Engineering Design Report
Hamilton Street Bridge Site
Spokane, Washington

May 28, 2003

Prepared for

Avista Corporation and
Burlington Northern Santa Fe Railroad Company

LANDAU ASSOCIATES
10 North Post Street, Suite 218
Spokane, WA 99201
(509) 327-9737

AVISTA Utilities
1411 E. Mission Avenue
P.O. Box 3727
Spokane, WA 99220-3727

LETTER OF TRANSMITTAL

Re: Hamilton Street Bridge Site

DATE	W.O. No.	P.O. No.
06/10/03		

RE: Engineering Design Report
Dated May 28, 2003

TO Ms. Teresita Bala

Department of Ecology
4601 North Monroe
Spokane, WA 99205

WE ARE SENDING YOU X Attached ☐ Under separate cover via ______________ the following items:

☐ Drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ ______________

COPIES	DATE	PAGES	DESCRIPTION
3	05/28/03		Engineering Design Report, Hamilton St. Bridge Site
3	05/28/03		Health & Safety Plan For Cleanup Action Plan
3	05/28/03		Compliance Monitoring Plan
3	5/29/03		Institutional Control Plan

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Alison Kenyon, Project Assistant

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1.0 INTRODUCTION

1.1 INTRODUCTION

The Avista Corporation (Avista Corp) and Burlington Northern Santa Fe Railroad Company (BNSF) (The Companies) entered into a Consent Decree (Consent Decree No. 02205445-0) with the Washington State Department of Ecology (Ecology) to remediate the Hamilton Street Bridge Site (Site). This engineering design report (EDR) describes the containment of impacted soils, stormwater management, streambank bioengineering remedial components, institutional controls, and compliance monitoring of the cleanup action to demonstrate the effectiveness of the remediation activities.

Landau Associates has prepared this EDR on behalf of The Companies to meet the requirements of the Consent Decree, the Model Toxics Control Act (MTCA), and specifically Section 173-340-400 (4)(a) (Ecology 1996) of the Washington Administrative Code (WAC). This EDR presents the design criteria and engineering justification for the selected cleanup action, as specified in the final cleanup action plan (FCAP) prepared by Ecology (Ecology 2001a).

The remainder of this section presents the cleanup action goals, provides a Site description and history, summarizes previous Site investigations, and identifies the responsibilities for operation and maintenance of the cleanup action. Subsequent sections of this EDR describe the planned cleanup action, present the design parameters and construction requirements, describe the planned compliance monitoring activities, discuss public participation and permitting, and present the project schedule.

The contents and level of detail presented in this EDR are conceptual and reflect the present status of design development. Project permitting, particularly regulatory review by the U.S. Army Corps of Engineers (USACE), and site access and institutional control issues may impact the final scope of the cleanup action.

1.2 CLEANUP ACTION GOALS

Specific cleanup goals for the Site include the following:

- Placement of a soil cap over the contaminated soil exposed on the American Tar Company (ATC) area to prevent direct contact with the materials.
- Decommission dry wells on the Site to reduce potential water infiltration and contaminant leaching.
- Grade the Site to direct surface water away from known areas of contamination to reduce infiltration and contaminant leaching.

- Utilize bioengineering along the Spokane River to stabilize the riverbank so that erosion or flooding does not cut back and expose contaminated soil, and provide additional vegetation along the shoreline to provide riparian corridor enhancement and water filtration.
- Implement institutional controls to prevent human contact with soil and groundwater media exceeding human health cleanup levels
- Implement a compliance monitoring program to monitor performance of the cleanup action.

1.3 SITE BACKGROUND

1.3.1 SITE DESCRIPTION

The Site is located at 111 North Erie Street in Spokane, Washington (Figures 1 and 2), and includes the BNSF property (including a portion of which was formerly leased by the ATC), the former Spokane Manufactured Gas Plant (SGP), and Chicago Milwaukee & Saint Paul Railroad (CM&SPR) properties which are now owned by Spokane River Properties, Limited (SRP) (Figure 3). Several monitoring wells are located on the north side of the Spokane River on the BNSF Taylor Edwards property and, although outside the Site boundary, were considered part of the Site study area during the Remedial Investigation (RI).

Brown Building Materials currently operates a building materials salvage and sales operation on the Site. The Site is transected, roughly north-south, by the James Keefe (Hamilton Street) Bridge which is elevated high above ground surface on pilings with spread footings. A 60-inch diameter sanitary sewer line crosses beneath the Site in a southwest-northeast alignment.

Property in the vicinity of the study area is zoned light and heavy industrial. The closest residential properties are located south of Sprague Avenue (approximately 1,200 feet from the Site) or north of Trent Avenue (over 2,000 feet from the Site).

1.3.2 SITE HISTORY

Between approximately 1905 and 1948, manufactured coal gas and carburetted water gas was produced on the former SGP property. On June 3, 1958, Avista Corp (formerly The Washington Water Power Company) merged with the Spokane Natural Gas Company (formerly the Spokane Gas & Fuel Company) and dispensed natural gas from the Site until 1962 or 1963. Mr. Richard Brown established Brown Building Materials on the Site, leasing the former SGP property from Avista Corp from 1963 until March 1978, when he purchased the property. Mr. Brown conveyed the property to SRP, of which Mr. Brown is the general partner, in January 1982.

During the operation of the manufactured gas plant, coal tar, a by-product of coal gas production, reportedly was conveyed to a coal tar processing plant and distribution facility located on a parcel leased from the Northern Pacific Railroad (contemporary BNSF) adjacent to the south side of the former SGP property. The C.G. Betts Company operated the facility until the early 1930s when the operations were taken over by the ATC. The ATC utilized the facility until 1967, reportedly shipping tar to the Site from Seattle after the former SGP was shut down. Mr. Brown leased the ATC property from the BNSF from 1968 until 2002.

The existing riverfront property at the Site was formerly owned by the CM&SPR. The CM&SPR property was purchased by Mr. Brown in 1981, and the title is now held by SRP. The CM&SPR constructed a rail line circa 1911, which extended along the southern riverbank to a railroad tunnel which is located within the basalt embankment on the west side of the Site. The tunnel formerly connected the CM&SPR to the area known as the Milwaukee Trench, which parallels Trent Avenue east of Division Street. Historical records indicate that, during the construction of the CM&SPR, fill materials were deposited into the river, and the Spokane River shoreline was modified to its present configuration. Remnants of a former CM&SPR rail car turntable, consisting of an elevated concrete pad, are still present west of the James Keefe Bridge. The CM&SPR railroad tracks have been removed from the Site.

1.3.3 Site Investigation Background

In 1987, the U.S. Environmental Protection Agency (EPA) completed a preliminary assessment of both the former SGP and ATC properties. The EPA recommended additional investigation for the ATC property, and withheld a decision regarding the former SGP until the ATC property was further investigated. In 1988, EPA completed a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) screening site investigation of the ATC property and turned further investigation over to the state. In 1992, Ecology ranked the ATC property under the MTCA, scoring the Site as a low risk (with a ranking of 5 out of 5). That ranking was revised to 3 in 1994.

In 1995, URS Consultants on behalf of the EPA completed a screening site investigation of the former SGP. The screening site investigation included sampling water and sediments of the Spokane River. EPA's conclusion was that the samples did not appear to reflect a release of contamination from the Site to the Spokane River (URS 1995). Consequently, EPA did not anticipate further investigation at the Site under CERCLA, and referred the Site to the state for further consideration.

In 1981, the Washington State Department of Transportation (WSDOT) conducted drilling on the Site to provide design information for the James Keefe Bridge. Oily material was observed at depth in several of the test borings and was also observed during the bridge construction in 1982. This information was not presented to Avista Corp or BNSF until 1997.

The presence of contamination was further documented when WSDOT initiated exploratory activities on the Site in the summer of 1997 to evaluate the proposed realignment of SR290 (Trent Avenue). Information from the 1997 investigation indicated the presence of affected soil at the Site containing total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAHs), semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), metals, and cyanide above detection limits. Analytical results for groundwater samples collected on November 13, 1997 by WSDOT from the nearest city supply well (Nevada Street well located approximately 8,500 feet north-northeast from the Site) did not indicate the presence of TPH as diesel or oil, PAHs, SVOCs, or cyanide above detection limits.

In June 1998, the Washington State Department of Health (DOH) prepared a health consultation at the request of Ecology to evaluate the potential public health hazards posed by the contamination in the vicinity of the proposed Trent Avenue realignment corridor, including the SRP and BNSF properties. The health consultation was prepared by the DOH under a cooperative agreement with the U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry of Atlanta, Georgia. Based on the information available, the consultation stated that no apparent public health hazards exist based on current land and groundwater use, but identified the need for further study should Site or local groundwater use change (DOH 1998). On July 10, 1998, the Spokane County Health District (SCHD) completed a site hazard assessment of the former SGP property under the MTCA and assigned the property a hazard ranking of 3 (SCHD 1998).

Because the WSDOT investigation was limited primarily to an investigation of soil conditions for road design purposes, Avista Corp initiated additional soil and groundwater investigation of the former SGP property in 1997, and BNSF initiated additional soil and groundwater investigation of the ATC property in 1998.

In 1999, The Companies and Ecology jointly agreed to negotiate an Agreed Order to conduct an RI and feasibility study (FS). The RI and FS were completed in early 2001 and late 2000, respectively. Ecology issued the FCAP on August 10, 2001, and the Consent Decree No. 02205445-0 was recorded on September 12, 2002, which stipulated the terms for the cleanup action.

1.3.4 Summary of Site Conditions

The present understanding of the geology and hydrogeology, and nature and extent of contamination for soil, groundwater, sediment, and surface water at the Site were presented in the RI (Landau Associates 2001) and were based on multiple investigations conducted by the EPA, Ecology, WSDOT, Avista Corp, and BNSF. The understanding of geology and soil quality were based on more than 100 soil samples analyzed for PAHs, TPH, SVOCs, VOCs, metals, and cyanide constituents, and observations of soils in 74 borings drilled and 12 test pits excavated within and outside the Site boundary. The understanding of hydrogeology was based on river stage and groundwater level measurements collected between 1997 and 2001 from one staff gauge placed in the Spokane River and up to 28 Site monitoring wells installed in three zones within the uppermost Site aquifer. Relevant hydrogeologic data collected from other regional Spokane Aquifer studies were also utilized to enhance the understanding of the Site. The understanding of groundwater quality was based on more than 100 samples collected from 28 monitoring wells installed in three aquifer zones, located adjacent to and below the areas of affected soil, and was analyzed for similar environmental constituents as the soil. The understanding of sediment quality for the RI was based on four samples collected from surface sediment in the Spokane River which were analyzed for SVOCs, PAHs, cyanide, and metals. The understanding of Site surface water quality was based on five samples collected from the Spokane River which were analyzed for SVOCs, PAHs, metals, polychlorinated biphenyls (PCBs), and/or cyanide.

1.3.5 Geology and Hydrogeology

The primary conclusions regarding Site geology and hydrogeology are summarized as follows:

- Geologic units encountered at the Site include, youngest to oldest, recent surficial fill materials (including cinder, brick, soil, and basalt cobbles and boulders), unconsolidated sediment, and basalt bedrock.

- Fill materials range up to approximately 30 feet in thickness, and are thickest on the western portion of the Site where during the early 1900s fill materials were placed in the river for the construction of the CM&SPR. Placement of fill for the CM&SPR circa 1910 - 1912 shifted the riverbank as much as 230 feet north of its pre-1910 position.

- The unconsolidated sediments on the Site consist primarily of Spokane River deposits of silt, sand, gravel, and cobbles, and glaciofluvial sediments deposited by the Pleistocene catastrophic floods. Drilling records indicate that the unconsolidated sediments in the central area of the Site are over 115 feet thick.

- Bedrock underlying the unconsolidated sediments at the Site has only been encountered in MW08-90 at a depth of 90 feet below ground surface (BGS). Basalt outcrops along, and protrudes under, the western edge of the Site, at least to the area of MW08-90. The basalt forms a cliff face comprising the western boundary of the Site, and diverts the Spokane River to the north.

- The Site appears to be within, but on the southwestern edge of, the Spokane-Rathdrum Prairie Aquifer based on regional aquifer studies and the unconsolidated sediments observed in the study area,

- Groundwater is encountered approximately 10 to 20 feet below the Site surface. Groundwater elevations were observed at the highest levels in the spring (April – May), and at the lowest levels in the late summer to fall (August – November). The high and low groundwater levels correspond with the Spokane River levels.

- The Spokane River surface water level is generally higher in elevation than groundwater. This indicates that the Spokane River locally recharges groundwater, and receives only limited recharge from groundwater during periods of peak runoff in the late spring to early summer.

- The geologic materials (fill versus native soil) play a significant role on the water table and potentiometric surface response for shallow groundwater. River water appears to interact rapidly with the highly permeable fill materials, and as a result, the shallow groundwater elevations in the fill correspond closely to the river level. The native soils are composed primarily of sand and gravel, and although these materials are very permeable, they have a significantly lower hydraulic conductivity than the fill. Conceptually, the coarse fill material essentially acts as an extension of the Spokane River while the native deposits are heavily influenced by the river but also reflect regional hydrogeologic conditions.

- During most of the year shallow groundwater gradients are from the river to the fill, and from the fill laterally and downward into the native sand and gravel aquifer.

- The horizontal hydraulic gradients in the shallow, intermediate, and deeper zones through much of the year are very low. During some monitoring events only hundredths of a foot difference were observed across the entire Site.

- During most of the year the water level gradients suggest a convergence of river water, shallow groundwater, and deeper groundwater in the intermediate zone of the aquifer.

1.3.6 ENVIRONMENTAL CONDITIONS

The primary conclusions regarding Site environmental conditions are summarized as follows:

- Constituents typically associated with manufactured gas plant processes and/or coal tar processing were detected in Site soil samples. The analytical data indicate that soils within the Site boundaries are impacted with SVOCs, PAHs, VOCs, and inorganic compounds.

- The approximate extent of soil contamination based on exceedance of the MTCA Method A soil cleanup level for total carcinogenic PAHs (cPAHs) is shown on Figure 4. Based on visual observations, surface soil contamination is only present on the western portion of the ATC property and consists of tar and cinder. The remaining soil contamination is covered by at least 2 feet of imported soil and gravel. The extent of contamination in some areas extends up to 80 feet BGS, and the majority of soil contamination is located below the groundwater table. The estimated volume of soil exceeding the cPAHs soil cleanup level for the entire Site may be as much as 92,000 cubic yards.

- Constituents associated with the former manufactured gas processes and/or coal tar processing were not detected in the soil off of the Site.

- Indicator hazardous substances (IHSs) developed by Ecology for soil consist of six PAHs, total cPAHs, TPH, carbozole, cyanide, arsenic, barium, lead, mercury, and selenium.

- Groundwater monitoring was focused on evaluating groundwater quality outside of the affected soil area. Groundwater within the non-aqueous phase liquid (NAPL)-affected area was assumed to be contaminated for the purposes of the RI.

- Relatively few VOCs, SVOCs, PAHs, and inorganic constituents were detected in the groundwater samples analyzed, and those that were detected have not been detected with any consistency.

- Because groundwater inside the soil impacted area is considered to be contaminated by the soil, IHSs developed by Ecology for groundwater are identical to the IHSs for soil.

- Natural attenuation parameters in groundwater indicated a rapid decrease in carbon dioxide, sulfate, and methane concentrations, and an increase in nitrogen concentrations, with distance from the source. These trends support the conclusion that natural attenuation processes such as aerobic biodegradation and oxidation are occurring at the Site, which results in rapid destruction or transformation of IHSs present in Site groundwater.

- The limited extent of groundwater contamination detected outside of the impacted soil areas indicate that the source material has a low solubility, and any constituents that may be partitioning into groundwater are rapidly attenuating through natural physical, chemical, and biological processes (i.e., natural attenuation).

- No indicator constituents above cleanup levels were identified in sediment. Sediment is not an affected media for the Site.

- No indicator constituents above cleanup levels were identified in surface water. Surface water is not an affected media for the Site.

- Two wells were installed in the area of NAPL-affected soil to evaluate the physical and chemical characteristics of the NAPL; however, samples of NAPL could not be collected due to insufficient NAPL volume in the wells. The limited occurrence of NAPL in the product wells supports the conclusion that NAPL migration is very limited or not occurring.

- The potential impact on natural resources and the environment from Site contaminated materials appears to be limited. The long term industrial nature of the Site limits the presence of potential plant or animal receptors. Based on the available soil, groundwater, and sediment data from the RI, relevant media are not affected to the extent that aquatic or benthic organisms in the Spokane River are being adversely impacted. All detected parameters in the Spokane River sediments were well below the preliminary Washington State draft freshwater sediment quality values. The low frequency of criteria exceedance for groundwater, in conjunction with the lack of associated sediment impact, indicates that groundwater is not adversely impacting the Spokane River or any associated ecological receptors.

1.4 OPERATION AND MAINTENANCE OF THE CLEANUP ACTION

The Companies will operate and maintain the Site cleanup action during and following remedial construction activities, as agreed in the Consent Decree.

2.0 PROPOSED CLEANUP ACTION

The following section summarizes the general design concepts for the primary elements of the proposed cleanup action.

2.1 CONCEPTUAL DESIGN OVERVIEW

The conceptual design for the proposed Site cleanup is based on the preferred cleanup alternative defined by Ecology in the FCAP. Ecology developed this alternative by combining elements from the various alternatives considered in the FS (GEI 2000) to arrive at a practicable overall remedy which is protective of human health and the environment. The primary components of the cleanup action, as defined in the FCAP, are as follows:

- Covering and bringing to grade the impacted ATC area with clean soil or gravel
- Use of existing fill materials as a barrier or cover for the contaminated soils in the former SGP area
- Stormwater management that includes abandonment of existing dry wells on the Site
- Construction of streambank bioengineering along the vulnerable shoreline of the Spokane River
- Groundwater monitoring
- Institutional controls that include restrictive covenants on the properties
- Five year reviews by Ecology.

Ecology determined that this selected remedy is protective of human health and the environment, and is permanent to the maximum extent possible.

A conceptual plan illustrating the elements of the proposed cleanup action is presented on Figure 4. The following sections provide a brief summary of the conceptual design for each of the first four components of the cleanup, as well as a description of the shoreline restoration and protection measures which have been incorporated into the remedy. Further design details, along with pertinent design criteria considerations, are presented in Section 3. The final component, compliance monitoring, is addressed in Section 5. Institutional controls are addressed in Section 6.

2.2 CONCEPTUAL DESIGN COMPONENTS

2.2.1 LIMITED SOIL CAP

A soil cap will be placed over the exposed contaminated soils on the ATC property to prevent direct contact with the contaminated soil. The two existing structures on the ATC property (tin shed and block building) will be removed down to surface level. The concrete pad of the block building will be left in place. The area that will be capped consists of approximately 8,500 square feet located on the western portion of the ATC property (see Figure 4). This area will be covered with a minimum of 2 feet of soil or gravel and then covered with crushed stone, gravel, or select fill to bring the area to appropriate grades for stormwater drainage.

2.2.2 STORMWATER MANAGEMENT

Stormwater management will focus on directing surface water away from known areas of contamination and abandonment of dry wells. Our approach does not intend to disturb the existing soil cover, and our proposed design will not include any cuts into areas where contamination has been identified.

Spokane River Properties

Stormwater management on property owned by the SRP will consist of two components. The first component will be abandonment of the six existing dry wells located adjacent to the concrete pad of the former Brown Building Materials office (the burned structure), and the second component will consist of directing surface runoff away from the contaminated soil areas to a swale located outside of the areas of contamination. The dry well locations are shown on Figure 4.

American Tar Property

The contaminated materials on the ATC property are located in a topographically depressed area. Additional material will be required to bring the area up to grade after the soil cap is placed over the contaminated surface soil. The final grade will be brought up to an approximate elevation of 1,886 feet mean sea level (MSL) and sloped to the eastern side of the ATC property to direct runoff away from the impacted area. It is assumed that the ATC property will remain unpaved. Though not required by stormwater regulation, an infiltration swale will be constructed on the eastern side of the property to assure on site containment of stormwater.

2.2.3 STREAMBANK BIOENGINEERING

There are two elements of streambank bioengineering that will be implemented at the Site. The first and most important aspect to preventing migration of the contaminated materials is the long-term stabilization of the river embankment so that erosion or flooding does not cut back into the contaminated soil. The second element consists of providing additional vegetation along the shoreline to provide riparian corridor enhancement and some level of filtration between surface water and groundwater. The segment of the Site shoreline that will be addressed is shown on Figure 5.

2.2.4 MONITORING WELL MODIFICATIONS

Monitoring wells (including two product monitoring wells) that are not included in the groundwater monitoring program will be abandoned. Monitoring wells that will be included in the groundwater monitoring program may need wellhead modifications or protective bollards to coordinate with topographic changes proposed for the Site.

2.2.5 PERMITTING

The Companies are conducting the remediation of the Site under the MTCA (RCW 70.105D) and have entered into a Consent Decree with Ecology. The RCW (70.105D.090) states that remedial actions conducted under a consent decree, order, or agreed order, are exempt from the procedural requirements of Chapters 70.94 (Air), 70.95 (Solid Waste), 70.105 (Hazardous Waste), 75.20 (Hydraulic Permit), 90.48 (Water Quality), and 90.58 (Shorelands) RCW, and the procedural requirements of any laws requiring or authorizing local government permits or approvals for the remedial action. The MTCA, however, does not exempt Federal permitting requirements.

Substantive compliance for permits applicable to cleanup under the MTCA is facilitated through the State Environmental Policy Act (SEPA), chapter 43.21 RCW. The SEPA requires that all governmental agencies consider the environmental impacts of a proposed project before making decisions. Ecology is the lead agency for SEPA compliance and for those permits that are exempt on MTCA cleanup projects, and will coordinate review of the SEPA document (i.e., environmental checklist, expanded checklist or environmental impact statement) by appropriate local governments, state, and federal agencies, and native American tribes, in addition to general public review and comment. The Companies submitted a SEPA checklist to Ecology and a Determination of Non-Significance (DNS) was issued by Ecology on December 16, 2003. No comments were received by Ecology during the December 16 to 31, 2002 public comment period. Ecology and/or the Companies will work with appropriate state and local agencies to determine which of the substantive requirements will apply.

The cleanup action will require work below the high water line of the Spokane River, and therefore a Federal Permit will be required. The USACE facilitates aquatic work through the Joint Aquatic Resources Permit Application (JARPA). A JARPA was submitted by the Companies to the USACE on January 28, 2003 for work along the shoreline area at the Site to facilitate acquisition of a Section 404, Nationwide Permit 38 (nationwide permit for remediation of contaminated sediments).

3.0 ENGINEERING AND DESIGN

3.1 SITE-SPECIFIC CONSIDERATIONS

This section describes Site-specific characteristics which are pertinent to the design, construction, and operation of the selected cleanup action. Specifically, this section addresses the relationship between the proposed cleanup action and the Site geographic features, subsurface conditions, existing structures, and existing and future Site operations.

3.1.1 GEOGRAPHIC FEATURES

The principal geographic feature of interest with respect to the remedial design is the Spokane River. The variation in the river discharge rates and stage levels will be considered in design of the riprap slope protection and revegetation for the shoreline enhancement element of the remedial design.

The river level is regulated, in large part, by dams located upstream and downstream of the Site. The normal pool elevation of the Upper Falls Hydroelectric Development is at approximate elevation 1870 feet MSL and backs up to the east central portion of the Site. The ordinary high water level is at approximate elevation 1875 feet MSL based on the vegetation level along the Site riverbank. The recent historical high water level was recorded in May 1997 at elevation 1881.8 feet (approximately 2 feet below the top of bank) by Avista Corp surveyed to a point on the Hamilton Street Bridge. Spokane River discharge rates typically range from about 1,200 cubic feet per second (cfs) during the late summer months up to about 20,000 cfs during the peak spring discharge. During the 1997 spring flood condition, the discharge rate exceeded 40,000 cfs.

3.1.2 TOPOGRAPHY AND SUBSURFACE CONDITIONS

Topographic conditions at the Site will affect the grading design and associated volume of fill required to achieve the desired drainage. Subsurface soil and groundwater conditions will be considered in the design of stormwater infiltration swales and basins. Excavation spoils from the infiltration swales/basins will be incorporated into the grading fill, to the extent practicable.

Generally, the Site topography slopes gently up to the east and west from an approximate low elevation of 1884 feet MSL located beneath the bridge. The overall topographic relief across the Site is less than 1 percent. An approximately 3-feet-deep topographic depression, with a base elevation of 1,881 feet MSL, is located along the southern boundary of the Site, in the location of the former ATC plant.

The near surface soil conditions (above the water table) vary across the Site. The upper 2 to 5 feet is comprised of a mixture of sand and gravel, concrete, bricks, cinders, and cobble and boulder fill material. A surface layer of clean crushed gravel covers most of the Site; however, tar and clinker are visible on the surface within the depressed area of the former ATC property. Unconsolidated sediments underlie the fill and consist primarily of river deposits of silt, sand, gravel, and cobbles.

The groundwater table beneath the Site ranges from approximately 10 to 20 feet BGS, during most of the year. All unconsolidated materials on the Site are considered to be highly permeable.

3.1.3 Existing Structures and Utilities

Prior to initiating remedial construction activities, the existing buildings on the Site will be removed. The remedial design will include measures to accommodate the permanent structures and utilities that exist both on and adjacent to the Site.

Site grading activities will involve placement of fill material around the Hamilton Street Bridge piers in both the upland area of the Site, and in the area of the proposed shoreline restoration work. This will required coordination with the WSDOT who owns and operates the bridge, to verify their concurrence with the proposed design for upland grading and riprap placement adjacent to the piers along the riverbank.

A 60-inch sanitary sewer line, owned and operated by the City of Spokane Public Works Department, runs east-west through the Site, at a depth of about 20 feet BGS. Fill placement associated with Site grading activities will require raising of at lease one manhole lid.

Site grading activities will also require adjustment to some of the groundwater monitoring well heads around the Site. At a minimum, protective bollards will need to be adjusted to the new Site grades. In some locations, the well casings may also need to be raised.

A shallow drainage ditch will need to be excavated along the west side of Erie Street, to convey runoff to the proposed infiltration basin/swale at the northeast corner of the Site.

Grading materials will be placed next to overhead utilities poles and structures. Buried utilities will be covered with additional grading materials and will be extended upwards when necessary.

3.1.4 Existing and Future Site Uses

The Site area between the Spokane River and the BNSF property boundary is presently used for a building materials salvage and sales operation, operated by Brown Building Materials. These building materials, which occupy a large portion of the Site, will need to be temporarily or permanently relocated to accommodate planned grading activities. Aspects of a materials relocation plan is currently being discussed between the Browns and the Companies.

Upon completion of the remedial action, SRP is currently planning to develop an office park on the Site. Preliminary plans for the development include construction of four buildings along the riverbank and one additional building adjacent to Erie Street, at the locations shown on Figure 6. As part of an agreement between The Companies and SRP, the remedial design includes certain accommodations to facilitate the future development of the property. Specifically, the Site grading plan has been designed so as not to preclude the planned Site development. Additionally, fill materials for Site grading and surfacing will be selected so as to provide a suitable base for future asphalt pavement.

3.2 DESIGN CRITERIA AND CONCEPTUAL DESIGN DETAILS

This section outlines the design criteria and associated conceptual design details for the primary elements of the selected remedy.

3.2.1 LIMITED SOIL CAP OVER ATC PROPERTY

A soil cap will be placed over the exposed contaminated soils on the ATC property to prevent direct contact with the contaminated soil. The area that will be capped consists of approximately 8,500 square feet located on the western portion of the ATC property (see Figure 6). This area will be covered with a minimum of 2 feet of soil, plus additional material to bring the area to appropriate grades for stormwater drainage. The final grade will be similar to the grade on the other portions of the Site and sloped to direct runoff to an infiltration swale at the east end of the BNSF property, away from the area of contamination (see Figure 6). Cross sections of the grading plan are shown on Figures 7 and 8.

The soil cover will consist of a base coarse and surfacing material. The base coarse material type and gradation will be selected on the basis of structural stability, erodibility, availability, and cost. Based on preliminary design evaluations and inquiries with local quarries, it is anticipated that the base coarse material will be comprised of a naturally-occurring or crushed sand and gravel mixture meeting the general requirements for "ballast," as defined in the WSDOT Standard Specifications [Section 9-03.9(1)]. Provisions may be incorporated into the standard specification to allow a greater maximum particle size (i.e., greater than 2 ½ inch), greater fines content (i.e., greater than 9 percent passing the No. 200 sieve). Additionally, the use of recycled materials, such as concrete, may also be considered These provisions would be aimed at allowing greater flexibility in selecting material sources, improving runoff characteristics, and providing for possible cost savings. The soil cover material will be placed in approximately 8-inch lifts and compacted with a smooth drum vibratory roller, to at least 95 percent of its maximum dry density.

Approximately 6 inches of surfacing material will be placed over the base material to promote surface water runoff and to serve as a running course for light traffic use. The surfacing material will be comprised of approximately 1¼ inch minus crushed rock, meeting the general requirements for "crushed surfacing," as defined in the WSDOT Standard Specifications [Section 9-03.9(3)]. The crushed surfacing will be placed in a single lift and compacted with a smooth drum roller, to at least 95 percent of its maximum dry density.

3.2.2 SITE GRADING/STORMWATER MANAGEMENT

Stormwater management on the SRP property will consist of two components. The first component will be abandonment of the six existing dry wells located adjacent to the concrete pad of the former Brown Building Materials office (the burned structure). The second component will consist of directing surface runoff away from the contaminated soil areas to infiltration swales located outside of the areas of contamination. The location of the dry wells and proposed swales are shown on Figures 4 and 6.

The method of abandoning the dry wells will consist of filling each dry well with granular soil or gravel to the top of the perforations, and capping the granular material with a minimum 6-inch layer of bentonite followed by a layer of surface gravel.

The ground surface overlying the former SGP contaminated area consists of compacted gravel and is relatively flat. Fill will be added to the former SGP area to provide a drainage grade of approximately 0.5 to 0.75 percent away from the impacted area (see Figure 6). The grading design will not involve disturbance of the existing soil cover over the impacted area. However, provisions will be included in the design to allow the reuse of spoils generated from the drainage swale excavations for grading fill material. These spoils would likely be incorporated into the lower portion of the grading fill.

The gradation and placement requirements for the grading fill will be the same as described for the ATC soil cover material. Based on preliminary design calculations, the total volume of fill required for Site grading, including the ATC area, will be less than 27,000 cubic yards (cy).

Upon completion of Site grading, approximately 6 inches of surfacing material will be placed over the grading area to promote surface water runoff and to serve as a running course for light traffic use. The surfacing course will be comprised of approximately 1¼ inch minus crushed rock, meeting the general requirements for "crushed surfacing," as defined in the WSDOT Standard Specifications [Section 9-03.9(3)]. The crushed surfacing will be placed in a single lift and compacted with a smooth drum roller, to at least 95 percent of its maximum dry density.

Stormwater runoff will be directed to onsite infiltration swales located at the northeast and west central areas of the SRP property, outside the contaminated soil boundary (see Figure 6). The swales will be designed in general accordance with applicable guidelines set forth in Ecology's *Draft Stormwater Management Manual for Eastern Washington* (Ecology 2002) and Spokane County's *Guidelines for Stormwater Management* (Spokane Co. 1998). The swales will be sized to accommodate approximately 0.5 inches of runoff from a paved surface above the contaminated area. The balance of the runoff going to the northeast swale will be infiltrated via dry wells. The dry well configuration will be designed to accommodate the 10-year design storm. However, until the Site is paved the swales will not be grass lined.

3.2.3 STREAMBANK BIOENGINEERING

There are two elements of streambank bioengineering that will be implemented at the Site. The first and most important aspect to preventing migration of the contaminated materials is the long-term stabilization of the river embankment so that erosion or flooding does not cut back into the contaminated soil. The second element consists of providing additional vegetation along the shoreline to provide riparian corridor enhancement and some level of filtration between surface water and groundwater.

In accordance with the requirements of the FCAP, alternative design concepts were considered to address the remedial objectives for the vulnerable shoreline. The following sections summarize the results of this evaluation, including a description of pertinent Site conditions, a comparison of three alternative design concepts, and finally a description of the selected design concept.

Existing Conditions

The area of concern is located on the cut bank edge of the Spokane River where the river makes a sweeping turn and changes flow direction from the southwest to the northwest (Figure 5). Control of erosion is especially important in this area so that the river does not cut back into the areas of contamination. The closest contamination in the top 20 feet of soil was observed approximately 40 feet from the river's edge in the vicinity of SB-7.

Presently, the upper reaches of the Site shoreline are fully vegetated, and approximately 85 percent of the lower third of the riverbank contains trees or brush. The central reach beneath the Hamilton Street Bridge has some vegetation. The majority of the riverbank contains basalt cobbles, boulders, and riprap that were placed by the railroad more than 90 years ago.

Observations of the riverbank made with an Ecology representative in April 2000 indicated only one small area where riverbank erosion had occurred (Figure 5). The erosion occurred as a result of high river flows during the spring of 1997, where back eddies were formed on the downstream Hamilton Street Bridge pier.

Based on the observed conditions, the riverbank is presently very stable, except where the bank riprap armoring was cut back to accommodate bridge construction. This alteration to the bank geometry, in combination with installation of the bridge piers, resulted in modification to the river hydraulics. On either side of the area impacted by bridge construction, the riprap armoring and vegetation that presently exists along the majority of the shoreline has successfully prevented bank erosion since the bank was originally constructed.

Based on observations made by Landau Associates' project engineers in August 2002, it appears that shoreline erosion beneath the Hamilton Street Bridge is due, in large part, to grading and filling activities associated with construction of the bridge piers in 1982. Specifically, it appears that the riprap slope protection was not entirely reconstructed following construction of the bridge piers (see Figure 9). As a result, the existing bank slope is undulating and irregular in shape, likely contributing to irregular flow patterns in this area. In addition, the top 2 to 3 feet of the riverbank is comprised of sand and gravel fill placed directly over the riprap material. It is readily apparent that this upper sand and gravel fill zone has been subject to the most severe erosion, while the underlying riprap material has remained largely intact.

Evaluation of Design Alternatives

Three alternative design concepts were considered to address the remedial objectives for the shoreline: 1) a concrete revetment mat or geocell layer with soil-filled voids to support a vegetative mat, 2) coir matting to develop lifts of soil interspersed with plated vegetation, and 3) restoration of the slope using riprap in combination with geotextile and appropriately graded fill materials at the top of the slope, with willow staking.

The revetment/geocell design concept was initially evaluated in the FS report. The FS identified certain technical limitations with the application of this technology at the Site and concluded that a revetment mat or geocell would have limited effectiveness for the intended purpose. Nonetheless, this technology was considered further during development of the conceptual design. The engineering evaluation observed the following issues with its use:

- A revetment mat or geocell layer would be susceptible to instability and failure due to the steepness of the existing riverbank (typically 1 to 1.5 horizontal : 1 vertical). The stability of a revetment or geocell would be dependent on the anchoring system designed to hold the mats in place, thus reducing long-term reliability and increasing maintenance requirements.

- Installation of a revetment or geocell would be difficult due to the geometry and gradation of the existing slope. To install either system, the existing riprap slope would need to be subexcavated to prepare the underlying subgrade (i.e., the surface layer of riprap would need to be removed to create a depression and to form a level subgrade to set the mats). The revetments/geocells would need to be inlaid so as to prevent sharp transitions between the dissimilar bank materials. Given that the angular riprap and underlying rock fill boulders are typically on the order of 2 to 5 feet in diameter and interlocking, such subgrade excavations would be problematic, with the potential to cause unstable slope conditions during construction. Installation of revetments/geocells could result in a significant increase in turbidity levels during construction, and given unpredictable currents during flooding, continued erosive flow patterns could occur over time between the dissimilar bank materials.

- Fill material placed in the voids of the revetments/geocells would be susceptible to erosion given that water will flow freely both over the surface of the mats and within the cobble and boulder fill underlying the mats. Outward seepage pressures from behind the mat would likely erode fill from the cell voids under high river levels. The steepness of the riverbank slopes would further contribute to erosion potential of the cell fill material.

Engineering evaluation of the coir matting alternative indicated that the technology would be impractical at the Site because installation would require terracing of the existing slope, which is on the cut bank of the river, where velocities are expected to be high during flood events. Excavation of the existing slope would require removal of the stable boulder size riprap placed by the railroad circa 1911. Given that the angular riprap and underlying rock fill boulders are typically on the order of 2 to 5 feet in diameter and interlocking, such subgrade excavations would be problematic and could cause unstable slope conditions during and potentially after construction. Additionally, the coir matting would be susceptible to organic degradation allowing future erosion on the cut bank of the river.

Description of Preferred Alternative

On the basis of the above discussion, coupled with observations made during our August 2002 Site investigation, restoration of the slope using riprap material was selected as the preferred alternative. The primary factors leading to this selection are summarized as follows:

- The existing riprap slope protection along the Site shoreline has remained stable under a wide range of flood conditions since it was placed by the railroad circa 1911. As previously noted, the apparent erosion in the vicinity of the bridge piers is primarily associated with the sand and gravel fill on the upper bank placed by the WSDOT, whereas the underlying riprap placed by the railroad remains stable. There is little, if any, evidence to suggest that reconstruction of the slope using similar sized riprap would become unstable. The new riprap can be appropriately sized to accommodate the anticipated peak flow conditions in the river, including potential eddy conditions around the piers.

- The riprap slope will support a range of vegetation similar to that existing along the shoreline today. Presently the riprap shoreline is well vegetated with willow and black cottonwood residing within the voids. Vegetation provides approximately 85 percent cover along the bank in the project area, providing additional erosion protection when this area is underwater during normal high flow.

- The riprap design will allow willow, black cottonwood, and service berry stakes to be placed along the lower portion of the bank to supplement re-establishment of vegetation along the area that will be stabilized with riprap. WSDOT commented on the JARPA (WSDOT, 2002) and indicated that they remove all trees located underneath and within 20 feet of their bridges for inspection purposes. Therefore, plantings will not be placed within 20 feet of the bridge piers or beneath the bridge.

- The existing angular riprap and underlying rock fill boulders are typically on the order of 2 to 5 feet in diameter and interlocking. In the disturbed area these boulders create a slope that is irregular both vertically and laterally. Utilization of riprap will allow variable rock placement to create a shoreline that is smooth (figuratively) and resistant to erosion. Placement of riprap will interlock with the existing materials and will only require minimal disturbance of the existing materials during construction.

Restoration of the shoreline will be accomplished by reconstructing the riprap slope and planting selected willow, service berry, and several black cottonwood trees along the riverbank to the east and west of the Hamilton Street Bridge piers. An irrigation system will be installed on the shoreline rim and utilized until the plantings are established. The proposed location and extent of the shoreline restoration is shown on Figure 5. The conceptual design details for the shoreline restoration are presented on Figures 10 and 11.

The limits of the proposed restoration were determined based on visual inspection of the shoreline area that appears to have been disturbed in conjunction with the bridge pier construction and associated erosion at the top of the riverbank. This area spans a total length of approximately 175 feet along the river, including approximately 45 and 65 feet of riverbank to the east and west of the bridge crossing, respectively. The planned vertical limits of the restoration will extend from the existing toe of the slope at approximate elevation 1,865 feet MSL, to the top of the existing bank at approximate elevation 1,884 feet MSL.

It is anticipated that the bulk of the riprap will be placed to reconstruct the portion of the slope above the "ordinary high water level," estimated to be at approximate elevation 1,875 feet MSL. However, riprap may also be needed further down the slope in some locations in order to achieve a stable key-in to the existing slope. Prior to placing the riprap, the existing loose sand and gravel material, which appears to have eroded down from the upper portion of the bank, will be excavated from the slope as necessary to allow a positive key into the existing underlying riprap. In addition, the 2- to 3-feet-thick crushed gravel surfacing layer at the top of the bank will be excavated down to the underlying rock fill/riprap, to allow construction of an erosion-resistant transition at the top of the bank.

The slope will then be reconstructed using riprap comprised of angular basalt or granite stone, and/or concrete fragments, similar to those presently in place. Based on preliminary estimates, it is anticipated that the riprap gradation will be comprised of an approximately 1.5 feet median stone size, with a maximum size of 5 feet. Final design of the riprap armoring will be based on the guidelines set forth in the Federal Highway Administration's manual for *Design of Rip Rap Revetment* (FHWA 1989), taking into consideration appropriate design flow, and potential backwater and eddy effects due to the bridge piers. FHWA design guidance pertaining to bridge scour and stream stability will also be reviewed, as appropriate (FHWA 2001a,b,c)

As indicated on Figure 10 , a transition zone will be constructed at the top of the bank to reduce the potential for erosion of the sand and gravel layer which serves as the surfacing material for the upland portion of the Site. The transition zone will be comprised of a thick non-woven geotextile fabric separation layer placed up against the riprap, and an adjacent well-graded sand/gravel/cobble zone to serve as a filter between the finer crushed surfacing and the large riprap material.

Existing willow and black cottonwood saplings will be pruned back for construction, leaving their root systems intact. It is expected that some of these plants will re-sprout and grow up between the newly installed riprap. Vegetation in this area will be augmented by driving live stakes of willow and black cottonwood at a spacing of approximately 3 feet to 6 feet on center, where possible, between approximate elevation 1,874 feet and 1,880 feet MSL. Service berry will be planted at the top of the bank between 1,877 and 1,880 feet MSL at a spacing of 3 to 5 feet on center. The stakes will be driven into the voids between the new and existing large stones (where soil can be reached) along the reach of the restoration area (see Figure 11 for planting detail). Vegetation will not be planted beneath or within 20 feet of the bridge piers as requested by WSDOT (WSDOT 2002).

3.2.4 MONITORING WELL MODIFICATION

Monitoring wells not incorporated into the groundwater monitoring program will be abandoned consistent with the *Minimum Standards for Construction and Maintenance of Wells* (chapter 173-160 WAC; Ecology 1998). After abandonment the protective bollards and locking protective casings will be removed and the wells will be cut to ground level. The monitoring wells proposed for abandonment include:

Shallow Monitoring Wells	Medium Monitoring Wells	Deep Monitoring wells
MW01-20	MW03-40	MW06-100
MW03-20	MW05-40	MW10-100
MW05-20	MW06-40	MW12-70
ATC03-20	MW10-40	ATC01-75
ATC04-20	ATC05-40	ATC02-65
ATC05-20	PW07-30	
	PW12-30	

Monitoring wells that are included in the groundwater monitoring program may require well head or bollard extensions to extend above the proposed Site grades. The modifications will be conducted to protect the integrity of the monitoring wells.

3.3 EFFICIENCY AND EFFECTIVENESS OF CLEANUP ACTION

The selected remedy will reduce the risks posed to human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through containment, engineering controls, and institutional controls. The soil and fill materials, that serve as the cover to the contaminated soils left on Site, along with periodic inspection and maintenance, would prevent direct exposure to the contamination. Stormwater management would reduce concentrated precipitation from locally infiltrating into the contaminated soils. The streambank bioengineering would provide for erosion control and riparian corridor enhancement and locally help dampen rapid interaction between the groundwater and the river. Institutional controls include deed restrictions that will restrict the use of contaminated groundwater and land use that could result in unacceptable risks to human health and the environment. Long-term monitoring will help to ensure that the remedy remains protective in the future.

The overall efficiency of the engineering and institutional controls contained in the proposed remedy is expected to be high and have been demonstrated to be effective at numerous sites under variable conditions. Additionally, future planned development at the Site (i.e., asphalt paving), will enhance the overall effectiveness of the remedy, by further reducing potential surface water infiltration and associated contact with the contaminants underlying the Site.

3.3.1 COMPLIANCE WITH CLEANUP STANDARDS

The cleanup action, as proposed, is designed to satisfy the requirements and cleanup standards per WAC 173-340-700 through 760 (Ecology 1996). Soil cleanup levels for IHSs will not typically be met throughout the Site, because the cleanup action involves containment. The cleanup action will comply with the cleanup standards, however, because the compliance monitoring program is designed to assess the long-term integrity of the containment system.

For groundwater a conditional point of compliance will be at a location as close as practical to the contaminant source. Compliance monitoring will be conducted to demonstrate that cleanup actions have attained cleanup standards and performance standards. The compliance monitoring plan is presented under separate cover. Institutional controls will be implemented to limit or prohibit activities that may interfere with the integrity of the cleanup or result in exposure to hazardous substances at the Site. The language for the institutional control plan is currently being negotiated.

4.0 CONSTRUCTION REQUIREMENTS

4.1 CONSTRUCTION DRAWINGS AND SPECIFICATIONS

Construction plans and specifications will be prepared under separate cover to detail the cleanup actions to be performed. The construction bid plans and specifications will:

- Be prepared in conformance with currently accepted engineering practice and WAC 173-340-400 (4)(b) (Ecology 1996); plans and specifications will be stamped and signed by a Washington State Registered Professional Engineer.

- Provide a general description of the project which details the cleanup action, including work to be done, a summary of Site environmental conditions, a summary of design criteria, an existing facility map, adequate Site surveying, and a copy of permits and approvals.

- Provide detailed plans and specifications necessary for construction, including existing and final surface contours, irrigation system, construction materials storage, construction waste storage and management, utility locations within cleanup areas, surface drainage, materials, backfill, and change in grades.

- Provide description of construction impact controls (including dust, turbidity, stormwater, traffic, and noise).

- Provide construction documentation including specific quality control tests such as soil density/in place compaction, moisture content, material gradation, subgrade, strength, spot elevations, frequency of tests, and acceptable results.

4.2 CONSTRUCTION QUALITY CONTROL/QUALITY ASSURANCE

Day-to-day construction quality control (CQC) will be performed by the contractor, consistent with the requirements of the construction contract specifications for the cleanup action. Avista Corp will have a quality assurance (QA) representative onsite during construction to confirm that the work is being performed in accordance with the intent of the plans and specifications. CQC will include the necessary elements to ensure that the provisions of the contaminated materials handling plan are being followed. In accordance with WAC 173-340-400(7)(b), all aspects of construction will be performed under the supervision of a professional engineer registered in the State of Washington or a qualified technician under the direct supervision of the engineer.

A construction QA plan will be prepared in conjunction with the project plans and specifications. It is anticipated that the plan will include, but not be limited to, the following monitoring parameters:

- Adequacy of construction submittals

- General construction methods and equipment

- Field engineering and survey methods

- Fill gradation, quality, and consistency
- Fill placement and compaction
- Suitability, quality, and installation of structural elements
- Plant species quality and installation procedures
- Stormwater runoff and erosion control measures
- Decontamination procedures
- Traffic control
- Contractor quality control methods and documentation
- As-built dimensions of completed work.

Specific quantitative measures and performance requirements will be established for each of the above CQC/QA parameters during final design and will be incorporated into the construction specifications and the quality assurance plan for the cleanup action.

4.3 CONTROL OF HAZARDOUS MATERIALS, ACCIDENTAL DISCHARGES, AND STORMWATER

Procedures to control, and, as appropriate, respond to spills will be incorporated into the final design plans and specifications. The materials most likely to be spilled during the Site cleanup action include equipment fuel and oil, or contaminated soil, if unexpectedly encountered. Additionally, stormwater runoff has the potential to convey water and soil off the Site. The contractor will be required to perform work involving handling of the above materials in accordance with the project construction plan, equipment decontamination plan, and stormwater management plan. These plans will be prepared by the contractor in accordance with project and Site-specific requirements set forth in the contract specifications that adequately address environmental protection measures. These plans will be subject to review and comment by Avista's CQA representative prior to initiating the work.

The contractor's project construction plan will describe the overall sequence and construction methods that will be used to complete the cleanup action. The plan will include detailed procedures for controlling, collecting, handling, and disposal of residual contaminated soil and debris, and any liquids generated during disposal operations. The equipment decontamination plan will provide design details for the contractor's equipment decontamination pad, including the pad dimensions, construction materials, and water collection, conveyance, and treatment systems. The contractor's stormwater management plan will provide construction details and operation procedures for collection, conveyance, and treatment and disposal of stormwater runoff, and for erosion and sediment control measures, as required to ensure that materials are properly managed and maintained within the Site boundary. This plan will also address procedures for handling and storage of hazardous materials used for construction purposes (e.g., fuel, oil, etc.), and for prevention, and, as appropriate, response to hazardous material spills or accidental discharges. The stormwater management plan will be prepared in accordance to guidelines set forth in Ecology's *Stormwater Management Manual for Washington State* (Ecology 2001b) and Spokane County's *Guidelines for Stormwater Management* (Spokane Co. 1998), as applicable.

4.4 HEALTH AND SAFETY

4.4.1 HEALTH AND SAFETY DURING CLEANUP ACTION

The Landau Associates health and safety plan (HSP) is provided under separate cover. A HSP will also be prepared by the contractor before beginning work on the Site. The plan will be prepared consistent with the referenced HSP. Each HSP will be required to be at least as protective as the existing Site-specific HSP used for previous Site investigation activities, and will satisfy the requirements of Avista Corp, Ecology (per WAC 173-340-810), the Occupational Safety and Health Act (OSHA) of 1970 (29 U.S.C. Sec. 651 et seq.), and the Washington Industrial Safety and Health Act (WISHA) (chapters 296-24, 296-62, and 296-155 WAC). All workers on the Site will be required to read and sign the HSP. A health and safety meeting will be conducted with the contractor, subcontractors, construction testing personnel, and appropriate Avista Corp employees before starting work at the Site.

4.4.2 LONG-TERM HEALTH AND SAFETY

Remedial construction activities will be completed in accordance with design criteria, WISHA regulations for construction safety and work at hazardous waste sites, and local standard of practice for construction. During construction, an exclusion zone will be maintained to keep the public outside of the work area. When the cleanup action is complete, including implementation of institutional controls, potential exposure pathways (e.g., direct contact, ingestion, inhalation of dust, groundwater to surface water) will be controlled, and the Site will not pose a threat to future long-term workers, public, or other people accessing the Site.

5.0 COMPLIANCE MONITORING

The MTCA requires compliance monitoring 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 containment system. Compliance monitoring is conducted for the following three purposes:

- Protection monitoring, to confirm that human health and the environment are adequately protected during construction and the operation and maintenance of the cleanup action
- Performance monitoring, to confirm that the cleanup action has attained cleanup standards and any other performance standards
- Confirmational monitoring, to confirm the long term effectiveness of the cleanup action once the cleanup standards and other performance standards have been attained.

5.1 PROTECTION MONITORING

Monitoring for protection of human health addresses worker safety for activities related to construction, operation, and maintenance of the cleanup action will be addressed through the project HSPs. The project HSPs will address potential physical and chemical hazards associated with Site activities, consistent with the requirements of WAC 173-340-810. Anticipated potential physical hazards include working in proximity to heavy equipment and water. Anticipated exposure to Site contaminants through various exposure pathways (i.e., direct contact, ingestion, inhalation) include contact with potentially contaminated soil or groundwater. The existing project HSP will be updated (if needed) for use by the engineering team during construction oversight and the selected construction contractor will be required to prepare and submit a HSP for use by its workers and subcontractors. A copy of the HSP that will be used by Landau Associates personnel is presented under separate cover.

Monitoring for protection of the environment addresses environmental receptors that may be exposed to physical or chemical hazards at levels that may cause adverse effects. For this project, the potential physical adverse impacts are limited to the exposure of aquatic organisms to excessive turbidity resulting from work in the Spokane River. Chemical hazards in the environment are not anticipated at levels above those already present, and protection monitoring for chemical hazards is not proposed.

Turbidity will be the primary monitoring parameter used for protection monitoring decisions. WAC 173-201A-110(3)(d) allows a 150-feet mixing zone for short-term turbidity impacts resulting from sediment removal. In accordance with the WAC, water quality monitoring will be implemented at a distance of 150 feet from the construction activities.

If water quality monitoring parameters are exceeded during construction activities, appropriate corrective actions will be taken. Corrective actions could include modification of work procedures, implementation or modification of engineering controls, or suspension of the activity causing the exceedance.

5.2 PERFORMANCE MONITORING

Performance monitoring will be conducted by monitoring groundwater as near as possible to the contaminant source. Performance monitoring will be conducted in accordance with the groundwater monitoring plan presented under separate cover. Specific procedures, monitoring parameters, and sampling frequency for the performance monitoring program are presented in the groundwater monitoring plan.

5.3 CONFIRMATIONAL MONITORING

The performance monitoring report prepared in 2008 will contain recommendations for either continuing the performance monitoring program or initiating confirmational monitoring. The Companies will meet with Ecology at that time to discuss these recommendations and establish the type of monitoring program to be continued in the future.

6.0 INSTITUTIONAL CONTROLS

The selected remedy involves containment and that a conditional point of compliance will be used for groundwater. Therefore, institutional controls will be implemented on the Site to limit or prohibit activities that could interfere with the integrity of the cleanup action or result in exposure to hazardous substances remaining on the Site. The institutional controls will include restrictions on excavation and groundwater extraction, operation and maintenance of the remedial action, groundwater monitoring, and legal and administrative mechanisms through a restrictive covenant. The institutional controls will be formalized in a Restrictive Covenant that will be executed and recorded with the registrar of deeds for Spokane County.

The language for institutional controls that will be placed on the SRP property is currently being negotiated for incorporation into a Restrictive Covenant. Draft language for institutional controls on the land owned by WSDOT (bridge footing parcels only) is in place but has not been formalized in the Restrictive Covenant. Language for institutional controls on the ATC property was formalized in the Restrictive Covenant, filed and recorded with Spokane County on January 21, 2003. The draft institutional control language for the SRP and WSDOT properties, and the filed Restrictive Covenant for the ATC property, with institutional control language, are presented under separate cover.

7.0 PUBLIC PARTICIPATION

The Companies will cooperate and support Ecology in the public participation activities during the engineering design and remedial action phases of the cleanup action.

8.0 PROJECT SCHEDULE

The proposed schedule for the Site cleanup action has been developed to meet the requirements of the Consent Decree. The construction schedule for shoreline work will be controlled by the seasonal low water level of the Spokane River and permit acquisition. The construction schedule for the upland area will be controlled by site access and institutional control issues. It is assumed that low water will be attained in June or July and construction can begin shortly thereafter. Construction is expected to take up to 6 months to complete; however, the shoreline construction must be completed by early October when the river level begins to rise as Lake Coeur d'Alene is drained. For economic reasons it is assumed that construction will take place during a single work period.

A summary schedule, identifying the tasks required to complete the project permitting, remedial design, and construction is presented below.

Submittal	Schedule
Draft EDR Submittal to Ecology	On or before January 10, 2003
Public Review EDR Submittal to Ecology	21 days after receipt of Ecology comments
Public Comment Period	
Draft Plans and Specification Submittal to Ecology	90 days after Ecology approval of EDR
Final Plans and Specifications	30 days after receipt of Ecology comments
Construction Phase	Construction to begin during first summer low water period after document approvals, landowner agreements are in place, and contractor selection
Groundwater Monitoring	Start after construction is completed
Draft Cleanup Action Report Submittal to Ecology	90 days after construction is completed
Final Cleanup Action Report Submittal to Ecology	21 days after receipt of Ecology comments

The estimated time for completing the remedial action construction is based on preliminary estimates and is subject to change during final design and construction planning. Also, the schedule is dependent on site access agreements with the landowners, and timely review and concurrence of permits and plans by Ecology and federal resource agencies.

9.0 USE OF THIS REPORT

This EDR has been prepared for the exclusive use of The Companies for specific application to the planned remedial action at the Hamilton Street Bridge Site, in Spokane Washington. Any reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Craig C. Schwyn, L.G.
Associate Hydrogeologist

and

Tom Briggs, P.E.
Senior Project Engineer

State of Washington Licensed Geologist Hydrogeologist 2218 Craig C. Schwyn Expires 4/22/04

Thomas D. Briggs State of Washington Registered Professional Engineer 37981 EXPIRES 7/24/04

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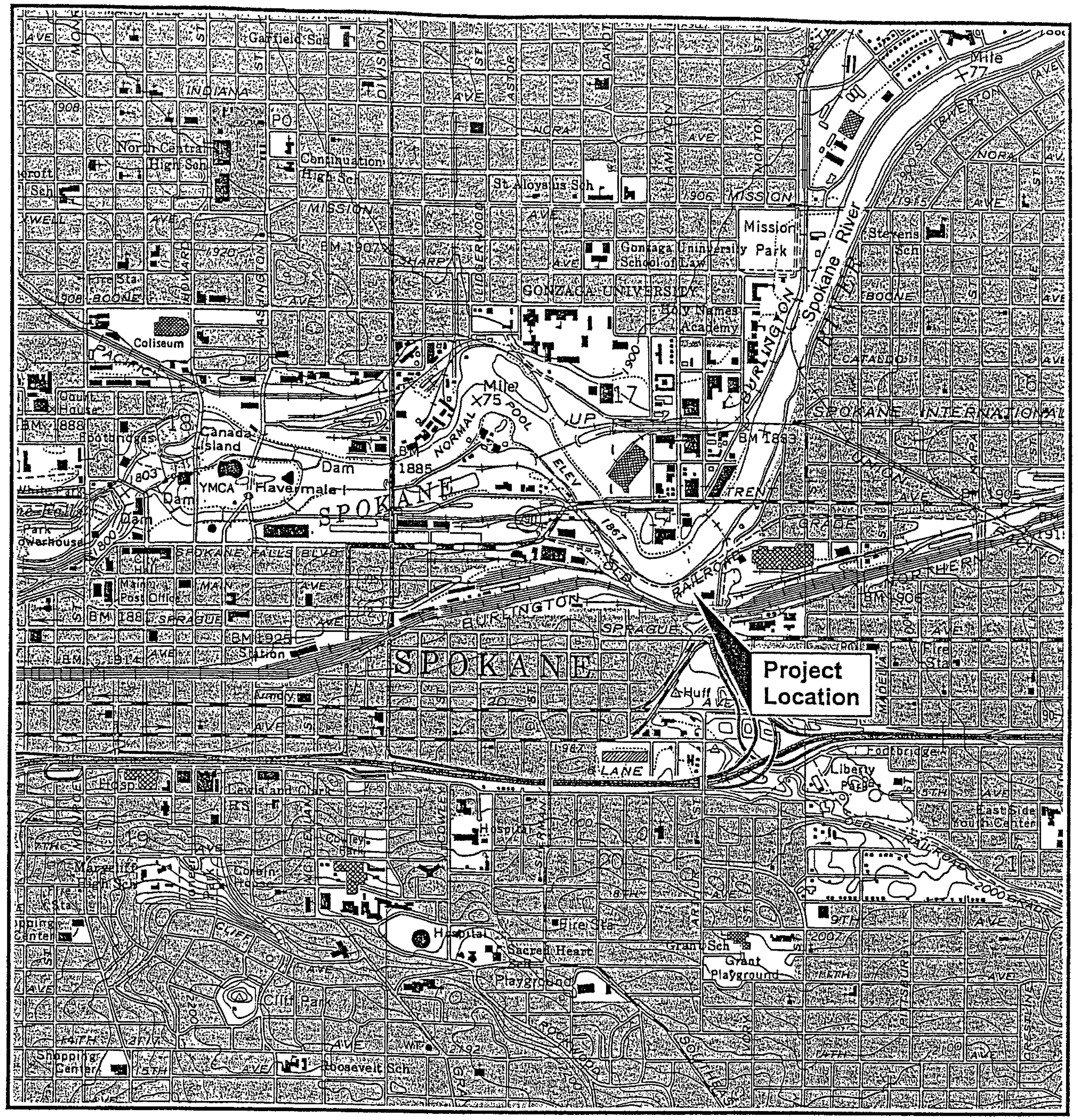
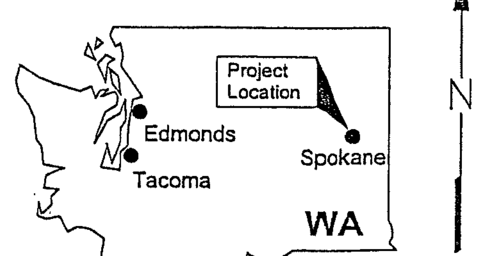


Source: USGS Spokane NW, WA Quad, 1974: PR 1986

0 2000' 4000'

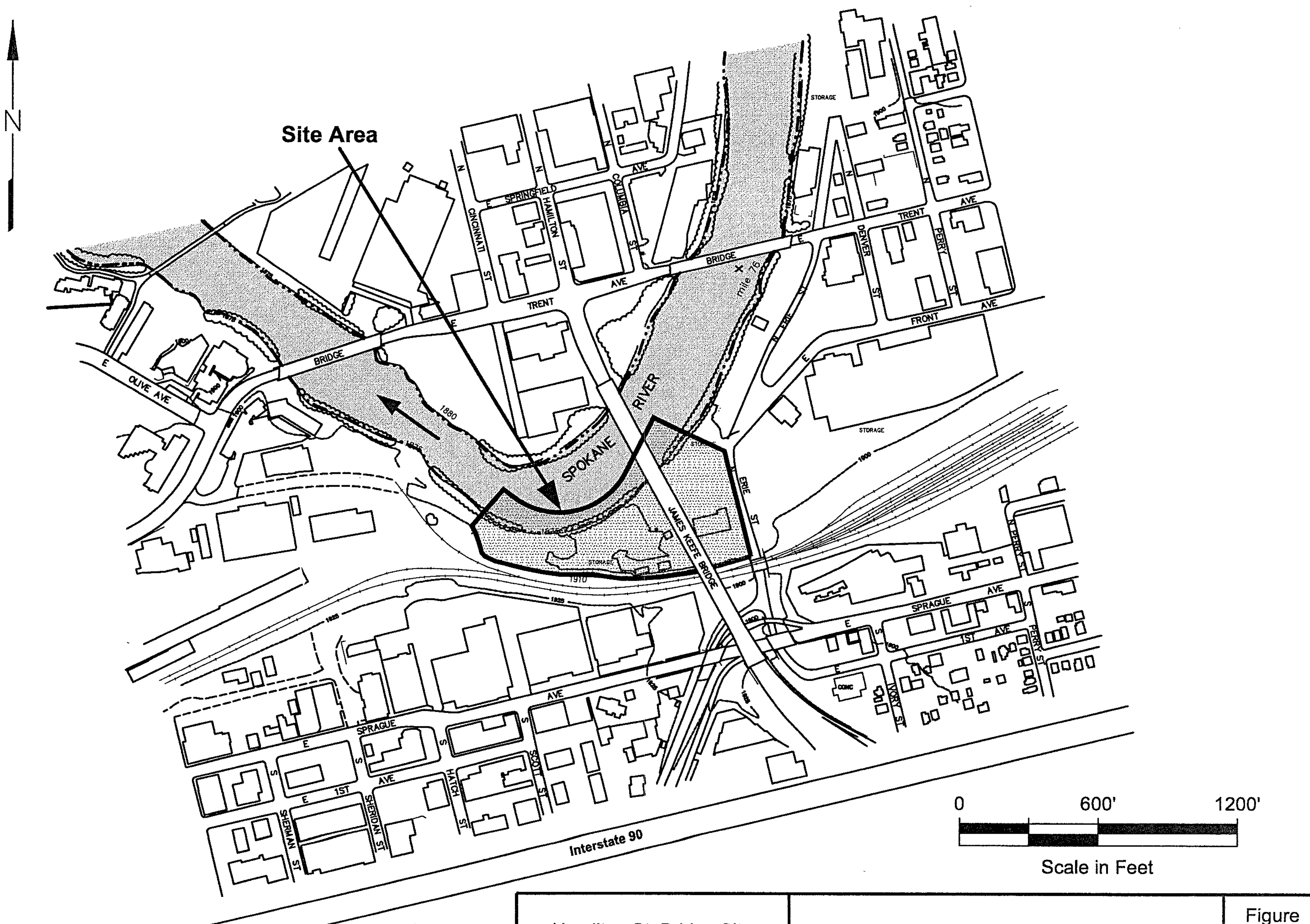
Approximate Scale in Feet



JARPA Application I:\cad\pit-file\236042022\vicinity (A) 10/2002

LANDAU ASSOCIATES	Hamilton St. Bridge Site Spokane, Washington	**Site Location Map**	Figure 1

EDR Rpt. I:\cad\plt-file\236042\012\area (A) 10/2002



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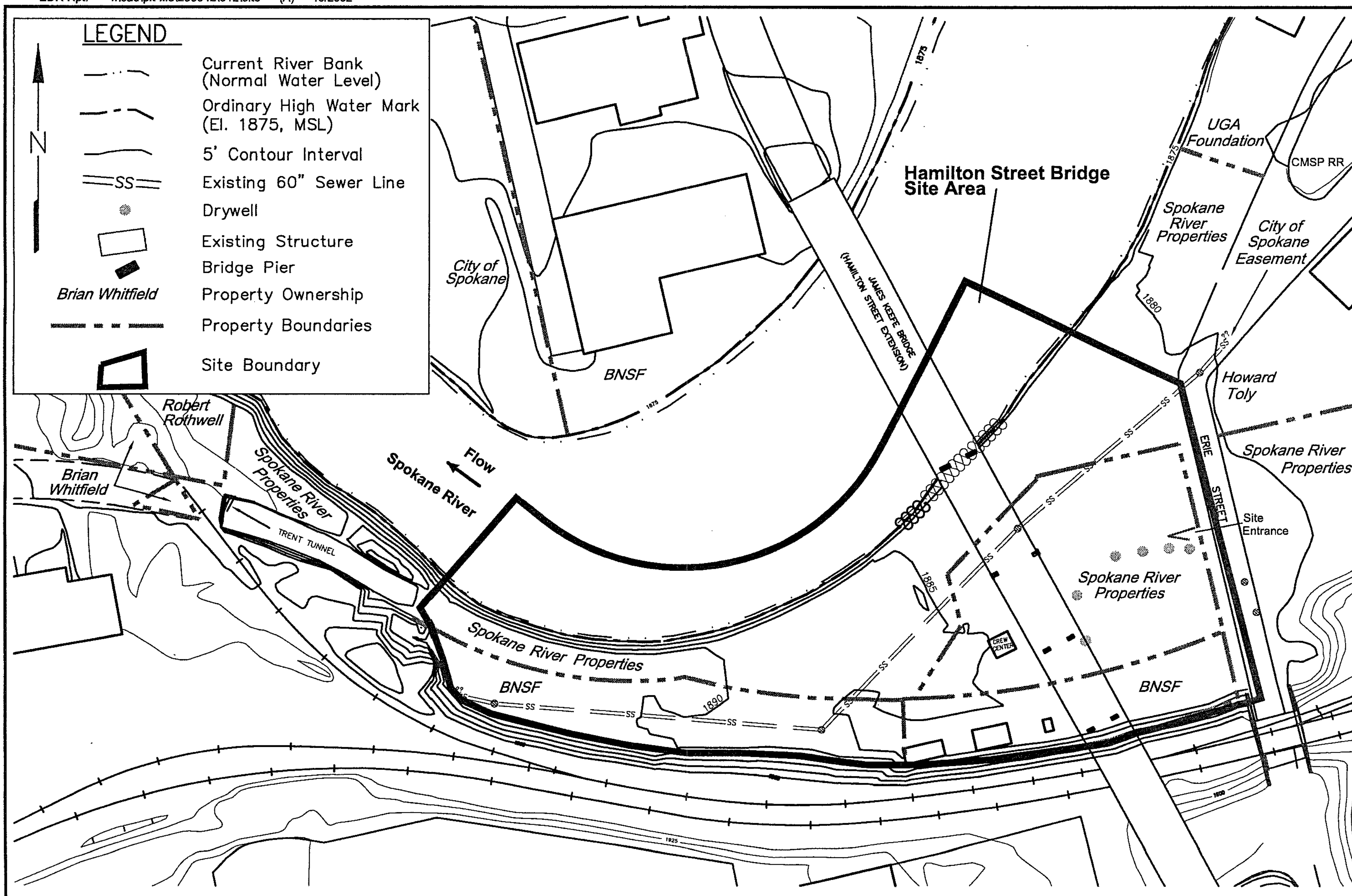
Hamilton St. Bridge Site Spokane, Washington	**Vicinity Map**	Figure 2



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Hamilton St. Bridge Site
Spokane, Washington

Site Map

Figure 3

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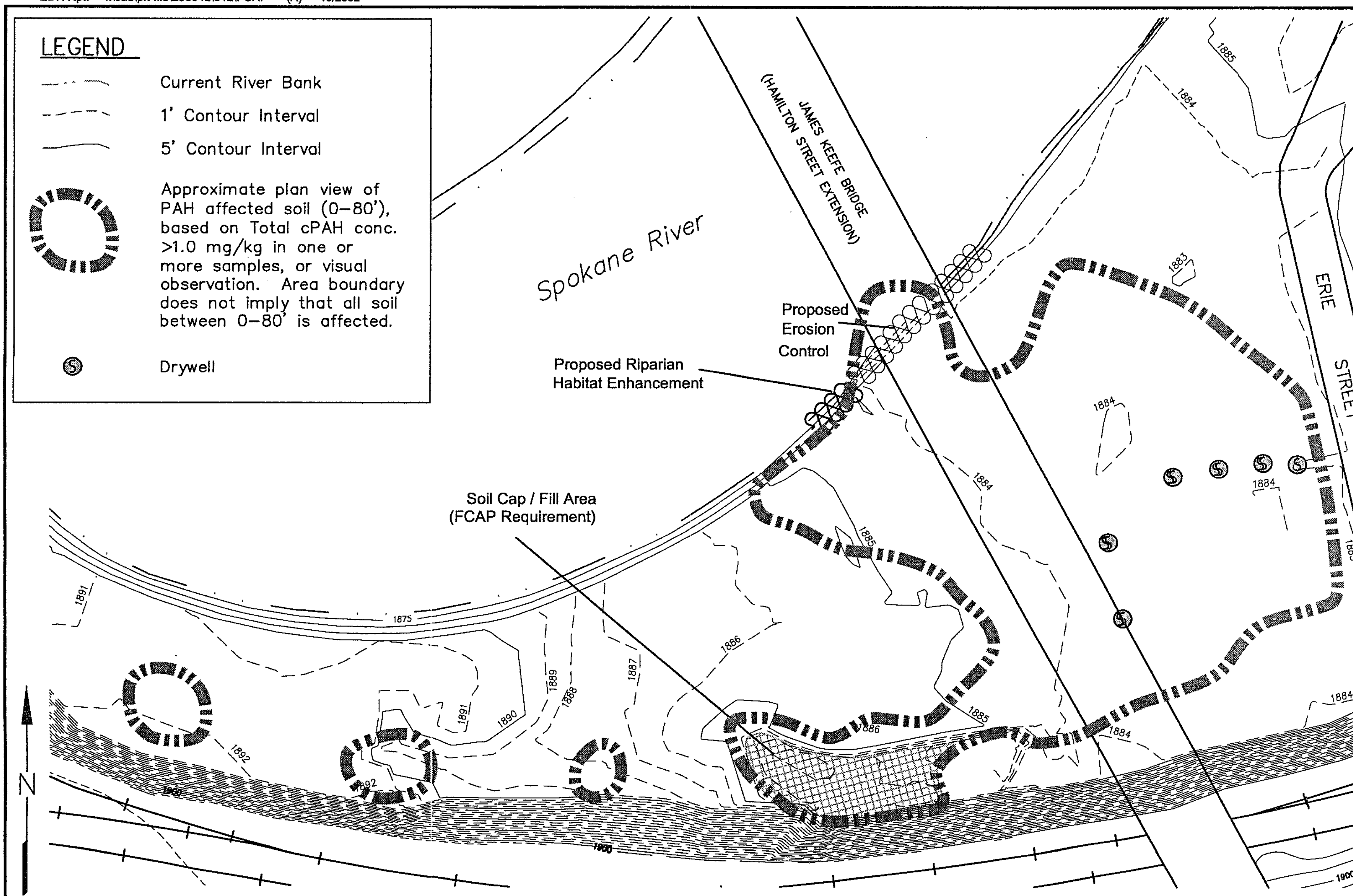

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Hamilton St. Bridge Site
Spokane, Washington

Plan View of PAH Affected Soil

Figure 4

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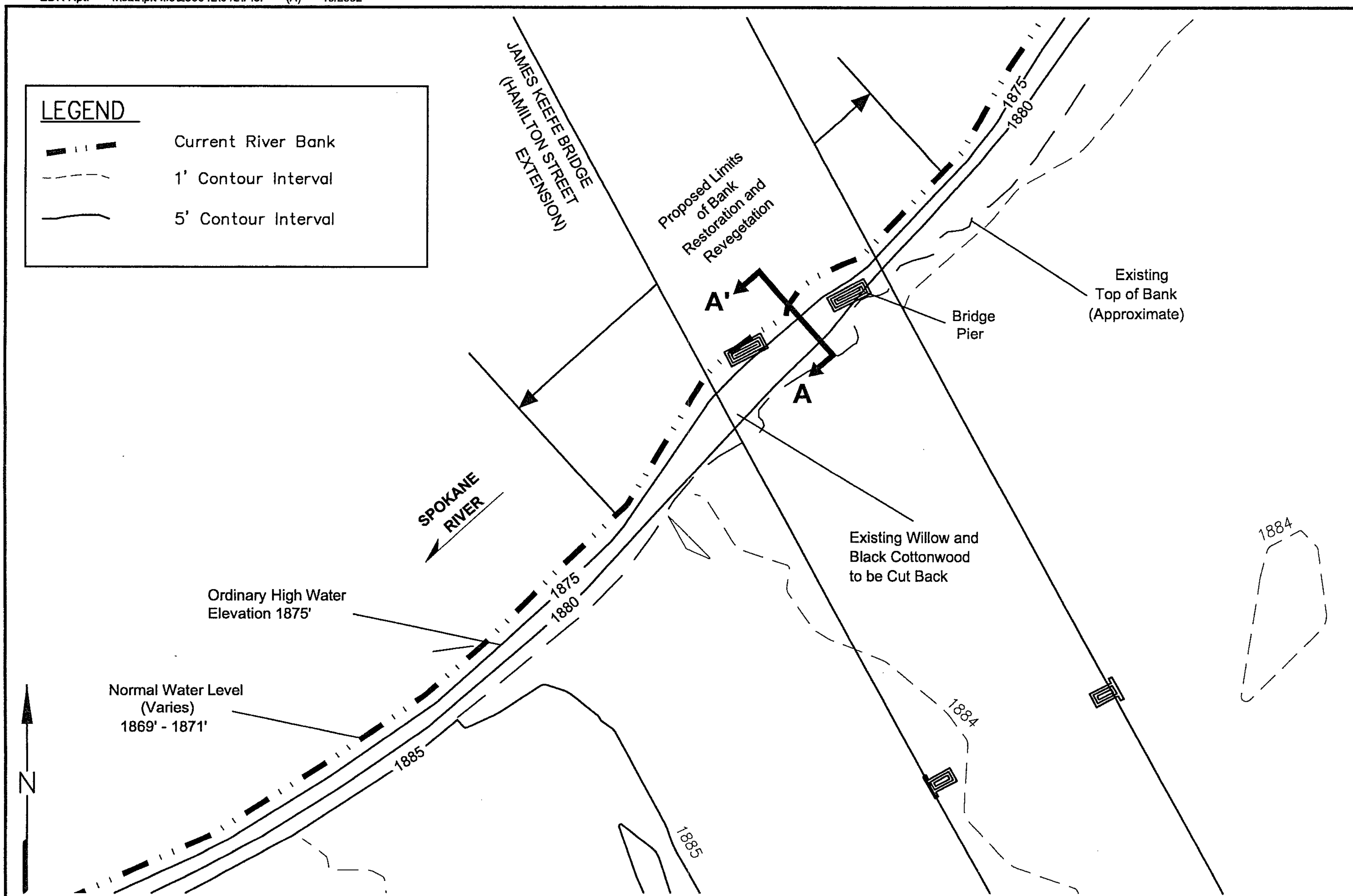

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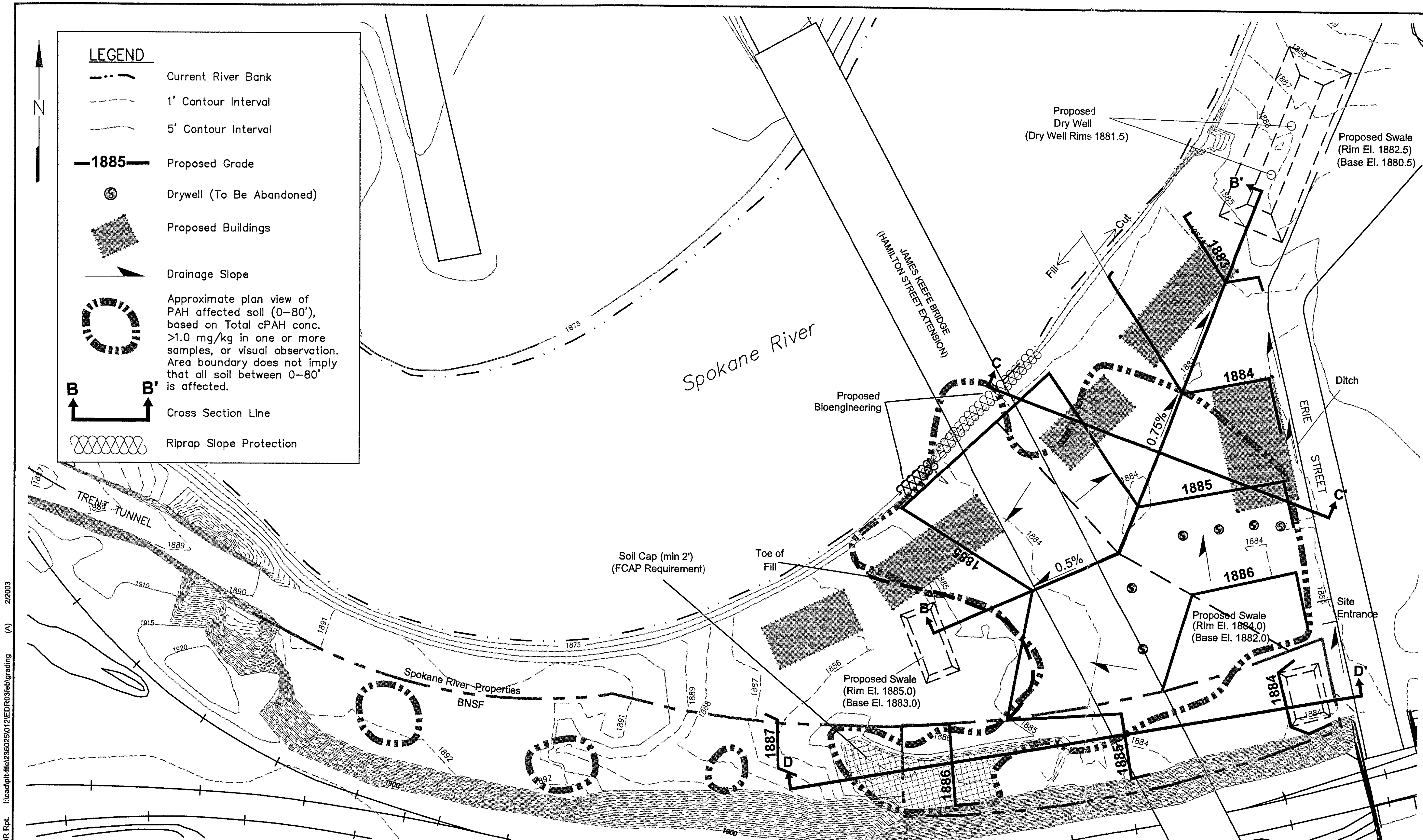
Hamilton St. Bridge Site
Spokane, Washington

Plan View of Conceptual Shoreline Erosion Mitigation Plan

Figure 5



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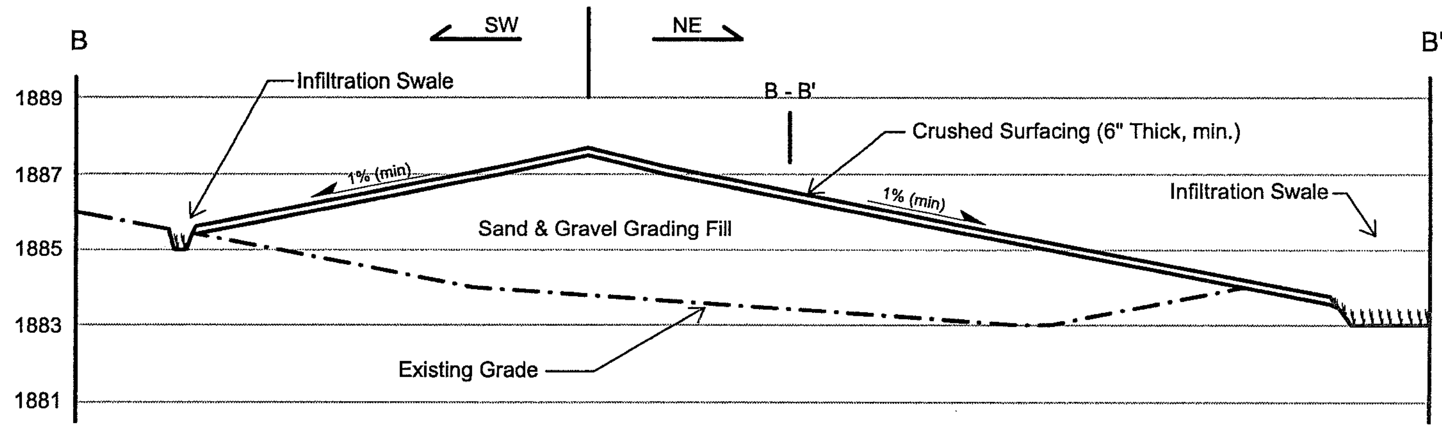
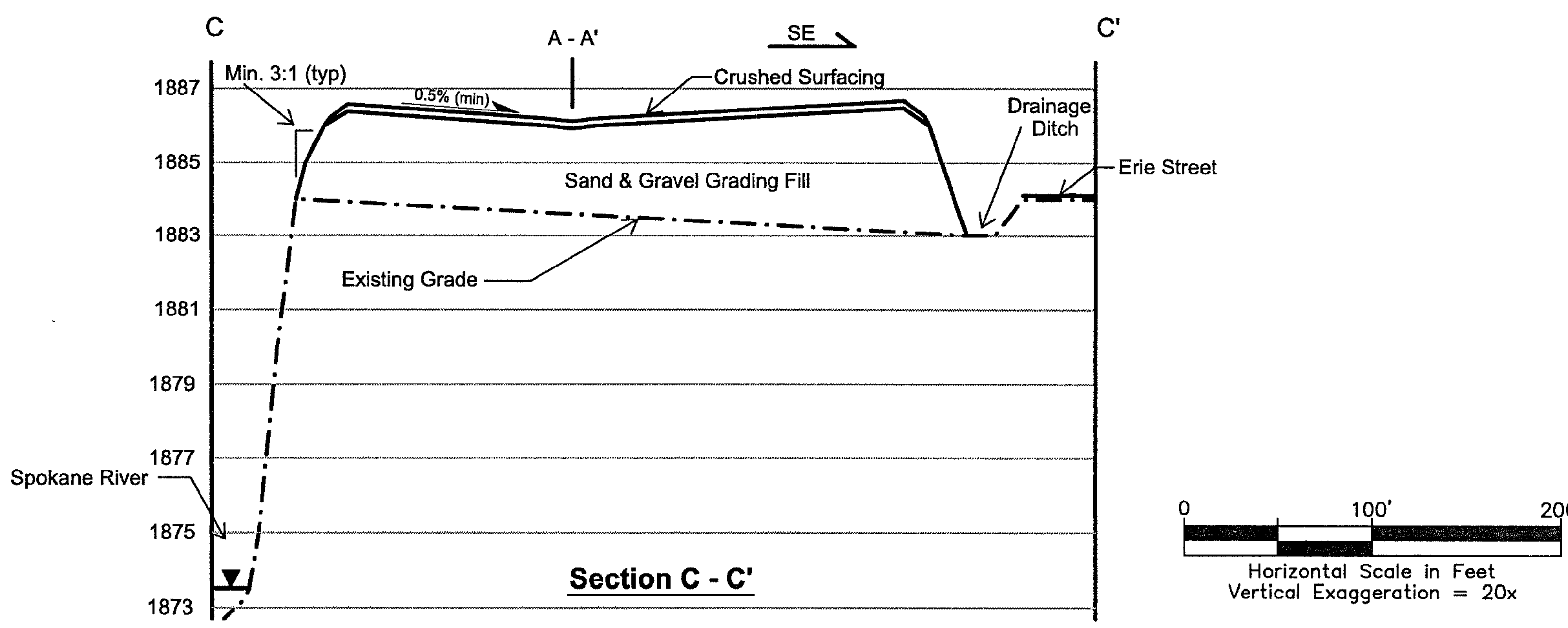
Hamilton St. Bridge Site
Spokane, Washington

Conceptual Grading Plan

Figure 6



Section B - B'



Section C - C'

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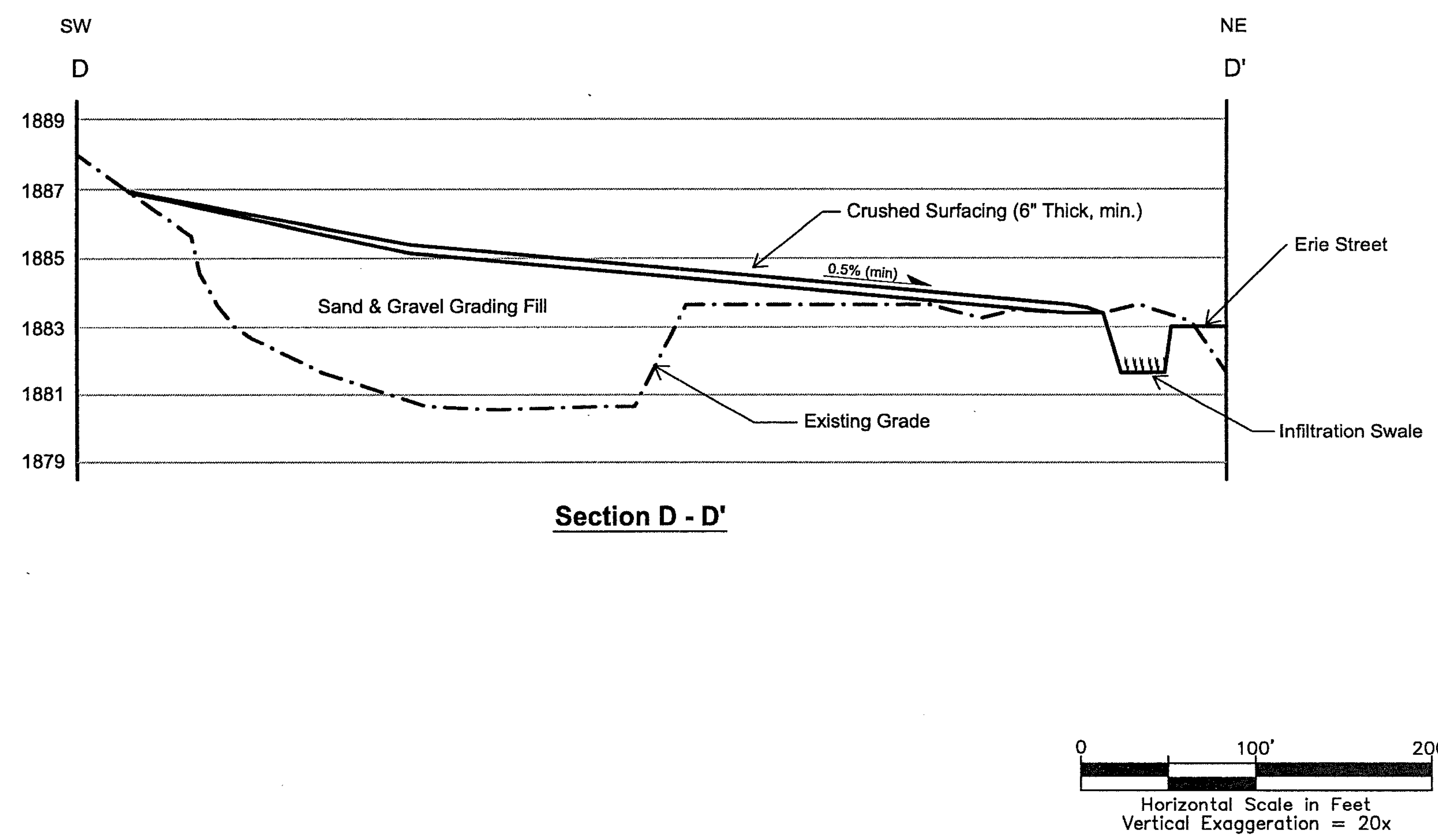
Hamilton St. Bridge Site Spokane, Washington	**Conceptual Grading Plan Typical Sections**	Figure 7



Section D - D'

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Hamilton St. Bridge Site Spokane, Washington	**Conceptual Grading Plan Typical Sections**	Figure 8

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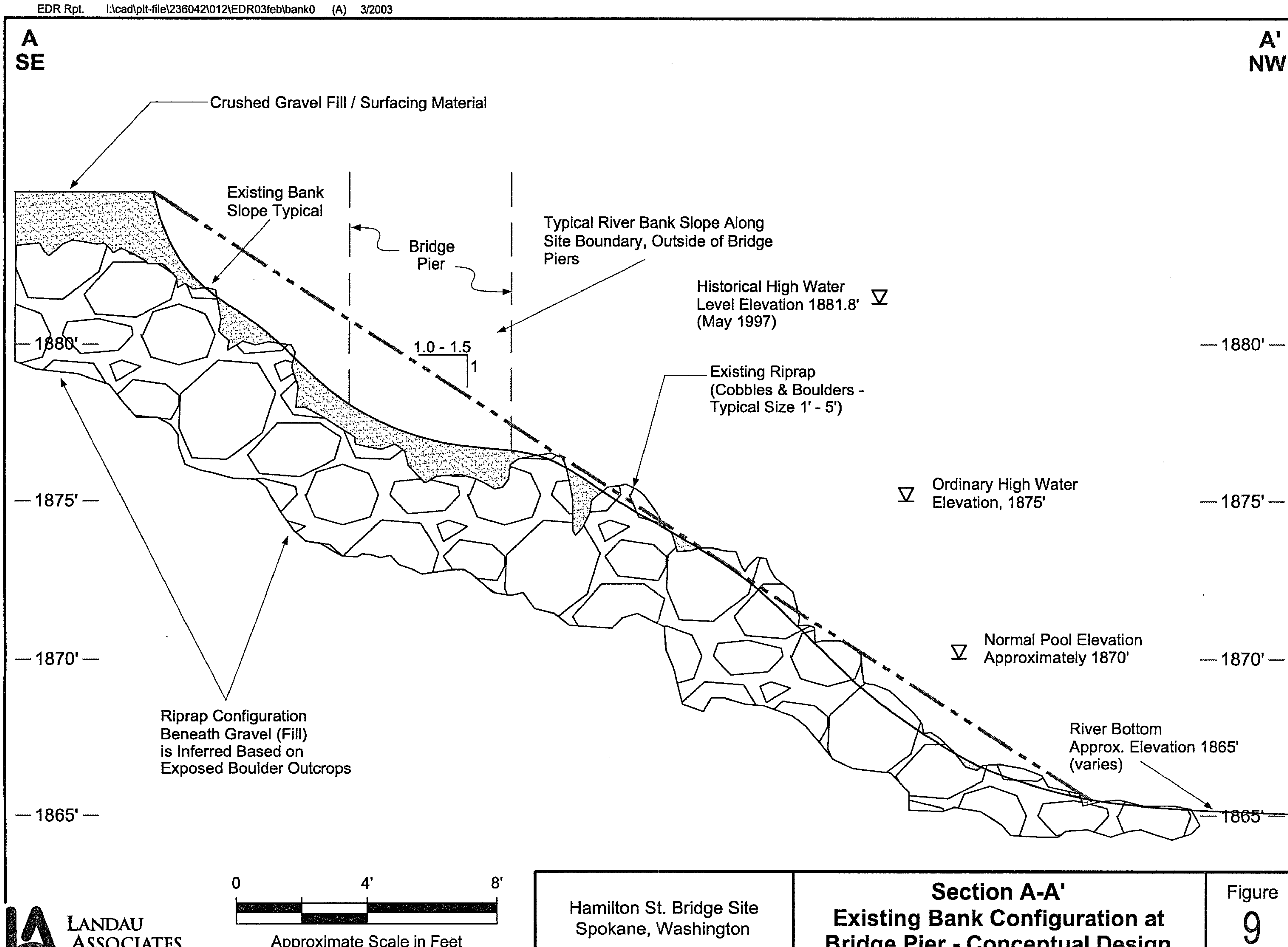

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Hamilton St. Bridge Site
Spokane, Washington

Section A-A'
Existing Bank Configuration at Bridge Pier - Conceptual Design

Figure
9

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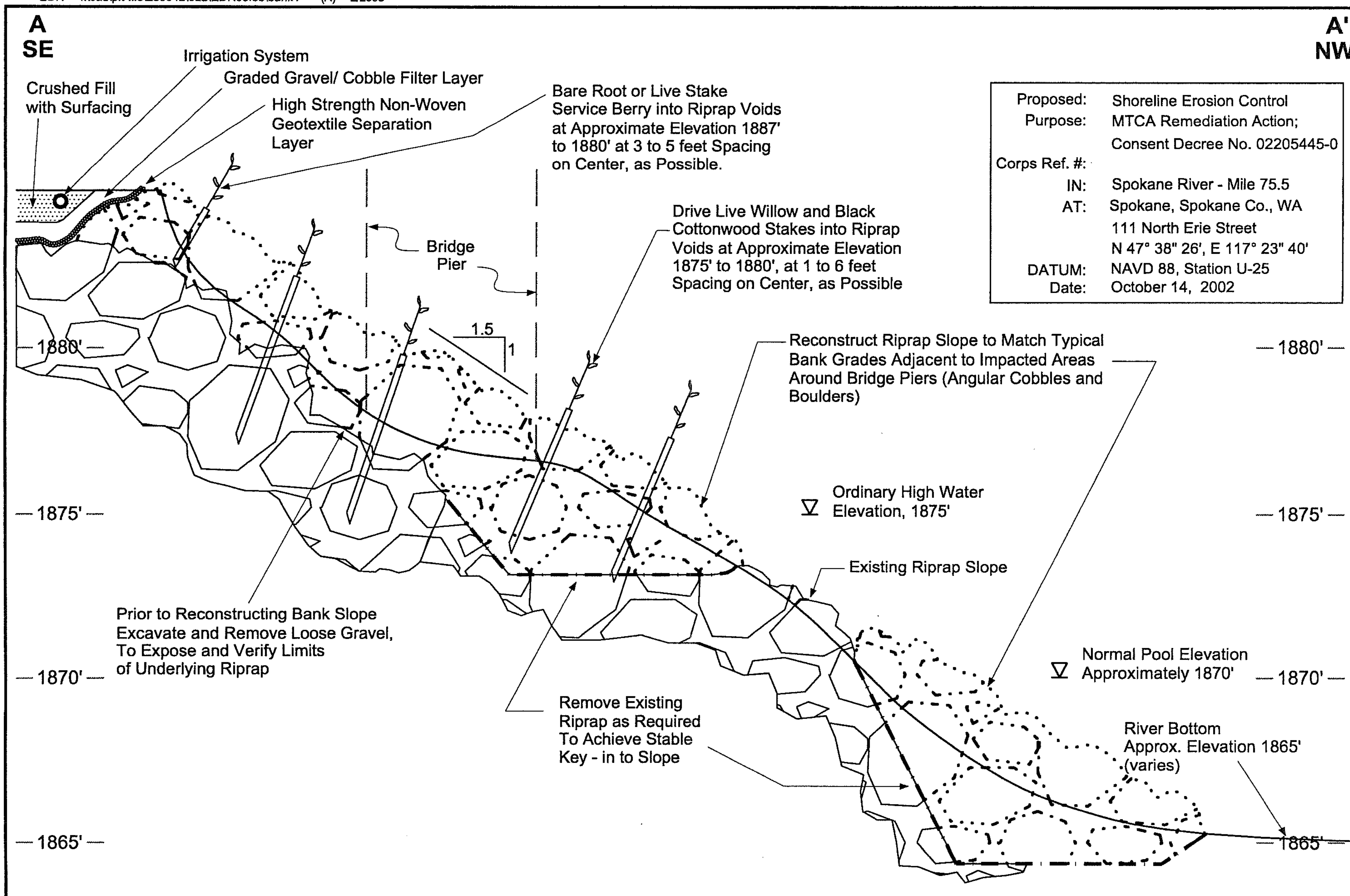

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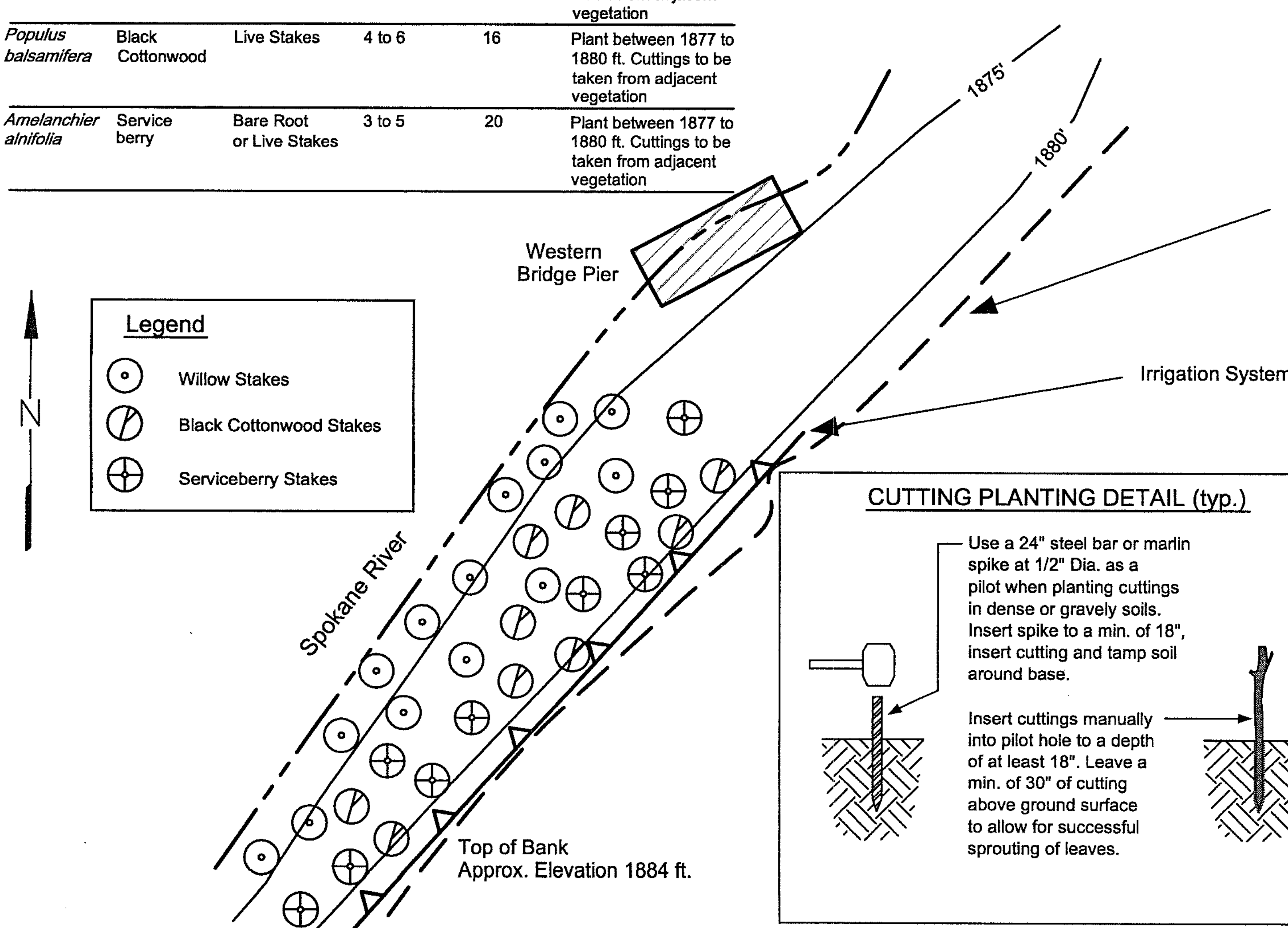
Hamilton St. Bridge Site Spokane, Washington	**Section A-A'** **Proposed Bank Reconstruction & Planting - Conceptual Design**	Figure 10

Plant Schedule for Hamilton Street Bridge Site

Scientific Name	Common Name	Specs	Spacing on Center (ft.)	Quantity	Notes
Salix spp.	Willow	Live Stakes	1 to 4	28	Plant between 1873 to 1879 ft. Cuttings to be taken from adjacent vegetation
Populus balsamifera	Black Cottonwood	Live Stakes	4 to 6	16	Plant between 1877 to 1880 ft. Cuttings to be taken from adjacent vegetation
Amelanchier alnifolia	Service berry	Bare Root or Live Stakes	3 to 5	20	Plant between 1877 to 1880 ft. Cuttings to be taken from adjacent vegetation

Typical Planting Plan

(Planting Area Continues Approximately 75' Upstream and 5' Downstream. Plantings to be Blended with Existing Vegetation.)



CUTTING PLANTING DETAIL (typ.)

Use a 24" steel bar or marlin spike at 1/2" Dia. as a pilot when planting cuttings in dense or gravely soils. Insert spike to a min. of 18", insert cutting and tamp soil around base.

Insert cuttings manually into pilot hole to a depth of at least 18". Leave a min. of 30" of cutting above ground surface to allow for successful sprouting of leaves.

1. Cuttings shall be species as noted.
2. Cuttings shall be at least 1/2" Dia. and 4' (min.) in length.
3. Cuttings must be alive with side branches clearly removed and bark intact. Cuttings shall be planted within 24 hours of cutting.
4. The butt ends should be cleanly cut at an angle for easy insertion into the soil. The top should be cut square or blunt.
5. Cuttings must be fresh and kept moist after cutting. They should be pruned and installed the same day.
6. Dip bottom of cutting in a plant rooting hormone prior to insertion into the soil.

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Hamilton St. Bridge Site
Spokane, Washington

Plan View of Revegetation Design Concept

Figure 11