lifting techniques. Follow MSDS and product data sheets for the proper PPE, handling, storage and loading of chemicals. Keep all personnel not involved in the process at a safe distance.

2. Excavation, Hauling, Grading.

Issues and Concerns	Consequences	Recommended Controls
Damage to cables, slings or other rigging.	Possible that Trench Box or other equipment being lifted and rigging could fail.	Daily rigging inspections and proper maintenance or removal of damaged gear. Lift tags and labels required per OSHA requirements. Daily inspections will be completed at the start of each shift.

Caught in between/struck by or against objects or equipment.	Employee injury, possible loss of bodily limbs and or death.	Insure all back up alarms are working; stay away from the equipment swing zones and dumping areas; all ground personnel shall wear site specific PPE including high visibility/reflective vests; set up area to prevent un authorized access. Stand clear of suspended loads; set trailer brakes and chock wheels of trucks being loaded or unloaded. Use spotters as necessary.
Pinch Points	Crushed hands fingers, abrasions, cuts.	Keep hands and clothing away from moving/rotating parts. Gloves shall be worn onsite at all times. Loose (oversized) clothing will not be permitted to avoid being caught in or snagged by operating machinery. Drawstrings should be tucked away to prevent catching or snagging. Be aware of distances between personnel and equipment.
Pipe laying	Caught In Between, Bodily Injury, Crushing	Pile Driver is to be inspected prior to each use. Only authorized personal are to be in the area where Pipe Laying activities are being conducted.
Slip, trip, fall	Bodily injury from impact to surfaces and structures.	Workers shall visibly assess the work area prior to the start and throughout the work day to identify and mitigate potentially hazardous conditions. Be aware of openings and ground debris, maintain three points of contact when climbing on or off equipment and ladders. If employees are exposed to a fall 10 feet or more, 100% fall protection shall be used, including: guard rails capable of withstanding 200 lbs., personal fall arrest system with 5000 lbs. anchor, limited access zone limiting access to 6' from the leading edge. All

		employees using personal fall arrest systems shall be trained in personal fall arrest systems and their limitations. Follow Respirable Crystalline Silica Program
Silica Exposure	Respiratory illness, Both Acute and Chronic	

3. Traffic and Equipment Operations.

Issues and Concerns	Consequences	Recommended Controls
Traffic Safety	Employee injury, citations, regulatory compliance issues, delays	All personnel working onsite shall wear high visibility traffic vests. Trained flagmen will be used to control traffic when necessary. Vehicles will be equipped with audible backup alarms and wheel chocks.
Unsafe Equipment Operation	Damage to personal, equipment, and the environment.	Use of qualified operators only. Operators will be trained and will show proof of training before operating equipment. Inspection of any equipment to be completed daily. Any defective equipment will be taken out of service immediately and tagged. Follow the lifting plan for setting equipment or material.
Climate stress	Fatigue, Dehydration,	Onsite temperatures will be observed hourly for heat stress conditions; temperatures reaching near and above normal body temperature shall be considered heat stress conductive and shall be discussed with employees at the start of each day on the daily job briefing. The discussions shall include signs of heat stress and number of breaks required by temperatures

		registered. The General Foreman and/or Site Safety Personnel on site will monitor temperatures throughout the day.
Struck by incidents	Bodily injury, Damage to equipment.	Stay out of swing radius of equipment, communicate with operator, avoid blind spots and stay alert. Do not stand under or near equipment being loaded or unloaded. Inspect slings and chokers before use. Remove damaged rigging from service. Loads shall only be rigged by a qualified rigger.
Pinch Points	Crushed hands fingers, bodily injury.	Keep hands and fingers from between rigging and loads. Always be aware of line of fire and avoid positioning equipment and personnel in the area. Keep hands and fingers from between equipment/materials and other objects.
Other Site workers	Un-wanted personal,	Barricades must be installed where necessary, coordinate with subs prior to the task. Delineate work area and use signage to alert others, coordinate with subcontractors.
Sprains and strains	Muscle fatigue, back shoulder and knee injury due to improper lifting	Employees shall be instructed in safe lifting techniques and use the "team lift" approach to material handling. Avoid twisting and overextending.
Slip, Trip and Fall	Sprains, bodily injury	Daily pre-briefing survey by the crew for hazard identification and elimination. Any hazard that cannot be eliminated shall be noted on the job briefing prior to communication to the crew. Maintain housekeeping, tool and material organization.
Falls from height	Bodily injury.	Use personal fall arrest systems, only use personnel that have been trained in fall protection, anchors rated to 5000 lbs. set up horizontal life line if practicable, use ladders that are 3A rated and have been inspected by a competent person on a daily basis,

		secure ladder to prevent displacement, maintain three points of contact while climbing the ladder, set up a rope to lift and lower materials.

4. Excavation Haul and Disposal

Issues and Concerns	Consequences	Recommended Controls
Injuries, metal to metal contact, ground personnel, slips trips and falls, complacency, weather, mechanical failure, fatigue, pinch points, steep slopes steep slopes, noise	Employee injury, delays, rework, equipment damage	Training, PPE, adequate supervision, Inspections, Activity Hazard Analysis (AHA), Planning, Communication, proper disposal of materials, Pre-Ops, Fit for duty, routine maintenance, proper lighting, wheel chocks, lighting, wheel chocks

5. Roadway Reconstruction & Surfacing

Issues and Concerns	Consequences	Recommended Controls
Injuries, metal to metal contact, ground personnel struck by, slips trips and falls, complacency, weather, mechanical failure, fatigue, pinch points, steep slopes, noise, mechanical vibration, traffic	Employee injury, delays, rework, equipment damage	Training, PPE, adequate supervision, Inspections, , Activity Hazard Analysis (AHA), Planning, Communication, proper disposal of materials, Pre-Ops, Fit for duty, routine maintenance, proper lighting, wheel chocks, internal traffic control plan

Issues and Concerns	Consequences	Recommended Controls
Mobile equipment, heat stress, steep slopes, pinch points, cuts, strains, slips trips and falls, noise, machine guarding, traffic, burns	Employee injury, citations, regulatory compliance issues, delays	Training, PPE, Proper supervision, Inspections, Activity Hazard Analysis (AHA), Planning, Communication, Wheel chocks, LO/TO/TO, Internal traffic control plan

5.0 DUST MITIGATION

Control of dust will be a high priority during the project. Construction activities that have the potential to generate dust include facilities construction, equipment traffic, excavation activities, loading, hauling, and placement of soils. Controls for dust mitigation during material loading, transportation and placement will include a water mist/spray wet suppression system.

A water truck will be on-site and water shall be used as necessary to wet the material. Site activities and conditions will be periodically monitored by the Superintendent.

6.0 POLLUTION PREVENTION PLAN

The Pollution Prevention Plan (PPP) is a requirement for all projects which do not have coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP).

Best Management Practices (BMPs) will be used to design, install, and maintain effective erosion and sediment controls to prevent the discharge of potential pollutants from the site. Silt fence and fiber rolls shall be functional before land disturbing activities take place. Fences and rolls shall be maintained throughout construction and for a duration following construction sufficient to allow disturbed areas to stabilize.

NAD will monitor and upgrade erosion control measures as necessary to ensure the sediment controls are effective and turbid water is not observed discharging from the site. Please refer to the PPP for this project for additional information.

SWINERTON

SITE SPECIFIC SAFETY PLAN

District on the River
Spokane, WA

Prepared by

Swinerton
14432 SE Eastgate Way, Suite 230
Bellevue, WA 98007

4/7/2021

SWINERTON BUILDERS SITE SPECIFIC SAFETY PLAN

SWINERTON BUILDERS SITE SPECIFIC SAFETY PLAN

TABLE OF CONTENTS

TABLE OF CONTENTS continued

SWINERTON BUILDERS SITE SPECIFIC SAFETY PLAN

1.0 INTRODUCTION

This Site-Specific Safety Plan (SSSP) has been prepared, exclusively, to accommodate all phases of the construction activities associated with the development/redevelopment:

Jobsite Address: 1185 E Martin Luther King Jr. Way

Spokane, WA 99202

Parcel Number: _____

1.1 Relevant Safety and Environmental Documents for Review

The following documents are available for review:

1. Name of Document: _____

   Location: _____

2. Name of Document: _____

   Location: _____

3. Name of Document: _____

   Location: _____

1.2 Additional Information (use as needed)

_____

_____

2.0 PURPOSE OF THIS DOCUMENT

2.1 The SSSP serves three "Key" functions:

- The SSSP identifies key personnel and project organization.
- The SSSP is the primary health and safety resource tailored specifically for the project and sets forth the minimum work practice standards for all work on the project including, but-not-limited-to requirements for: incident reporting, accident investigation and medical management, public safety, employee safety, transportation, waste management, excavation, equipment management, site security, emergency response and site evacuation, environmental conditions, construction safety,

agency relations, sanitation, decontamination, hazard awareness and training and so forth.

- The SSSP sets for the minimum environmental health and safety standards contractors will use to incorporate into their own individual HSP's or JHA's.

2.2 Additional Information (Use as needed)

3.0 PROJECT MANAGEMENT AND STAFF ORGANIZATION

3.1 Table 1 - General Contractor Key Personnel

Swinerton Builders Project Manager (PM)		
Name: Chris Bischoff	Office:	(425) 458-7728
	Mobile:	(206) 793-0400
	Fax:	
Swinerton Builders Project Engineer (PE)		
Name: Thane Werner	Office:	(425) 283-5175
	Mobile:	(206) 620-4202
	Fax:	
Swinerton Builders Project Superintendent (PS)		
Name: Richard Pratte	Office:	
	Mobile:	(213) 395-9154
	Fax:	
Division/Regional Safety Manager		
Name: Matt Nilsson	Office:	
	Mobile:	(206) 914-9135
See Safety Hot Sheet for numbers.	Fax:	
Other Safety Personnel or Contact		
Jason Stoberl – Certified Industrial Hygienist	Office:	(949) 622-7047
	Mobile:	(949) 526-6035
	Fax:	

3.2 Table 2 - Owner/Developer Key Personnel

Owner			
Name:	Charles Dubroff & Robert Hayes	Phone:	
Company:		Fax:	
Address:			
Developer			
Name:	Charles Dubroff & Robert Hayes	Phone:	
Company:		Fax:	
Address:			

3.2 Table 3 - Emergency Contacts - Agencies

Regional Water Resources Board		Phone:	509.477.7579
Address:	1116 W Broadway Ave.		
	Spokane, WA 99204		
WA L&I		Phone:	509.324.2600
Address:	901 N Monroe St STE 100		
	Spokane, WA 99201		
State Office of Emergency Services		General:	800.525.0127
		Warning Center: Phone:	800.562.6108
		Hazardous Material Spills: Phone:	253.512.7000
		National Response Center: Phone:	800.424.8802
Fish & Game, Environmental Division		Phone:	509.892.1001
Address:	2315 N Discovery Pl.		
	Spokane Valley, WA 99216		
Police/Fire Department		Phone:	911 P: 509.244.3703

Local Hospital/Urgent Care Clinic		Phone:	(509) 747-0770
Address:	Concentra Urgent Care		
	2005 E 29th Ave Spokane, WA		

3.4 Additional Information (Use as needed)

4.0 PERSONNEL ROLES AND ORGANIZATIONAL RESPONSIBILITIES

4.1 Management Team

The Management team for this Project includes: Swinerton Builders Project Manager (PM), Swinerton Builders Superintendent , and Owner's Representative.

All inquiries and decisions regarding this Project should be addressed to PM or Superintendent who will act as liaison to the Management Team.

Management Team Members, by name, for this Project include:

PM: Chris Bischoff

SUPERINTENDENT: Richard Pratte

Owner's Representative: OAC Services

4.2 Developer Personnel

Developer Representative: OAC Services

The representative is the liaison between the developer and the PM and SUPERINTENDENT. However, any questions regarding the Project should be directed through the PM or SUPERINTENDENT.

4.3 General Contractor Personnel

4.3.1 Swinerton Builders Project Manager (PM)

PM is charged with the overall responsibility for the successful completion of field operations. PM's responsibilities include, but are-not-limited-to:

- Prepare and organize project activities on-site.
- Review and approve the site-specific HSP.
- Provide operational needs, supplies, etc.
- Coordinate cost controls.

4.3.2 Swinerton Builders Project Engineer (PE)

The Project Engineer is charged with the responsibility to work with the developers, PM and the Superintendent to assure the quality and accuracy of the engineering plans. The Project Engineer responsibilities include but are-not- limited-to:

- Oversees the engineering and design.
- Manages construction drawings and works with owner to assure accuracy and completeness.
- Coordinates with PM and Superintendent to interpret engineering drawings.
- Provide and coordinate contractual obligations.
- Provide materials and supplies.

4.3.3 Swinerton Builders Superintendent (SBS)

Superintendent coordinates Contractor and Subcontractor activities on the site. The Superintendent's responsibilities include but are-not-limited-to:

- Prepare and organize project activities onsite.
- Supervise Contractors and Subcontractors for compliance with job scope and quality.
- Supervise field operations and implement safety procedures.
- Develop the SSSP if no Site Specific Safety Manager has been assigned to the site.
- Enforce implementation of SSSP and established health and safety practices.

4.3.4 Site Specific Safety Manager (SSSM)

The SSSM is responsible for assuring daily compliance with the SSSP. Specifically duties of the SSSM include but are-not-limited-to:

- Establishes site safety controls.
- Develops the SSSP.

- Liaison with Contractors on the Project.
- Point person for health and safety questions.
- Performs daily inspection of the Project.
- Monitors Contractor compliance.
- Oversees security for the Project.

4.4 Additional Information (use as needed)

_____

_____

_____

5.0 GENERAL SITE REQUIREMENTS

5.1 General Site Conditions and Requirements Applicable to All General and Subcontractor Personnel

a. As required by the state the work is being done in, each Subcontractor shall develop their Injury, Illness and Prevention Program (IIPP) and shall provide written documentation to Superintendent verifying existence of program.
b. Each Subcontractor shall provide a copy of their Hazard Communication Program to the Superintendent at the onset of activities at the Project.
c. Each Subcontractor is required to provide one employee per crew/shift that holds current standard First Aid training. Standard First Aid training covers First Aid and CPR.
d. Any hazardous material products brought onto the project will be cleared with the SBS or SSSM. Safety Data Sheets (SDS) will accompany each product and must be turned in to the Superintendent or Site-Specific Safety Manage as soon as the material enters the Project. Each Subcontractor will be responsible for submitting a list of SDS on the job. The Swinerton Builders shall post a composite SDS list on the central job board.

5.2 Site Security/Visitors

All visitors to the Project shall enter and exit through the security gate(s) located at the Swinerton Builders trailer. A Visitor Sign-in Log will be available inside the Swinerton Builders job trailer.

5.3 Accident Reporting

All accident(s) will be reported to the Superintendent or the Site-Specific Safety Manager as soon as possible after it occurs. A follow-up completed written

accident investigation report will be submitted to the Superintendent or SSSM within 24 hours of the accident.

Accident investigation(s) will be handled by each Subcontractor using its own internal reporting system. A copy of this report will be submitted to the Superintendent or Site-Specific Safety Manager, as described above.

Accident investigations involving hazardous materials or wastes will be handled jointly by each Subcontractor and the Superintendent or SSSM. This is to assure that the cause of the accident is completely determined, and proper precautions implemented for other activities in the area or performing similar work, and the information is relayed to other Subcontractors.

5.4 Safety Audits/Inspections

Each Contractor is expected to conduct reasonable and customary self-audits of their operations and promote safe work practices.

Each Contractor will be required to submit a copy of the job site safety inspection or job hazard analysis upon request. The inspection forms shall be turned into the Superintendent.

5.5 Tailgate/Toolbox Training

Each Subcontractor is expected to attend Swinerton Builders Weekly Site Safety Meeting or conduct their own Weekly Site Safety Meetings for their own employees. A copy of the meeting records, which enumerates the content of the meeting along with the attendance roster, shall be turned into the Superintendent.

5.6 Noise

Noise exposures above 85dBA may be expected when working near or operating machinery and equipment (*e.g.*, graders, backhoes and generators*).*

If noise levels cannot be controlled under this limit, the Superintendent shall be notified and the work may be temporarily suspended until suitable controls can be implemented.

Personnel will be required to wear approved hearing protection to maintain exposures below 85dBA.

5.7 Sanitation Stations and Drinking Water

Superintendent will be responsible for providing sanitation stations. Each individual Subcontractor is responsible for providing potable drinking water to its own workers as required by WA L&I's Heat Stress Standard.

5.8 First Aid Station

Each Subcontractor is required to provide a minimum of one First Aid/CPR trained supervisor and First Aid kit/supplies that meet WA L&I Standards.

A central First Aid station will be designated at the Swinerton Builders trailer to facilitate off-site emergency response and off-site medical emergency facilities will be posted on the bulletin board in the Swinerton Builders trailer. Subcontractors are required to advise their own employee(s) of the name and telephone number of the designated facility and the location of this information on the project site.

5.9 Fire Protection Plan

Each Subcontractor is required to have at least one 20-lb. ABC fire extinguisher properly tagged with a current inspection. A current inspection indicates servicing and/or inspection within the past twelve months.

Fire extinguishers shall be inspected at the start of the project and not less than once per month thereafter.

The following table enumerates the minimum fire protection necessary per item and activity. These minimum standards are required for every Subcontractor working on the project.

Table 4

Cranes, forklifts, aerial devices, loaders, backhoes, etc.	10:BC	1 per piece of equipment
Work generating sparks or open flames	10: ABC	1 per operation
Temporary heating devices	4A: 40BC	1 per piece of equipment
Fueling areas	Dry chemical or carbon dioxide 20 ABC	2 per station
Floors	10: ABC	2 per floor <3,000 ft2 or every 100 ft of travel

Stored oxygen and acetylene shall be stored separately, at least a minimum of 20 feet or separated by a wall not less than 5 feet in height. Storage of cylinders means the caps are on tight.

If this project includes some burning and/or welding all burning, and welding operations should provide a fire watch person and/or burning blankets and a fire extinguisher to protect adjacent areas.

5.10 Excavation and Trenching

A competent person will be responsible for supervising excavations, drilling, and trenching. Type A, B, C soils will be checked by the competent person, daily, to determine the minimum type and level of protection necessary. Soil inspections shall be checked and documented daily by the competent person for the duration of the soil excavation.

Objects shall not be stored within 2 feet of the edge of all excavations.

5.11 Fall Protection

All employees shall wear a full body harness and double shock-absorbing lanyard system anytime a worker is required to disconnect and reconnect to travel around an obstacle. At no time will a worker be totally "unhooked".

Fall protection shall be provided on all fixed elevated surfaces above 4 feet for all trades. The 4-foot fall protection rule does not pertain to ladders and scaffolding as long as they are used within WA L&I standards.

Subcontractors that work from temporary elevated surface heights of 4 feet or more will be required to provide a written fall protection plan. Said plan shall be submitted and approved prior to Subcontractor starting any work.

5.12 Traffic Control

Orange/yellow-orange, or equivalent safety vests will be provided for all employees, flagmen and traffic monitors working around heavy moving or rotating equipment.

5.13 Confined Space Entry Requirements

Confined space work requiring an entry permit shall be performed only under the supervision of a competent person. Only trained and authorized employees shall be allowed to enter the confined space. A Confined Space Entry Permit has been provided as Figure 2 for use by Swinerton Builders. Subcontractors may also use any equivalent permit.

5.14 Housekeeping

Daily housekeeping is a part of this job safety plan with special emphasis placed on stairways. All stairways will be artificially lit and be clean of debris.

5.15 Scaffolds

All Subcontractors using scaffolding on this site will be required to attend the pre-scaffolding meeting. The meeting will lay out, in detail Swinerton Builders rules of erecting, dismantling and the use of scaffolding. Subcontractors not attending this meeting will not be allowed the use of scaffolding on this site.

5.16 Electrical

All temporary power sources will be provided with Ground Fault Circuit Interrupters (GFCI), and all cords, plugs and receptacles shall be checked for damage daily. Testing of the ground and labeling of the cords will be performed as needed or at least monthly. Remove any damaged equipment from use and tag out of service until repaired.

Tools and equipment shall be routinely inspected and tested before use.

5.17 Cranes

Crane erection and maintenance and care shall comply with the manufacturer's specifications and limitations. Rated local capacities and recommended operating speeds shall be visible to the operator. Crane certifications must be in the cab at all times and all crane operators must have current certification.

Cranes shall be level and located on firm footing or cribbing when necessary and accessible areas within the swing radius of the rear-rotating superstructure of the crane shall be barricaded or cordoned off to avoid being struck by the crane.

Cranes shall be annually inspected and a record of this inspection shall be provided upon request.

All materials shall be rigged by a qualified rigger and under the supervision of a competent person. Rigging must have a manufacturer tags showing the capacity of the equipment being used and shall be inspected prior to each shift and as appropriate during the work. All loads shall have an appropriate tag line attached to help control the load.

The qualified rigger is expected to communicate with others on the jobsite to ensure no one is working under an overhead load. Appropriate communication methods may include air horns, whistles, etc. and shall be determined by the Competent Person and documented.

5.18 Scissor Lifts

If scissor lifts are required on this project the following standards shall apply:

- A scissor lift shall not travel in an elevated position with men in the basket.
- Chains and gates shall be utilized whenever the scissor lift is in an elevated position.
- All operating and maintenance instructions and recommendations must be followed.
- The manufacturers operating manual shall with the equipment at all times.

5.19 Aerial Lifts, Snorkel Lifts, Boom Supported Work Platforms

If aerial lifts, snorkel lifts, or boom supported elevating work platforms are required on this project the following standards shall apply:

- All personnel in the lifts shall be tied-off to an appropriate location on the lift.
- Lifts shall not travel in an elevated position with men in the basket.
- All operating and maintenance instructions and recommendations must be followed.
- The manufacturers operating manual shall with the equipment at all times.

5.20 Forklifts

No modifications or additions that affect the capacity or safe operations of the equipment shall be made without the manufacture's written approval. In no case shall the original safety factor of the equipment be reduced and only trained and certified personnel shall be permitted to operate forklifts.

If a load is lifted by two or more trucks working in unison, the proportion of the total load carried by any one truck shall not exceed its capacity.

Rigging over the forks is prohibited. When using a forklift to hoist material, you must have a manufacturer approved lifting attachment or use the picking eye located at the end of the boom.

5.21 Tools

Impact tools, such as drift pins, wedges and chisels shall be kept free of mushroomed heads.

The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

5.22 Lock Out/Tag Out

Before any modifications, maintenance, or repairs are done on equipment, tools, or power panels, the energy source shall be disconnected or turned off (turn valve, pull fuse, switch breaker) and locked out or blocked out with a padlock, chain or both to ensure energy source is locked off.

1. Place a tag at the disconnect point, identifying who you are, who you work for, and why you locked it off. Never move or remove another person's tag.
2. Be sure to release residual energy (i.e. lead line grounding circuits).
3. Test equipment or energy source to ensure it will not run. Turn on equipment or test circuits to ensure it is disconnected.
4. Restore energy safely when you are finished with your repairs. Remove lock and tag.

5.23 Silica Exposure

Regardless if you are sweeping or simply moving debris, if you can see any amount of dust, dust control methods must be utilized. All dust must be controlled by watering down or misting the debris, or using "Clean Sweep" compounds. A new rule has be administrated to curb lung cancer, silicosis, chronic obstructive pulmonary disease and kidney disease in America's workers by limiting their exposure to respirable crystalline silica.

- Silica exposure must remain below 25 micrograms per cubic meter of air, averaged over an 8-hour shift.
- This rule requires employers to: use engineering controls (such as water or ventilation) to limit worker exposure; provide respirators when engineering controls cannot adequately limit exposure; limit worker access to high exposure areas; develop a written exposure control plan, offer medical exams to highly exposed workers, and train workers on silica risks and how to limit exposures.

5.24 Personal Protective Equipment (PPE)

The minimum PPE required includes hard hats, sturdy work boots, shirtsleeves (no tank tops), long pants, and safety glasses are to be worn at all times. Goggles, and/or face shields shall be worn as necessary for eye protection.

Respiratory protection shall be worn, as necessary, to prevent breathing harmful concentrations of paint, welding fumes, concrete and sheetrock dust, solvent vapors, etc.

5.25 Hot Work

A hot work permit, Figure 3, will be required for any work activity performed in an enclosed environment, including but not limited to inside a building or a

confined space, that generates sparks, open flames or creates in any way a potential fire hazard.

5.26 Discovery of Potentially Contaminated Materials

Should possibly contaminated materials be discovered when and Aspect field representative is not present, the contractor should be familiar with and utilize the field-screening indicators. Any related discoveries should be reported to Aspect.

Suspected Impacted Soil

It is the responsibility of the contractor to identify potentially impacted soil if discovered in unexpected locations. Equipment operators and laborers will be instructed to immediately report to their supervisors any potential evidence of contamination and cease work in that area pending evaluation by Aspect. Criteria to be used in identifying Potentially Contaminated Fill include (but are not limited to):

- Petroleum hydrocarbon staining, sheen, or chemical color hues in soil or standing water
- Soil material that is bluish in color or turns blue when exposed to air. This material may have a distinct, foul, almond-like odor and may be corrosive and cyanide containing
- The presence of separate-phase petroleum hydrocarbon product or other chemicals
- The presence of tar or clinker debris (shiny, low density, sand like material).
- The presence of gasoline- or oil-like odors

If evidence of potential contamination in an unexpected location is identified, notify Swinerton and Aspect immediately. Aspect will assist the contractor with environmental monitoring and evaluate the need for field screening possible segregation of contaminated fill and potentially noncontaminated fill.

Underground Storage Tanks

There are no documented underground storage tanks (USTs) present or anticipated. However, if an undocumented UST is discovered during earthworks, the following Ecology protocols for removing a UST will be followed.

1. Prior to removal, an International Code Council (ICC) Certified Site Assessor must provide notice of UST removal/closure to Ecology using the *30-Day Notice* form. Ecology will provide written or verbal authorization to proceed with the UST removal.
2. Prior to removal, an ICC-certified UST Decommissioner must empty and clean the tank of all liquids and accumulated sludges. The tank

must be properly inerted of flammable vapors by a marine chemist, as directed by the International Fire Code. The Decommissioner must ensure the tank and atmosphere and excavation area are regularly monitored for flammable vapor concentrations until the tank is removed from both the excavation and the site.

3. The cleaned tank may be removed from the excavation, crushed, and transported from the site (e.g., to a metals recycler). Once the tank is removed, the Decommissioner must ensure the tank atmosphere and excavation area are regularly monitored for flammable vapors until the tank is removed from the excavation and the redevelopment areas.
4. The UST Site assessor will photo document and visually inspect the tank prior to transportation, obtain confirmation soil samples from the excavated UST pit, and assist with the segregation and management of any suspected impacted soil identified during UST removal. The Decommissioner is required to fill out a Permanent Closure Notice that must also be signed by the site owner.
5. Any removed tanks will be tracked to destination to ensure no reuse. The fate of any removed UST's will be documented in the Construction Completion Report.

If there is no clear evidence of contamination, soil samples will be collected for laboratory analysis in accordance with the sampling requirements provided in Ecology's *Guidance for Site Checks and Site assessments for Underground Storage Tanks* (Ecology, 2003). For example, if field screening does not indicate evidence of soil contamination in the excavation it, one soil sample will be collected from beneath each UST and one from each of the four excavation pit sidewalls.

Aspect will complete a Site Check/Site Assessment Checklist and prepare either a Site assessment report (if no contamination is confirmed) or a Site Characterization report (if contamination is confirmed) for submittal to Ecology.

Other Excavation Discoveries

Examples of other possible excavation discoveries of environmental concern include:

- An undocumented monitoring well
- An unknown underground facility, such as utility vaults or sumps
- A utility line exhibiting evidence of contamination
- Debris or buried waste material exhibiting evidence of contamination, such as drums, paint/oil cans, etc.

The contractor is responsible for reporting any unanticipated discovery. Aspect is responsible for documenting any unanticipated discovery.

6.0 CONTINGENCY AND EMERGENCY RESPONSE PROCEDURES

6.1 Site Evacuation Plan / Assembly Area

Site evacuation procedures are required as part of an emergency response plan. Every job site should at the outset, determine a safe corridor for escape and assembly.

Examples of emergencies requiring a site evacuation include:

- Explosion from underground pocket of flammable/combustible gases.
- Equipment fire or explosion.
- Inclement weather.
- Toxic gas/vapor release from subsurface pocket of gases or containers.
- Cave-in from excavated trenching.

Evacuation routes are established upwind and cross from the direction of wind flow as determined by either a windsock or other visual means of determining air movement. In the event of an evacuation signal, every worker is required to cease operations, note the wind pattern and move in a cross and upwind direction to the designated assembly point.

6.2 Response to a Release of Hazardous Materials/Wastes, Liquids, Unusual Smell or Odor

If there is a release, i.e. oil, diesel, or other petroleum product, hazardous waste, or the perception of an unusual foul or irritating smell or odor, immediately evacuate the area by moving across and up-wind from the source to the designated assembly point. Remain there until cleared to return. Notify Swinerton Builders Management Team prior to resuming operations.

If the identity of the released product/waste or odor is known and does not pose an immediate threat to the safety and/or health of the workers or the environment, notify the SSM and implement steps to contain and control the release.

6.3 Fire

Alert and immediately evacuate personnel away from the immediate area. Notify Swinerton Builders Management Team regarding any size fire that

occurs on the Project. If necessary, the Management Team will notify the Fire Department by calling 911.

For small fires (a fire that can be controlled with one 20 lb., fire extinguisher), contain and extinguish the fire as quickly as possible.

For large fires, immediately evacuate the affected area and report to the designated assembly point.

6.4 Explosions

Following an explosion, immediately survey the affected area for injured workers. If safe to enter, remove the injured to a safe distance. Injured workers will be transported to the nearest emergency medical facility.

Immediately evacuate the affected area and report to the designated assembly point. If a fire develops, follow emergency procedures for fire control and evacuation, as described above.

6.5 Accidents

All accidents/incidents shall be reported to the SSSM/Superintendent immediately for investigation and follow-up. An incident written incident report shall be submitted to the SSSM/Superintendent within 24 hours.

For accidents involving personal injury, immediately apply appropriate First Aid and transport the injured party to the designated medical facility. Never allow the injured employee transport him/herself. SSSM will summons emergency medical response for injuries requiring emergency assistance.

6.6 Vehicle Accidents

Stop the vehicle as soon and as safely as possible. Assess the damage to the vehicle and collateral damage to equipment and any other objects. If injuries are sustained, follow the accident procedures above. Report all vehicle accidents to your supervisor immediately.

An Incident Report online must be filled out for all accidents/incidents.

6.7 Equipment Failure or Power Outage

Turn off equipment or power. Assess damage and notify your supervisor. Wait for further instructions.

6.8 Natural Disaster/Earthquake

Complete the following:

1. Shut down all operations/equipment in a safe effective manner.
2. Check all personnel for injury and follow appropriate procedures
3. Inspect all fuel/oil/wastewater tankage and/or containment structures for signs of leakage or damage.
4. Inspect all operational units for proper operations made, and manually check to insure all automatic and alarmed features are working properly.
5. Inspect all piping, values, and fixed pumping units for damage.
6. Re-inspect electrical circuits and power supplies for damage.
7. Report to assembly point and wait further instructions.

6.9 Exposure Assessment

Subcontractors will become familiar with the potential hazards on the job, as described in the SSSP, train, manage and provide appropriate measures to protect their employees.

Each Subcontractor shall provide appropriate tools, i.e., PPE, equipment, environmental exposure monitors, to assess and assure that its own employees are working in a safe area and manner.

6.10 Liaison, Notification Requirement for Incidents, Accidents and Injuries

Should any of the events listed above occur, SSSM/Superintendent shall be contacted immediately. The SSM will assist Subcontractors in resolving the issue and coordinate the preparation of a written report to the PM within 24 hours.

Swinerton Builders will determine the appropriate reporting and notification procedures involving notification to local authorities.

6.11 Additional Information (Use as needed)

_____

_____

_____

7.0 MEDICAL MANAGEMENT PLAN

7.1 Medical Support Facilities

Emergency medical facilities shall be identified and posted for emergency response. The following medical support personnel have been contacted and informed of this project. The contacts and corresponding telephone numbers of local clinics and hospitals are given below:

Local Hospital/Urgent Care Clinic	Phone:	(50) 747-0770
Address:	Concentra Urgent Care	
	2005 E 29th Ave, Spokane, WA 99203	

Figure 5 is a site map showing the closest transportation routes to the clinic and hospital.

7.2 Additional Information (Use as needed)

Figure 1
SWINERTON'S VISITOR'S LOG
(Attach Form)

Figure 2
SWINERTON'S CONFINED SPACE PERMIT
(Attach Form)

Figure 3
HOT WORK PERMIT
(Attach Map)

Figure 4
ASSEMBLY AREA
(Attach Map)

Figure 5
DESIGNATED CLINIC/HOSPITAL LOCATION
(Attach Map)

Concentra Urgent Care
2005 E 29th Ave, Spokane, WA 99203

- Continue to E 29th Ave
  1 min (0.1 mi)
- Take S Southeast Blvd, S Sherman St and S Sprague Way to S Ivory St
  8 min (3.5 mi)
- Take Erie St to E M.L.K. Jr. Way
  1 min (0.4 mi)

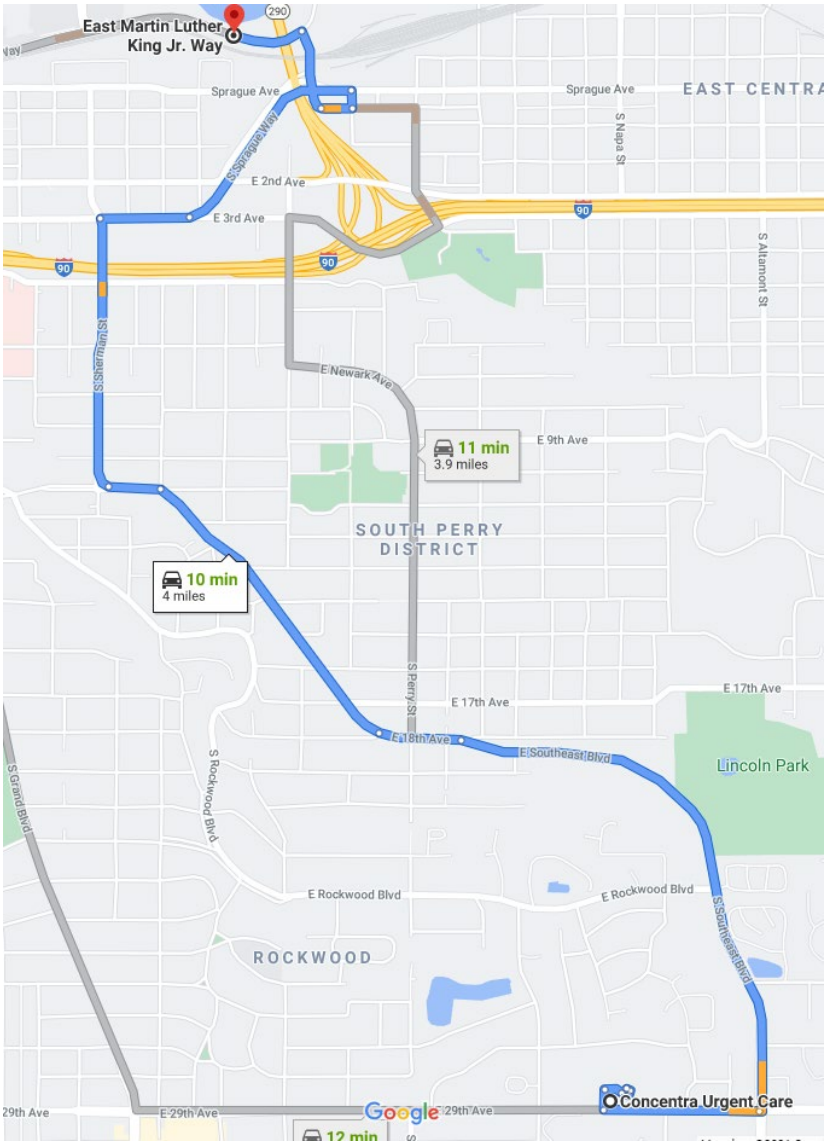


Figure 6
Swinerton COVID-19 Plan
(Attach Plan)

With new information regarding COVID-19 being continuously released by public health officials, please always check, https://swinerton.com/swinerton-covid-19-plan/ and or, the SwinNet COVID-19 intranet page to ensure that you are always using the most up to date plan.

APPENDIX K

Contractor Spill Prevention Control and Countermeasures Plan

Spill Prevention, Control and Countermeasures Plan

District on the River

Prepared by
Greg Leach

N.A. Degerstrom, Inc.

Spill Plan Contact

Greg Leach
3303 N. Sullivan Rd.
Spokane Valley, WA 99216
Phone 509.928.3333
Fax 509.927.2010
gleach@nadinc.com

Finalization Date: 4/19/2021

N.A. DEGERSTROM, INC. (NAD) SHALL MAINTAIN A COMPLETE, UPDATED COPY OF THIS PLAN IN AN ACCESSIBLE LOCATION ON THE PROJECT SITE AT ALL TIMES.

Table of Contents

SPCC Plan Elements

1. Responsible Personnel

Table 1.1 identifies the name(s), title(s), and contact information for the personnel responsible for implementing and updating the SPCC Plan, and for responding to spills. Spill response Subcontractor(s) will be used for spill response (as described in Section 8, Spill Response, below), the Subcontractor(s) company name(s) and contact information are also included in Table 1.1.

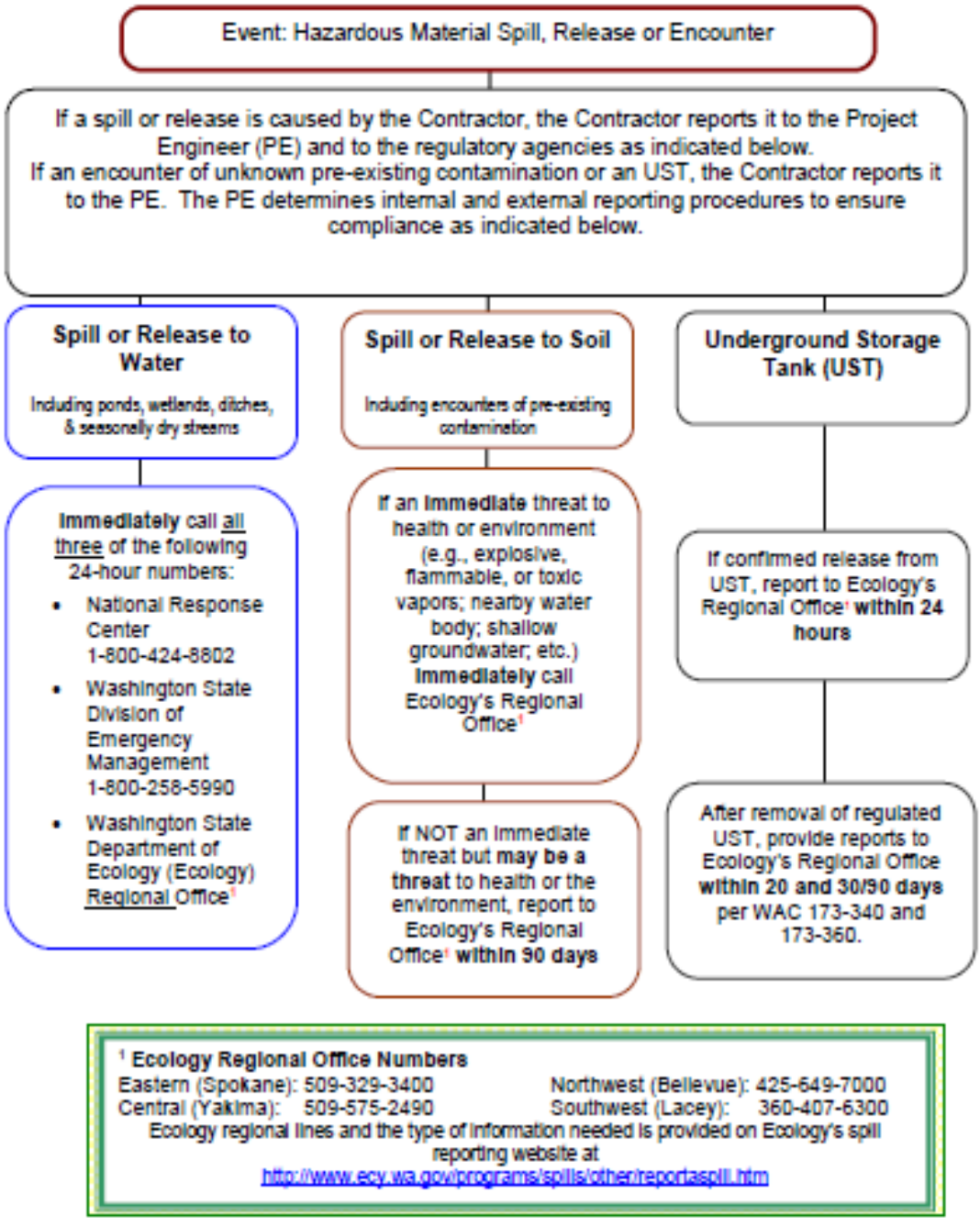
Table 1.1 Responsible Personnel

Responsibility	Name and Title	Contact Information
Implementing and Updating SPCC Plan (primary contact person)	Michael E. Coleman, CSP V.P. – EH&S	Company: NAD Office Phone: (509) 928-3333 Cell Phone: (509) 435-1952
Implementing and Updating SPCC Plan (secondary contact person)	Project Superintendent	Company: NAD Office Phone: (509) 928-3333 Cell Phone: (509) 435-1942
On-Site Spill Responder	Project Foreman	Company: NAD Office Phone: (509) 928-3333 Cell Phone: (509) 998-9336
On-Site Spill Responder		Company: Office Phone: Cell Phone:
Spill Response Subcontractor (see Section 8, below)	Kipp E. Silver, President	Company: Able Clean-up Tech. Office Phone: (509) 466-5255 24 Hr. Phone: (866) 466-5255

2. Spill Reporting

In the event of a spill, NAD shall notify the Project Engineer and the Federal, State, and Local Agencies listed in Figure 2 and Table 2.

Figure 2 Hazardous Materials Event
Contractor Minimum Reporting Requirements



[1] **Ecology Regional Office Numbers**

Eastern (Spokane): 509-329-3400	Northwest (Bellevue): 425-649-7000
Central (Yakima): 509-575-2490	Southwest (Lacey): 360-407-6300

Ecology regional lines and the type of information needed is provided on Ecology's spill reporting website at
http://www.ecy.wa.gov/programs/spills/other/reportaspill.htm

Table 2 Project-Specific Federal, State, and Local Agencies to be Notified in the Event of a Spill

Agency Name	Agency Notification Telephone Number	When Agency Shall be Notified	Agency Region
J-U-B ENGINEERS, Inc.	509-458-3727	Spill or release to water	Spokane, WA
Department of Ecology	509-329-3400	Spill or release to soil that is an immediate threat to human health or the environment or a spill or release to water or a confirmed release or spill from a UST	Spokane, WA
National Response Center	1-800-424-8802	Spill or release to water	Not applicable
Washington State Division of Emergency Management	1-800-258-5990	Spill or release to water	Not applicable

2. Project and Site Information

A. The Project work:

The District on the River project contains the following work activities

- Site Demolition
- Site Fill
- Site Grading
- Site Utilities
- Structural Excavation and backfill.

B. The site location and boundaries:

Martin Luther King Way

3. Potential Spill Sources

A description of each potential fuel, petroleum product and other hazardous material brought or generated on-site is set forth in Table 4. The potential fuel, petroleum product and other hazardous materials listed on Table 4 include materials used for operating, refueling, maintaining, and cleaning equipment - including equipment used below the ordinary high water line. NAD shall fill out Table 4 prior to initiating any project related activities.

Table 4 - Fuel, Petroleum Product and other Hazardous Materials Brought or Generated On-Site

Hazardous Material Name	Intended Use of Material	Est. Max. Amount of Material On-Site at Any One Time	Material Staging, Use, and Storage Location(s), & Material Storage and Secondary Containment Practices and Structures1	Distance of Material Staging, Use, and Storage Locations from Nearby Waterways2 and Sensitive Areas3
Delo 400 SAE 15-40	Motor oil for equipment	100 gallons	Contained in field service truck	N/A
Drive train fluid 10W-30-50	Transmission rear ends and hydraulics	50 gallons	Contained in field service truck	N/A
Delo XLC	Antifreeze and coolant	50 gallons	Contained in field service truck	N/A
Diesel fuel	In heavy equip and trucks	1000 gallons	Contained in field service truck	N/A
Gasoline unleaded	In pickup trucks and small equip.	500 gallons	5 gallon safety cans in vehicles or flammable cabinet	N/A

Notes:

1 See also Section 7.D (Spill Prevention, secondary containment and structures may be described in Table 4 or under Section 7D.

2 Waterways include streams, creeks, sloughs, rivers, Puget Sound, etc.

3 Sensitive areas are areas that typically contain populations that could be particularly sensitive to a hazardous materials spill or release. Such areas include wetlands, areas that provide habitat for threatened or endangered species, nursing homes, hospitals, child care centers, etc. Sensitive areas also include areas where groundwater is used for drinking water, such as wellhead protection zones and sole source aquifer recharge areas.

4. Pre-Existing Contamination

Refer to the Aspect Consulting Geotechnical Report dated May 22nd 2020

5. Spill Prevention and Response Training

Employees and service crew will be briefed in an annual safety meeting in the requirements for preventing and containing spills. Onsite crews will attend weekly safety meeting that also involves spill response. In these meetings crews will review spill practices and be reminded of the spill response kits located onsite. All fueling will be conducted by authorized personnel only.

6. Spill Prevention

A. Spill response kit contents and location(s) (see Table 7). Appropriately stocked spill response kits shall be maintained in close proximity to hazardous materials and equipment and shall be immediately accessible to all Project personnel.

Table 7 Spill Response Kit Contents and Locations

Type of Spill Kit	Spill Kit Contents	Spill Kit Location(s)
Vehicle kit(s)	One (1) water resistant nylon bag, twelve (12) 17”x19” oil absorbent pads, three (3) 3”x4’ oil absorbent socks, two (2) 3”x10’ oil absorbent socks, dams, splash resistant goggles, three (3) pairs nitrile gloves, plastic sheeting, ten (10) disposable bags with ties.	In all mobile fuel vehicles
Conex Kit(s)	One (1) water resistant nylon bag, twelve (12) 17”x19” oil absorbent pads, three (3) 3”x4’ oil absorbent socks, two (2) 3”x10’ oil absorbent socks, dams, splash resistant goggles, coveralls, three (3) pairs nitrile gloves, plastic sheeting, ten (10) disposable bags with ties, anti-static shovel, disposal drum, full copy of updated SPCC plan.	Within 1500 linear feet of all work areas.

B. Security measures for potential spill sources. The two primary access points shall be gated and locked during all non-work periods. Hazardous materials shall be stored inside locked sheds or other appropriately secured areas. Equipment shall be equipped with locked fuel caps.

C. Methods used to prevent stormwater from contacting fuel, petroleum products and hazardous materials. All hazardous materials will be stored on diked/impervious surfaces capable of handling the maximum volume of hazardous material storage. Drip pans or other equivalent protection shall be utilized for all hazardous material transfers. All fueling operations shall occur at least 500 feet

away from waters of the state. In the event that any materials are used from any of the spill response kits, the materials shall be restocked immediately.

D. Secondary containment for each potential spill source listed in Section 4, above. Hazardous materials shall be stored in accordance with the attached BMP C153 (Material Delivery, Storage and Containment). Secondary containment structures shall be in accordance with Section S9.D.9 (http://www.ecy.wa.gov/programs/wq/stormwater/construction/permitdocs/cswgpermit120110.pdf#page=32) of Ecology's Construction Stormwater General NPDES Permit, (http://www.ecy.wa.gov/programs/wq/stormwater/construction/) where secondary containment means placing tanks or containers within an impervious structure capable of containing 110% of the volume contained in the largest tank within the containment structure. This NPDES Permit does not require additional secondary containment for double-walled tanks.

E. Best Management Practices (BMP) Methods used to prevent discharges to ground or water during mixing and transfers of hazardous materials, petroleum product and fuel. All transfers of hazardous materials shall follow guidelines specified in the attached BMP C153 (Material Delivery, Storage and Containment).

F. Refueling procedures for equipment that cannot be moved from below the ordinary high water line. Refueling of equipment below the ordinary high water line shall only be conducted if no other option is available. Under no circumstances shall equipment be refueled below the ordinary high water line as the normal operation of the proposed work. In the event that equipment runs out of fuel while working below the ordinary high water line, and cannot be removed through any other means, only the minimum amount of fuel shall be added to the equipment so that it can be moved to a designated fueling location. While adding the minimum amount of fuel to the equipment, drip pans or equivalent protection shall be utilized to prevent fuel contamination.

G. Daily inspection and cleanup procedures that ensure all equipment used below the ordinary high water line is free of all external petroleum-based products. All equipment shall be inspected for leaks or any other hazardous material contamination prior to being used below the ordinary high water line.

H. Routine equipment, storage area, and structure inspection and maintenance practices to prevent drips, leaks or failures of hoses, valves, fittings, containers, pumps, or other systems that contain or transfer hazardous materials. All equipment shall be inspected for leaks for malfunctioning hoses, valves fittings, containers, pumps or other parts during refueling, and at the beginning and end of all shifts.

I. Site inspection procedures and frequency. Visual inspection of the site shall be conducted at the start and finish of each shift to identify any circumstances that are not consistent with the guidelines set forth in this section (i.e. Section 7, A-H).

7. Spill Response

Tables 8A and 8B, below, outline the response procedures that the NAD shall follow for the scenarios described in the tables below, indicating that if hazardous materials are encountered or spilled to soil or water (including stormwater, as described in Section 7C) during construction, NAD shall do everything possible to control and contain the material until appropriate measures can be taken. The response procedures include a description of the actions that NAD shall take to address each task shown in the tables as well as the specific on-site, spill response equipment that shall be used to perform each task.

NAD will use a Subcontractor for spill response, provide contact information for the Subcontractor in Table 1 and, in the appropriate table below, identify when the Subcontractor shall be used and the actions that NAD shall take at the site while waiting for the Subcontractor to respond.

If NAD encounters unanticipated pre-existing contamination within the Project area during Project work, NAD shall immediately notify the Project Engineer.

Table 8A Spill Response Procedures, Including Actions to be Taken and Equipment to be Used

Hazardous Material and Location	Spill Response Task			
	Assess the Spill	**Secure the Area**	**Contain and Eliminate the Spill Source**	**Clean Up Spilled Material Decontaminate Equipment Dispose of Spilled & Contaminated Material[1]**
Gasoline Diesel Fuel Motor Oil Hydraulic Fluid	Turn off any equipment that is causing the spill (if applicable). Determine if the leak/spill location is correctable to prevent additional contamination. If there is a threat that the contamination could move to waters of the state call numbers specified in Table 8b. Call Washington Department of Ecology (Eastern Regional Office) at 509-329-3400 within 90 days (or immediately if the spill is an immediate threat to health or the environment.	Remove any non-response personnel and equipment from the spill area.	If safe to do so, spill response personnel shall put on personal protection equipment (i.e. goggles, gloves, coveralls, etc.) and contain the spill with spill pads, socks and/or dams from the spill kits.	If spill is not too large or dangerous to be handled with onsite spill kits, clean up the spill by collecting contaminated soil and absorbent pads/socks within disposal bags or disposal drum(s). Decontaminate all non-disposable equipment; dispose of all disposable equipment and contaminated soil at a facility legally permitted to handle such waste. If the spill is too large or dangerous to be handled with onsite spill kits, NAD shall work with a spill response subcontractor and emergency personnel to clean up the spill.

Notes:

[1] Spilled fuel, petroleum product and hazardous materials, contaminated stormwater, contaminated soil and water, and all cleanup supplies shall be transported off site for disposal at a facility approved by the Department of Ecology. No potentially hazardous materials, contaminated soil or water, or cleanup supplies may be discharged to any sanitary sewer without approval of the local sewer authority. Contaminated stormwater will not be discharged to any sanitary sewer without approval of the local sewer authority.

- Petroleum products, fuel, and hazardous material spills shall be addressed and shall be prevented from reaching storm drains or other discharge points.
- It is acceptable to combine materials covered by the same response procedures, as long each material is clearly identified

Table 8B Spill Response Procedures for Spills Occurring During Work with Equipment Used Below the Ordinary High Water Line (Including Actions to be Taken and Equipment to be Used)

Hazardous Material and Location	Spill Response Task			
	Assess the Spill	**Secure the Area**	**Contain and Eliminate the Spill Source**	**Clean Up Spilled Material Decontaminate Equipment Dispose of Spilled & Contaminated Material[1]**
Gasoline Diesel Fuel Motor Oil Hydraulic Fluid	Turn off any equipment that is causing the spill (if applicable). Determine if the leak/spill location is correctable to prevent additional contamination. Immediately call all four of the following: National Response Center (1-800-424-8802) Washington State Division of Emergency Management (1-800-258-5990) Washington State Department of Ecology, Eastern Regional Office (509-338-3223)	Remove any non-response personnel and equipment from the spill area.	If safe to do so, spill response personnel shall put on personal protection equipment (i.e. goggles, gloves, coveralls, etc.) and contain the spill with spill pads, socks and/or dams from the spill kits.	If spill is not too large or dangerous to be handled with onsite spill kits, clean up the spill by collecting contaminated soil and absorbent pads/socks within disposal bags or disposal drum(s). Decontaminate all non-disposable equipment; dispose of all disposable equipment and contaminated soil at a facility legally permitted to handle such waste. If the spill is too large or dangerous to be handled with onsite spill kits, NAD shall work with a spill response subcontractor and emergency personnel to clean up the spill.

Notes:

[1] Spilled fuel, petroleum product and hazardous materials, contaminated stormwater, contaminated soil and water, and all cleanup supplies shall be transported off site for disposal at a facility approved by the Department of Ecology. No potentially hazardous materials, contaminated soil or water, or cleanup supplies may be discharged to any sanitary sewer without approval of the local sewer authority. Contaminated stormwater will not be discharged to any sanitary sewer without approval of the local sewer authority.

8. Project Site Map

A Project site map, clearly showing the general components and approximate locations of each of the following required or recommended items, is attached:

A. Site location and boundaries;

B. Site access roads;

C. Drainage pathways from the site;

D. Nearby waterways and sensitive areas (Waterways include streams, creeks, sloughs, rivers, Puget Sound, etc. Sensitive areas are areas that typically contain populations that could be particularly sensitive to a hazardous materials spill or release. Such areas include wetlands, areas that provide habitat for threatened or endangered species, nursing homes, hospitals, child care centers, etc. Sensitive areas also include areas where groundwater is used for drinking water, such as wellhead protection zones and sole source aquifer recharge areas.);

E. Hazardous materials, equipment, and decontamination areas identified in Section 4 (Potential Spill Sources), above;

F. Pre-existing contamination or contaminant sources described in Section 5 (Pre-Existing Contamination), above;

G. Spill prevention and response equipment described in Section 7 (Spill Prevention) and Section 8 (Spill Response), above;

I. Recommend using Project-specific Plan Sheets or a consistent map scale with identifiable or readable map symbols for each Project SPCC Map.

9. Spill Report Form(s)

A copy of the spill report form that NAD shall use in the event of a release or spill is attached (see Appendix A).

10. Plan Approval

This SPCC Plan is supported by the executives, project manager and the superintendents of the Contractor having the authority to commit the necessary resources, including labor, equipment, and materials, to expeditiously control and remove any harmful quantity of fuel, petroleum product or hazardous materials spilled or released to the waters or land of the State of Washington.

NAD's President

_____ _____

Date Signature

_____

Name

NAD's Project Manager

_____ _____

Date Signature

_____

Name

NAD's Project Superintendent

_____ _____

Date Signature

_____

Name

SPCC Plan Acknowledgement Form (to be signed by all Project personnel)

This is to certify that I have read this Project SPCC Plan and understand its contents. I have attended a Project orientation meeting discussing the elements of this SPCC Plan and the safety and health hazards associated with SPCC operations to be performed at this Project. Failure to comply with the requirements contained in this SPCC Plan may result in my removal from the Project.

PRINT NAME	SIGNATURE	DATE

APPENDIX A

EXAMPLE SPILL OR INCIDENT REPORT FORM

Instructions: Complete for any type of petroleum product or hazardous materials/waste spill or incident. Provide a copy of this report to management.

1. Personnel Involved in Spill Reporting:

Project Office: Name, Title, and Phone Number: _____
_____
Regional Environmental Office: Name, Title, and Phone Number: _____
_____

2. Contractor:

Name and Title of Person Responsible for Spill Response: _____
Phone Number:_____

3. General Spill Information:

Common Name of Spilled Substance: _____
Quantity Spilled (Estimate): _____
Describe Concentration of Material (Estimate): _____
Date of Spill: _____/_____/_____
Time Spill Started: _____ AM _____ PM Time Spill Ended: _____ AM _____ PM

4. Spill Location and Conditions:

Project Title: _____
Street Address and/or Milepost, City: _____
Weather Conditions: _____
If Spill to Water,
Name of Water Body (if ditch or culvert, identify the water body that the structure discharges to):
_____
Identify the Discharge Point: _____
Estimate the Depth and Width of the Water Body: _____
Estimate Flow Rate (i.e., slow, moderate, or fast): _____
Describe Environmental Damage (i.e., fish kill?): _____

5. Actions Taken:

To Contain Spill or Impact of Incident: _____
To Cleanup Spill or Recover from Incident: _____
To Remove Cleanup Material: _____
To Document Disposal: _____
To Prevent Reoccurrence: _____

6. Reporting the Spill:

Spills to water: Immediately call the National Response Center (1-800-424-8802), Emergency Management (-1-800-258-5990) and the appropriate Ecology Regional Office.
Spills to soil that may be an immediate threat to health or the environment (i.e., explosive, flammable, toxic vapors, shallow groundwater, nearby creek, etc.)**:** Call the appropriate Ecology Regional Office immediately. If not immediately threatening, but may be a threat to human health

List all agencies contacted; include names, dates, and phone numbers for people you spoke with:
_____
_____
_____

Record ERTS #, if issued by Ecology: _____

7. Person Responsible for Managing Termination/Closure of Incident or Spill:

Name and Phone: _____
Address and Fax: _____

8. Additional Notes/Information (if necessary):